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**«Modern Technologies: Improving the Present
and Impacting the Future»**

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Збірка містить тези доповідей Міжнародної наукової мультидисциплінарної конференції студентів і молодих учених «Modern Technologies: Improving the Present and Impacting the Future», яка відбулася 22 листопада 2018 р. у Дніпропетровському національному університеті залізничного транспорту ім. академіка В. Лазаряна. Тези представлені англійською, німецькою, французькою та іспанською мовами.

Для студентів, аспірантів, викладачів.

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EFFECTOS DEL CAMBIO CLIMÁTICO SOBRE EL TURISMO EN ESPAÑA

Como bien se sabe, el cambio climático está ejerciendo los efectos sobre distintas áreas de nuestra vida y nuestro entorno. Uno de los aspectos más importantes y globales que sienten aquella influencia es la rama de la economía, que, a su vez, engloba otros varios sectores, entre los que también encontramos turismo. El turismo en España es la actividad promotora del desarrollo económico. Según los últimos datos disponibles, en 2017 turismo aportó 172.900 millones al PIB español, lo que supone un 14,9% del PIB. Sin embargo, debido a su localización geográfica, España es uno de los países europeos que más vulnerable se sentiría respecto del fenómeno del cambio climático.

Los impactos del cambio climático, a diferencia de las crisis económicas, son mucho más complicados de corregir. Este proceso natural tarda décadas, por lo cual es posible que no se note la diferencia en seguida, sin embargo, los efectos que provoca son muy graves. Más concretamente, el éxito de la actividad turística desde el punto de vista económico depende de los recursos con los que se cuenta y el clima que afecta a la zona. El clima en particular afecta a la distribución temporal y geográfica de los turistas en el territorio del país a lo largo del año (A. Moreno, 2010).

Existe un amplio abanico relacional entre los impactos climáticos y las consecuencias sobre el territorio y los recursos disponibles en éste. Veamos algunos de ellos que más afectan al territorio español en particular y a la actividad turística (fuente: elaboración propia):

Impacto	Consecuencias para el turismo
Aumento de temperaturas	Cambios en la estacionalidad, aumento de los costes de energía (aires acondicionados/calefacción), cambios en la estructura de las poblaciones, cambios en la distribución de flora y fauna en una zona dada
Aumento del nivel del mar	Deterioro de recursos en primera línea de costa, pérdida de los recursos de playa
Reducción de las precipitaciones	Escasez de recursos hídricos, conflictos sobre el uso del agua, desertificación, sequías, aumento de incendios forestales
Mayor intensidad de tormentas	Deterioro de las infraestructuras y recursos turísticos
Cambios en la biodiversidad terrestre y marina	Pérdida de atractivos naturales y especies, aumento de la aparición de ciertas enfermedades

Como hemos podido ver, el proceso del cambio climático ejerce sus acciones que afectan a varios sectores de nuestro entorno, la mayoría de ellos están vinculados a la rama económica, otros de ellos al propio bienestar y salud de la población local y los visitantes.

Sin embargo, y gracias al hecho de que en España en sector del turismo se encuentra bien desarrollado y sigue innovando constantemente, hasta el día de hoy, el turista no siente apenas los inconvenientes que provoca el cambio climático, esto principalmente se debe al hecho de la diversidad de los tipos de turismo dentro de la oferta y la existencia de los recursos y las infraestructuras que facilitan la estancia del visitante y la hace más placentera, así como el hecho de que hasta la actualidad el mayor porcentaje de los visitantes son los propios nacionales, los que suavizan bastante los fenómenos de la estacionalidad, entre otros.

De todas formas, el cambio climático sigue evolucionando y si no se toman las medidas necesarias a nivel mundial, en las próximas décadas nos vamos a quedar cortos de formas de

diversificar las actividades económicas para combatir el fenómeno y de vivir cómodamente en las condiciones así.

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GOOGLE X AND THE SCIENCE OF RADICAL CREATIVITY

A snake-robot designer, a balloon scientist, a liquid-crystals technologist, an extradimensional physicist, a psychology geek, an electronic-materials wrangler, and a journalist walk into a room. The journalist turns to the assembled crowd and asks: Should we build houses on the ocean? The setting is X, the so-called moonshot factory at Alphabet, the parent company of Google. And the scene is not the beginning of some elaborate joke. The people in this room have a particular talent: They dream up far-out answers to crucial problems. The dearth of housing in crowded and productive coastal cities is a crucial problem. Oceanic residences are, well, far-out. At the group's invitation, I was proposing my own moonshot idea, despite deep fear that the group would mock it.

Like a think-tank panel with the instincts of an improv troupe, the group sprang into an interrogative frenzy. "What are the specific economic benefits of increasing housing supply?" the liquid-crystals guy asked. "Isn't the real problem that transportation infrastructure is so expensive?" the balloon scientist said. "How sure are we that living in densely built cities makes us happier?" the extradimensional physicist wondered. Over the course of an hour, the conversation turned to the ergonomics of Tokyo's high-speed trains and then to Americans' cultural preference for suburbs. Members of the team discussed commonsense solutions to urban density, such as more money for transit, and eccentric ideas, such as acoustic technology to make apartments soundproof and self-driving housing units that could park on top of one another in a city center. At one point, teleportation enjoyed a brief hearing.

X is perhaps the only enterprise on the planet where regular investigation into the absurd is not just permitted but encouraged, and even required. X has quietly looked into space elevators and cold fusion. It has tried, and abandoned, projects to design hoverboards with magnetic levitation and to make affordable fuel from seawater. It has tried—and succeeded, in varying measures—to build self-driving cars, make drones that deliver aerodynamic packages, and design contact lenses that measure glucose levels in a diabetic person's tears.

These ideas might sound too random to contain a unifying principle. But they do. Each X idea adheres to a simple three-part formula. First, it must address a huge problem; second, it must propose a radical solution; third, it must employ a relatively feasible technology. In other words, any idea can be a moonshot—unless it's frivolous, small-bore, or impossible.

X has a dual mandate to solve huge problems and to build the next Google, two goals that Teller considers closely aligned. And yet Facebook grew to rival Google, as a platform for advertising and in financial value, by first achieving a quotidian goal. It was not a moonshot but rather the opposite—a small step, followed by another step, and another. Insisting on quick products and profits is the modern attitude of innovation that X continues to quietly resist. For better and worse, it is imbued with an appreciation for the long gestation period of new technology.

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SCIENTISTS BLASTED MIRRORS WITH LASERS TO LISTEN TO LIGHT

Scientists have known for a while that light has momentum and exerts force on whatever it hits. But because this momentum is so small, experiments haven't been able to observe exactly how it affects matter.

In search of answers, an international group of researchers turned to mirrors in a new study. "The mirror always tells the truth," Tomaž Požar, the lead author of the study and assistant professor in the department of mechanical engineering at the University of Ljubljana in Slovenia wrote in the playful analogy referencing "Snow White and the Seven Dwarfs" that he created and sent to Live Science. Though Požar and his team didn't have a conversation with the mirror, they did listen intently to how it reacted when it was hit with a beam of light. They attached acoustic sensors, which work similarly to a medical ultrasound, to a mirror fitted with a heat shield. (Heating can create elastic waves that would hamper the signal they were trying to study: the elastic waves created by momentum.)

Then, the researchers shot laser beams into the mirror and used the acoustic sensors to listen to the waves created as light hit the surface. "It's like a hammer smash made by light," Požar told Live Science.

These tiny waves caused "sounds," or tiny movements among the atoms of the mirror. The smallest displacement they found was about 40 femtometers, which is about four times the size of the core of an atom, Požar said.

Scottish physicist James Clerk Maxwell was the first to propose, in 1873, that light carries momentum in its electromagnetic fields. His equations along with a few others form the basis of electromagnetism. "Everybody agrees with Maxwell's equations of electromagnetism" and the laws that say momentum and energy are conserved, Požar said. But different scientists have their own views on how the force of light is distributed throughout matter.

One famous example is the so-called Abraham-Minkowski controversy, an argument between German physicist Max Abraham and German mathematician Hermann Minkowski. Abraham suggested that the momentum of a photon should be inversely related to the "refractive index," a number that describes how light travels through a material, whereas Minkowski suggested it should be directly related.

Though the new study hasn't yet determined which, if any, hypothesis was correct, the researchers hope to fine-tune and use this experimental procedure in liquid and other materials to eventually figure it out.

Požar continues in his analogy: is it Snow White or the evil Queen? "Is it the formulism proposed by Abraham? Perhaps the one suggested by Minkowski? Or is it the one of Einstein...Or of a yet anonymous scientist whose name will [one] day appear in all textbooks?"

Understanding the physics behind light momentum would most likely have thrilled Kepler, but it would also have some practical applications. For example, optical tweezers could be optimized to exert the least force on the tiny, organic objects they handle. Or grand solar sails could be created to sail through the galaxy on the sun's energy.

*Chia Maximil,
Cameroon*

*A student of Pre-University Training Center in
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INFORMATION COMMUNICATIONS TECHNOLOGY (ICT) EFFECT ON THE DEVELOPMENT OF CAMEROON'S ECONOMY

Most advancing economies, especially in Africa, are experiencing Information Communications Technologies (ICT) growth more in areas of mobile and wireless communications. The advancements in the Internet, WWW and mobile-wireless communication technologies continue to drive these economies. The Internet access is comparatively low per population in advancing economies and its use is unbalanced. There are obvious gaps in terms of the numbers of nets, hosts and users.

Nevertheless, nowadays one can see the increasing use of mobile-wireless technology within the African continent. The technologies are contributing to the use growth of handheld devices especially the use of mobile phones in many rural areas. In Cameroon, where there are upgraded parts of the telephone network with digital technologies, the public has seen, since privatization, some improvements in mobile connection and call quality, and also expanding subscriber base. The Mobile and wireless technology system has also penetrated into the hinterlands of the country. Soon the country will see the great change, much to the benefits derived out of many factors: for example, digitalisation of networks, improved reliability and high bandwidth, low overhead costs of and flexibility of wireless systems structural implementation, falling costs of technological devices, and ease of use; equipment and maintenance costs.

The Cameroon government has signed an agreement pack with the CISCO Company to develop and propagate ICT network throughout the country. Presently, the country has a monopolistic supplier – CAMTEL, for the fixed or wired lines telecommunication networked systems and services. But within the mobile domain, competition is fierce from other mobile-wireless suppliers who are increasingly putting up strong challenges for the mobile–wireless market.

Major players in this domain today are MTN (58% market share) and Orange (40%), who have the majority of the wireless users and signal coverage spanning almost 40% of the country and about 80% of the population. There is another branch of CAMTEL, CMT with their CT phone, which is based on CDMA and providing competitive services for mobile subscribers. However, some of the services provided in the Cameroon mobile-wireless telecommunication systems are limited to voice calls and SMS text only. Other value-added services and technologies such as emails, MMS, GPRS and mobile web-browsing that could enhance users experience and give access to limitless resources on the WWW are almost non existent.

This could be attributed to inferiority of the technologies still in use today in most parts of the Country, which provides very limited facilities such as low bandwidth, poor connection, poor signal quality and infrequent power supply. The arising of new problems could be attributed more to issues of costs or lack of support infrastructures for technology, technical know-how, funding and other factors of opportunity costs of acquiring such technologies

Having explored issues in the adoption of ICT in Cameroon, we can explain the nature of the aggressive fight for prevalence between the fixed and mobile operators. The market trend is shifting more in favour of the mobile sector than fixed line. Therefore, in order for the Cameroon fixed line operators to strongly compete in the ICT market, they need to develop and experiment with new technologies such as provide and support broadband, converged fixed-mobile products, etc. The future in fact depends on the ability of mobile networks to provide high speed internet access. And until it comes to the point when users would be able to easily access the Internet at comparable prices and quality over their mobile phones, they would not do away with fixed lines in the short to medium term.

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STRUCTURE AND CAPACITANCE OF ELECTRICAL DOUBLE LAYERS AT THE GRAPHENE–IONIC LIQUID INTERFACE

The distribution and migration of the ions in the EDL on the rough and non-rough electrode surfaces with different charge densities are compared and analyzed, and the effect of the electrode surface morphology on the capacitance of the EDL is clarified. The results suggest that alternate distributions of anions and cations in several consecutive layers are formed in the EDL on the electrode surface.

The potential energy valley of ions on the neutral electrode surface establishes a potential energy difference to compensate the energy cost of the ion accumulation, and is capable of producing a potential drop across the EDL on the uncharged electrode surface. Due to the greater effective contact area between the ions and electrode, the rough electrode possesses a larger capacitance than the non-rough one. In addition, it is harder for the larger-sized [EMIM]⁺-cations to accumulate in the narrow grooves on the rough electrode, when compared with the smaller.

Consequently, the double-hump-shaped C–V curve (which demonstrates the relationship between differential capacitance and potential drop across the EDL) for the rough electrode is asymmetric, where the capacitance increases more significantly when the electrode is positively charged.

However, the ionic liquid only contains organic cations and organic (or inorganic) anions with a complex structure, which is free of solvent and cannot be simply regarded as a system of ‘particles’. This makes the ionic liquid EDL more complicated than that of traditional inorganic electrolytes. Consequently, the above theories do not seem to be tenable any more. In order to solve this problem, many researchers have turned to further study of the ionic liquid EDL on the solid surface, and they suggest that the EDL of the ionic liquid contains two components: the inner compact layer, and the outer diffusive layer. In the former layer, the counterions are packed closely. Outside the compact layer, anions and cations are distributed alternately in several consecutive layers, which form the diffusive layer. From this viewpoint, the complex structures of ions are taken into consideration.

In summary, up until now, several investigations have been carried out to study the ionic liquid EDL on the graphene electrode surface, including its structures and capacitance characteristics, as well as the relative influence factors. However, the detailed distribution and migration of the ions during electrode charging, as well as the underlying molecular-level mechanisms, are not fully understood.

In addition, the influence of electrode morphology on the detailed distribution and migration of the ions needs to be further explored. As a result, in order to gain a molecular-level insight into the ionic liquid EDL on the graphene electrode surface, an electrode–electrolyte model is constructed here by combining the vertically oriented graphene electrode and [EMIM]⁺/[BF₄][–] ionic liquid, which is numerically analyzed by the molecular dynamics (MD) method in this work. Accordingly, the distribution and migration of the ions in the ionic liquid EDL on the vertically oriented graphene electrode with different charge densities and roughnesses are compared and analyzed to clarify the effect of electrode surface morphology on the capacitance of the ionic liquid EDL.

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SECHS WICHTIGE MEDIZIN-INNOVATIONEN: JETZT UND IN DEN NÄCHSTEN MONATEN UND JAHREN

In diesem Artikel möchte ich 6 neue wichtige medizinische Technologien vorstellen, die derzeit und in Zukunft verwendet werden.

I. CAR-T-Zelltherapie: Kampf gegen Leukämie und Lymphom

Mit der neuen Krebsimmuntherapie – CAR-T-Therapie (Chimäre Antigenrezeptor-T-Zell-Therapie) – sollen die T-Zellen eines Krebs-Patienten entfernt und genetisch neu programmiert werden, um die fremden Tumorzellen zu suchen und zu zerstören. In 2017 könnte es zu einer Welle von Zulassungen in diesem Bereich kommen.

II. Flüssige Biopsien: Krebs schnell und einfach lokalisieren

Neue Methoden ermöglichen es, Tumor-DNA (ctDNA) in Wirbelsäulen-Flüssigkeit, Blut oder sogar Urin aufzuspüren. Diese wenig invasive Technik hilft, Tumore besser zu verstehen und frühzeitig zu identifizieren. Mehrere Unternehmen sind daran, entsprechende Test-Kits zu entwickeln.

III. E-Health: Bessere und raschere Vernetzung

«Fast Healthcare Interoperable Resources» (FHIR) unterstützt den Datenaustausch zwischen Softwaresystemen im amerikanischen Gesundheitswesen. Ein Hauptziel: Gesundheitsdaten auch auf mobilen Endgeräten wie Tablet und Smartphone zu verarbeiten und diese dann auf einfache Art und Weise in existierende Systeme einzubinden. 2017 hat in den USA das Jahr der digitalen Interoperabilität markiert, wie die Klinik hat geschrieben.

IV. Ketamin: Bei behandlungsresistenten Depressionen

Wenn Therapien, Medikamente oder anderes bei Depressionen nicht mehr anschlagen, soll der Wirkstoff Ketamin in der Lage sein, die Symptome innerhalb von 24 Stunden zu verbessern. Die US-Arzneimittelbehörde FDA hat ein entsprechendes verkürztes Entwicklungsverfahren gewährt. Ketamin wird üblicherweise für die Anästhesie verwendet.

V. 3D-Visualisierung und AR für Operationen

Bei Eingriffen an den Augen oder am Gehirn ist Millimeterarbeit gefragt. 3D-Kameras und computergestützte Erweiterung der Realitätswahrnehmung (Augmented Reality) verhelfen zu einer besseren Ansicht der «Arbeitsfläche» – und zu weniger Rücken- und Nacken Leiden bei Chirurgen. Im Jahr 2019 sollen Virtual-Reality-Tools die Grenzen der Möglichkeiten testen.

6. Bioabsorbierbare Stents aus Polymer

Metallische Stents öffnen verengte oder blockierte Arterien. Die meisten bleiben dort für immer, was mitunter Komplikationen mit sich bringen kann. Mehr und mehr kommen deshalb winzige «Röhrchen» aus dem Material Polymer zum Einsatz, die sich nach erledigter Arbeit dann selbst auflösen.

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IM MASCHINENBAU GEHT NICHTS OHNE IT-WISSEN

Elektronik und Informationstechnologie spielen im modernen Maschinen- und Fahrzeugbau eine wichtige Rolle. Längst gibt es fließende Übergänge zwischen den Disziplinen. Ob in der Entwicklung von modernen Verbrennungsmotoren oder von Steuertechniken für Maschinen – voneinander unabhängige Disziplinen wie Maschinenbau, Informatik sowie Elektrotechnik verzahnen sich immer mehr. Ingenieure und Informatiker mit verschiedenen Studienschwerpunkten arbeiten gemeinsam an neuen Lösungen.

Automatisierung nimmt zu. In dieser Weise erfindet sich auch die Automobilbranche gerade neu. Wenn Ingenieure beispielsweise einen neuen Motor entwickeln, spielt die CO₂-Diskussion eine ebenso große Rolle wie Hybridisierung oder Elektrifizierung des Antriebsstrangs, also jede Menge Elektrotechnik und Software. An der Hochschule Rhein-Waal lernen Informatikstudenten deshalb während ihres Studiums verschiedene Anwendungsfelder kennen. In Projekten forschen und entwickeln Hochschule und Industriefirmen gemeinsam.

Ein Maschinenbauprodukt besteht heute im Allgemeinen zu drei Vierteln aus mechanischen Komponenten und zu einem Viertel aus Software, Elektrotechnik und IT-Hardware, so das Ergebnis einer Umfrage des Verbands Deutscher Maschinen- und Anlagenbau. Dieses Verhältnis werde sich weiter zugunsten von IT-Komponenten verlagern, denn die

befragten Unternehmen messen der Software- und Automatisierungstechnik eine wachsende Bedeutung bei.

Autoindustrie stellt kaum ein. Die Karrierechancen von Maschinenbauingenieuren sind nach wie vor gut. Dagegen müssen Informatiker, die an der Schnittstelle zwischen IT und Maschinenbau einsteigen möchten, oft intensiver suchen. Die Automobilbranche stellt gerade sehr zurückhaltend ein. Doch wer beispielsweise über Kenntnisse in Automotive, Visualisierung oder Hybridisierung verfügt, hat gute Chancen. Auch für die Optimierung von Fertigungsprozessen suchen Firmen qualifiziertes Personal. Doch die Anforderungen steigen. Im klassischen Maschinenbau wirke sich die Wirtschaftskrise dagegen auf den Stellenmarkt aus.

Firmen fordern hohe Flexibilität. Wenn sich der Arbeitsmarkt zugunsten der Arbeitgeber verschiebt, müssen Absolventen und Bewerber ihre Suchstrategien anpassen. Beispielsweise, indem sie sich bei kleineren und mittelständischen Firmen sowie im Dienstleistungssektor bewerben, denn die wachsen noch. Das Beratungshaus mit seinen 300 Mitarbeitern in Deutschland und 600 weltweit braucht für die vielfältigen Aufgaben von der Installation über die Kundenberatung bis zur Inbetriebnahme von Anlagen eine ganze Reihe von Spezialisten. IT und Maschinenbau verwachsen immer mehr miteinander.

Wer als Ingenieur oder Informatiker bei Invenio im Beratungs- und Dienstleistungssektor einsteigen möchte, muss besonders flexibel sein, was Arbeitszeiten und Einsatzorte angeht. Fachkräfte mit drei bis fünf Jahren Berufserfahrung fehlen nach wie vor.

Bislang waren es vor allem Ingenieure mit einem Faible für Bits und Bytes, die sich um die IT im Maschinen- und Anlagenbau gekümmert haben. Doch die steigende Komplexität der Produkte bedingt zunehmende Professionalität für den Informatikteil, weshalb auch das Interesse an Informatikern in der Branche steigt.

Naturgemäß arbeiten die Maschinenbauinformatiker in Technologiefirmen aus dem weiten Feld des Maschinen-, Fahrzeug- und Anlagenbau sowie in Produktionsunternehmen. Typische Aufgaben sind die Erstellung und/oder Anpassung von softwaregestützten Werkzeugen, mit denen technologische aber auch organisatorische Fragestellungen gelöst werden können. Beispiele dafür sind die Konfiguration von Produktauslegungssoftware, der Aufbau eines Simulationsmodells für Nutzfahrzeuge, die automatisierte Erstellung von CNC-Programmen für die Fertigung sowie die Gestaltoptimierungen von Bauteilen mit Hilfe der Finite-Elemente-Methode.

IT wird sich auch im Maschinenbau weiter ausweiten. So kann man bei unseren Autos schon fast von Software auf vier Rädern sprechen. Ein weiterer Megatrend ist die effizientere Nutzung der Energie. Sowohl bei der intelligenten Gestaltung von Antrieben, Generatoren und Fahrwerken als auch bei der Auslegung und Vernetzung von Energiegewinnungs- und -speicherungsanlagen ist das Wissen des Maschinenbauinformatikers gefragt.

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DER ROBOTER IM MENSCHLICHEN KÖRPER

Tatsächlich haben die Forscher die verschiedenen Bewegungsformen im Tierreich abgeschaut. Neben den Nesseltieren standen diverse Käferlarven, Raupen und sogar Spermien Modell. Der Roboter kann nun rollen, schwimmen, gleiten, springen, über kleine Mauern und Gräben klettern, sich im Kreis drehen. Er kann sich zu einem C formen und seine Enden als Greifarm einsetzen, um Gegenstände zu bewegen. Mit den ganzen Fortbewegungsarten ist dieser Roboter in der Lage, sich auch durch abwechselnde Körperregionen zu bewegen, etwa durch den

Magen-Darm-Trakt. Es gibt da Bereiche, die voller Flüssigkeit sind, in anderen ist ein bisschen und in ein paar weiteren ist gar keine. Roboter, die nur schwimmen, kämen dort nicht weit.

Seine Mission im menschlichen Körper: Krebszellen verbrennen und Blutungen stoppen. Es bleibt das Problem, dass menschliche Mägen in der Regel nicht halb geöffnet in der Hand eines Wissenschaftlers liegen. Wie also werden die Ärzte einst wissen, wo sich der Roboter befindet, nachdem ein Patient ihn geschluckt hat? Dazu benutzen wir Ultraschall. So können die Ärzte den Roboter in Echtzeit überwachen. Das haben die Forscher auch schon in Hühnerfleisch getestet. Sie schoben den Roboter in das Muskelgewebe, setzten die Ultraschall-Sonde an und sahen sowohl die Kontur des Roboters als auch das umliegende Gewebe live auf einem Bildschirm. Sie erkannten Hindernisse, konnten den richtige Fortbewegungsmodus wählen und ließen den Roboter durch das Hühnchen schwimmen, kriechen und rollen. Ein nächster Schritt wäre, das Experiment in lebenden Mäusen statt einem toten Huhn zu wiederholen.

Zehn Jahre werde es zwar mindestens noch dauern, dann aber könnte der Roboter in Kliniken eingesetzt werden. Dort könnte er zunächst zwei Aufgaben übernehmen. Zum einen soll er Medikamente transportieren, indem er sie wie ein Schwamm absorbiert oder wie eine Lasche einklemmt. Am gewünschten Ort könnte der Wirkstoff dann durch ein magnetisches Signal freigesetzt werden. Ein Medikament kann so in einer kontrollierbaren Dosis an einer exakten Stelle abgegeben werden. Besonders Krebs-Medikamente haben viele Nebenwirkungen, die man so minimieren kann.

Wenn der Roboter noch kleiner wird, könnte er sogar zum Herzen oder ins Gehirn gelangen. Für die zweite Funktion nutzen die Forscher, dass sie den Roboter durch das Magnetfeld auf bis zu 70 Grad erhitzen können. So lassen sich Krebszellen verbrennen oder, wenn ein Patient Magenblutungen hat, die Wunden veröden. Allein diese zwei Anwendungen würden die Möglichkeiten der Medizin enorm ausweiten. Daneben bringt der Roboter noch weitere Vorteile: Er ist weich und kann nichts verletzen, er kann mit magensäureresistentem Material überzogen werden, und wenn man ihn nicht mehr braucht, kommt er irgendwann von alleine wieder heraus.

Für eine noch fernere Zukunft, wenn der Roboter noch kleiner geworden ist, denken die Wissenschaftler über viele weitere Einsatzgebiete nach. Durch andere Organe oder Blutgefäße könnte das Rechteck schwimmen und so sogar bis zum Herzen oder ins Gehirn gelangen. Man könnte ihm Sensoren aufsetzen, die Druck oder Temperatur messen, und auf diese Weise Diagnosen aus dem Körperinneren ermöglichen.

Forscher haben einen nur wenige Millimeter großen Roboter gebaut, der den menschlichen Körper bereisen soll. Dort könnte er Medikamente transportieren oder Tumorzellen verbrennen. Bewegungslos liegt das winzige, schwarze Silikon-Rechteck am Rand einer Petrischale, umzingelt von sechs Kupfer-Spulen, eine in jeder Richtung. Roboters sind speziell ausgerichtete Eisenpartikel eingebettet, die das Magnetfeld nun in verschiedene Richtungen zieht.

Mit kleinen Schritten macht sich der Roboter auf den Weg, die Zukunft der Medizin zu verändern. Der rechteckige Roboter krümmt sich zu einem stehenden Rundbogen. Dann hebt er sein vorderes Ende an, schiebt es ein kleines Stück vor, setzt es ab und zieht das Hinterteil nach. Jeden Bewegungsschritt steuert das wechselnde Magnetfeld. Der Arzt hat die Abfolge programmiert. Sie läuft jetzt als Dauerschleife, und der Roboter marschiert im Takt. Wie eine Raupe macht er sich in kleinen Schritten auf den Weg zum anderen Ende des Plastikgefäßes. Man könnte durchaus sagen, dass er da gerade aufbricht, die Zukunft der Medizin zu verändern. In einigen Jahren soll der Roboter nicht im Labor, sondern im menschlichen Körper umherwandern und unter anderem helfen, Krebs zu heilen. Noch ist nach ein paar Zentimetern erst mal Schluss - der Roboter hängt am gegenüberliegenden Ende der Petrischale fest.

Man kann darüber streiten ob ein Silikonstreifen mit implantierten Magneten als "Roboter" durchgeht. Mit jenen Artgenossen aus Terminator, Wall-E oder den neuesten,

selbstfahrenden Staubsaugern hat das kleine Rechteck wenig gemein. Das Rechteck kann rollen, schwimmen, gleiten, springen und sogar klettern. Doch was ist so besonders an ihm? Er ist klein, aber es gibt schon kleinere Varianten im Mikro- oder sogar im Nano-Bereich.

Alle anderen Kleinstroboter, die oder andere entwickelt sind, sind auf eine bestimmte Art der Bewegung spezialisiert. Manche können schwimmen, aber eben nur schwimmen. Oder kriechen, und nur das. Neuer Roboter ist der erste, der sich auf viele verschiedene Arten fortbewegen kann. In der zweiten liegt ein kleines Glasröhrchen, nicht dicker als der Strohalm eines Trinkpäckchens. In der Röhre wartet ein zweites Roboter-Exemplar. Der Forscher schaltet am PC die Magnetfeld-Steuerung für Kriechen ein, und der Roboter schlängelt sich durch die Röhre. Dann tauscht der Forscher die Petrischale gegen ein kleines Wasserglas aus, auf dessen Boden ein weiteres Exemplar des Rechteck-Roboters liegt. Ein Klick und er klappt sich zu einem auf dem Kopf stehenden V zusammen und schlägt immer wieder seine beiden Enden gegeneinander. Stoß um Stoß schwimmt er vom Boden an die Oberfläche - pulsierend wie eine Qualle.

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PORTABLE 3D SCANNER

3D scanning is a non-contact and non-destructive technology that digitally captures the shape features of a sample. Laser scanning is the fastest, most accurate and automated way to get 3D digital data for reverse engineering. 3D laser scanner is an electronic device capable to scan real objects and collect the surface data. The collected data can be used to construct digital three-dimensional shapes for further use in CAD. Specialized software and physical actuators drive the sample in the way, that the laser line drives smoothly on the sample's surface, while a camera sensor continuously record the changing distance and shape of the laser line in three dimensions (XYZ). The resulting data appears as a points cloud. It is nothing, but an array of the points with the coordinates in space. The mesh surface can be easily created of the gathered points, using widely spread computational software like "Dassault Systems Solidworks" or "Mathworks Matlab".

3D Scanner is a device, that is capable to scan three-dimensional real-world objects by continuously streaming the laser light on the surface of sample and gathering its shape featured for the further computer aided treatment. In other words, 3D scanning is a way to capture a physical sample's exact size and shape into the computer world as a three-dimensional environment representation.

In this work we are going to use a camera sensor to capture the physical object's outline and the lasers to light up the object. This scanning hardware in going to be inside of the scanning module in order to secure geometrical constraints. In this case, we have two possibilities: fix the object and rotate the scanning module around it, or to fix the scanning module and rotate the object. For the functional simplicity we decide to choose a configuration when the object is placed onto the rotation plate, and the scanning module is fixed on the linear moveable carriage.

An image of a 3D object provides the projection of the object only a two-dimensional plane. The extraction of X and Y coordinates of the object is clear since they lie on the image plane. Nevertheless, the Z coordinate is missing. Thus, we have no information about the depth of an object with respect to the center of the object. To gather the Z coordinate, some additional help is needed. A line-laser diode is placed in the way that it creates a triangle with the view direction of a camera and projects a line on the object. The laser line intersects the view direction of the camera exactly at the axis of rotation of the object. The angle of two lines intersection is called θ ("theta"). This θ -angle provides us with the possibility to extract depth related

information from the image captured by the camera. Let's imagine that Y-coordinate corresponds to each line of pixels in the image and maps to the actual Y- coordinate through a scaling factor. At each Y-coordinate the intersection of the laser line with the view direction of camera and the perpendicular dropped from the point on the surface to the view direction form a right-angled triangle. The X-coordinate with a scaling factor can be taken from the length of the perpendicular dropped on the view direction.

In order to extract 3D points cloud of each point lying on the surface of the object the points of the information extraction should be determined. It can be achieved by capturing two images. One of them should be without the laser projected on the sample, and the other one is with the laser. Since everything else in the camera view remains the same, the difference between two images should give us all the points that lie on the laser line projected on the sample. Most of the unneeded information can be removed by converting the difference image into a binary image and making a difference between them. The points extracted from the image lie on the same plane and are not oriented correctly in the 3D space. To change it, each extracted point should be rotated by some degrees around the rotational plate axis. The final algorithm is present below:

Actuator Choice. In this project we decided to choose a stepper motor instead of an ordinary DC motor. It has to do with the precision. Using a stepper motor, you basically can control its precision angle and calculate when the rotation should stop. In case of a DC motor it is not possible to control the angle without rotary encoder. Using a rotary encoder will make a system more complex and will result in additional cost. Due to all these facts, after lots of discussions we decided to choose a stepper motor as the main actuator.

This project has the following concluding comments:

- The product has a price advantage on the market of the standing 3D Scanners.
- 3DoT scanner has a unique physical form among all the other 3D Scanners on the market.
- The product can scan 30x30x40 cm object, which is a strongly unique feature for this type of scanners.
- The scanning quality result can be improved by adding one more line-laser.
- Using a tailor-made controller will improve the cost-efficiency of this business.

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TINY, SOLAR-POWERED SENSORS

New ultralow-power circuit improves efficiency of energy harvesting to more than 80 percent.

The latest buzz in the information technology industry regards “the Internet of things” — the idea that vehicles, appliances, civil-engineering structures, manufacturing equipment, and even livestock would have their own embedded sensors that report information directly to networked servers, aiding with maintenance and the coordination of tasks.

Realizing that vision, however, will require extremely low-power sensors that can run for months without battery changes — or, even better, that can extract energy from the environment to recharge.

Last week, at the Symposia on VLSI Technology and Circuits, MIT researchers presented a new power converter chip that can harvest more than 80 percent of the energy trickling into it, even at the extremely low power levels characteristic of tiny solar cells. Previous ultralow-power converters that used the same approach had efficiencies of only 40 or 50 percent. Moreover, the researchers' chip achieves those efficiency improvements while assuming additional responsibilities. Where most of its ultralow-power predecessors could use a solar cell to either charge a battery or directly power a device, this new chip can do both, and it can power the device directly from the battery.

All of those operations also share a single inductor — the chip’s main electrical component — which saves on circuit board space but increases the circuit complexity even further. Nonetheless, the chip’s power consumption remains low.

“We still want to have battery-charging capability, and we still want to provide a regulated output voltage,” says Dina Reda El-Damak, an MIT graduate student in electrical engineering and computer science and first author on the new paper. “We need to regulate the input to extract the maximum power, and we really want to do all these tasks with inductor sharing and see which operational mode is the best. And we want to do it without compromising the performance, at very limited input power levels — 10 nanowatts to 1 microwatt — for the Internet of things.” The prototype chip was manufactured through the Taiwan Semiconductor Manufacturing Company’s University Shuttle Program.

Ups and downs. The circuit’s chief function is to regulate the voltages between the solar cell, the battery, and the device the cell is powering. If the battery operates for too long at a voltage that’s either too high or too low, for instance, its chemical reactants break down, and it loses the ability to hold a charge.

To control the current flow across their chip, El-Damak and her advisor, Anantha Chandrakasan, the Joseph F. and Nancy P. Keithley Professor in Electrical Engineering, use an inductor, which is a wire wound into a coil. When a current passes through an inductor, it generates a magnetic field, which in turn resists any change in the current.

Throwing switches in the inductor’s path causes it to alternately charge and discharge, so that the current flowing through it continuously ramps up and then drops back down to zero. Keeping a lid on the current improves the circuit’s efficiency, since the rate at which it dissipates energy as heat is proportional to the square of the current.

Once the current drops to zero, however, the switches in the inductor’s path need to be thrown immediately; otherwise, current could begin to flow through the circuit in the wrong direction, which would drastically diminish its efficiency. The complication is that the rate at which the current rises and falls depends on the voltage generated by the solar cell, which is highly variable. So the timing of the switch throws has to vary, too.

Electric hourglass. To control the switches’ timing, El-Damak and Chandrakasan use an electrical component called a capacitor, which can store electrical charge. The higher the current, the more rapidly the capacitor fills. When it’s full, the circuit stops charging the inductor.

The rate at which the current drops off, however, depends on the output voltage, whose regulation is the very purpose of the chip. Since that voltage is fixed, the variation in timing has to come from variation in capacitance. El-Damak and Chandrakasan thus equip their chip with a bank of capacitors of different sizes. As the current drops, it charges a subset of those capacitors, whose selection is determined by the solar cell’s voltage. Once again, when the capacitor fills, the switches in the inductor’s path are flipped.

“In this technology space, there’s usually a trend to lower efficiency as the power gets lower, because there’s a fixed amount of energy that’s consumed by doing the work,” says Brett Miwa, who leads a power conversion development project as a fellow at the chip manufacturer Maxim Integrated. “If you’re only coming in with a small amount, it’s hard to get most of it out, because you lose more as a percentage. [El-Damak’s] design is unusually efficient for how low a power level she’s at.”

“One of the things that’s most notable about it is that it’s really a fairly complete system,” he adds. “It’s really kind of a full system-on-a chip for power management. And that makes it a little more complicated, a little bit larger, and a little bit more comprehensive than some of the other designs that might be reported in the literature. So for her to still achieve these high-performance specs in a much more sophisticated system is also noteworthy.”

TRAFFIC CONTROL SYSTEM IN ANGOLA

By leveraging its favorable location at the intersection of two trans-African transport corridors, Angola plans to become an important logistics hub. For this purpose, a road network of close to 14.000 km is under construction. The key to the future are innovative traffic control systems.

In the civil war, which lasted almost three decades, a large part of Angola's road network was destroyed. Ten years later, the Ministry of Transportation was able to report that over 3,000 km of road had already been repaired. In fact, Angola does not currently face a significant infrastructure funding gap. Thanks to its large oil reserves, the republic has the financial resources to address structural issues and rebuild its shattered infrastructure.

By global standards, Angola is still lagging behind. Rehabilitating and expanding the nation's ports, highways and railways will be essential to transforming the country into a logistical hub of considerable importance in Southern Africa. The geographical situation is favorable: Angola is a part of two major trans-African transport corridors.

At present, most of the freight in Angola is transported by road on trucks. Firstly because there are no inland waterways, and secondly because the few existing railway lines have just started operation and are not yet interconnected. For passenger transport, trains are not an option since service is rather irregular. In the cities, people are mostly using the private car to get around. Those who cannot afford a car, make use vans operating in the system of a public transport scheme. All in all, the country is still lagging behind in terms of multimodal transport by global standards. However, the necessary investments in all modes have already been planned.

In urban areas, traffic pressure keeps rising rapidly. The government sees intelligent transport systems as the key to the future. The rapid growth in passenger car numbers puts huge pressures on the existing urban traffic infrastructure. The urban road network has very limited expansion options since the cities have generally reached a relevant size by now.

This is why current plans are focusing on the implementation of a wide range of ITS-based solutions, for instance local signal actuation and dynamic signal plans, reversible-direction lanes, and also traffic information systems for route selection and deflection of traffic flows. Siemens Mobility is cooperating with local universities to investigate the deployment of these and other solutions for traffic management. In the field of interurban transport, the focus is on tolling and enforcement systems because, mainly around major cities, ring roads have been or are being built.

In Angola the authorities start using innovative transport technologies. The major project of this kind has been implemented in Angola's capital Luanda, where 220 ST controllers from Siemens are in use. The authorities have also adopted the path towards Smart Mobility technology. About 680 km to the east of Luanda, in Malanje, a traffic management system including four solar-powered Sitraffic sX controllers was put into operation last year.

Ultimately, this future-oriented option has been chosen for three main reasons: Firstly, thanks to its independent power supply, the installed solution defies the uncertainties of the frequently overtaxed power grid. Secondly, its numerous advantages in terms of user-friendliness, flexibility, connectivity and efficiency provide long-term serviceability and sustainability. And thirdly, the choice has been caused by the unique traffic engineering consulting services offered in addition. The next milestones on Angola's rapid journey from the past directly into the future are already in sight.

SECTION 1. TRANSPORT TECHNOLOGIES AND EQUIPMENT

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TRANSPORTATION SOLUTIONS OF THE VENUS PROJECT

It is well known that today we face unprecedented set of problems relating to the environment, ongoing process of spiritual decline, poverty, crime and homelessness. We are quite aware that no one can actually predict the future. We can only extrapolate from present information and trends. Population growth, technological change, worldwide environmental conditions, and available resources are the primary data required for solving. The only right way is technological and social progress. One of the “ways to happy future” is The Venus Project, constructed by Jaque Fresco. This project predicts using resource-based economy and modern technologies in different spheres of industry and other branches of monotonous work.

The Venus Project proposes different transportation solutions for different purposes. The transportation around the city and between cities would be shared between autonomous transveyors, motor vehicles and maglev trains. Sea freight would be carried out by freighters and sea crafts. Less reachable destinations would be serviced by aircrafts. The proposed solutions below are just examples of what could be developed as means of transportation if we apply science and technology intelligently. Only when cybernation is integrated into all aspects of this new and dynamic culture can computers appropriately serve the needs of all people. No technological civilization can ever operate efficiently and effectively without the integration of cybernetics as an integral part of this new world civilization, including transportations processes.

According to the project trains traveling on magnetic levitation reduce resource waste and shorten the average travel time. These maglevs travel with supersonic speeds almost continuously. While approaching a station, the maglev reduces its speed and passenger compartments are shifted to the side or elevated above as the entire train passes through the station. At the same time, other compartments with passengers getting on board are shifted or lowered in their places. This method allows the main body of the train to remain in motion, thus conserving energy. In addition, the removable multi-functional compartments could be specially equipped to serve most transportation purposes.

Streamlined autonomous motor vehicles will provide high-speed, energy efficient, and safe, long-range transportation. Some vehicles will have wheels, while others will eventually be equipped with magnetic levitation or air-floatation capabilities. Most vehicles will be equipped with voice-recognition technology that will allow the passengers to request their destination by voice command.

As for helicopters, they will have stationary center around which the rotors, propelled by engines at their tips, would spin. They will be designed to combine the most desirable attributes of fixed winged aircraft, helicopters, and flying platforms. Transcontinental travel will be achieved through advanced aircraft and high-speed maglev trains, all integrated in a worldwide transportation system.

Modular freighters consist of floating, detachable sections that can be rapidly loaded or unloaded. The number of sections can be varied depending on the amount of freight to be delivered. When all of the modules are connected, they can be propelled as a single unit. Then, when the freight arrives at its destination, the selected modules can be disconnected and towed to docks. The front and back of the freighters would then join into one unit for the return trip thus avoiding the return of empty sections and conserving energy.

In the conclusion, the Venus Project calls for a cybernated society in which computers will replace the outmoded system. This new technology will not dictate or monitor individual's lives, as in The Venus Project this would be considered socially offensive and counterproductive. Books such as 1984 and Brave New World, and motion pictures such as Blade-Runner and Terminator 2 have spawned fear in some people regarding the takeover of technology in our society. The Venus Project's only purpose in the contrary is to elevate the spiritual and intellectual potential of all people, while at the same time providing the goods and services that will meet their individual and material needs.

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MULTIMODAL TRANSPORTATION PLANNING

Multimodal transportation planning is defined as the process of defining problems, identifying alternatives, evaluating potential solutions and selecting preferred actions that meet community goals in a manner that includes all feasible transportation modes.

There are many transportation facilities and services available in a metropolitan area that provide opportunities for mobility and accessibility. The multimodal transportation system consists of different modal transportation networks (including the information/communications network) that by themselves allow a traveler to move from one location to another. Intermodal connections provide the ability to transfer from one modal network to another. In addition, metropolitan land-use patterns and the institutional structure for providing transportation service affect the overall performance of the system.

At its most fundamental level, multimodal transportation planning recognizes the fact that there is no single solution to the transportation problems facing a metropolitan area. A coordinated program of action is necessary to deal with the complex nature and interactions of the transportation phenomenon. The concept of a coordinated strategy includes three components – supply management, demand management and land-use management. Note that a key word used to describe each component is management.

Managing the transportation system by adding new facilities or by making operational changes to improve system performance has been the most common response to transportation problems for many years. Typical actions include new highways and transit facilities, improved streets, reversible lanes and turn prohibitions, new or improved transit services, preferential treatment for those who use multioccupant vehicles and ramp metering. Increasingly, transportation professionals have become interested in strategies that minimize the effects of accidents and other nonrecurring incidents on traffic flow including incident detection programs, motorist information systems and towing/enforcement efforts. The application of information processing, communications technologies, advanced control strategies and electronics known as intelligent transportation systems (ITS), to improve the safety and efficiency of the transportation system has also become a part of many metropolitan transportation strategies. There are some types of transportation strategies that would have been considered historically for different types of problems as compared to an operations-oriented approach with ITS. The operations approach suggests a very different implementation environment than that existing for highway or transit facility expansion. Indeed, two of the major difficulties in the early development and deployment of ITS technologies have been a misunderstanding of what these types of strategies can accomplish and the mismatch between organizations geared toward building infrastructure and the ITS need for innovative service provision.

Because planners and engineers have had many years of experience with the supply side of the transportation system, there is more evidence in the literature on the resulting impact of these actions. In the unusual case where new capacity can be continually added to accommodate demand, these actions can significantly reduce congestion levels. In the long term, however, this additional capacity, if assigned to highway improvements only (e.g. additional lanes) would continue a heavy reliance on the automobile that could have serious implications for the provision of metropolitan mobility. In heavily urbanized areas, the construction of these actions (especially major highway improvements) can be costly, their implementation met with strong opposition and even if feasible, they might take a long time to complete. It is for these reasons that other actions need to be considered.

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PROBLEMS AND DEVELOPMENT OF PUBLIC TRANSPORT

Passenger transport is one of the main elements of the social infrastructure of the city, ensuring the needs of residents in urban, suburban and intercity transportation. Reliable and efficient operation of public transport for the city is the most important indicator of socio-political and economic stability.

In recent years, the level and quality of transport services for the city's population has noticeably decreased, and this causes fair criticism of passengers and can lead to an increase in social tensions in the city. In general, the situation today in the field of public passenger transport in our city can be described as critical.

1. Causes of development

Everything is simple - public transport has more passenger than a private car.

The use of public transport as the main way to move around the city reduces the number of traffic jams. An excellent illustration is the photo below. Compare how much space it takes to transport 70 people by car, bus, and bicycle.

2. The main problems of urban transport

One of the main problems of urban public transport is a strong deterioration and insufficient pace of renewal of rolling stock. As a result of rolling stock wear, the level of technical reliability and safety of passenger transport decreases. In addition, the costs of operating the rolling stock and the cost of transporting passengers are significantly increasing. The increase in transport mobility of the population, in the face of reduced freight capacity, leads to an increase in the occupancy rate of the salons. At peak times, it is almost three times higher than the values recommended by the International Union of Public Transport, and reaches a physical limit. Not only the minimum level of comfort for traveling passengers is not ensured, but also the necessary conditions for ensuring safety during their transportation. The need to improve the ecological situation of the residential zone of the city, the need to unload passenger traffic in places with heavy traffic is urgent, it is imperative to change the concept of further development of urban transport.

3. Measures for the development of public transport

The development of public transport involves the following measures:

1) Improving the tariff policy. The problem of public transport enterprises is that in modern conditions they cannot become profitable at the expense of more efficient work, and not at the expense of increasing tariffs. And today, in general, they remain unprofitable.

2) Creation of an information-analytical system of public transport management, which is caused by the need to improve the efficiency of public transport management and monitoring its operation.

3) Elaboration of the route system, the elimination of repetitive routes. Constant monitoring of demand and specification of traffic intervals.

4) Creating a public transport dispatch control system that ensures the operational management of public transport and generates objective information about its operation.

5) Reducing the harmful effects of public transport on the environment, which will protect the environment from the harmful effects of vehicles, including public transport.

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ALFA-X EXPERIMENTAL TRAIN: INCREASING SPEED UP TO 400 KM/H

As it is known the purpose of increasing train speed is that the competition capacity with other modes of transportation and railway revenue are increased by reducing the travel time.

The next generation of Shinkansen bullet trains will begin testing next year. The state-of-the-art 'Alfa-X' is expected to travel faster than 400 km/h and will have a range of groundbreaking features.

The Alfa-X will become the fastest bullet train in operation. Though its maximum speed will be higher, it will run at around 360 km/h while carrying passengers. The fastest commercial train in the world is Shanghai's maglev train (431km/h) which uses magnetic levitation.

Designated Series 956, the ALFA-X is intended to pave the way for a new fleet of high speed trains as part of the railway's Transform 2027 strategy. Having launched the project in July 2017, the railway has now completed detailed design work for the new train. It says the core objectives are to pursue 'further safety and stability', while improving comfort and incorporating 'four innovative concepts' to enhance maintainability compared to the existing fleet.

The ALFA-X testbed will incorporate two new nose designs in order to reduce the pressure waves generated when entering tunnels at very high speeds. Car 1 at the Tokyo end of the 10-car trainset will have a similar nose to the Series E5, but lengthened from 15 to 16 m. Car 10 will have a 22 m nose with a more complex shape, at the cost of a much reduced interior space. To further improve environmental performance, tests will be undertaken with two designs of low-noise pantographs.

Improved energy efficiency is a key priority, including the use of lighter materials and components. Improved traction control technology will include the use of silicon carbide power converters.

To improve ride comfort, enhanced dampers and a 'tremble protection control device' are intended to minimise vertical vibrations, while changes to the lateral dampers will reduce any side-to-side motion. The active suspensions will also provide a degree of body tilt to allow operation through curves at higher speeds. Modifications to the underfloor structure are intended to reduce the risk of snow build-up during severe winter weather.

Learning lessons from the derailment of a Joetsu Shinkansen trainset in October 2004, JR East plans to integrate earthquake-preparedness measures in the ALFA-X, including 'anti-earthquake dampers' to suppress the movement of the carbody and stabilise the train if a strong force is detected. 'Crushable stoppers' would permit a greater degree of movement between the bogie and carbody so that any shaking of the train is not transmitted to the bogie in a way which could affect the wheel-rail interface.

Maintenance innovations include the use of onboard sensors to collect status data and support a condition-based maintenance regime. The train will also be fitted with infrastructure monitoring equipment.

According to JR-East, the ALFA-X trainset is to be finished in bright metallic colour that reflects the local surroundings and ‘actively communicates’ the railway’s participation in the cities it serves, highlighted by ‘exhilarating’ and ‘refreshing’ green highlights. The logo will be presented in a ‘digital’ font representing the incorporation of Internet of Things and AI features in the train design. With the graduated lining becoming brighter and rising to the right, the logo symbolises a feeling that the use of advanced technology will lead to a bright future.

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INNOTRANS EXHIBITION LEADERS

InnoTrans is the leading international trade fair for transport technology that takes place every two years in Berlin where a lot of companies from different countries represent their products and innovations. Subdivided into the five trade fair segments (Railway Technology, Railway Infrastructure, Public Transport, Interiors and Tunnel Construction), InnoTrans occupies all 41 halls available at Berlin Exhibition Grounds. The InnoTrans Convention, the top-level supporting programme of the event, complements the trade fair. There are some leaders in this event.

Alstom company represented Prima shunting locomotives stand out through their higher operating speeds. The three-axle Prima H3 can run at up to 100 km/h and the four-axle Prima H4 at 120 km/h, compared with the 80 km/h of most shunters. This means that they can be integrated more easily into rail traffic for mainline services or transiting between sites. The tractive efforts of 240 kN and 300 kN respectively also provide better adhesion when moving off on a bend, as well as greater towing capacity.

Lutz frequently receives ideas for new control system functions from users and customers whose factories have been using the control systems for years. In the pharmaceutical industry, for instance, these systems do such jobs as control when active ingredients are mixed together. In the process, they open valves, start pumps and measure the temperature during the production process. «The goal is simple: the unit must operate without interruption», Lutz says. Every stoppage means lost production and potential harm to people or the machinery.

Velaro is one of the fastest high-speed trains in the world, having reached a speed of 403 km/h without modifications. Whether it’s used as a high-class solution with outstanding passenger comfort for business people or as a highly cost-effective transportation system for large numbers of passengers: Velaro scores not only with its speed but also with its flexibility. Spain’s Velaro E, for example, has been providing passengers with reliable service from Madrid to Barcelona for years. It covers the 625-km route in less than 2.5 hours. The eight-car, 200-m long standard train configuration has a traction output rating of eight MW. With punctuality exceeding 99 % and operating distances of more than 500, 000 kilometers annually, the Velaro demonstrates top performance for high-speed travel. And the best thing: the world’s most versatile train platform is being continuously further developed by leading technologists. From Spain to Russia and as far as China: the high-performance Velaro family can be operated in four climatic zones. It also demonstrates its adaptability to different track gauges. The Spanish and Chinese versions are based on Europe’s 1,435-mm standard gauge, while Velaro Russia is built for that country’s 1,520-mm broad gauge.

Bombardier company had a great solution in suburban trains. High capacity double-deck trains are the recognized solution to the issue of overcrowded routes when extending platforms are not required. The OMNEO double-deck train allows operators to service high capacity lines without compromising accessibility and comfort. The train can be used for commuter, regional

and intercity service with maximum speeds ranging from 140 to 200 km/h. With alternating single and double-deck cars, the OMNEO train ensures outstanding capacity, comfort, accessibility and transparency as passengers have the benefit of visibility throughout the train that is a key to ensuring passengers feel safe and secure. Flexibility is the main feature of the OMNEO innovative train concept. It offers an exceptional range of train lengths from 81 m upwards with increases in increments of 10 to 15 m. Moreover, additional intermediate cars can be added during the lifetime of the train.

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THE IMPORTANCE OF TRANSPORTATION TO TOURISM DEVELOPMENT

Transportation and travel can be discussed without taking tourism into consideration, but tourism cannot thrive without travel. Transportation is an integral part of the tourism industry. The advent of flight has shrunk the world, and the motor vehicle has made travel to anywhere possible. Transportation in tourism is most often seen as just a part of the tourism system which is in charge of bringing the tourists to the destinations, a means of getting around the place and leaving it once the duration of the trip is over. Transportation system of a tourist destination has an impact on the tourism experience which explains how people travel and why they choose different forms of holiday, destination, and transport.

There is a general agreement that tourism expands more when there are better transportation systems. In many parts of the world tourism had been underperforming compared to the natural heritage the country is endowed with. Transportation needs for tourism promotion and tourism development among others, to be maintenance of the existing roads, construction of more roads, rail track, sea and air transportation, and construction of local airports and enhancement of local flight operations.

Tourism sector is one of the main important sectors of the economy. Many countries take advantage of covering the budget deficit with the help of profits coming from tourism. But tourism has its own unique features that differentiate this sector from the others. Like in other service industries, in tourism the customers, that is, the tourists come to the destination where the tourism services are provided. As the matter of fact it is difficult to think of tourism sector without transportation. Transportation is the main means to carry passengers, that is, the tourists to the actual site where tourism services are performed.

The development of transportation, transportation vehicles, infrastructure and using new technologies in this sector speed up the development of tourism. But the main important factor here is the rapid development of the transportation sector and application of technological innovations which enable the tourists to reach many destinations of the world.

Automobile Transportation. In short distances automobile transportation comes forward in regard to other modes of transportation. The automobile transportation makes it easy to see local culture and nations. The importance of this mode in tourism is also very important. When compared with the prices in air transportation, this mode of transportation is frequently used by tourists because of low prices. But the main factor affecting this choice is time and distance

Railway Transportation. The other mode that affects tourism is railway transportation. This type of transportation is considered the oldest one. Currently in many countries the railways are used for transportation of loads. The reason for this is tourist choice of air or automobile transportation.

Sea Transportation. Here we may include cruise travel, boat travel, yachting, ferry travel and many other. The cruise ships named as sailing hotels provide tourists with indispensable

travel opportunity. While travelling with a cruise ship, the tourists get the opportunity to see several countries at a time.

All the stated issues prove the importance of transportation in tourism. As mentioned above the tourist's travel experience starts and ends with transportation. In this sense, if the countries want to gain sustainable development of tourism sector, they must pay attention to transportation sector.

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WOMEN-ONLY TRAIN CARRIAGES: IS IT A GOOD OR BAD IDEA?

The latest statistics would suggest there's a problem not only on the UK's train network but on the train networks all over the world. It should be pointed out that the number of reported cases of sexual assault has reached an all-time high.

The figures indicate women are by far the most likely victims – so the theory is that by giving them their own carriage, they'll be protected from male would-be attackers. This idea has caused a lot of debates. Protecting victims is, obviously, a good thing but lots of people say women-only zones aren't the best way of doing that. It is said that this idea sends out the wrong message. However, both the supporters and the opponents agree it's a good thing that the issue of sexual offences on trains is being talked about.

The number of recorded sexual offences on trains and at stations rose 25% in the last year, according to the British Transport Police (BTP). In 2017-18 there were 1,399 sexual offences in England Scotland and Wales – that's an increase of 282 on the previous year. As it is reported most victims were female, but some were male. As it is noted that the best solution of the problem is to create well monitored environments in which all commuters can feel safe and in which perpetrators are inhibited.

The situation in the world is the following. Women in Tokyo have had the opportunity to travel separately since 2000 and reports suggest it's generally been a success. Eight private train operations and Tokyo's two underground companies launched the carriages, identified by pink «Women Only» stickers printed in Japanese and English. Any man trying to enter is ushered away by station officials. The move was widely welcomed, as incidents of groping had trebled in the past eight years, and there was thought to be a severe lack of women reporting sexual harassment. The carriages were also welcomed by men who feared being falsely accused. Now the carriages are available in Japan's biggest cities – Tokyo and Osaka – and they've become part of the culture. They are women-only between typical rush hour of 7am and 9am, although apparently this changes depending on the line, and young boys are allowed to use them too.

Mexico City introduced metro carriages for women and children in 2000 to a generally positive reception. All trains now reserve the first few cars for women, while the rest of the trains are mixed. They've also introduced «pink taxis» with female-only drivers.

Jakarta introduced female-only train carriages in 2012. The orange and pink-seated carriages were at the front and rear of trains, provided by the state-owned railway operator PT Kereta Api Indonesia (KAI). But the scheme only lasted for around seven months before they were scrapped. The problem was that while rush-hour mixed trains were packed, the female-only carriages were largely empty. It meant the company had little choice but to convert them back into mixed spaces to accommodate passengers, in spite of protests. A spokesperson said they were planning to increase their passenger capacity with more trains, and if they could, they would re-introduce women-only carriages in the future.

Men in India who ignore the female-only rules have been forced to do sit-ups as punishment but the scheme has generally been welcomed there. Since 2006, Brazil has had them on some services but there have been reports of men ignoring the rules.

If the scheme went ahead in the UK, it wouldn't be the first time. For around 100 years, until the 1970s, women on some UK railways could use female-only compartments. They were phased out because it was thought they weren't being used enough.

The BTP, who are in charge of policing the Britain's railways and stations, has released a statement. While they haven't given a view on whether they think female-only carriages is a good idea, they have explained the other methods they are using to help protect passengers. «We are exploring a number of new approaches including encouraging more active engagement from bystanders, developing new technology to increase methods of reporting and working to understand the motivation of offenders», the statement says.

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TRAVEL TIME EFFICIENCY

There have been some profound changes in travel time efficiency over the past 10 years. With crises looming in the background, companies are internationalizing. People are becoming increasingly mobile, in all senses of the word; and work is also becoming mobile. While barely 15 years ago the internet profoundly altered all our professional limitations, it only took a few months for smartphones to take hold and, once more, revolutionize the way we do things. At the same time, people have the pressing need to think about development in sustainable terms. Individuals and professionals alike are torn between two imperatives: on the one hand, going faster, being more productive and being in a position to take up challenges in a globalized world and, on the other, being able to stand back far enough to anticipate and allow time to make the right decisions.

Train travel is considered to be one of the most efficient means of travelling. It is no surprise that cost is the foremost criterion taken into consideration when deciding how to travel. Clearly, getting to the railway station or airport costs money: public transport when possible and when easy to do, parking, taxis etc. According to the statistics, taxis are the favourite way of getting to and from airports. These are always located on the city outskirts, which obviously tends to increase the overall average cost of a journey by air. Whereas railway stations are always located in city centres, the average cost of travelling by trains is decreased by very frequent use of public transport 41% of travellers use public transport to get to the railway station, and 51% do so when they come out of the station to get to their destination.

With more and more trade taking place and ongoing globalization, professionals are increasingly mobile and their travel time is mainly seen as time payable by the company. The results of the survey (provided by the transport companies like Thalys) on the potential provided by the different modes of transport in terms of productivity show 90% of the managers viewed rail travel as very good, while only 6% said the same about air travel. Their forecasts focus on a highly «productive» view of rail travel: 68% of managers surveyed thought that a professional can work efficiently for more than half of the time spent in the train. Only 4% thought the same applied for air travel. In support of what they said, travel managers explained that they attached key importance to the following aspects:

- availability of an electrical socket,
- availability of an internet connection,
- proximity of the departure point (station or airport) to the company,

- the option of using a mobile phone,
- a quiet environment and the ability to travel without being interrupted,
- proximity of the station or airport to the city centre,
- and to a lesser extent: availability of a table to work on, waiting areas etc.

While both individuals and professionals face the need always to go faster, their time is becoming more valuable. In both business and private life, time is a key factor that requires careful decision-making, from which we all build our success and balance.

Travel companies such as Ukrzaliznytsia, must have a part to play in promoting these decisions and creating added value. They should provide these new facilities (electrical sockets, internet connections, comfort, meals served at your seat, taxi bookings etc.) as they are highly acclaimed by travellers, enabling them to turn their journey into useful time. This usefulness will have a different meaning for everyone, whether it means improving work/life balance, having a rest before an important meeting, or work on an important project.

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COMPARISON OF ENERGY EFFICIENCY DETERMINATION METHODS FOR THE INDUCTION MOTORS

Currently, induction motors are playing the most important part in the alternating electric drivers due to their robust construction, easy operation, self-starting and rather high reliability in comparison with direct current or synchronous motors that have many considerable drawbacks. Mostly such machines represent small or average power motors with traction mode; induction generators are used quite rarely. As induction motors represent one of the most important power equipment, so their power consumption accounts a large proportion. Induction motor efficiency states how much electrical power is converted into useful work (mechanical power); also what part of the electrical power is lost. Factors which influence the efficiency of the induction motors used in industrial application vary and these must be taken into account to minimize energy losses. The ways of power consumption reduction are discussed in details in variety of articles. But not only the question of minimization of losses in induction motors should be under close attention, but also the approaches of accurate efficiency determination of the induction machines.

According to the standards there are two major ways of efficiency determination of the induction motors implemented: direct and indirect. The usage of the direct method means that the motor efficiency is determined from the direct measurements of the input electrical power P_{in} and output mechanical power P_{out} .

Both methods have direct connection with all losses in the motor. Engineers are trying to minimize the percentage of losses, because each percent is very important for electrical energy industry. There are several effects that could influence and minimize the losses that occur in the induction motors:

1. Stator core losses – could be reduced by using of improved permeability steel, lengthened core, using thinner lamination in the core.

2. Stator and rotor copper losses – could be reduced by increasing the volume of copper wire in the stator through improved stator slot designs, and by using thinner insulation.

In the case of squirrel cage rotor the copper losses could be reduced by increasing the size of rotor conductive bars and end rings to reduce resistance.

3. Friction and windage losses – using the lower friction bearings, improved fan design and air flow could effect on the losses reduction.

4. Stray losses – as this type of the losses appear mostly due to leakage fluxes induced by currents load thus various design and manufacturing details may influence on them.

Energy losses are the determining factor in motor efficiency. The losses, as it was shown earlier, could be divided into five main classes.

As a result, the main factors that influence induction motors efficiency in industry. The value of induction motor efficiency can be affected by various aspects; one of them is National Standardization. The article considers the influence of various standards on the value of induction motor efficiency. As efficiency level is determined in accordance with National standards, it depends on the stray load losses accuracy determination. In the future it is planned to work on the development of the experimental procedure for stray load losses determination and take into account the impact from power supply characteristics and the features of test equipment.

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DEVELOPMENT OF AUTOMOBILE TRANSPORT IN OUR DAYS

It is not a secret that auto transport is very important in our time for a modern man. For example, you are walking down the street and see a lot of cars: light vehicles, trucks and mass transit. There are a lot of them and each has a specific objective. Truck drivers must deliver a load to a certain place, and drivers of passenger transport must bring people to the right stop. There are also cars in our lives thanks to which a person can move independently in the right direction, both on vacation or on business trips.

In our time there are certain difficulties with the operation of vehicles, namely:

- For today, Ukrainian roads pose a danger to people and cause a deterioration in the ecological situation. Because of poor quality of the roads cover, fuel consumption, emissions of harmful substances into the atmosphere in Ukraine is 30% higher than in neighboring countries;

- Non-compliance with EU technical standards inequality and cargo loads;
- Frequent rise in price of fuel and spare parts;
- Lack of financing for this sector;
- Transport congestion of certain sections of highways;
- High level of traffic accidents.

At the moment, a lot of projects are being developed that can contribute to improving and solving some problems in the field of road transport, namely:

1) About three thousand motorists in Michigan, the United States, are involved in a test of the Ministry of Transport, which uses the wireless connection of a car to a car to avoid collisions. Depending on the results of this test, by 2020, the Wi-Fi device can become mandatory equipment for every vehicle manufactured in America.

2) Recently, in November 2017, it became known that in London some buses will be refueled with diesel fuel containing active additives derived from the coffee grounds.

3) Now people are talking about the development of such function as driving by gestures. Of course, to steering by waving hands in the air, opening the window or turning on the heating, without touching the dashboard - is already quite real.

There are many options for the future for the strategy development of the transport industry as a whole. Solving problems in the automobile transport industry will make it possible to improve the living conditions in any country.

From this follows that the importance of transport in our life is quite large. There is no place where there would not be this or that car. Everywhere cars work for us and our needs, which are becoming more and more, but different companies interested in the development of vehicles are not waiting.

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THE PREVENTION OF CRIME ON PUBLIC TRANSPORT

The prevalence of crime in the world, Ukraine in particular, has had a negative impact not only on national economic growth, investor confidence and tourism, but also on the safety and security of its citizens and residents. Sad testimony to this, is the fact that the incidence of criminal activity has permeated into all facets of society including public transportation.

There are a number of reasons why understanding and preventing crime on public transport should be of interest. Firstly, public transport has an important role to play in reducing social exclusion, by providing access to facilities such as work, health, leisure, and employment. There are also obvious environmental benefits in promoting public transport as a means of sustainable travel, and hence, the use of public transport may be expected to grow over time rather than decrease.

There is limited information available as to the extent of crime and disorder on public transport and, furthermore, discrepancies exist as to the actual levels of crime and disorder on public transport. The most likely reasons for this include the following: the multiple agencies responsible for maintaining and operating the various systems, the lack of standardized reporting and recording of crime and disorder on public transport, difficulties in analyzing the available data, and the different policing and security arrangements in place across the network, and the likely levels of underreporting on the system.

One of the definitive references in this area identifies six categories of crime that are typically evident on the public transport network, these being antisocial behavior; crimes against passengers including theft, robbery, and assault; crimes against employees including assault and robbery; vandalism and graffiti; and line of route crimes which are offenses along routes that cause delay or affect safety. In addition, it is suggested that it is extremely useful to distinguish «en route» offenses from those at stations and stops.

Perhaps a key significant feature of the concentrations and potential specializations of crime and disorder that are evident is the prevention opportunities these offer. Crime and disorder has been shown to be concentrated within certain components of the public transport network, and these include along particular route sections of journeys; nearby and within certain stations and stops; and within particular parts of stations and interchanges; and these all vary by offense type and time of the day. There is also a clear interaction between the movement of vehicles and the environments through which they traverse, and regulating access to and from the system (the entry and exit points) can serve as a useful mechanism for reducing crime and disorder on the network. The design, environment, and management of stations and stops can influence crime rates, and there is a growing evidence based on how improvements to the design of public transport infrastructure can reduce crime levels including better lighting and illumination and removing dark corners and hiding places. Furthermore, effective place management of stations, the introduction of capable guardians, and the use of effective handlers can all significantly reduce risk on the public transport network. Many aspects of the public transport network have regulated entrance and exit points that connect the internal environment of a transport journey with its external environment. These offer clear prevention opportunities

but these must be contextualized within an intelligence-led or problem-solving approach. The design of transport systems and the introduction of new technologies can also influence crime rates.

There are a number of recent developments that should be mentioned, as they offer insights into potential avenues for further research into crime patterns on the public transport network. One of the issues that was raised is whether public transport systems act as a generator or attractor of crime, or perhaps both. It is clear that the environs of public transport and the potential transmission of crime around this system is an area for further research, particularly when examining how offenders may potentially use the public transport as part of their journey to and or from crime. This is a key question in examining the spatial and temporal patterns and concentrations of crime evident on public transport and perhaps, moreover, in determining the extent to which offenders may specialize on public transport networks. This is certainly an area that warrants future research activity.

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MODERN FLYING DEVICE - AS THE WAY OF COMMERCIAL INSPECTION OF TRAINS

The development of science and technology provides us with a huge number of different devices that facilitate our lives or provide new opportunities. Ukrainian railways also need to introduce new products to simplify the implementation of various daily operations. For example, the use of unmanned aerial vehicles (or as they are also called quadcopters) for the commercial inspection of freight trains.

As it is well known, a commercial inspection of trains includes an external inspection of wagons and the correctness of cargo loading when a train departs from a station or when it arrives at disbandment. Regardless of the time of a day, weather conditions and the seasons, inspection is performed by a commercial agent. These workers have to bypass the freight trains of enormous length and, on non-electrified tracks, also climb onto wagons to inspect the cargo. Quadcopters could help in this difficult matter.

First, to control the copter does not need special knowledge or skills, which will allow you to train employees easily to use them. Basically, the control is performed remotely with a remote equipped screen. If properly implemented, the camera image can be saved to confirm the inspection. Employees will not even need to leave the premises and, under any weather conditions, easily to inspect the wagons. This method will speed up the work even at night, because quadcopter cameras transmit a good image in the dark. It is also possible to install small spotlights to illuminate the inspection site.

Secondly, it will be possible to inspect the loading on the tracks with a contact network. At such sites, railroad workers are not allowed to climb onto wagons since electric shock is possible, which is dangerous for their life. For a copter, the distance between the car and the contact wire is sufficient. Therefore, increased control over the safety of the goods and the correctness of its placement is done. It is also possible to refuse installing of expensive industrial television at medium-loaded stations in favor of using UAVs.

Definitely this technology has its drawbacks. It may be impossible to control the device in case of strong wind, or maintenance after operation will become very expensive. But still, when introducing a new method, often there appear various difficulties, which over time help to adapt the technology to work in the right conditions.

As we see, the development of science and technology contributes to the development of railway operations, which will make it possible to deliver goods faster and increase the profits from their transportation accordingly, reduce the cost of operations, simplify the work of railway workers and increase their pay.

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TO THE PROBLEMS OF RAIL FREIGHT TRANSPORTATION IN EUROPE

It's well known rail that freight transport plays an important role in creating a sustainable and competitive transport market, but has lost ground to other competing modes of transport, particularly road. The freight market is driven by a mix of external influences, including spatial planning, the decline of bulk traffic such as coal, and the arrival of a competent, aggressive and commercially competitive alternative. Transport demand is evolving, both in terms of cargo characteristics and customer requirements, and will continue to change in response to industrial and consumer needs. For example since the 2000s containerized/unitized cargo and door-to-door (rather than terminal-to-terminal) transport service have become widely accepted, normal phenomena. Rail has been slow to respond to such changes, for example by failing to cooperate with transport chain partners to offer a door-to-door service. Consequently rail has lost market share. National rail policies across Europe have been set by governments and increasingly focused on cost containment and network contraction. Recognizing this, a wide ranging series of measures, instigated by the European Commission, turned the position of rail freight into a more attractive and competitive base work.

The specialists underline that rail freight service quality can be improved by better planning, application of appropriate ICT-systems and adoption of an integrated supply chain approach. A more customer-orientated service will be vital and can be achieved by further deregulation of rail. Besides a competitive price and reliable service, a reduction in operating costs will be vital, and can be achieved by implementing a number of measures, including operation of heavier and longer trains, wider loading gauge, higher average speed, and better utilization of wagon space etc. This will bring increased capacity, as well as better timetable planning, signaling systems and infrastructure improvements.

One attempt to increase the competitiveness of the rail sectors in the important container market is the Swiss Split concept. Swiss Split is a rail service in Switzerland which distributes containers via conventional shunting yards directly from intermodal terminals to the final recipients' sidings by rail. Currently Swiss Split service is quite successful, although it still has several weaknesses (e.g. in the areas of rolling stock, transshipment terminal structures and the service production schemes for single wagon load i.e. SWL) that reduce its competitiveness compared to container transportation by road.

Generally the rail sector is slowly recovering from the drop in activity caused by the financial and economical crisis of 2008-2009. However, it is still experiencing some serious problems. Due to recent affairs, a number of European countries decided to close their borders and strengthen border controls – increasing the security, but also limiting the free flow of goods and having effect on the transport and logistics industry. Although rail freight continues to dominate, increased border controls are now shifting the demand towards faster solutions (such as air freight). Still, it is too soon to tell how the sector will continue to grow from there.

The need to improve the range and quality of freight transport data has gained new urgency in recent years as governments have begun to develop carbon reduction policies for transport. The initial requirements have been to estimate the share of total greenhouse gas

(GHG) emissions attributable to freight transport and to examine how this has been changing through time. To devise and refine decarbonization strategies, governments need to supplement these macro-level calculations with disaggregated GHG estimates for specific transport modes, vehicle types and logistics sectors.

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SELF-DRIVING VEHICLES IN MODERN LOGISTICS

Self-driving vehicles have been defined as vehicles in which operation occurs without direct driver input to control the steering, acceleration, and braking, according to the National Highway Traffic Safety Administration. In this type of vehicle, the driver is “not expected to constantly monitor the roadway while operating in self-driving mode”.

The widespread adoption of driverless vehicles may seem a distant vision – something we would expect to see in a futuristic movie perhaps. However, the reality is that some of the world’s leading automotive and technology companies are already showcasing first prototypes and discussing the advent of the next automotive revolution. First trials of fully driverless vehicles are already underway. Self-driving vehicles have a lot of advantages such as: improved safety, lower environmental impact, higher efficiency, greater comfort and other.

Autonomous technologies have been used productively in a number of different applications for many years. One of the most obvious uses is in aviation or in the military sector. To achieve a vehicle capable of driving itself, four basic interdependent functions are required. These are navigation, situational analysis, motion planning, and trajectory control. But the most problem is ethic. As we prepare self-driving vehicles for the open road, we must define in precise detail how the vehicle will react in various situations, recognizing that passengers, other road users, and pedestrians could be hurt because of the self-driving vehicle’s decision.

There is a strong case for suggesting that the logistics industry will adopt self-driving vehicles much faster than most other industries. The reason for this is that different rules apply when a vehicle is moving around in a secure, private zone. Also, liability issues are less pressing when that vehicle is transporting goods instead of people. These conditions are typical of many logistics applications – for example, vehicles often move materials in private warehouses and controlled open-air sites. Already today there are numerous applications of autonomous technology in logistics, providing further evidence that driverless vehicles are safe and successful in closed environments. It’s the next evolutionary step to start applying this technology to outside premises and on public streets. Beyond warehousing operations, analysts expect many more applications in future along the entire supply chain, particularly in outdoor logistics operations, line haul transportation, and last-mile delivery.

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ROADS OF THE FUTURE

Infrastructure development is one of the priority areas worldwide. Most of the leading countries invest huge amounts of money in high-quality, safe and durable roads. Throughout

world history, roads had a lot of surfaces - stone, crushed stone, brick, wood, sand, asphalt. What surfaces will be next in progress?

To endow the road with “reason”, to make it not only lie under the wheels, but also to work for a person in the truest sense of the word is an interesting idea. A typical smart road will be more ‘animated’ than its conventional ‘inanimate’ predecessor. It’ll come with sensors, data capture capabilities, the ability to be responsible for changes in the environment and, perhaps most importantly, be connected. Roads will ‘talk’ to cars, bicycles, traffic lights and even cities. Roads will be ‘alive’.

Smart roads have already existed in such countries like Holland, Netherlands, Germany, USA and other. What is a smart road? For example, in Holland, construction of an interactive “smart road” is coming to the end. At this stage, a fluorescent markup is applied to the roadway, which will glow all night long.

At the second stage, special symbols will be applied to the asphalt, which will be visible only in certain conditions (for example, the symbol of “snowflakes” - if the roadbed has a negative temperature). It is also planned to use intelligent lighting, to illuminate the track only when the car is moving along it.

In addition to intelligent lighting, there is also the idea to use motion-sensor lights. Interactive light works in the case: when a car approaches a particular stretch of a road, the motion sensors will light up only on that particular section of the road. The lights will become brighter as the car comes closer and will slowly dim away as it passes.

In the US, they seriously consider the possibility of creating roads capable of generating electricity. Such roads will be unusual for a modern driver and consist of three layers, each of which will be used in its own way. The upper layer will be made of special high-strength and moisture-resistant materials to be able to withstand even multi-ton trucks. But at the same time, this material will be translucent to provide enough light for the solar cells that come with the second layer. In addition, ordinary LEDs can be easily embedded in such a canvas, which will display not only the markings, but also road-specific information for the driver. The last, third layer will be used to accommodate special “antennas” to allow charging vehicles passing along the highway.

A new navigation system is being developed now that to be able to inform with the help of information boards about the most convenient route, taking into account traffic jams, accidents or ongoing road works.

In general, the world is ready for the adoption of interactive roads. The technologies allow placing solar batteries under the pavement, linking the markings with road signs into a single network and even turning the route into one large interactive screen.

Smart roads are a new step of progress. They will introduce a new history of road development in the world, to change completely the perception of the population about the roads and their technical capabilities.

There is much to be optimistic about, but with intelligent roads, there is still a long way to go. For now, smart roads are something to look forward to.

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MODERN SYSTEMS OF PASSENGER TRANSPORTATION

Today there observed an increase of interest of the executive power bodies to the information necessary for the effective control and management of the passenger transport. The experience of Germany, United States, Australia, Italy and other countries leads to the

irreversible process of the urban regional transport systems and speaks about the improved development, on the basis of application of the latest information technologies, telematics and proper decisions in city-planning, creation of new transport infrastructure. Such systems began to be actively introduced on the base of mobile radio contact and satellite navigation. The term “Automatic Vehicle Location – AVL” or controller's systems of supervision and management enter the vocabulary of transport workers.

In general, it is necessary to mention that in the countries of near and far abroad states with the automated control of transport systems main attention is paid to the intellectualization of transport means, to production of apparatus of so-called SMART (thinking) mobile units. The most important in the considered automated transport systems is the accumulation of dynamic data about the state of the corresponding routes including the location of mobile units.

At present the basic task of intellectualization of mobile units is creation of rather simple in exploitation, reliable and cheap universal built in apparatus for the equipment of practically any transport means. The first consists in the provision of a transport vehicle with a complex having the apparatus of contactless counting of passengers getting in and off, which is linked to the system of the satellite position. Examining the aspects of application of positioning facilities, including the global one, on the motor transport as a whole and on the urban passenger transport in this country in particular it is necessary to mark the primacy of controlling the radio navigational systems. At such approach monitoring data flow down with the general controlling center. The foreign works show there exist systems of contactless counting of passengers in combination with the satellite navigation at foreign markets. Their task is to solve the question of exactness and trustworthiness of navigation as a means of determining time and place of passengers getting in and off on the UPT route.

The next approach is the developing the UMTL (universal mobile transport laboratory) conception. The basic task of UMTL operation will be getting information for forming dynamic database of passenger streams provided by the intellectual system of monitoring being an analogue of comparatively simple systems of interrogation of residents. The results of such monitoring will be a basis for organization of effective controller's management and quick response in extraordinary situations.

The equipment of UMTL will look like a program-operation complex:

- intellectual sensors;
- system of video supervision;
- Internet-technology network;
- theory and facilities of artificial neuron networks;
- different software products and etc.

The application of such approach allows to apply a relatively inexpensive but at the same time a mobile operative control of passenger transport system without any capital costs.

In a long-term prospect at using these approaches it will be possible to create a flexible computerized control of urban and regional transport of Ukraine.

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THE FUTURE POTENTIAL BENEFITS OF ELECTRIC CARS AND SELF-DRIVING SYSTEMS

In my report, I would like to speak about the transport of our future. I will tell you what is a self-driving car, how does this car work and will call some pros and cons. Today we can already buy and use electric cars in our daily life, so we are one-step away from the widespread

use of autonomous cars. Self-driving cars are based on electric cars, therefore we should first find out what they are. An electric car is a plug-in electric automobile that is propelled by one or more electric motors, using energy typically stored in rechargeable batteries.

Self-driving vehicles are cars in which human drivers are never required to take control to safely operate the vehicle. Usually this is the electric car. Self-driving cars combine sensors and software to control, navigate, and drive the vehicle. Various self-driving technologies have been developed by Google, Uber, Tesla, Nissan, and other major automakers, researchers, and technology companies.

While design details vary, most self-driving systems create and maintain an internal map of their surroundings, based on a wide array of sensors, like radar. Uber's self-driving prototypes use sixty-four laser beams, along with other sensors, to construct their internal map; Google's prototypes have, at various stages, used lasers, radar, high-powered cameras, and sonar.

Software then processes those inputs, plots a path, and sends instructions to the vehicle's "actuators," which control acceleration, braking, and steering. Hard-coded rules, obstacle avoidance algorithms, predictive modeling, and "smart" object discrimination (ie, knowing the difference between a bicycle and a motorcycle) help the software follow traffic rules and navigate obstacles. Partially-autonomous vehicles may require a human driver to intervene if the system encounters uncertainty; fully-autonomous vehicles may not even offer a steering wheel.

Self-driving cars can be further distinguished as being "connected" or not, indicating whether they can communicate with other vehicles and/or infrastructure, such as next generation traffic lights. Most prototypes do not currently have this capability. The potential benefits of self-driving cars include reduced mobility and infrastructure costs, increased safety, increased customer satisfaction and reduced crime level. Autonomous cars are predicted to increase traffic flow; provide enhanced mobility for children, the elderly, disabled and the poor; relieve travelers from driving and navigation chores. The disadvantage is that autonomous cars would make many jobs redundant. Also robots can't always make right decisions, especially when it comes to life and death.

Conclusions. Currently, there are no legally operating, fully-autonomous vehicles in the world. There are, however, partially-autonomous vehicles—cars and trucks with varying amounts of self-automation, from conventional cars with brake and lane assistance to highly-independent, self-driving prototypes. Though still in its infancy, self-driving technology is becoming increasingly common and could radically transform our transportation system (and by extension, our economy and society). Based on automaker and technology company estimates, level 4 self-driving cars could be for sale in the next several years. A couple of years ago it looked like a very distant perspective, now it is already obvious that self-driving cars will become common soon enough. However, it can't be said that the technology of self-controlled vehicles is already ready for widespread use. Because of the correct operation of the autopilot so far requires ideal road conditions. In any controversial situation on the road, the robot is not always able to make the best decision. But we seem to agree that the future belongs to autonomous cars.

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THE PROBLEM OF UKRAINIAN RAILWAY. IDLE CARS

Frequently, various kinds of problems occur between railway workers and their customers - shippers and consignees, especially large ones, caused by different views on the same problems. One such problem is a downtime of freight wagons.

The turnover of a wagon is a general, comprehensive, qualitative indicator of the work of rail transport, reflecting the results of technical, economic, and organizational activities at all levels of the railway, which characterizes both the degree of use of the wagons and the complexity of work, discipline and organization of railway workers. The turnover of the wagon determines the need for wagons of the working park for transportation. The faster the wagon turns around, the lower the turnover of the wagon and, consequently, the smaller the wagon fleet, you can perform the specified size of traffic. Consequently, this increases the amount of cargo that can be transported by the available wagon fleet. The problem of increasing the turnover time of wagons and their shortage is relevant, both for railway workers, as they receive income directly from transportation, and for cargo owners, as fines are imposed for non-compliance with the standards for idle railways. In order to improve the efficiency of rolling stock use and meet the needs of shippers, it is necessary to reduce the time lost in the wagon's turnover.

To increase traffic volumes and local speed on each leg reserves are being sought. Big downtime after the arrival of the cargo on the latest technical station along the route arises mainly at the stations with a small turnaround. The technology of accelerated promotion of car traffic flows is based on:

1. Changing the conditions of circulation of combined trains and the replacement of one-group transfer and export trains group.
2. A selection of wagons in the trains, taking into account access roads, cargo points, wagon seats and the simultaneous decrease in the number of shunting locomotives at intermediate and freight stations of the area.
3. Accelerated formation of multigroup trains due to optimization shunting runs.

In many European countries, it is not customary to distill empty wagons from one direction, to others, when this is practiced at Ukrainian Railway (UZ) and quite often. And this leads to high costs, which do not bear profits. It is often possible to observe how empty freight cars go from Lviv railway to Prydniprovsk railway to fill them with goods and send them back. When it is possible to transport cargoes that are in demand for its territory to Prydniprovsk railway.

Also the need to introduce penalties for the overload of freight wagons, which will be more profitable for UZ and for the country as a whole. As an alternative solution, you can enter a program that will calculate the number of freight cars that are empty at the stations. It is evident that this will be more efficient and the employer will be able to see for himself which wagons need to be loaded, for faster wagon turnover and the reception of goods.

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AUTOMOBILE DEPENDENCY

Automobile use is obviously related to a variety of advantages such as on demand mobility, comfort, status, speed, and convenience. These advantages jointly illustrate why automobile ownership continues to grow worldwide, especially in urban areas and developing economies. When given the choice and the opportunity, most individuals will prefer using an automobile. Several factors influence the growth of the total vehicle fleet, such as sustained economic growth (increase in income and quality of life), complex individual urban movement patterns (many households have more than one automobile), more leisure time and suburbanization. Therefore, rising automobile mobility can be perceived as a positive

consequence of economic development. The automotive sector is a factor of economic growth and job creation with several economies actively promoting it.

The acute growth in the total number of vehicles also gives rise to congestion at peak traffic hours on major thoroughfares, in business districts and often throughout the metropolitan area. Cities are important generators and attractors of movements, which have created a set of geographical paradoxes that are self-reinforcing. For instance, specialization leads to additional transport demands while agglomeration leads to congestion. Over time, a state of automobile dependency has emerged which results in a declining role of other modes, thereby limiting still further alternatives to urban mobility through path dependency. In addition to the factors contributing to the growth of driving, two major factors contributing to automobile dependency are:

Underpricing and consumer choices. Most road infrastructures are subsidized as they are considered a public good. Consequently, drivers do not bear the full cost of automobile use, such as parking. This is also reflected in consumer choice, where automobile ownership is a symbol of status, freedom and prestige, especially in developing countries. Planning and investment practices means planning and the ensuing allocation of public funds aim towards improving road and parking facilities in an ongoing attempt to avoid congestion. Other transportation alternatives tend to be disregarded. In many cases, zoning regulations impose minimum standards of road and parking services and de facto impose a regulated automobile dependency. There are several levels of automobile dependency, ranging from low to acute, with their corresponding land use patterns and alternatives to mobility. Among the most relevant indicators of automobile dependency are the level of vehicle ownership, per capita motor vehicle mileage and the proportion of total commuting trips made using an automobile. A situation of high automobile dependency is reached when more than three quarters of commuting trips are done using the automobile. For the United States, this proportion has remained around 88% over the recent decades. Automobile dependency is also served by a cultural and commercial system promoting the automobile as a symbol of status and personal freedom, namely through intense advertising and enticements to purchase new automobiles. Not surprisingly, many developing countries perceive motorization as a condition for development. Even if the term automobile dependency is often negatively perceived and favored by market distortions such as the provision of roads, its outcome reflects the choice of individuals who see the automobile more as an advantage than an inconvenience.

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NEGATIVE IMPACTS OF CARS ON THE PEOPLE AND ENVIRONMENT

Nowadays the need for transport has no doubt. Vehicles have a great positive impact on the economy, create comfort for people. The development of transport, increasing its role in people's lives is accompanied not only by the positive effect, but also by negative consequences, in particular, the high level of accidents of transport vehicles and people injuries. Any vehicle is a source of increased danger. The person who uses the vehicle's services is in a high-risk area. This is due to the possibility of accidents and catastrophes of trains, planes, sea and river vehicles. Annually more than 1.7 million people die in accidents and more than 30 times more injuries around the world. A significant increase in the number of various vehicles in recent years has led to an increase in traffic injuries.

Traffic accidents are understood as mechanical damage caused by external or internal parts of transport during its movement. The greatest variety of injuries is the injury of ground transport which is divided into two large groups: wheeled and non-wheeled transport injuries.

Road safety is a serious and growing problem in Ukraine. Road safety performance is very poor by international standards and deteriorating. With close to 160 deaths per 1 million inhabitants, Ukraine is approx. 2-3 times above the best performing EU Member States and 10 - 30% above its neighbours (Poland and Slovakia). Compared to neighbouring countries such as Poland and Slovakia, the number of fatalities per 10,000 vehicles is also significantly higher, with approx. 13.4 times in Ukraine, 4.5 times in Slovakia and 3.6 times in Poland and compared to Denmark approx. 7 times higher.

Apart from the fact that road transport is harmful to humans, it also negatively affects the environment. From this position, we can formulate the following negative impacts of cars on the environment.

The first group is related to the production of cars:

- high resource and raw material and energy capacity of the automobile industry;
- the actual negative impact on the environment of the automotive industry (foundry, instrumental and mechanical production, tire production, etc.).

The second group is due to maintenance:

- fuel and air consumption, emissions of harmful exhaust gases;
- emissions of tire and brake test products;
- noise pollution of the environment;
- material, human losses and losses of the animal world as a result of transport accidents.

The third group is associated with the alienation of land under the transport trunk, garages and parking:

- development of infrastructure for car service (gas stations, service stations, washing stations);
- supporting of highways in working conditions (use of salt for melting snow).

The fourth group combines problems of regeneration and utilization of tires, oils and other technological liquids, used cars.

Car pollutants cause immediate and long-term effects on the environment. Car exhaust gas emits a wide range of gases and solid matter, causing global warming, acid rain, and harming the environment and human health. Engine noise and fuel spills also cause pollution. Cars, trucks and other forms of transportation are the single largest contributor to air pollution but car owners can reduce their vehicle's effects on the environment. It became necessary to rethink air pollution control strategies including the long-term monitoring of affected receptors.

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TECH AND THE FUTURE OF TRANSPORTATION

There is inevitably a lot of hype surrounding the future of transportation, but also plenty of substance, with big investments being made both by disruptive tech companies and by incumbent industry players. Can technology help to get us and our goods around quicker, in greater safety, and with less damage to the planet? Transportation changes are either incremental or revolutionary. The future of transportation will be influenced through a higher integration between physical and information systems.

SpaceX successfully launched the Falcon Heavy rocket - the heaviest rocket lift at the moment - and perhaps the transport revolution is closer than we think. Consider how amazing the transport of the future can be. The cities of the future will become increasingly convenient for cyclists. Cars on the roads will occur less and less - especially in large cities. Madrid, Copenhagen and Hamburg are adopting a car-free policy to become the most green capitals and smart city. But between the cities the motorways will become super-fast - Ilon Musk is already going to build such a high-speed tunnel between Los Angeles and its suburb Culver City. There, cars will be able to move without traffic jams and at speeds up to 240 km/h. The roads themselves will also change and, in addition to transport, they will provide settlements with energy. Already in France there is an experimental road laid out with solar batteries: 2,800 square meters of solar panels were laid out on a section of the road of one kilometer long. The energy generated by the "solar road" is enough for all street lamps of the nearest village, and the company that completed the project believes that France can become energy independent if only 250 thousand kilometers of roads are paved with solar panels. Over a million people a year are killed in road traffic accidents, with tens of millions more injured. The emergence of smart roads connected to the internet of things (IoT) can significantly help to reduce road deaths, as IoT-enabled road sensors can instantly get to about the best ways to avoid hazards or adverse road conditions. A Portuguese scheme, co-funded by the European Union, is set to create around 1,000 kilometers of smart roads in the country. This programmer will see a series of cutting-edge transportation technologies installed on the route, facilitating wireless communication between road-based infrastructure nodes and smart cars. It is not just safety issues that technologically enabled roads can help address, with Sweden recently completing a pilot project that saw two kilometers of road transformed into an electrified track that recharges electric cars and trucks while they drive. In the future, wireless battery chargers will be found underneath roads, helping to reduce the level of air pollution and virtually eliminating the need for fossil fuels to power cars.

New transportation technologies are becoming increasingly complex and governments are often in the position of having budgetary constraints and the lack of capabilities to directly implement them. It is thus likely that future transport systems will be the outcome of private initiatives, or public-private partnership schemes, with the market (transport demand) the ultimate judge about the true potential of a new transport technology. Economic history has shown that market forces will always try to find and adopt the most efficient form of transportation available. Some transport systems or technologies have become obsolete and have been replaced by other that are more efficient and cost effective based upon the prevailing input conditions such as labor, energy and commodities.

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LE TRANSPORT DES MARCHANDISES DANGEREUSES EN UKRAINE

Chaque jour sur les routes ukrainiennes, on rencontre des milliers de camions transportant des explosifs, des matières corrosives ou radioactives. Ils conduisent pratiquement sans surveillance. Une mauvaise manipulation peut entraîner la mort, d'énormes pertes matérielles et une contamination de l'environnement.

Le transport de matières dangereuses, par sa diffusion à travers l'espace et sa proximité avec des lieux habités, suscite une crainte continue d'accidents catastrophiques. C'est pourquoi il est couvert par une réglementation très régulièrement actualisée et un management très attentif des entreprises de transport [1]. Les marchandises dangereuses en Ukraine sont transportées

principalement par la route et un peu par le rail. L'Ukraine a ratifié le Règlement concernant le transport international de marchandises dangereuses par chemin de fer - RID et l'accord européen relatif au transport international des marchandises dangereuse par route - ADR en 2010.

Même si le RID et l'ADR sont ratifiés, il y a malheureusement encore des problèmes dans le secteur des transports, en particulier en ce qui concerne le transport des marchandises dangereuses. Le groupe le plus nombreux de marchandises dangereuses comprend en particulier les combustibles liquides.

Pour réduire le risque pendant le transport, il existe un système d'information complexe qui surveille en temps réel les marchandises dangereuses et qui est interconnecté en ligne avec un système d'urgence intégré. Pour déterminer ce type de système, il convient de prendre en considération les qualités suivantes: modularité, flexibilité, possibilité d'être utilisé dans des environnements hétérogènes, interopérabilité, utilisation de standards ouverts, performance, , système, etc. fiabilité, sécurité et sûreté de l'information, convivialité de l'interface utilisateur, intelligence service [2].

En vertu de l'accord ADR, dans le cas des véhicules transportant des marchandises dangereuses à haut risque, il devrait y avoir des dispositifs de surveillance utilisés pour les marchandises dangereuses (systèmes de télémétrie, dispositifs de suivi des mouvements de marchandises), afin de prévenir efficacement le vol des véhicules et des marchandises.

Par conséquent, pour assurer la surveillance des marchandises dangereuses en Ukraine, il est nécessaire de concevoir et de mettre en œuvre un système national de surveillance des marchandises dangereuses.

Il n'existe pas de système de contrôle en temps réel des véhicules transportant des marchandises dangereuses en Ukraine. L'objectif est de développer un système coopératif pour les véhicules de transport de marchandises dangereuses par la surveillance des itinéraires, le réacheminement (en cas de besoin) et le soutien des chauffeurs, sur la base de données dynamiques en temps réel, afin de réduire au minimum les menaces liées aux déplacements des véhicules de transport de marchandises dangereuses.

Ce système peut apporter une contribution significative : améliorer la sécurité des personnes et l'environnement, élaborer des méthodes pour minimiser les dommages et les coûts, améliorer l'échange d'informations entre les centres de production, de transport, de collecte et de sauvetage, développer des méthodes de coopération sur le site de dépannage.

Références

1. <https://www.unece.org/fr/trans/danger/publi/adr/adr2017/17contentsf.html>
2. http://www.sante-securite-paca.org/risques_prevention/risque_rutier/transport_matières_dangereuses.php#

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CRITERIA FOR CHOOSING A MODE OF TRANSPORT

The choice of transport is one of the most important and basic decisions in logistics management. Very often, the transportation of cargo is the main item of expenses and ranges from 40% to 50% of logistics costs and from 4% to 10% of the final cost of the product.

There are various ways to transport goods between countries. When planning the departure of goods and the choice of mode of transport, it is necessary to take into account a number of circumstances. The following of them affect the choice of vehicle type:

- cargo weight, volume, consistency, hazard category. It is necessary to take into account that different types of transport have different limits on the weight and volume of transported goods.

- distance and route of transportation. The place of departure and the final destination of transportation are also determined when choosing a mode of transport.

- time of delivery of the goods to the customer. If the customer needs a short delivery time, it is necessary to choose a fast mode of transport as possible. If there is no limit on the delivery time, it is logical to choose a more economical type of delivery.

The time required for delivery of the goods is important in the case of transportation of perishable goods or fashionable clothing. For example, transportation over long distances may require about two months, therefore it is necessary to rely on design and production, given time, otherwise, the customer will receive clothes on store shelves only by the end of the season:

-economic aspect, the issue of fare. Naturally, each mode of transport, due to its specific features and technology, has its own cost price, which is the basis of the fare (prices for transport services).

- fuel consumption;

- quantity - one of the main values when choosing a mode of transport is given to the analysis of the transportation network of the region of transportation and carrying capacity of its transport routes, i.e. the number of goods or passengers that he is able to transport per hour with sufficient speed and appropriate quality.

- cargo value (insurance) and cargo safety, non-fulfillment of supplies.

Choosing the type of transport for the carriage of goods, it is necessary to take into account that each of them has specificity and peculiarity. The choice of vehicle depends on the type of cargo, distance, dimensions of cargo, delivery time, quantity, fuel consumption.

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MODERN WAYS TO MONITOR ROAD SAFETY

Road safety is very important these days. According to the statistics, a lot of fatal accidents happen on the road. There are several reasons for this: conscious and unconscious violation of traffic rules, ignorance of these rules, vehicle malfunctions, poor road conditions and poor control of safety and traffic on the roads in general. Dealing with some of these problems is quite simple. For example, to eliminate situations with ignorance of the rules, it is necessary to change the concept of education in driving schools, as well as intensification of the teaching road basics for children in schools, for understanding the dangers of improper behavior on the roads from an early age. Also, cases of accidents can be significantly reduced by increasing the fines for violating the rules of the road and, of course, improving the skills of people who are obliged to keep order on the roads. In this article I want to talk about some of the new technologies and road safety monitoring devices.

Surveillance cameras and radars. Sometimes it happens that an accident occurs, but it's not recorded, the culprit is not found, and reasons are not established. For these cases, photo and video fixation devices are needed. Ukraine is already considering the issue of installing video cameras that will recognize car license plates and transfer to the police in case of violations, measure movement speed and investigate the space-time characteristics of the vehicle. This will help in a timely manner to take measures to punish offenders and reduce the number of incidents due to traffic violations.

Modern pedestrian crossings. Not all accidents happen because of the driver's fault; there are also many accidents due to pedestrians, especially at unregulated crosswalks, therefore measures should be taken to increase safety in places on the road where the pedestrian meets with the driver of the car. For example, the modernization of traffic lights. Now the traffic lights on the roads make great innovative steps forward. It's not just green and red lights already, but sound and light warning devices, and this is definitely great. The next step, which is offered by engineers, will be a laser projection in the form of a red or green grid, placed along a pedestrian crossing, which will attract the attention of the driver and pedestrian, which is much larger than a traffic light signal. Also, these devices will have motion sensors. That is, when moving or moving at the wrong time, the sensors will activate the cameras, which will fix the intruder.

Modern roads. When we talk about safe roads, we imagine smooth roads without holes and pits. Scientists have gone far ahead, they invented, for example, roads with luminous markings and warning symbols, "smart" roads that will tell cars the way, or even a special asphalt from nanobacteria that "heals" pits by itself. Of course, until we reach at least good road conditions, it's rather difficult to talk about such technologies, so we can only wait when we will see them and can try them personally.

Adding to all these methods and devices for improving quality of the road surface, thorough vehicle diagnostics and repair before going into use, road lighting and better road planning in general, we will come to the future in which there will not be such a huge number of accidents and deaths on the roads and the movement will be much safer.

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THE WORK OF LOCOMOTIVES WITH TRAINS

In the process of the development of domestic rail transport, the system of locomotive usage was improved. At the same time, there was a change in the methods of servicing locomotives brigades, lengths of locomotive turning points, traction rolling stock repair technologies, and, consequently, the methods of locomotive usage. For example, previously the massive use of variable ride with locomotive traction was organized. But at the same time, attention was diminished to the technical maintenance of the locomotive park and, as a consequence, a return to the previously adopted ride. Replacing locomotives with locomotives and electric locomotives, new forms and methods of operating a locomotive, servicing them with replaceable locomotive crews, driving trains without separating locomotives from a train at distances up to 1000 km and more appeared.

Depending on the location on the railway line of the main and rotating depot, transit, traffic, type of traffic flow, different methods of locomotive work with trains are used.

The haul method is used when only one section of traffic (one tractive arm) is adjacent to the main depot or the main depot is located at the sorting station and most locomotives in this station are separated from the trains. In the case of the haul method, after the service of trains, the locomotive is sent to the depot for maintenance scope 2, equipping and changing brigades.

The circular method is used, as there are at least two traction hauls to the main depot and a high traffic flow coefficient at the main depot station.

Moving from the point of rotation, the locomotive arriving at the station of the main depot isn't detached from the train, but it passes the train further to another traction haul (to the second point of rotation), where it turns and returns with the oncoming train near the station of the main depot to the first point of rotation. Locomotive equipment, depending on necessity, can

be served at the turning points, on the station tracks of main depot and at intermediate stations (if there are any), where special equipment is being built. Maintenance scope 2 is carried out at the turning points, at the location of the locomotive service point.

In the circular method, the non-production time of locomotives is reduced and the need for a locomotive fleet is reduced by approximately 6-9% compared to the haul. The load of the main depots receiving and departing parks decreases, their capacity increases too. Additional investments in the equipment business pay off in 2-3 years.

The loop method is a kind of circular method and is also used in the case of adjoining to the station with the main depot of at least two traction hauls. This method is effective in rearranging trains at a station with the main depot or in the absence of service facilities at the station and sending locomotives to the equipment (and maintenance) in the main depot. In the loop method, the required fleet of locomotives is reduced by 3-4% compared with the haul.

As we see, circular way of servicing train locomotives is most effective.

The circular mode of locomotive maintenance is of the highest priority for use due to its highest efficiency in comparison with other methods.

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CHINA INTENDS TO BUILD A RAILWAY TUNNEL UNDER MOUNT EVEREST

China is considering extending a railway line linking the country to Nepal via a tunnel under Mount Everest, according to Chinese state media. The ambitious project of the Chinese government, which was presented in China in early 2014, continues to acquire new and rather interesting details. First of all, we note that we are talking about neither much nor little construction of the branch line of the Qinghai-Tibet railway to the base camp of Everest! Traversing valleys, mountains and crossing the glacier-fed Brahmaputra River, the line takes in breathtaking views of snow-capped peaks and majestic plateaus as it wends from the territory's capital to its second city.

The track is an extension of the Qinghai-Tibet line – an engineering marvel named the "closest stretch of railway to the sky" after it first carried passengers above 5,000 meters in 2006. Work on the new \$2.1 billion line across the roof of the world began in 2010. When it opens, it will allow passengers to connect by rail from Beijing all the way to Shigatse, a gateway to Everest, which lies just 240 kilometers away, on the border with Nepal. Suolang Deji, an officer with Shigatse's tourism department, told CNN the railway would be inaugurated at the end of August and would initially carry Chinese visitors. "The first batch of tourists is from Shandong province," she said.

"The line will probably have to go through Qomolangma so that workers may have to dig some very long tunnels," railway expert Wang Mengshu told the China Daily, referring to Mount Everest by its Tibetan name.

Owing to the challenging Himalayan terrain, with its remarkable changes in elevation, trains on any line to Kathmandu would probably have a maximum speed of 75mph (120km/h), he added.

The railway is a part of a huge Chinese investment program in the infrastructure of its remote western territories that is seen as an effort to consolidate Beijing's economic and political control of the autonomous region.

Such developments have not been welcomed by some Tibetans who say China invaded their land in 1950 and dispute Beijing's claim that the Himalayan plateau has historically been a part of China.

Political tensions mean that access to the railway for non-Chinese tourists is likely to be subject to tight controls.

In addition to Chinese visas, foreign visitors already require special permits to enter Tibet and the availability of these is subject to sudden change. Anyone hoping to travel on from Shigatse to Everest or Nepal will have to wade through further red tape.

It was unclear to what extent China had consulted any of the other countries whose consent would be required, although it was announced that Thailand's military junta had approved a \$23bn transport project that would see two high-speed railways link up directly with Kunming, via Laos, by 2021. The line would form part of the planned route to Singapore, which would also run through Malaysia.

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FEATURES OF THE DEVELOPMENT OF THE WORLD'S TRANSPORT SYSTEMS

The modern world's transport system is a service industry that transports goods and passengers, was formed in the twentieth century. The transport system includes infrastructure (roads, railways, canals, pipelines), terminals (railway and bus stations, airports, sea and river ports), vehicles. Transport provides the economic relationship between the territories.

The development of transport in itself affects the surrounding area, giving it special impulses of accelerated development. Territories provided with transport infrastructure are becoming more attractive for many types of human activity.

Progress in the means and means of communication (an increase in the tonnage of ocean vessels, their speed, container transportation, mechanization of loading and unloading) contributed to the growth of world trade and the involvement of new types of resources into economic circulation.

A few centuries ago, the most important international goods were expensive goods of low weight and volume (jewelry, spices, fabrics, salt), with the development of the international division of labor, means and means of communication, world trade became global and mass goods and raw materials got involved in trade exchange.

Statistical indicators for analyzing the level of development of transport are the density of the network (calculated relative to the area of the service area, population, shipped goods), the average distance of traffic, freight turnover.

Regional transport systems of North America have the highest level of development (about 30% of the total length of world routes of communication, e. i. the first place in terms of freight turnover) and Western Europe (the first place in terms of the density of the transport network). In these regions, there is a reduction in the network of railways and an increase in road transport.

In developed countries, road transport is leading (40% of traffic), railway accounts for 25%. In countries with transitional economies, the railway turnover prevails in freight turnover (60%), while automobile transport accounts for 9%.

Europe plays an important role in the export of international transport services (about 50%) and Asia (25%), America accounts for 13%, all other regions - 11%.

Freight transport. In freight traffic maritime transport is leading, it accounts for 2/3 of the transported goods. Sea transport, as the cheapest, connects the main areas of production of goods, separated by oceans - Europe - America - Japan and China. The share of railway - intracontinental - transport in the world freight turnover over the past 50 years has decreased by almost 2 times (up to 15%), the share of pipeline transport is growing. Inland transport is dominated by road transport.

SECTION 2. ADVANCEMENTS, PERSPECTIVES, AND PROBLEMS OF ENGINEERING

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BRAKE SYSTEM INSTALLATION

The brake system combines the braking mechanism and the brake drive. The brake mechanism is designed to create the braking torque necessary to slow down and stop the car. The cars are equipped with friction brakes, the work of which is based on the use of frictional forces. The brake mechanisms of the working system are installed directly in the wheel.

The brake mechanism consists of a rotating and stationary part. As a rotating part of the drum mechanism, a brake drum is used, the stationary parts are brake pads or tapes. The rotating part of the disk mechanism is represented by a brake disc, the immobile part is represented by brake pads. As a rule disc brakes are installed on the front and rear axle of modern cars. The disc brake mechanism consists of a rotating brake disc, two fixed pads installed inside the caliper on both sides. The support is fixed to the bracket. In the slots of the support, working cylinders are installed, which, while braking, press the brake pads against the disk.

Brake discs become very hot during braking. Cooling of a brake disc is carried out by a stream of air. For better heat dissipation, holes are made on the surface of the disk. Such disc is called ventilated. To improve the efficiency of braking and provide resistance to overheating on sports cars, ceramic brake discs are used. Brake pads are pressed against the support by spring elements. Friction linings are attached to the pads. On modern cars, brake pads are equipped with a wear sensor.

The brake drive provides control of the brakes. In brake systems of cars the following types of brake drives are used: mechanical, hydraulic, pneumatic, electric and combined types. The mechanical drive is used in the parking brake system. The mechanical drive is a system of links, levers and cables connecting the parking brake lever with the rear wheel brakes. It includes a drive lever, cables with adjustable tips, cable equalizer and shoe drive levers. The hydraulic drive is the main type of drive in the service braking system. The hydraulic drive design includes a brake pedal, brake servo, brake master cylinder, wheel cylinders, connecting hoses and piping.

The brake pedal transmits the force from the driver's foot to the main brake cylinder. The brake booster generates an additional force transmitted from the brake pedal. The main brake cylinder creates the brake fluid pressure and pumps it to the brake cylinders. Above the main cylinder is an expansion tank, designed to replenish the brake fluid in case of small losses. The wheel cylinder ensures the operation of the brake mechanism, i.e. pressing brake pads to the brake disc (drum).

To implement brake functions, the operation of the hydraulic drive elements is organized in independent circuits. If one circuit breaks down, another circuit performs its functions.

Working circuits can duplicate each other, perform part of each other's functions, or perform only their functions. The pneumatic drive is used in the brake system of trucks. The combined brake drive is a combination of several types of drive. For example, an electropneumatic drive. The braking system is the basis for the safe movement of the car, since it is designed for controlled changes in the speed of the car, its stopping, and also saving in place. Therefore, it must always pay close attention to it. In the event of a malfunction of the service braking system, the operation of the vehicle is prohibited completely.

References

1. Системы современного автомобиля [Электронный ресурс] – Режим доступа: <http://systemsauto.ru/brake/brake.html>

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MULTICOPTERS AND QUADCOPTERS: THEIR PROSPECTS AND APPLICABILITY

A multirotor or multicopter is a rotorcraft with more than two rotors. An advantage of multirotor aircraft is the simpler rotor mechanics required for flight control. Unlike single- and double-rotor helicopters which use complex variable pitch rotors whose pitch varies as the blade rotates for flight stability and control, multirotors often use fixed-pitch blades; control of vehicle motion is achieved by varying the relative speed of each rotor to change the thrust and torque produced by each.

Due to their ease of both construction and control, multirotor aircraft are frequently used in radio control aircraft and UAV (unmanned aerial vehicle) projects in which the names tricopter, quadcopter, hexacopter and octocopter are frequently used to refer to 3-, 4-, 6- and 8-rotor rotorcrafts, respectively.

In the 20th century, the use of quadcopters was a novelty. One of the first manned copters with four rotors, which in practice could detach from the surface and hover above the ground, was created and tested by the Russian-American aircraft designer Georgy Botezat in 1922.

Let's look at the use of quadcopters. London restaurant Yo Sushi - an institution where they use quadcopters instead of waiters. Here the drones, which are remotely controlled from the app on the iPad, deliver food directly to the visitors' tables on a tray.

In 2013, Amazon announced that it was working on organizing the delivery of parcels to cities in America using copters. In 2017, an application for patenting the tower was filled, which will be the starting point for drones. Air Courier will track the location of the recipient through the application on the smartphone of the latter and be able to go directly to the target, scanning the terrain and avoiding collisions with animals and people in their path. Now the project called Prime Air is in the testing stage, Amazon is working on the design of the copter-couriers.

We are aware of another company's plans to arrange delivery by means of UAVs: Domino's pizza has purchased so-called "housecopters" for this purpose. In 2016, for the first time, a pizzeria delivered an order to the island of Whangaparaoa in New Zealand. In the future, the company plans to arrange a delivery in Australia, Belgium, France, the Netherlands, Japan and Germany.

How to use drones, in addition to entertainment? Rescue services with their help looking for lost people. Engineers from Switzerland taught the quadcopter to navigate in the forest: the device scans the area around, finds footpaths trodden by man, and flies over them at a height of about two meters. To prevent the robot from crashing into trees, scientists at the University of Zurich have developed special software for it, in fact, it is artificial intelligence, trained by a

neural network. The developers promise that after finalizing the program, it will be enough to send up to six quadcopters to search for those who have lost their way.

The management of the German railway company Deutsche Bahn bought drones to prevent acts of vandalism, after unknown hooligans painted the graffiti cars of one of the company's trains. Copters hover over the protected object and rapidly fly down when sensors record suspicious activity.

UAVs use is rapidly expanding to commercial, scientific, recreational, agricultural, and other applications, such as policing, peacekeeping, and surveillance, product deliveries, aerial photography, agriculture, smuggling. UAVs can threaten airspace security in numerous ways, including unintentional collisions or other interference with other aircraft, deliberate attacks or by distracting pilots or flight controllers.

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CYBORGS: THE TRUTH ABOUT HUMAN AUGMENTATION

Probably 50 years ago people had no image how cyborgs look like and how they work. However today it is not a fantasy anymore. In current reality we can see that there are different ways and fields of science in which we can apply them in everyday life.

Many developments were made in augmentation possess. This technology can transform incredibly lives of those who have problem with their health and are disable to do simple tasks.

According to Gabriel Licina, who is dealing with unlocking infrared vision in humans “The myth to dispel is that with an augmentation, people will easily become superhuman. It's important that we stay grounded in scientific reality. This doesn't mean that there isn't room for improvement, it just means that it's not as easy as just popping a pill or flicking a switch.” She and other members of her working team have found during their experiments that this method can improve human night vision by tweaking their nutritional input. However, there is there is one disadvantage which is based on the fact that patients can lose a perception of blue or green colors a little bit. Here augmentation is seen to like a good method which can help people to prepare themselves for a new lifestyle. In Licina’s research we also can see that the importance of the point that augmentation does not have to be connected with technology is raised. The mentioned that people do not have to get a special chip which will be inserted in their bodies. In addition it can involve different biological tricks too.

John Cryan was very interested in this subject and described this process with an example of how the bacteria in gut can make you smarter. “When we talk about brain augmentation, it is vital to think also below the neck. Neuroscience must understand the importance of signals from the periphery: from the immune system, gut hormones or microbes,” he said.

Nonetheless, people must remember that when we begin to augment ourselves we can lose control. Thankfully, according to Stuart Meloy, there is a chance that humanity will survive in our fast developed world. He said: “One concern that was expressed with pleasure implants was the use of the device to point of distraction or neglect of self, like the proverbial rats that starved to death because they had a choice of pushing a lever for food or getting an electrical stimulation of their pleasure centers in the brain. Humans are more complicated than rats.”

Nonetheless, there are many people who are against trans human aspirations and think that it is unnatural. For those Neil Harbisson, a person who wears an antenna which allows him to differentiate color, suggests his opinion about this topic: “Some might think that we might become less human if we modify ourselves, but I believe there is nothing more human than doing that. I strongly disagree with those who think that our union with technology will alienate

ourselves from reality, from nature or from other livings. In my case, becoming technology does not make me feel closer to machines, or to robots, but quite the opposite. Having an antenna makes me feel closer to insects and other creatures that have antennae, hearing through bone conduction make me feel closer to dolphins and other marine species that perceive sound through their bones, having ultraviolet and infrared perception makes me feel closer to insects and mammals that perceive these colors. I feel a stronger connection with nature now than I ever did before. Technology can bring us back to nature.”

In conclusion, we hope that in the nearest future this technology will improve lives of people with different disabilities and all debates will go on the background.

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ON EXPERIMENTAL AND COMPUTATIONAL INVESTIGATION OF HEAT TRANSFER DETERIORATION AND HYDRAULIC RESISTANCE IN ANNULAR CHANNEL AND SCWR 3-ROD BUNDLE

Keeping in mind crucial position of heat transfer deterioration (HTD) in the problem of super critical water reactors (SCWR) operation security it is very important to clarify an impact of coolant free convection and dynamic viscosity, flow thermal acceleration and channel inertia/friction resistance, as well as thermoacoustic oscillations of pressure (TOP) on the level of heat flux causing transition to HTD. As known, heat transfer is a resulting effect of molecular and turbulent forces in the flow of coolant, in their turn, depending upon its thermophysical properties, operation conditions (inlet temperature, heat flux, mass velocity, pressure, flow direction) and geometric parameters (heated diameter and length), to say nothing about roughness of heated surface, kind of coolant and its pureness, as well as even acoustic characteristics of the channel. Interaction between them becomes significantly complicated in the zone of pseudocritical state with its extremely non-linear variation of thermophysical properties.

No wonder, until now the attempts to describe this process either theoretically or empirically are not very successful and the difficulties could be overcome possessing only direct (velocity and temperature fields) or reliable indirect (friction and acceleration resistances) data on thermohydraulic structure of the flow. Probe measurements, especially in the channels of small diameter are still practically impossible. Available is only measurement of full pressure drop, but as it was rightly noted, e.g., in [1], it is also connected with significant experimental problems of obtaining local values of frictional and inertial components of hydraulic resistance. That is why the relevant data so far are very limited.

The experiments on upward flow of supercritical water in a vertical annuli and 3-rod tight bundle simulator made of 485-mm heated-length tubes of 5.2-mm OD and 4.5-mm ID with four helical ribs of 0.6-mm height, 1-mm width, and axial 400-mm pitch were carried out at the Igor Sikorsky Kyiv Polytechnic Institute.

Heat transfer and pressure drop under various operating conditions (inlet pressure and temperature, flow mass rate and heat flux) were investigated. Longitudinal wall temperature profiles made it possible to determine the place and flow thermal state of heat transfer deterioration (HTD) onset. Analysis of the obtained data (about 200 regimes) proved their good enough agreement with the correlations previously derived by the authors both for the heat flux rate $(q/G)_b$ of HTD beginning and for pressure drop in round tubes and annular channels. These correlations were updated to correct the results of their prediction.

Computational fluid dynamics and its counterpart computational heat transfer were used for modeling the above-mentioned thermohydraulic processes studied in the first part of the work by finding the most adequate flow turbulence model and optimized domain meshing. The accepted model was benchmarked by some data on heat transfer and pressure drop in tubes and annular channels cooled by SCW [2].

References:

1. Petukhov B.S., Kirillov V.V. On heat exchange under turbulent flow of liquid in tubes. (In Russian)/ Heat Power Engineering (Tyeploenergyetika), No.4, pp.63-68, 1958.
2. Filonov V.V., Filonova Y.S., Razumovskiy V.G., Pis'mennyi E.N. on experimental and computational investigation of heat transfer deterioration and hydraulic resistance in annular channel and SCWR 3-rod bundle. Proceedings of the 2018 26th International Conference on Nuclear Engineering – ICONE26-81289. London, Great Britain, July 22-26, 2018.

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**REACTOR CORE BAFFLE TEMPERATURE DISTRIBUTION EVALUATION
FOR SWELLING ASSESSMENT**

Swelling is the main limiting factor in the reactor core internals long term operation of VVER-1000 nuclear units. The material irradiation-induced swelling and creep models are very sensitive to temperature distribution in metal, thus a more detailed analysis of the core baffle metal thermohydraulic cooling characteristics is required.

In recent years the use of CFD analysis has become widespread in calculations to clarify the distribution of thermal and hydraulic parameters in the reactor and to obtain profiles of the coolant temperature distribution during the transient processes. It must be noted that the core is represented in the form of a porous body. In order to predict temperature distribution in the core baffle metal, CFD analysis is used only for PWR reactors of a different type (not for VVER's) in order to predict the temperature embrittlement processes of structural elements.

In this paper we present an improved estimation of reactor core baffle temperature distribution, during operation, at the nominal power level to address swelling problems of the reactor internals.

There are two fundamentally different approaches to determining the temperature field in the core baffle metal. The first approach is a detailed modeling of the geometry starting at the inlet nozzles, taking into account all the structural elements that cause the above-mentioned flow transformation features. Here, the number of required determining boundary conditions decreases, but at the same time the demand on the computational grid dimension increases, particularly for the boundary layer. Consequently, this approach is computationally expensive. The second approach is to narrow the boundaries of the computational model and to make geometric simplifications and physical assumptions by conducting a preliminary analytical estimation. In this case, the calculation model is significantly simplified and the requirements for computational resources are reduced.

Using this second approach, it is possible to limit the computational domain boundaries by the height of the core baffle, where the core is modeled as a porous body. An original analytical model was developed to estimate specific thermal-hydraulic effects and compensate them by appropriate boundary conditions (BC) applied to the CFD. Obtained BC's allow us to simplify CFD analysis, i.e. the real geometry of the cooling channels was replaced by equivalent elements, the core was presented as porous body with the appropriate characteristics. CFD analysis was performed using 60 – degree symmetry, which included: core, baffle and core

barrel, it is limited by the height of the baffle. Core is simplified as a homogeneous body with considering of spatial volumetric energy release. Core baffle is presented as monolithic body with considering of gamma-ray heat generation. Model includes a simplified geometry of connecting studs, considering cooling flow of the coolant through the nuts grooves [1]. Calculated convection coefficient and temperature are in good agreement with analytical model, and give a more convenient result comparing to RELAP5/mod3.2. Obtained results were used to estimate baffle swelling process. Due to the less conservative results in temperature distribution swelling and creep deformations significantly decreased.

References:

1. Filonova Y.S., Filonov V.V., Dubyk Y.R. Reactor baffle cooling CFD framework for swelling assessment. Proceedings of the 2018 26th International Conference on Nuclear Engineering – ICONE26-82365. London, Great Britain, July 22-26, 2018.

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CAN GIANT MAGELLAN TELESCOPE HELP PEOPLE TO FIND LIVING BEINGS IN THE UNIVERSE?

Many planets similar to Earth are believed to exist in space, but we cannot consider them in detail yet. In the last decade, we have discovered thousands of planets outside our solar system and have learned that rocky, temperate worlds are numerous in our galaxy. The next step will involve asking even more important questions. Could some of these planets host life? And if so, will we be able to recognize life elsewhere if we see it?

In order to answer the key questions of modern astrophysics, experts build the giant Magellan telescope. It will be the first in a new class of Extremely Large Telescopes, capable of exploring the cosmos with unprecedented clarity and sensitivity. The GMT will leverage cutting-edge optics technology to combine seven giant mirrors to achieve 10 times the angular resolution of the Hubble Space Telescope in the infrared region of the spectrum. When it begins operations early in the next decade, GMT will embark on a mission of discovery to explore the origins of the chemical elements (carbon, oxygen, nitrogen and others) that make up our planet and our bodies, the formation of the first stars to form in the universe, and the mysteries of dark matter and dark energy. The GMT will also search distant exoplanets for signs of biological processes around other stars in our Milky Way galaxy.

The exact system of mirrors of this device may allow us to discover the first inhabited planets, learn more about the past of the universe and answer many of its other mysteries. The giant Magellan telescope is a new large astronomical observatory, the construction of which will be completed in 2025. This international project worth about \$ 1 billion led by the United States, in partnership with Australia, Brazil, Korea and Chile, will be built on a peak in the Andes Mountains near several existing telescope facilities at Las Campanas, Chile at an altitude of 2.516 meters. This place is chosen because of the clear weather, high altitude, dry climate, dark skies, and unsurpassed seeing quality, as well as its access to the southern sky.

The telescope weighing 1600 tons is composed of seven mirrors with a height of 8.4 meters. It will be installed on a concrete base inside a rotating dome (65 meters high and 56 meters in diameter). The telescope will form a single optical surface with a diameter of 24.5 meters. The principle of operation of the Giant Magellan telescope is that the light hits the main mirror, then it is reflected on smaller secondary mirrors and, finally, through the opening of the main mirror it hits the matrix of the charge-coupled device. There the light will be measured by various instruments mounted on the telescope. As of the summer of 2018, 5 out of 7 mirrors are

ready. When all the mirrors for the Giant Magellan Telescope are ready, they will be installed on a closed platform on the top of the mountain. The giant Magellan telescope will be equipped with a lifting mechanism, cranes, an air conditioning system, power sources, etc. The mechanism of its operation is quite complicated. To create special telescope mirrors, specialists put one high-quality borosilicate glass one by one into a huge circular shape, divided into cells like honeycombs. Then it is heated to 1171 ° C and slowly rotated so that the glass melts and evenly distributes inside. After that, the mirror is cooled and polished with an accuracy of about one millionth of an inch. At the end of the polishing surface is covered with a thin layer of aluminum to achieve maximum reflectivity. The entire production process takes several months, because the mirrors of a giant telescope are designed to capture the incredibly ancient light that came to Earth from the farthest corners of the Universe. It will also be the light of the earliest moments of its existence – that is why, perhaps, the telescope will help us learn more about the evolution of the Universe.

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ADVANTAGES AND DISADVANTAGES OF MODERN TECHNOLOGIES

The modern technologies have its pros and cons. Now, it is up to us how we deal with it! It is in our hands to get the best out of it! Today, it is very hard to find out an individual without any advanced or modern gadgets. Well, that totally indicates our dependency on modern technology to a great level. Most of the chores in our daily life are related to the technology in one way or another. Advanced technology has helped us greatly in making our life easier. From commercial to residential sectors, new enhancement in technologies has made the overall development of our society, so rapid and beneficial beyond our imagination.

- Technology has improved communication: electronic media like radios, televisions, internet, social media have improved the way we exchange ideas which can develop our societies.

- Technology has improved education and learning process: education is the backbone of every economy. Many schools have started integrating educational technologies in their schools with a great aim of improving the way students learn. With the advent of internet, knowledge is now not just constrained to a classroom. Anyone can learn anything from it.

- Technology has helped us live longer by improving health facilities and aiding in the research for solutions for most health problems. This is good news for developed countries but is bad news for developing countries which have not been in a position to access these health care benefits brought by technology.

- Aviation technology has made our travel time so convenient and short that was almost out of imagination prior its invention. These are just few examples. There are a lot of other valuable benefits that we get out of modern technology.

But modern technology also comes with its own set of negative points:

- Sometimes, a solution of one issue using some technology may give a rise to another problem. While we can get in touch virtually with many people, the technology has ruined our personal life in some way.

- In absence of proper guidance, children are also getting addicted to the online games and other activities that are not recommended for them. In this way, their involvement in physical games and exercises has become significantly less.

- Pollution affects the land we grow crops on, the water we drink and the air we breathe. The more demand for new technologies and advancement of current technologies, the

more pressure we put on earth's natural resources. By heavily using the fertilizers, the soil also tends to lose its natural fertility. This has made several plant species extinct and endangered.

- The social sites also have become a major reason behind the divorce of many couples. The never ending addiction of many people towards such social networking sites and other internet activities have made them totally isolated and alone in real life.

The proper use of technology can improve our life, but the same technology can ruin it if used improperly. So, let the technology guide you and not dominate you!

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ELECTRIC VEHICLES ARE THE FUTURE OF MOTORING

Electric vehicles are the future of motoring. Governments across Europe are pledging to support the manufacturing of ultra-low-emission vehicles while car brands from Mazda to Maserati have either built electric cars or have plans to do so.

But electric cars are also a part of the past and their legacy goes further back than you'd think. The first electric car was built in 1837 in Aberdeen, Scotland and the technology enjoyed such success that electric battery-powered taxis were even introduced to the streets of London and New York late in the 19th century. But their popularity didn't last. And with the price of oil decreasing it was petrol and diesel cars that dominated on the roads.

Back in 2008 the Tesla Roadster reached a range of 350 km and provided inspiration for mainstream car manufacturers to enter the space themselves. Now, companies like Volvo are announcing that every car it produces from 2019 will be partially or completely battery powered and a recent report by ING claims that as early as 2035 all new cars sold in Europe will be electric. Instead of a fuel tank, an electric vehicle has an on-board battery that gets charged through an electricity supply and then stores and uses that energy to power an electric motor and set the wheels in motion. It means the cars have no need for a clutch and gearbox or an exhaust pipe and it makes them much quieter and, many say, smoother to drive.

On a full charge, a standard electric car can now run more than 400km before needing to be recharged. That might not be as far as you could get on one tank of petrol, but most journeys could still easily be accomplished in an electric car. For instance, in the UK 94% of all car journeys are under 25 miles in length, with 56% less than five miles. There are plenty of reasons why someone would want to buy an electric car. One of the most prominent is the environment. While electric cars are still only as green as the electricity used to power it, they are still far better for the planet than conventional cars. They generate fewer emissions and are more efficient – 95% of the energy generated by an electric car is put into motion, whereas the internal combustion engine is only 30% efficient – the rest of the energy being lost as heat or noise. But there are other benefits too. There are lower operating costs as a full charge costs significantly less than a tank of gasoline. Fewer movable parts means that maintenance costs are lower as well.

Though, electric cars are at least for the time being more expensive to buy up front than a conventional car. However, there are various incentives and government grants that can counter this. Grants of around €4,000 are available across Europe for those thinking of making the move.

1. Conventional Hybrids like the Toyota Prius that require a petrol tank but also have an electric motor powered by a battery that charges when the vehicle breaks.

2. Plug-in Hybrids which also have both petrol engines and electric motors but can be plugged-in to charge and can generally run for a short period on electric power before the battery is drained.

3. Battery Electric Vehicles these run only on electricity. Many major car manufacturers offer one of these, from traditional names like Renault to specialist manufacturers like Tesla.

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STENT RETRIEVER TECHNOLOGY

Nowadays stent retriever technology is increasingly used for those who flow restoration and thrombectomy in acute embolic stroke. At the beginning of developing this idea there were clinical results which support the evidences of how this device works, particularly in the ability to rapidly restore flow and effectively retrieve clots from large intracranial arteries. Here we would like to represent the theoretical and technical parts of this method of treatment and summarizes the different clinical results which are based on various case reports.

Firstly, we would like to describe theoretical part of this technology. Stent placement in acute embolic stroke enables entrapment of the thrombus between the stent and the vessel walls. This can lead to fast recanalization and restore antegrade blood flow. And then the flow restoration can rapidly increase supplement of oxygen in the damaged brain region and increase the effectiveness of thrombolytic drugs. In addition to conventional stenting, thrombectomy is allowed to be performed by pulling back the deployed stent into the guide catheter, whereby the struts of the stent engage the thrombotic material. The biggest advantage of using this method is that the stent is applicable repeatedly and can be used even in small peripheral vessel branches. In comparison to conventional stent systems, no anticoagulation and antiaggregation are required, because the stent is not deployed permanently.

At present, there were made several multicenter observational studies, which were connected with investigating the safety and efficacy of the Solitaire, Revive and Trevo stent retrievers in acute stroke in larger populations. Based on these findings, scientists conducted that a good outcome after acute ischemic stroke depends on different factors, but at the same time early revascularization also plays a very big part in it.

Intravenous lysis with recombinant tissue plasminogen activator is one of those methods which is said to be a standard treatment in these situations. But on the other hand, there are evidences based on which researchers can say that intravenous plasminogen activation is less effective in occlusion of proximal large vessels such as the distal internal carotid artery or the main stem of the MCA, and in fact there are less than 30% recanalization in these cases. It is reported that in various studies the level of on endovascular intervention ranges from 47% to 100%, and it is higher in comparison to those reported for intravenous treatment only. Researchers say that there can be several causes of difference between good technical and still less satisfactory clinical results, such as severity of stroke, patient selection, time to treatment, duration of procedure or concomitant anticoagulation treatment.

In conclusion we would like to say that taking into consideration everything what was described above, using of stent retriever technology can make patients' lives better and easier, despite all disagreement of researchers which were presented in this article, we believe that one day this technology can change our lives forever. The available outcomes on stent retrievers show very good results with improved and quicker recanalization rates, so in our opinion this technology must be used in clinics and hospitals.

IS THERE A SLIPPERY SLOPE FROM PROTHETICS TO CYBORGS?

The history of plastic surgery began in 600 B.C. in India. It was like a prototype of modern rhinoplasty. On the other hand in the ancient Rome, surgeons could make scar-removal operations on their patients' backs, and so on. However in the modern understanding of plastic surgery we might consider it like a field of medicine which primary help people to change something in their appearance (so called aesthetic plastic surgery). And at the same time a new field of plastic surgery occurred. This field deals with combination of new modern technologies and developments and those patients who got serious injuries.

At the beginning of 21th century researchers from Northwestern University proposed another type of surgery which is aimed on muscle reinnervation. According to them this method can rewire the nerve endings which control the limbs, so patients who had their legs or arms amputated can control electronic prosthetics easier and better.

Recently, researchers from Johns Hopkins have created a special prosthetic systems which can that allow people who have had both arms amputated from shoulder to make simple tasks at home. This device uses nerve sensors on the skin which are connected with other processes in our body, like sweating. By the way, researchers from Sweden used a prosthetic device which was inserted under the skin. This allowed them to connect the device directly to the bones, muscles, and nerves. But the biggest impact in development of this field in medicines was made by researchers from Ontario Prosthetic Systems. They dedicate a lot of their time on developing modern techniques which then can be used in clinics. Their main goal is to help their patients to live fully without any limits. On their account there are such innovations like:

- C-leg;
- Orion knee;
- Partial foot;
- Partial hand/finger;
- Myobock Certified, and so on.

To sum up, we would like to say that despite the fact that many people do not really believe in biotech researchers and are very sceptic about all these developments, scientists think that this idea and other modern devices which can be used in medicine are hostile. In their opinion, technology progress and using its benefits in clinics and hospitals can improve patients' further lives and their treatment. All these improvements in prosthetic systems are really very necessary in modern world. Probably one day these prosthetic systems will become the best and it will change our lives constantly.

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SPOTMINI THE ROBOT

Today I'll tell you about the invention that will make human's life easier in future. Let me introduce for you the robot that is called SpotMini.Spot and that is a new generation of robots. SpotMini is a small four-legged robot that comfortably fits in an office or home. It weighs 25 kg (30 kg if you include the arm). SpotMini is electrified completely and can go for about 90 minutes on a charge, depending on what it is doing.

On June 23, 2016, Boston Dynamics revealed the four-legged canine-inspired SpotMini which only weighs 25 kg (55 pounds) and is lighter than their other products. It is the quietest

robot Boston dynamics has ever built before. At a robotics conference in California, the company's founder Marc Raibert announced that the slightly creepy SpotMini was currently in pre-production and scheduled for large-scale production and general availability from middle of 2019. On its website, Boston Dynamics highlights that SpotMini is the "quietest robot they have built" and it is very important for users.

The company says it has plans with contract manufacturers to build the first 100 SpotMinis later this year for commercial purposes, with them starting to scale production with the goal of selling SpotMini in 2019. SpotMini inherits all of the mobility of its bigger brother, Spot, while adding the ability to pick up and handle objects using its 5 degree-of-freedom arm and beefed up perception sensors.

The sensor suite includes stereo cameras, depth cameras, an inertial measurement unit (IMU), and position/force sensors in the limbs. These sensors help with navigation and mobile manipulation. Where Boston Dynamics' previous robots featured plenty of exposed wiring and bare metal, the SpotMini has the sleek, finished design of a commercial product.

You know any company can deliver packages to your houses with drones. What about plain old legged-robot delivery? There are various access ways. Also, the robot has mobile manipulation, robot can have an arm on his top and it's finding its way through the door. At 3 feet high and around 55 pounds, the SpotMini can go where larger robots can't. Its optional snake-like arm, which attaches where a real dog's head would be, even lets SpotMini do things like open doors. Nowadays one of the important things about making autonomous robots is to make them not do just exactly what you say, but make them deal with the uncertainty of what happens in the real world.

Marc Raibert has said that he thinks that robots which have the capabilities he's been talking about are going to be incredibly useful. About a year ago he went to Fukushima to see what the situation was there, and there's just a huge need for machines that can go into some of the dirty places and help remediate that. He thinks it won't be too long until we have robots like this in our homes, and one of the big needs is to take care of the aged and invalids. Marc supposes that it won't be too long till we're using robots to help take care of our parents, or probably more likely, have our children help take care of us. And there's a bunch of other things. Raibert thinks there is no limit for inventions. There are many of the ideas we haven't thought of yet, and even ordinary people like you, without some special technical skills, will help us think of new applications.

Maxim More

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THE EFFECTS OF THE GENE TECHNOLOGY

The genetically modified foods consist of a set of disputes over the use of food made from genetically modified crops. The disputes involve consumers, farmers, biotechnology, companies, governmental regulators, non-governmental regulators, non-governmental organizations, environmental and political activists and scientists. The major disagreements include whether GM foods can be safely consumed, harm the environment and are adequately tested and regulated.

Farming-related disputes include the use and impact of pesticides, seed production and use, side effects on non-GMO farms, and potential control of the GM food supply by seed companies. The conflicts have continued since GM foods were invented. They have occupied the media, the courts, local, regional and national governments and international organizations. The United Nations Food and Agriculture Organization estimates that the world will have to grow 70

percent more food by 2050 just to keep up with population growth. Climate change will make much of the world's arable land more difficult to farm. GM crops, Zilberman says, could produce higher yields, grow in dry and salty land, withstand high and low temperatures, and tolerate insects, disease and herbicides. So, many scientists consider GMF as the only way out.

A genetically modified organism (GMO) is an organism whose genotype has been altered by genetic engineering methods. The genetic modification differs from natural and artificial mutagenesis by a directed change in the genotype. In this case, the genetic material is transferred from one organism to another by using recombinant DNA technology. If the carried DNA is derived from another species, the resulting organisms are called transgenic. The history of GMOs begins in the 1970s, when a new branch of science was formed - genetic engineering. The first recombinant bacterias was created in 1973. Scientists understood that it was necessary to take into account the possible risks and ethical problems associated with the using of the new technology.

Generally, GMOs are used in biological and medical research, in the production of medicines, gene therapy and agriculture. The patterns of development of certain diseases, aging and regeneration processes are studied with the using of GMOs. Genetic engineering is used to create new sorts of plants that are resistant to adverse environmental conditions, herbicides and pests, or plants that have improved growth and taste qualities.

But scientific research indicates that the transfer of some genetic sites in new cultures can become a source of allergic reactions for humans, which has not such a reaction by this product previously. For example, the transfer of Brazil's nuts into soy (to increase the protein content) made it dangerous for people with allergies to nuts. Most known transgenic plants resistant to herbicides are capable to cumulate them .The confirmation of this are experiments on rats consuming genetically modified soybean, resistant to herbicide. These animals have a defective next generation and more than 50% of the rats were nonviable. Some experts consider that the modeled genes are capable of causing genetic mutations in the cells of the human organism. Therefore, GMOs can make a negative effect on the human organism. Scientists do not exclude that GMOs can become a reason of allergies and serious metabolic disorders, as well as increase the risk of malignant tumors, suppress the immune system and lead to organism immunity to certain medical products. There is a concern that the widespread use of genes for resistance to antibiotics in the creation of GMOs can promote the spread of new bacteria that are not susceptible to drugs against infections. In this case, many medicines will be just ineffective.

To sum up, despite these facts, it should be borne in mind that long-term studies of the safety of transgenic products have not been carried out, so no one can accurately confirm any negative GMOs impact on humans. However, as well as to deny such an opportunity. Generally, nothing can really be "proved safe". One can only fail to turn up significant risk after trying hard to find it – as is the case with GM crops.

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MODERN CONDITION OF DEVELOPMENT OF PSYCHOLOGICAL SERVICE IN HIGHER EDUCATIONAL INSTITUTIONS OF UKRAINE

Psychological assistance to students is necessary due to their age characteristics and difficulties that are associated with the transition from one educational environment to another, with experiences of professional competence and readiness to fulfill future professional duties, individual psychological problems, including problems related to addictions, co-dependence and others.

The need for the provision of psychological services is determined, on the one hand, by the growing interest of young people in themselves, in their relatives, in the quality and effectiveness of interpersonal relations; on the other hand, the increasingly obvious psychological illiteracy of compatriots, who, as a rule, do not know themselves well, their family members, those around them, are unable to build adequate, healthy relationships with them.

Of course, higher education needs psychological service. Training is work, therefore an educational institution and a psychological service educate a specialist who is trained to work professionally. This is a service of intensive permanent development of mental functions, primarily cognitive, through which continuous education is provided. Of great importance in the development of cognitive processes is, for example, the development of perceptual accuracy. The development of perceptual skills allows you to achieve more effective learning outcomes. Accuracy of perception develops the stability of consciousness, in the conditions of psycho-emotional stress (there are more than enough such situations in the learning process), a person retains the ability to reflect reality more precisely, while maintaining self-control.

As part of the functioning of the psychological service, individual counseling or assistance in further self-development can be provided, but it is the systematic psychological care of the professional development and well-being of the student that will ensure the development of the student's self-attitude to his or her psyche as a value. Values are the strategic backbone bases of the student's personality. The formation and formulation of the social attitudes of the future specialist is also an important activity of the psychological support service, among which it is necessary to include the student's value attitude to himself, knowledge and education.

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LASER EQUIPMENT IN DIAGNOSTICS AND TREATMENT OF SKIN DISEASES

Skin diseases are among the most common of all human health afflictions and affect almost 900 million people in the world at any time. The first lasers used to treat skin conditions occurred over 40 years ago. The popularity of laser therapy could be explained with the help of absence of allergic reactions. Practically it does not cause complications and side effects. To add more information, people of different ages rarely react badly to such courses of treatment. In dermatology doctors use low intensive laser radiation (LILR) and high intensive laser radiation (HILR). These methods have specific peculiarities and are used for different purposes.

Low intensive laser radiation restores skin fabric, relieves pain and emphysemas, stimulates immunity and exchange processes, accelerates wound healing, obstructs the development of infectious diseases. Also LILR improves blood microcirculation and increases blood flow velocity. That is why fabrics oxygenate better. The ability to accelerate synthesis of protein, nucleic acids and enzymes makes beneficial effect on skin health.

LILR is used for treatment:

- Psoriasis
- Vitiligo
- Vasculitis
- Alopecia
- Scaring
- Viral dermatosis
- Red lichen planus etc.

High intensive laser radiation is used in laser surgery to destruct skin tumors, to remove scars, to rejuvenate skin and in epilation. Laser destruction allows you to control the depth of radiation exposure and practically does not damage the surrounding fabrics. So it gives an opportunity to make postoperative period easier. Closing the wound is not required, and rehabilitation comes as quickly as possible. Laser dermabrasion provides the removal of the upper layer of epidermis. Therefore, it is actively used for skin rejuvenation, polishing of scars, tattooing and treatment of patients with severe forms of acne.

HILR is used for treatment:

- Warts
- Ingrown nails
- Nevi
- Leukoplakia
- Cysts of the sebaceous glands, atheroma, angiomas
- Seborrheic keratosis
- Papillomas, fibroids, keratomas, condyloma
- Basal cell and intraepidermal cancer etc.

According to statistics from the WHO, currently, between 2 and 3 million non-melanoma skin cancers and 132,000 melanoma skin cancers occur globally each year. Standard treatment such as cryosurgery, electrodesiccation and curettage, topical and photodynamic therapies are without inherent morbidity, including risk of bleeding, infection and scar. Recent studies have shown that the use of vascular targeting and ablative lasers offers the potential benefits of reduced collateral tissue destruction, decreased bleeding, shorter healing time, and less scarring, making them a promising alternative treatment option for patients who are unable to tolerate or who fail current standards of care.

A laser has been used in skin 3D-printing recently. It scans the size and the depth of the wound before the printer oozes different skin cells and layers. This procedure speeds up the body's ability to heal itself. Clinical trials on mice and pigs have been successful as printed skin cells healed wounds three times faster. The scientists at Wake Forest University are awaiting approval for human trials.

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INVESTIGATION OF ELECTROMAGNETIC COMPATIBILITY OF TRACK CIRCUITS WITH THE TRACTION SUPPLY SYSTEM

Electromagnetic process is difficultly and variedly flowing in the system of traction electric supply. Traction electric supply systems exert both galvanic and inductively influence on the adjacent railway automatics devices. Galvanic action is caused by the flowing return traction current in rails to the substation. The problem of electromagnetic compatibility now is actual, as the designing, project and installation of new generation of the rolling-stock, car's equipment and traction substations are carried out.

From all devices of railway automatics the track circuits and automatic locomotive signaling system is subjected to influence from the side of traction electric supply system more strongly. It is following from the fact that rails are used for the flowing traction current with all harmonic components. That is why the track circuits (way's receivers if to be exact) are chosen for the investigation.

The definition of nature of appearance of stationary harmonic interferences in rail lines plays main role to provide steady work of track circuits and system of automatic locomotive

signalling, which is widely used on railway of Ukraine. It is a known fact that principle of work of automatic locomotive signalling system is based on the transfer signal current by frequency 50 Hz at the DC traction and 25 or 75 Hz at the AC traction from the track circuit to the locomotive receivers (coils). So it is necessary to determine most dangerous interference at the spectrum investigation of return traction current which can be allowed to break in the normal function of system of automatics (in given case track circuits and automatic locomotive signalling system). At what it is necessary to investigate signal in pause of code.

In conformity with the proposed method it was fixed following spectrum of frequency: 25, 50, 75, 100, 150 Hz in track circuits on the separate section at the DC traction. Interference by 50 Hz is most dangerous from all, because it coincide with the code frequency of signal current. The interference by frequency 50 Hz fixes in pause of code and has value up to 50% on this oscillogram. The interference by frequency 75 H was fixed also.

The reasons of occurrence of 50 Hz interference are following. It can arise from the asymmetry of voltage supply. There is dissimilarity in electric power circuits of rectifiers of substation. This dissimilarity can arise from the various numbers of good working diodes (thyristors) and other auxiliary elements in each phase of the rectifier. Thus rectifiers work unequally in the intervals (phases of voltage). This phenomenon is called “parameter asymmetry of power circuits of rectifier”. The currents of frequency 25...375 Hz flow in signal canal (rails). This interference arises at the work of regulators of start of traction engine. In this spectrum 50 and 75 Hz interference includes.

The impedance of isolation of track circuits is not ideal. That is why in track circuit current can flow from the next track circuits at the multiway section or station.

The analysis of the railway section is shown presence of such harmonics by frequency 600, 1200, 1800 and 2400 Hz in the return traction current. In given case the measurement was carried out by the record signal from the inductive coil of locomotive moved on the railway of DC traction near substation. The deviation in the code current was not observed. The reason of occurrence of such interferences was operation of substation’s rectifier. It is possible to make a conclusion those inductive-capacitor filters of given substation work badly. So it is possible to signal about disrepair filters of substation with the help of proposed measurement system. The interferences of given frequencies do not influence the work of track circuits.

Let’s consider results of measurement recorded on the section with the AC traction. The DC drivers with the series connect winding of stator and rotor are used on the electric locomotive in given case. Thus there are 25...375 Hz interference in the return traction current caused by the work of brush-collector mechanism. The spectrum composition of return traction current will be depended of quality of primary voltage and work of thyristor converter of locomotive also.

So, we can do the following conclusions. The method is offered for the evaluation of spectrum composition of traction current. It assumes to record of signal from the inductive coil during measurement travel by the car-laboratory to control of parameters of current of automatic locomotive system. The spectrum composition of traction current is determined. The most dangerous interferences are harmonics of 50, 75 and 100 Hz. It may follow to the false switch on of way’s relay of 50 Hz track circuits.

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MODERN MEDICAL TECHNOLOGY

In today’s world, technology plays an important role in every industry as well as in our personal lives. The technology plays a crucial role in healthcare. Continuous technological

developments in healthcare have saved countless lives and improved the quality of life. Multiple medical issues such as congestive heart failure, diabetes, medication noncompliance, even stressful isolation, are researched and solved with remarkable new technologies. There are some new technologies which have been invented recently.

Leadless pacemaker. Traditional pacemakers consist of a small battery-operated power source implanted under the skin. Wires known as leads deliver electrical impulses to the heart muscle to help maintain a normal heartbeat. Although pacemakers are in general very reliable, the leads represent the weak link in the system. When complications do arise, they most often involve a broken lead (which can cause a malfunction) or an infection at the insertion site. In addition, some people have anatomical differences that make it difficult to implant the lead. The leadless pacemaker is a tiny, self-contained unit that is placed on the inside wall of the heart through a thin, flexible tube called a catheter. The first version of a single-chamber pacemaker placed in the heart's right lower pumping chamber looks promising. Future iterations may be available in the next few years.

Hybrid Closed-Loop Insulin Delivery System. This new technology enables direct communication between the continuous glucose monitoring device and insulin pump to stabilize blood glucose at an unprecedented level. The technology replaces the “open loop” concept that requires patients to use information from their continuous glucose monitor to determine how much insulin to inject.

Cancer nanotherapy. Nano devices and technology are already in wide use, and as the years pass, the technology in pharmaceuticals and medicine will only continue to improve. One of which is an emerging cancer treatment technology that implements nanomaterials in a more aggressive method. For example, researchers at Israel's Bar-Ilan University have developed nanobots to target and deliver drugs to defective cells, while leaving healthy ones unharmed. The 25-35 nm devices are made from single strands of DNA folded into a desired shape – for instance, a shell-shaped package that protects a drug while on route to the desired site but opens up to release it upon arrival.

Battery-powered germ-killers. As the number of joint replacement surgeries grows, so do concerns about the complications of infection from antibiotic-resistant superbugs. Biomedical engineers from the North Carolina State University Department of Industrial and Systems Engineering are developing nanotechnology built directly into orthopedic implants. A battery-activated device powers an army of microscopic germ-killers to fight bacterial infections. The process applies a low-intensity electrical charge to a silver titanium implant, releasing low-toxicity silver ions that kill bacteria. The power source, similar to a watch battery, can be integrated into the implant design. The body's own fluids act as a conducting medium between battery and silver, enabling the low-level charge.

A health check chair. Checking health signs such as blood pressure, temperature and mobility usually involves multiple tests and can be time-consuming. A chair developed by Sharp is equipped with multiple sensors that can measure a user's vital signs all at once and save the data to the cloud for physicians to reference. Sharp designed the chair for patients to use at home and is considering adding a videoconferencing system so patients can visit with physicians remotely.

In spite of huge development of medical technologies physician plays a central role in the delivery of health service, diagnosing abnormalities and prescribing treatment. All these machines can't work without medical staff.

But it's really important to be aware about all new technologies in medicine.

DRONES COULD CHANGE THE RAILWAY INDUSTRY

The power of drones is being harnessed across new industries every day. As drones become more affordable, we are seeing them used in industries from agriculture, to mail delivery, to insurance. Moreover, the number of industries utilising drone technology is set to rocket. Consulting group PwC predicted that by 2020 the global market for drone technology will reach \$127 billion (in 2016 it was just £2 billion).

The railway industry is no different. In the last couple of years railway consultants and innovators have been working with drone technology experts to find drone powered solutions to some of the key challenges the railway industry faces today. And there are at least three key areas in which drone technology may have a significant impact in the industry.

One way that drone powered solutions offer real value is that they can capture high-quality images from height. In fact, the quality of images that certain commercial drones can capture is so good that they can help to detect tiny deteriorations in infrastructure.

A recent study from engineers at the Bauhaus-Universität Weimar used drones to monitor the stability of retaining walls. With photogrammetry – the use of photography to measure the distance between objects – visual data captured by drones accurately detected deformations over time. The ability of drones to capture detailed data about infrastructure in remote, difficult to access areas has significant benefits.

Drone powered solutions can help reduce the risk, time, and cost of accessing difficult areas. Moreover, drones make it possible to get accurate data to support the intelligent management of remote infrastructure and increase the resilience and lifespan of the asset. Passengers are often frustrated by intermittent phone and WiFi access on the train. This is a real issue for customer satisfaction in the railway industry. The problem of tunnels and long stretches of rail through remote regions make internet connectivity a serious challenge.

Could drone technology help? It may sound strange but both Facebook and Google are researching the use of drones to increase WiFi connectivity around the world. And in 2015, the UK government began investigating the use of drones to follow trains and deliver targeted connectivity to passengers. There are some logistical difficulties with the use of drones to increase connectivity. For example, the Civil Aviation Authority guidelines, which limit commercial drones from flying within 50m of people, vehicles, and buildings, make the possibility of a drone flying alongside or behind a train problematic. However, the drones that Facebook have been trialling fly at 60,000 to 90,000 feet – away from turbulence, storms, and commercial airliners.

In the continuing effort to improve connectivity for rail passengers, drones may yet be proven effective. Drones are increasingly being used in the investigation of rail accidents. The Rail Accident Investigation Branch (RAIB), which looks into the causes of rail accidents, has been using drones for over a year to capture images of incidents, which can often be hard to reach by other means. For the RAIB, drones offer a far cheaper alternative to helicopters, which were previously used in their operations.

Drones also make it easier to access areas that would have been off-limits to helicopters, due their proximity to trees and overhead wires. In accident investigations, drones have been used to capture visual, thermal, and multispectral data. Vivaly, as well as capturing important data, drones also reduce the risks of unnecessarily bringing people into dangerous accident sites.

BENEFITS OF USING MODERN SWITCH DRIVES

The electric drive is a device moving the switches from one position to another, locking the switches at the extreme position. With its help a continuous control of the actual position of the points is obtained. Historically, it would require a lever to be moved by a human operator, and some switches are still controlled this way. However, most are now operated by a remotely controlled electric motor or by pneumatic or hydraulic actuation, called a point machine. This both allows for remote control and for stiffer, strong switches that would be too difficult to move by hand, yet allow for higher speeds.

Switch drives play an important role in ensuring the safety of trains. They must be reliable and withstand heavy loads. The drive should provide work in three modes: normal, when the point moves from one position to another and gives control of each position; in the part-position of 4mm or more in case of a casual obstacle between the wag and the frame rail; incision of point, when there is a forced transfer of the point under the influence of train ramps.

The main part of the electric drive is a DC or AC electric motor which rotating the armature forces the mechanical transmission consisting of a gearbox and an external pair of gears. With the help of mechanical transmission, the further rotational movement of the armature of the electric motor is transmitted to the gear, where it is converted into forward motion of the transferable tractions connected with the switches.

The very first switch drive on the railways appeared in the mid-20s of the last century. Such a type 3900 electric drive with external hinged contactors was an analogue of the Siemens and Galske electric drive of 1906 type. It was used in the USSR to switch the points until the end of the 1950s.

Since 1952, alternative circuit electric drives of the type MST-0.3 and MST-0.6 of various modifications have been used on the railways. In order to eliminate a number of shortcomings, an asynchronous MCA type electric drive was introduced, which, in the absence of a brush-collector unit, is protected from interferences and sparking, as well as a false control of the position of the points.

About 20 modifications of electric motors are made at the manufacture factory but this situation is unprofitable, as each requires specific equipment that must be maintained in working condition, even if it is used only a few times a year. Therefore, in 2000, the specialists of the Saratov electrical plant "GKSAR" invented a universal motor of the type of EMSU which due to the use of an electronic board, can be programmed for a different number of rotations and a different kinds of voltage. At the same time, the mechanics for all types of engines remained unified.

The switchboard BSG 9 of the German company "Siemens" became the foreign analogue of the EMSU. Invented in 2012, this electric drive managed to replace all existing types of both foreign and domestic electric drives. Having a wide temperature range (from -60 to + 70 ° C) and protection with IP-43 technology, it can be used in wide climatic conditions. At the moment, BSG 9 is already used in such countries as: Denmark, Egypt, Finland, Greece, India, Norway, Sweden.

The operation of modern electric drives can significantly reduce the number of failures, thereby increase traffic safety, as well as reduce the number of staff at the station. The use of integrated circuits in the design of the switch drives allows the station to be more automated (independent of the person) and efficient.

SECTION 3.

MODERN ECONOMIC PROBLEMS AND WAYS OF THEIR SOLVING

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INCREASING THE EXPORT POTENTIAL OF UKRAINE

Ukrainian export is selling goods by Ukrainian companies engaged in foreign economic activities. It also includes the re-export of goods. Export potential is a combination of factors, both internal and external that determine the volume of export of competitive products to international markets.

At the expense of export, enterprises get more profit. Therefore, they donate to internal consumers and give preference to external consumers. Thus, about 65% of all companies in the world export their best products. However, this does not apply to large and well-known companies that worry about their world name.

Export greatly affects the economy of the country. If the country did not export anything, it would have to seek external and internal investors.

There are export barriers that restrain the development of Ukrainian export to some extent, but at the same time, they do not allow to export goods that are already in limited quantities. Duties that hinder the export of goods that are not enough on the domestic market and export quotas that help to avoid the depletion of natural resources are the main barriers.

The reasons that explain the poor development of exports in Ukraine include:

- not enough experience in foreign economic activities to enter the world market correctly;
- the low level of marketing activities;
- the limited possibilities of using foreign loans.

In Ukraine, import exceeds export. As a result, we give away more money abroad than we receive. This situation leads to the negative value of the trade balance. It also has the negatively impact on the exchange of the dollar rate.

Ukrainian export has seen a small rise. The main export market is the European Union. Exports of goods and services to the EU in the first half of 2018 when compared with the first half of 2017 has increased by 35%. Export earnings mostly come from the trade in metallurgy, agriculture, foodstuffs and metals.

Today, 277 Ukrainian enterprises have the rights to export to the EU markets. It proves the fact that our products comply with international norms and standards.

Most Ukrainian companies export raw materials rather than finished products. This significantly reduces profits.

The main factor that limits the export capacity of Ukraine is the low level of competitiveness of products.

Export provides direct participation in international trade. Thus, Ukraine declares itself as a country that can offer something to other countries.

The country's GDP is growing. New workplaces are being created. Foreign currencies come to the country. All of the above demonstrate the benefits of export.

There should be a balance between export and import. After all, increasing exports may lead to increasing the national currency that will affect the price of goods.

INTERNATIONAL MARKET FOR UKRAINIAN COMPANIES

Nowadays, it is impossible to imagine the activities of successful companies without an access to external markets. Only some of them can secure access to the international markets, because the product must be competitive and satisfy not only local but also external consumer needs.

All Ukrainian companies are trying to enter the international market, especially the European ones. The EU countries occupy 70% of the world trade and about 500 million of potential clients. For most European families, our products are very affordable.

To start the effective foreign economic activity it is necessary to study the potential market, consumer needs and product requirements on this market; to see if we have the resources; to assemble a highly qualified team; to find partners; to register a trademark and to promote goods. The effectiveness of social networks that cover a large number of potential consumers is often underestimated in Ukraine.

International markets are very important for any country. They allow

- to expand both the range and volume of income-generation activities;
- to expand the market for products of the company;
- to develop the image of the company;
- to get the opportunity to further forward business partnership.

However, not all the companies are ready to get out to international market because

- the quality of the product does not match standards;
- the technology of production is outdated;
- packaging does not match standards;
- foreign economic strategy is not elaborated;
- the quotas on the European markets are not sufficient.

The main task of any company is to check the goods for compliance with the standards and requirements of the target market. Companies must understand that if a product is successful on the domestic market, this does not mean that it will be successful on the external market.

The weaknesses of the product should be analysed. It can be a limited range or low quality. Understanding and eliminating deficiencies product will help increase the chance of successfully entering the foreign market.

There exist three models for entering foreign markets.

B2B model is the model that helps one company to sell its products or services to another company and other countries. This model makes it possible to sell a large number of goods, but with each sold product the manufacturers lose their profits.

Trading with distributors is the model that helps to avoid working with logistics centers. The disadvantage of the model is that it will be necessary to share the profit with distributors.

Retailing is the model that allows companies to get the biggest profit. Getting to this level has to be pre-certified and have a lot of permissions.

In general, if a company wants to enter the foreign market, the achievable goal should be set. An inadequate assessment of the company's potential can lead to choosing the wrong strategy.

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THE PROBLEM OF FOOD CRISIS AND THE WAYS TO ITS SOLUTION

A great number of countries are facing food scarcity nowadays and such problems as overpopulation and poor government policies are the main causes of food shortage. It is widely accepted that environmental factors define the kind of crops to be produced, economic factors form purchasing and production capacity and socio-political factors determine food distribution. Food shortage has negative impacts on a lot of common things and is followed by starvation, malnutrition and political instability. That is why there is a great need to address this sensitive issue of food crisis by applying emergency plans and long-term activities.

According to the research provided by American company “Gro Intelligence”, the world will be short of 214 trillion calories by 2027. Such terrifying figure could be explained by the fact that the global population is going to reach such a figure as 8,3 billion thus greatly reducing required resources to satisfy people food needs. The scale of this issue is really frightening. It is hard to imagine how 214 trillion calories look like. An alternative way to think about this is to calculate in Big Macs. One Big Mac is equal to 563 calories. It means that the world will be short of 379 billion Big Macs in 2027, which is much more than McDonald's has ever produced.

It should be noted that changing the situation requires a lot of effects. Firstly, food waste can be reduced due to consumption pattern change; secondly, yield increase can be reached due to commitment performance. Attracting such developing countries as India and Africa can also help to solve this problem. As it is known, India has some upside in terms of potential yield increases. Unfortunately, there a gap between its current yield and the theoretical maximum yield it can achieve. Some arable lands are still remained unfarmed which is substantiated by the fact that India is quite land-constrained. As for Africa, it should be mentioned that the same situation is happening there. Although, if you compare sub-Saharan African corn yields produced nowadays with North American yields produced in 1940 they are equal. As a matter of fact, it will take 70 years to solve this problem that is why new approaches and absolutely different technologies are required. The solution starts with reforms and rule changes. Agricultural industries in Africa and India should be reformed and commercialized.

Commercialization means taking agriculture from too risky business to very profitable. It concerns not only private farmers but an entire agricultural system as well. Commercialization means that the responsibility cannot be placed only on small-scale farmers, but commercial farms are also responsible for that. Introducing commercial farms could provide certain economies of scale that even small-scale farmers can leverage. It is not about small-scale farming or commercial agriculture, or big agriculture. The first successful models of the coexistence and success of small-scale farming alongside commercial agriculture can be developed. The reason of this that applied data and knowledge being the most critical tools for success in the industry are becoming less expensive. In nearest future the amount of money and the type of business you own will not be taken into consideration to make optimal decisions and maximize probability of success in reaching your intended goals. It should be emphasized that such giant companies as Gro are working really hard to make it come true.

It is obvious that food shortage is a serious global problem taking into consideration its devastating impact on the population and government, and urgent remedial measures are in great demand. Fortunately, the global world has a smart solution to this problem. It is just need to act.

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THE FOOD PROBLEM AND WAYS OF ITS SOLUTION

Eliminating hunger and malnutrition, and achieving wider global food security are among the most intractable problems humanity faces. While many once-poor countries are now developing rapidly, the world as a whole is unlikely to meet the first Millennium Development Goal target of halving, between 1990 and 2015, the proportion of the world's population who suffer from hunger. Though the proportion of undernourished people in the world has fallen, the pace of reduction has slowed and the absolute numbers remain stubbornly high. And a number of countries mostly in Africa and South Asia have seen no improvement at all.

Main reasons for a global food problem

➤ Food waste. Food waste is getting a lot of attention lately, and for good reason. No matter how you slice it, the statistics are downright alarming. The world produces 17% more food than it did 30 years ago, yet almost half of it never reaches our bellies. In a way, it is a testament to the incredible progress we have achieved as a species by producing an overabundance of food to ensure survival. And while we continue to make progress through technology nearly a billion people still do not have enough to eat.

➤ Poverty of the population of Third World countries. The fundamental problem remains poverty and inadequate incomes. Even in this period of tighter world food markets, there is enough food available. Many people are just too poor to afford it. Broad based income growth is essential to reduce global hunger in a sustainable way.

➤ Demographic picture. Not long ago it seemed as if the rate of population growth was slowing everywhere except in Africa and parts of southern Asia. Today, the situation looks less promising since progress made toward reducing birth rates has been slower than expected. Over the next ten years, the population of the industrialized world will grow by 56 million, while the number of people living in developing countries will expand to over 900 million. Worldwide, enough food is produced to feed everyone, yet this food and the technology to produce it do not always reach those in need. As a result of food deficits, nearly 1 000 million people do not get enough to eat and over 400 million are chronically malnourished.

Solution

➤ Food Policy. A depressing amount of food is thrown away because it is not pretty enough. In addition, establishing policies that create uniform standards that reduce confusion around sell-by /expiration dates would help too. We also process way too much food each year. We simply can not eat that much. Installing portion-control laws and tackling the cronyism that leads to ineffective food policy would help a great deal.

➤ Consumer Behavior. Of all the available solutions to address food waste, changing our eating habits seems to hold the most promise. It turns out that by simply eating certain foods and avoiding others, we can cut down on a significant amount of waste.

➤ Agricultural development has a key role to play in generating the incomes needed to ensure food security. A range of policies can improve the opportunities of poor households, both within and outside agriculture. Improvements in education and primary healthcare can strengthen income growth.

So, when faced with a challenge, one must utilize every tool . Efforts to reduce food waste through technology and better food policies should be combined with agricultural development. Collectively, this would mean overcoming a food problem.

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TRANSPORT ECONOMICS

Good transport is an economic necessity for any country. But from the perspective of capital investment by the government, modes such as road and air are much more cost-effective than a state-owned railway, because the taxpayer only has to supply a limited part of the total investment. So governments usually build and maintain roads and airports, leaving private enterprise to invest in and operate the lorries, buses and planes

When a mismanaged trucking company or airplane goes out of business, there are usually several other companies ready to take its place, because they think they can do a better job. In reality, this may not be the case. If all the profits and losses reported by US airlines since the beginning of commercial aviation are added together, overall this private industry has lost money, but the skies are still full of planes.

In an era when railways were the primary mode of mechanized transport, many lines were promoted and built by venture capitalists and many were very profitable – although others were not and the investors lost their money. With the advent of road competition, railway profitability declined and so did the condition of the assets. Most private railways were nationalized in the 20th century for political reasons or to save them for eventual extinction.

Despite the repeated arguments about energy use, environmental impact and external costs, the reality is that main line railways throughout the world have to contend with steadily increasing competition. Lorries are getting larger and more energy-efficient whilst passenger trains must face up ever increasing numbers of private cars and now the low-cost budget airlines.

As the other modes have developed, the railways have lost market share. Today few of the world's railways handle a significant proportion of their nation's traffic. In fewer than 30% of the countries with railways do they handle more than 20% of freight-km, while only in 10% of the countries do the railways have more than a 10% share of the inter-city passenger travel market.

Part of the reason for this decline is that governments have effectively failed to regulate and tax the other modes on an equitable basis. Now it is probably too late – it is especially difficult to regulate retroactively, and much of the global economy has been shaped over this past 40 to 50 years by this imbalanced pricing of transport.

Railways are expensive to maintain. At the typical revenue rates for road-competitive transport, an annual traffic of at least 1.5 million net tons per route-km is required just to keep an existing line open and maintenance or needs upgrading, the annual traffic level would have to be greater, perhaps as much as the 5 million to 10 million tons per km needed to justify and support the construction of a new line.

Without substantial government support, the long-term service of a railway that does not meet these criteria must be considered doubtful. In short, many railways today need an operating subsidy restructuring, and substantial capital investment in they are offer a viable transport mode in the future.

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GLOBALIZATION: PROSPERITY OR IMPOVERISHMENT

At present we are moving progressively further away from a world in which national economies were relatively isolated from each other by barriers to cross-border trade and

investment, distance, time zones, languages, and national differences in government regulation, culture and business systems and toward a world in which national economies are merging into an interdependent global economic system.

As scientist underline economic globalization is the increasing economic interdependence of national economies across the world through a rapid increase in cross-border movement of goods, service, technology, and capital. Whereas globalization is centered on the rapid development of science and technology and increasing cross-border division of labor, economic globalization is propelled by the rapid growing significance of information in all types of productive activities and marketization, and the advance of science and technologies. Depending on the paradigm, economic globalization can be viewed as either a positive or a negative phenomenon. Generally, economic globalization comprises the globalization of production, markets, competition, technology, and corporations and industries. Of course, to the positive phenomenon the following issues can be referred:

- Competition between countries is supposed to drive prices down. In many cases this is not working because countries manipulate their currency to get a price advantage.
- According to supporters globalization and democracy should go hand in hand. It should be pure business with no colonialist designs.
- Transnational companies investing in installing plants in other countries provide employment for the people in those countries often getting them out of poverty.
- International trade has allowed the expansion of business mechanization and the advancement of technology which inadvertently has helped businesses to maintain and keep up with competitors all around the world.
- The proponents say globalization represents free trade which promotes global economic growth; creates jobs, makes companies more competitive, and lowers prices for consumers.

So, globalization has the potential to make this world a better place to live in and solve some of the deep-seated problems like unemployment and poverty. But the scientists are sure that globalization has not only positive impacts, but also negative ones:

- The general complaint about globalization is that it has made the rich richer while making the non-rich poorer. “It is wonderful for managers, owners and investors, but hell on workers and nature.”
- Apple is known as the most successful and wealthiest company due to its manufacturing that is done globally. However, what Apple fails to disclose is that the major production of the devices came from China sweatshops.
- Building products overseas in countries like China puts our technologies at risk of being copied or stolen, which is in fact happening rapidly
- Globalization has led to exploitation of labor. Prisoners and child workers are used to work in inhumane conditions. Safety standards are ignored to produce cheap goods. There is also an increase in human trafficking.
- It encourages the development and spreading of disease. Having a globalized economy means that there will be more people traveling internationally than ever before. The effects will lead to the fact, that diseases are going to spread into places of the world where they generally aren't seen today.

But at the same time as for Ukraine, there are good reasons for believing that declining barriers to international trade and investment do stimulate economic growth in our country, create jobs and raise income level of Ukarainians.

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WAYS OF INCREASING THE COMPETITIVENESS OF UKRAINIAN PRODUCTS ON THE INTERNATIONAL MARKET

It is widely acknowledged that competitive national enterprises are the basis of the country's competitiveness.

Competitiveness is a complex multifaceted concept that determines the ability of the product to occupy and retain its position on a competitive market for a certain period in competition with other similar goods. Competitiveness is a significant criterion for expediency of enterprises to enter the international market.

Ukraine is a young country, so domestic producers have almost no experience in order to be able to compete with international companies that have succeeded in the face of fierce competition, high saturation of commodity markets, and excess supply on demand. Ukrainian products do not meet the main criteria of international standards, therefore only 1% of Ukrainian goods and services is recognized as competitive on the world market.

It is known that the main criteria for assessing the competitiveness of products in the foreign market are:

- the consumer's availability of this type of product;
- the number of competitors producing similar products;
- the volumes of production and sales of products of competitor companies;
- the importance of thorough planning of the foreign economic activity of the enterprise;
- the main directions of competition in the foreign market;
- the assessment of competitors' strategic activity;
- the stability of demand for products of the enterprise in each segment of the market.

While considering modern activity of Ukrainian enterprises on the international market, we can assert that the export nomenclature of Ukrainian goods is very limited. Our products are mostly represented on markets with predominantly price competition, that is, markets of raw materials and standardized mass finished products. Insufficient consideration of the value of product quality continues to be one of the main reasons for the low efficiency of production of Ukrainian products and its low competitiveness on the foreign market.

Overall, the main ways to increase the competitiveness of Ukrainian products on the international market are:

- Introduction of strict standardization as the main instrument for fixing and providing a given level of quality at enterprises;
- Creation of conditions for improvement of innovative development;
- Timely response to changing market conditions;
- Prevention from the disparity between prices in the domestic market of Ukraine and world prices for goods and services.

Consequently, Ukraine's current position on the foreign market demonstrates the very low competitiveness of Ukrainian enterprises on the world markets due to a number of problems. However, only under the conditions of complex actions of the state and business it is possible to bring domestic products to a competitive level.

THE ENGLISH PROFICIENCY AS A KEY FACTOR OF BETTER ECONOMIES

English is an economic necessity. For people in emerging economies such as China, Ukraine, and Brazil, where English is not the official language, good English is a critical tool, which people rightly believe will help them tap into new opportunities at home and abroad.

Research shows a direct correlation between the English skills of a population and the economic performance of the country. Indicators like gross national income (GNI) and GDP go up. In our latest edition of the EF English Proficiency Index (EF EPI), the largest ranking of English skills by country, it is found that in almost every one of the 60 countries and territories surveyed, a rise in English proficiency was connected with a rise in per capita income. And on an individual level, recruiters and HR managers around the world report that job seekers with exceptional English compared to their country's level earned 30-50% percent higher salaries.

The interaction between English proficiency and gross national income per capita is a virtuous cycle, with improving English skills driving up salaries, which in turn give governments and individuals more money to invest in language training. On a micro level, improved English skills allow individuals to apply for better jobs and raise their standards of living.

This is one explanation for why Northern European countries are always out front in the EF EPI, with Sweden taking the top spot for the last two years. Given their small size and export-driven economies, the leaders of these nations understand that good English is a critical component of their continued economic success.

It's not just income that improves either. So does the quality of life. It is also found a correlation between English proficiency and the Human Development Index, a measure of education, life expectancy, literacy, and standards of living.

For business leaders, knowing which countries are investing in and improving in English can give valuable insight into how a country fits into the global marketplace and how that might affect your company's strategy.

Until now, it has been difficult to find data about the actual English skills – and skills gaps – of industries worldwide. Given the importance of English for companies' competitiveness, a global study of workforce English was conducted, surveying 510,000 professionals across 16 major industries in 40 countries. These professionals work for more than 2,000 different companies, with sales that range from less than \$1 billion to more than \$60 billion.

The results of this survey were published in the third edition of the EF English Proficiency Index for Companies. The findings suggest the opportunities for global companies to gain a competitive edge. Five findings in particular stood out:

On average, women have better English language skills than men in most countries, industries, and job functions. This skills gap might reflect an education gap: Women receive more years of formal education than men, are more likely to attend university, and are more likely to study the humanities.

Executives usually have lower English levels than the managers they oversee. Looking at global averages across industries, even the most junior staff outscored executives. This pattern is most likely a result of generational differences, as English skills tend to be lower among older adults than younger professionals. The result suggests that many executives from non-English-speaking countries may have trouble directing an English-speaking team, reading detailed reports in English, or taking the lead in complex meetings held in English.

There are wide skills gaps between industries. Certain industries where English-language communication seems critical, including the logistics industry and the aviation industry, show low levels of English proficiency. Only two industries surveyed – consulting and professional services and engineering – had consistently strong English skills.

Therefore, it should be noted that business leaders who understand which nations are positioning themselves for a smoother entry into the global marketplace will have a competitive advantage over those who don't. Your company needs to know how the center of English language aptitude is shifting. Because knowing English is not just a luxury – it's the *sine qua non* of global business today.

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HOW THE UNDEGROUND ECONOMY AFFECTS GDP

Economic analysts differ in their estimations of the size of the underground economy, but all agree on the fact the size of the underground economy affects to some extent gross domestic product (GDP) figures and other key economic measurements. Underground economic activity not reflected in official economic activity figures causes GDP and other economic metrics, such as unemployment, to be less accurate.

The underground economy, also known as the shadow economy, is often associated with criminal activities. However, the underground economy is larger than purely criminal monetary transactions, as it includes any income or sales transactions that are unreported.

Some economists draw a distinction between black market, illegal activity, such as drug or weapons sales, and shadow economic activity that is illegal only because it is unreported to tax authorities. But the distinction is primarily a technical one rather than a substantive one, since both black market and shadow economy transactions are part of the total underground economy.

The shadow economy includes unreported income earned from activities such as painting a house or performing roofing repairs for someone. The individual performing the work is paid "under the table" in cash and does not report the income to tax authorities. Other elements that make up the shadow economy are unreported work and income of illegal aliens or migrant workers, unreported tip income and the sale of stolen goods.

GDP is calculated using the total of four components: personal spending, business spending, government spending and net exports. The underground economy is primarily made up of transactions that constitute unreported personal spending and business spending.

The underground economy is estimated to account for as much as one-third of the total economy in developing countries and slightly more than 10% of the total economy in developed countries.

The primary concern in relation to the underground economy's impact on GDP is that by rendering a nation's GDP a less-than-accurate figure, this can adversely affect government policies that are at least partially based on GDP numbers.

The other major concern of governments regarding the underground economy is the issue of taxation.

The primary reason for black market growth is weak economic fundamentals. If a country has a high inflation rate and low currency reserves, it is far more likely to harbor a large underground economy. A fixed exchange rate can also have an impact. If the domestic currency

is pegged at a higher level than another currency, black markets can emerge. The black market flourishes in developing nations or those undergoing extensive economic upheaval.

It is important to remember that participation in the black market is not always obvious. When consumers purchase goods from a store in an exotic location, they may have participated in a black market transaction. Many corporations have products distributed in developing nations through middlemen who sell to stores operating in the underground economy.

If a country has a noticeably depressed GDP, that is a big sign that the shadow economy is booming. Increases in welfare and other social assistance can lead to people reporting lower incomes. Reductions in personal income tax rates can encourage individuals to report income more accurately and completely or increased tax evasion penalties can discourage underreporting.

A stronger economy overall with more good-paying jobs would also help to shrink the underground economy.

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DIGITAL CURRENCIES OPPORTUNITIES AND THE CONS

It is a well-known fact that technological progress is developing rapidly and modern Internet technologies are constantly progressing. They involve many areas of both endeavor and many technical fields. In recent years such technologies gain more and more popularity throughout the world.

Generally, a crypto currency is a digital asset designed to work as a medium of exchange that uses strong cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets. Cryptocurrencies are a kind of alternative currency and digital currency (of which virtual currency is a subset). Cryptocurrencies use decentralized control as opposed to centralized digital currency and central banking systems. The first decentralized cryptocurrency, bitcoin, was created in 2009 by pseudonymous developer Satoshi Nakamoto. It used SHA-256, a cryptographic hash function, as its proof-of-work scheme. In April 2011, Namecoin was created as an attempt at forming a decentralized DNS, which would make internet censorship very difficult.

To describe what cryptocurrency is we will accord to Jan Lansky, who tells that a cryptocurrency is a system that meets six conditions:

1. The system does not require a central authority, its state is maintained through distributed consensus.
2. The system keeps an overview of cryptocurrency units and their ownership.
3. The system defines whether new cryptocurrency units can be created. If new cryptocurrency units can be created, the system defines the circumstances of their origin and how to determine the ownership of these new units.
4. Ownership of cryptocurrency units can be proved exclusively cryptographically.
5. The system allows transactions to be performed in which ownership of the cryptographic units is changed. A transaction statement can only be issued by an entity proving the current ownership of these units.
6. If two different instructions for changing the ownership of the same cryptographic units are simultaneously entered, the system performs at most one of them.

What is more, the validity of each cryptocurrency's coins is provided by a blockchain. A blockchain is a continuously growing list of records, called *blocks*, which are linked and secured using cryptography. Each block typically contains a hash pointer as a link to a previous

block, a timestamp and transaction data. By design, blockchains are inherently resistant to modification of the data. It is "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way". In cryptocurrency networks, *mining* is a validation of transactions. For this effort, successful miners obtain new cryptocurrency as a reward. The reward decreases transaction fees by creating a complementary incentive to contribute to the processing power of the network. Some miners pool resources, sharing their processing power over a network to split the reward equally, according to the amount of work they contributed to the probability of finding a block. A "share" is awarded to members of the mining pool who present a valid partial proof-of-work.

A cryptocurrency is preserved in special wallet, which stores the public and private "keys" or "addresses" which can be used to receive or spend the cryptocurrency. With the private key, it is possible to write in the public ledger, effectively spending the associated cryptocurrency. With the public key, it is possible for others to send currency to the wallet.

Besides, transaction fees for cryptocurrency depend mainly on the supply of network capacity at the time, versus the demand from the currency holder for a faster transaction. Cryptocurrency exchanges allow customers to trade cryptocurrencies for other assets, such as conventional fiat money, or to trade between different digital currencies.

As specialists underline, the legal status of cryptocurrencies varies substantially from country to country and is still undefined or changing in many of them. While some countries have explicitly allowed their use and trade, others have banned or restricted it.

To sum up, the use and control of cryptocurrency is not secure and too unreliable both for a country and its inhabitants, that's why cryptocurrency will substitute for real money in individual transactions. Besides electronic money could create significant problems for tax authorities since electronic cash can be made available through accounted or unaccounted systems.

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INSURANCE AND PROSPECTS OF ITS DEVELOPMENT IN UKRAINE

The formation of Ukraine as an independent state led to the creation and development insurance market.

Insurance is a set of economic relations between its participants about the formation of an insurance fund and its use for damages.

Insurance market is a special area of monetary relations, where the object of sale is advocated specific service, that is insurance protection, the supply and demand are formed for it.

The state of insurance formation and development and insurance market in Ukraine is devoted to a number of scientific works, in particular such well-known scholars as V. Aleshin, V. Bazylevych, O. Filonyuk and other domestic and foreign economists.

Despite the wide range of problems mentioned in the writings of scientists, the question of planning and the prospects for the development of the Ukrainian insurance market need further science researches. Particular attention is needed to the complex analysis of operational and financial-investment activity taking into account various factors of external and internal environment risk. Also, there is a need for further research in such aspects as analysis, forecasting and modeling of financial and economic processes.

The specificity of insurance determines the direct connection of the insurance market with finance enterprises, finances of the population, the banking system, the state budget and other financial institutions, within which the insurance relations are realized. In such a

relationship the relevant financial institutions act as insurers and consumers of insurance products.

The current stage of development of insurance relations in Ukraine is characterized by rapid growth, an increase in the number of insurance companies, and, consequently, a high level of competition. That all occurs in conditions of low real demand of the population for insurance services.

However, the insurance market in Ukraine is still at the initial stage of development, some its segments are rapidly developing, but the level of insurance coverage remains low levels.

This is primarily due to the income level of the population. Due to the unstable political and the economic situation in the state, deteriorated the situation of the insurance market.

Prospects for the development of the insurance market in Ukraine will depend on the future improvement of the legislative framework, which regulates not only the sphere of insurance, but also, in general, all kinds activities, in particular the development of non-state pension insurance, life insurance, health insurance, mortgage lending, banking activities and their impact on insurance, as well also from the creation of a favorable system of functioning of the institution of insurance intermediaries, improving insurance culture and increasing trust in insurers. It is necessary for insurance companies to increase the efficiency of insurance management, applying the economic-mathematical tools and modern technologies of simulation modeling. This will allow to determine the degree of activity of the company's response to changes in the insurance market in order to take appropriate measures timely; to evaluate the effectiveness of technology for the formation of technical reserves and total assets of the company; to predict possible changes in its financial situation; to determine forecast values of the main end points of the insurer's activity. Application at the insurance management of quantitative models will allow to evaluate the objectively-necessary level the cost of management, the possibility of investment policy, determine the strategy marketing policy.

So, the insurance market of Ukraine has already passed the stage of formation and is located on the stage of development. It has reached a certain level of development, but has not become a real factor of stability and beyond its characteristics does not correspond to the tasks of the Ukrainian progressive development.

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FEATURES OF THE ACCOUNTING OF CAPITAL INVESTMENTS

Fixed assets are constantly in need of attention in order to support them in a proper state of use. It causes the enterprise to bear the costs of repairs and maintenance of fixed assets, as well as their constant updating.

Capital investment is the cost of capital construction, the acquisition (production by own means) of fixed assets, the acquisition or production of other non-negotiable tangible assets, the acquisition or production of intangible assets, as well as the formation of the main herd, carried out in this period in order to obtain economic benefits in the future.

Classify capital investments by type of planning and by their structure.

By types of planning they are divided into centralized and decentralized:

- centralized capital investment is the money allocated to capital construction from the state budget.

- uncentralized capital investment is determined by the plans of enterprises, the population and carried out at their own expense.

According to the structure of enterprises, capital investments are distinguished:

- acquisition (production) of fixed assets;
- the acquisition (production) of other non-current tangible assets;
- acquisition (production) of intangible assets;
- formation of the main herd.

Capital investment in the acquisition (production) of fixed assets includes: the purchase of equipment that does not require installation; purchase of equipment requiring installation; acquisition of a production instrument, measuring, testing and other equipment and inventory related to fixed assets; the acquisition of low-value and high-value items in cases where their acquisition is foreseen at the expense of capital investments.

The fact that structure of capital investment is divided into sectors characterizes their distribution by sectors of the economy. On this basis, capital investments are made in the reproduction of basic means of trade, public catering, agriculture, industry, transport, educational institutions, health care, etc. The territorial structure of capital investment means the distribution of costs associated with the creation of new, expansion and modernization of existing fixed assets, by the regions of their placement.

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PROBLEMS OF ACCOUNTING OF CASHLESS SETTLEMENTS IN UKRAINE

Non-cash cash is one of the main means of payment between organizations, enterprises and institutions. Non-cash payment allows you to reduce the amount of cash in circulation in the country and determine the share of risk when calculating buyers with suppliers.

An important condition for conducting cashless funds is the availability of funds in the bank at the payer and the payee.

In today's conditions of a market economy there are the following main problems for the development and organization of cashless cash in Ukrainian enterprises:

- optimization and systematization of forms of cashless funds and their organization;
- finding new mechanisms for the organization of cashless funds, which would further help to overcome the crisis phenomena;
- use of cashless settlements under the conditions of making cashless money in economic circulation and their perfect organization;
- acceleration and intensification of funds.

Existing problems with the further development of the organization of cashless funds at the enterprises of Ukraine need to be resolved, for this purpose, it is necessary to adjust the existing regulatory documents and laws, to correct all contradictions and inaccuracies, so that laws and normative documents do not contradict each other. An important aspect is the introduction of changes in the activities of banks in the field of cashless funds, it is important to force banking institutions to legislatively organize cashless settlements, so as to encourage people to use this type of settlement. It is imperative to create special conditions in order to encourage traders to set up terminals. Establishing a state fund of assistance is also a prerequisite for those entrepreneurs who wish to install their equipment at their own point of sale in order to make cashless settlements. First of all, it is necessary to carry out measures on the organization of e-commerce in Ukraine, the basis of which should be the development and formation of a

legal framework for conducting trading operations using the Internet. Because using cashless cash over the Internet can save time and money and lead to faster cash flow. To solve problems related to the organization of cashless funds at Ukrainian enterprises, it is possible with the help of ways to improve cashless settlements.

Creation of an efficient system of cashless payments is of fundamental importance for the clarification of the legal and organizational framework, as well as legal provisions that would regulate the system of cash and maximally contribute to accelerating the turnover of cash.

The main ways to improve and solve the problems of the development of cashless funds are:

- increase of public confidence in the banking system, lost due to the financial and economic crisis;
- introduction of risk insurance of holders of payment cards from unauthorized interference and unforeseen use.

Consequently, the system and organization of cashless funds are the main component of the overall national monetary system of Ukraine. Normalization of this system will facilitate the establishment of an organic connection with the market environment and the formation of normal market relations between economic entities.

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WAYS TO OVERCOME PROBLEMS OF MANUFACTURING INVENTORY ACCOUNTING IN UKRAINE

The stable provision of the enterprise with material resources and their effective use is an important factor in the development of production.

The purpose of the study is to identify and analyze the main problems of inventory accounting at enterprises and propose ways to eliminate them.

One of the important conditions for qualitative accounting of materials is the using of computer programs for automation of accounting with advanced methods of warehouse management and accounting of materials. The technological process of automated processing of inventory data is to perform all necessary operations of input, processing, storing and providing the necessary information, grouping data into accounts, in order to control the availability and cost of materials with timely compilation of reporting. Disadvantages of using computer programs for inventory accounting at enterprises may consist in the fact that the units that cooperate with the warehouse, need more operational information on the receipt of raw materials and therefore, it is necessary to automate the comprehensive distribution of reporting on the receipt of raw materials and other materials.

The ways to overcome the problem of manufacturing inventory accounting can include:

- improvement of the system of automation of accounting and analytical works in the management of production stocks and justification of rational methods for inventory accounting;
- coordination of accounting and tax accounting of inventories;
- substantiation of the accounting system of material costs for the development of new technology and production technology;
- clear organization of accounting and control procedures for the movement of inventories of enterprises;
- clarification of the classification and methodology for evaluating inventories.

There are a lot of problems associated with the acquisition of inventories of costs, some of which are transportation and procurement costs, namely to allocate the relevant costs in the cost of transport (i. e. include in the prime cost of inventories) or in the expenses of the current period. The problem costs are the cost of carrying out cargo handling, performed by the enterprise; transportation of stocks to their place of use by own transport of the enterprise; maintenance of the supply service of the enterprise. In order to avoid misunderstandings in transportation costs, it is necessary to include transportation and handling costs, performed not only by outsiders, but also by own forces. Another problem associated with accounting for transportation costs is the inclusion of these costs in the initial value of each unit of purchased stock or accounting for them on a separate account, that is, it should be entered into the plan of accounts number 29, which would be called "The transport and procurement costs." This account will include the cost of transportation and loading of materials in transport costs of storage of materials; maintenance costs for the stock-warehouse; rewards paid to intermediary organizations through which materials are acquired; packaging costs and others. We introduce the following sub-accounts: 291 - TPC in production activity, 292 - TPC in trading activities.

Manufacturing inventories are the main item of working capital and the basis of the company's existence. Therefore, their reliable accounting of the company is an integral part of management, without which it is impossible to achieve the current and long-term goals of the enterprise. The solution of a complex of controversial and debatable issues of accounting and analytical management of inventories is relevant to most enterprises.

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NATIVE ADVERTISING AND MAJOR TRENDS

Native advertising is a type of advertising, mostly online, that matches the form and function of the platform up on which it appears. In many cases, it manifests as either an article or video, produced by an advertiser with the specific intent to promote a product, while matching the form and style which would otherwise be seen in the work of the platform's editorial staff. The goal is to create a more natural and less intrusive ad serving to increase clicks, sales, and other targeted actions.

Native ads have become an integral part of the marketing strategy for the brand, as the sizes and formats in this niche are virtually limitless, and advertising performance indicators are among the highest in the industry. The benefits of organizing native ads through automated platforms are evident, such as the DSP platforms, which allow advertisers to target specific websites whose audiences are most valuable to the advertiser, including the geographic location of the viewers of the advertisement and the desired time to impress during the week.

Innovative trends in native ad advertising

1. Video has become the trend within most other trends. As new forms of ad inventory become available and increasingly popular (i.e. Snapchat), video often seems to be the thing pushing those new forms of inventory to prominence. Native video advertising appears mostly on social media platforms, but may also be seen on YouTube and other video-sharing platforms.

2. We have already touched a bit on this one, but social media is also playing a major role in the rise of native advertising – not just for the sake of video either. On any social media platform, our feeds are filled with a variety of content. That only creates more options for ads. For example, brands can use in-feed ads to send users to a number of different places, like articles, blog posts, and more. Social media advertising in general has given brands an increased

opportunity to show their personality behind the products or service they hope to sell. Now, more than ever, brands need consumers to buy into their humanity and their product.

3. A lot of that time is spent online within mobile apps – in large part due to the use of social media. There is been an overall heightened focus on mobile in recent years for advertisers, and native advertising is no different. Both mobile and native continue to grow, and continue to better engage viewers. Vertical video, a major mobile advertising trend, has become an important native advertising format, as well.

4. Native ads allow brands to live in content without disturbing consumer experience. At the same time, every consumer is fully aware that what they are looking at is an ad. This is an impressive level of integration associated with high levels of transparency. According to research on the LinkedIn network, 53% of users are more pleased to see native ads than banner ads, and 18% more respondents are ready to make a purchase after they are interested in natural advertising than the usual one.

References:

1. "Advertising under cover. Native advertising, content marketing and the secret world of promotion on the Internet", Alpina Publishers, 2017, Mara Einstein.

2. "Native Advertising Arbitrage: The Secret Guide to The Fastest Growing Way to Make Money With Blog" 2016 And Beyond, Rob Cyst

3. "The Native Advertising Advantage: Build Authentic Content that Revolutionizes Digital Marketing and Drives Revenue Growth", 2017, by Mike Smith.

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REGULATION OF ENTERPRISES' FOREIGN ECONOMIC ACTIVITY

During the past four years, more than 50% of the budget's revenue of Ukraine come by excise tax on goods produced in Ukraine and on imported excisable goods, value-added tax on domestic and imported goods, other taxes on international trade.

In other words, the main engine of the Ukrainian economy is an entrepreneur and products or services produced.

In order to expand markets, obtain foreign exchange earnings and foreign investment enterprises conduct foreign economic activity. Foreign markets have a lot of threats: loss, damage, or theft of business property during delivery; unfair competition from foreign manufacturers; interstate regulation of international economic relations; anti-dumping duty; non-fulfillment of obligations by a foreign partner; the loss of clients due to the changes in the country's political system.

To conduct foreign economic activity, an enterprise must have a clear goal, an appropriate organizational structure of management, international quality certificates, as well as professionals in a team. Ukrainian business not always has the half of the list.

In addition, the state regulates trade through various tariff, non-tariff and currency barriers, which should be aimed at protecting domestic producers.

The main barriers of foreign economic activity are: corruption, constantly changing laws, strong pressure of taxes on business, high lending rates, raw material orientation of the economy, Ukraine's weak position in the global political arena, lack of allied countries, war etc. Such areas as politics, law, and finance are the world elephants, on whose backs the entrepreneurship is based.

Changes in law and political order often occur in Ukraine. Foreign investors do not risk investing in Ukraine, because of fear to lose their property.

Resolving conflicts in Ukrainian courts is a costly and bureaucratic process. Therefore, during the implementation of transactions with a foreign partner, Ukrainian business relies on the external arbitration courts.

Besides, doing business in Ukraine is complicated because of the economic situation in the country, which causes bank failures, high lending rates, diversification and differentiation of the taxes, and large receivables. Therefore, Ukrainian business prefers to act with the help of bribes, “black salaries”, when the worker is not listed in the organization, “grey salaries”, when the worker is listed in the organization and his salary is only half documented, and offshoring of a business process.

Why is business hiding in offshores? Why is production located in China? The reason is the best conditions. For Ukraine it means tax and judicial reforms, the stabilization of laws. If the political authorities are not able to help the business, then the business should take matters into its own hands.

Certification of the process and product, employee training, development of innovations and effective marketing may help business become competitive in the international arena. Certification is an expensive process. Products will not be accepted by any foreign buyer without it. Employee training should be conducted constantly because of the rapid updating of the knowledge base in the industry. Innovations create new product characteristics and reduce the cost of production. Effective marketing helps to understand the supplier and the consumer, to consider the risks and create the best business strategy in the surrounding environment.

SECTION 4. INFORMATION TECHNOLOGIES

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QUANTUM COMPUTER AS A NEW CLASS OF COMPUTERS IN FUTURE

The history of computer technology has involved a sequence of changes from one type of physical realisation to another. Today's advanced lithographic techniques can create chips with features only a fraction of micron wide. On the atomic scale matter obeys the rules of quantum mechanics, which are quite different from the classical rules that determine the properties of conventional logic gates. Soon they will yield even smaller parts and inevitably reach a point where logic gates are so small that they are made out of only a handful of atoms.

On the atomic scale matter obeys the rules of quantum mechanics, which are quite different from the classical rules that determine the properties of conventional logic gates. So if computers are to become smaller in the future, new, quantum technology must replace or supplement what we have now.

From a physical point of view a bit is a physical system which can be prepared in one of the two different states representing two logical values : no or yes, false or true, or simply 0 or 1.

Any classical register composed of three bits can store in a given moment of time only one out of eight different numbers. A quantum register composed of three qubits can store in a given moment of time all eight numbers in a quantum superposition.

Quantum bits, called qubits, are implemented using quantum mechanical two state systems; these are not confined to their two basic states but can also exist in superpositions: effectively this means that the qubit is both in state 0 and state 1.

Thus quantum computers can perform many different calculations in parallel: a system with N qubits can perform 2^N calculations at once! This has impact on the execution

time and memory required in the process of computation and determines the efficiency of algorithms.

For an algorithm to be efficient, the time it takes to execute the algorithm must increase no faster than a polynomial function of the size of the input. Think about the input size as the total number of bits needed to specify the input to the problem — for example, the number of bits needed to encode the number we want to factorize. If the best algorithm we know for a particular problem has the execution time (viewed as a function of the size of the input) bounded by a polynomial then we say that the problem belongs to class P.

Problems outside class P are known as hard problems. Thus we say, for example, that multiplication is in P whereas factorization is not in P. "Hard" in this case does not mean "impossible to solve" or "non-computable." It means that the physical resources needed to factor a large number scale up such that, for all practical purposes, it can be regarded as intractable. However some quantum algorithms can turn hard mathematical problems into easy ones.

The difficulty of factorisation underpins the security of what are currently the most trusted methods of public key encryption, in particular of the RSA (Rivest, Shamir and Adelman) system, which is often used to protect electronic bank accounts.

Once a quantum factorisation engine (a special-purpose quantum computer for factorising large numbers) is built, all such cryptographic systems will become insecure.

Potential use of quantum factoring for code-breaking purposes has raised the obvious suggestion of building a quantum computer.

In principle we know how to build a quantum computer; we start with simple quantum logic gates and connect them up into quantum networks.

Thus our task is to engineer sub- microscopic systems in which qubits affect each other but not the environment.

The next decade should bring control over several qubits and, without any doubt, we shall already begin to benefit from our new way of harnessing nature.

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MODELING OF HYDROGENESIS YIELD DURING PLANT MATERIAL FERMENTATION

Today hydrogenesis is a breadth-wise subject spanning practically every aspect of the life sciences, from studying chemical sequences to modeling the structure and function of this process. A microbial electrolysis cell uses specific varieties of bacteria to breakdown organic matter [1]. The process releases hydrogen gas as a by-product, and this gas could be used as a fuel source. This new process has been entitled "electrohydrogenesis."

The bacteria can munch on a very wide variety of organic matter. Two of the most likely candidates for this fuel generating process would be waste water and the leaves and stalks of corn. Using waste water in a microbial electrolysis cell would be handy because the bacteria would generate hydrogen gas at the same time as purifying and treating the waste water.

The researcher defines curves approximation method, which describes hydrogen producing process by microorganisms during fermentation cellulose containing raw materials depending on hydrogen ion and substrate rates changes. It is shown that raw materials contents (corn waste) higher than 50 g/dm^3 causes change in medium pH value and can be described by third-degree polynomial. Rational parameters of hydrogen obtaining fermentation process are pH values in range 6 – 8 under substrate concentration within $40 - 60 \text{ g/dm}^3$ [2].

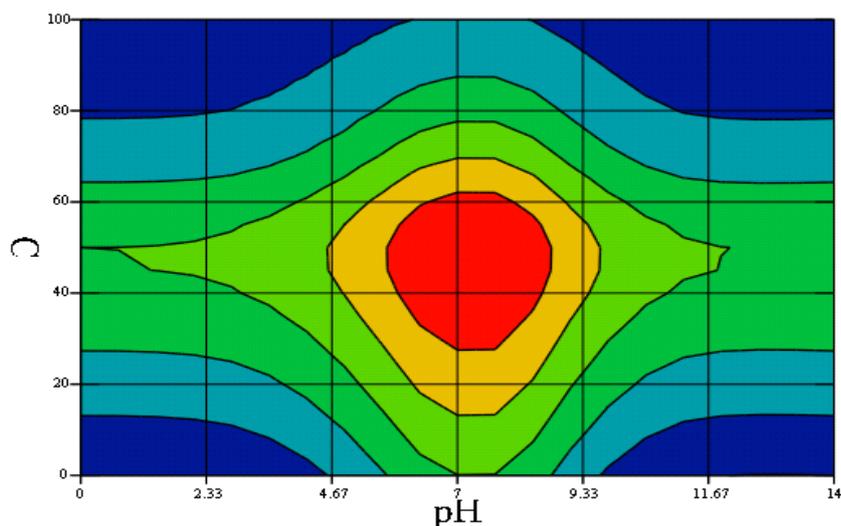


Fig.1. Dependence of hydrogen yield in cellulose fermentation process from pH changes and raw material concentration C

The researchers have reached a reported new level of efficiency: "This process produces 288 per cent more energy in hydrogen than the electrical energy.

This electrohydrogenesis process may first be implemented on farms, or waste-water treatment facilities, or other locations that have heaps of bacteria food at the ready. There are substantial infrastructure issues to be addressed in using hydrogen gas, but the environmental and energy-conversion efficiency benefits for hydrogen as a transportation fuel makes it worth addressing and solving these issues.

References

1. Jeremy Ramsden. (2009). *Bioinformatics*. London: Springer Verlag P. 8-36.
2. Н.Б. Голуб, П.Л. Денисюк, Д.И. Драпой. Определение оптимальных условий выхода водорода при ферментации растительного сырья. Альтернативная энергетика и экология (ISJAEE) № 4-6, 2017, с. 80-88

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THE SYSTEM OF CHOICE OF OPTIMAL SCHEMES OF POPULATION VACCINATION USING EPIDEMIOLOGICAL DATA

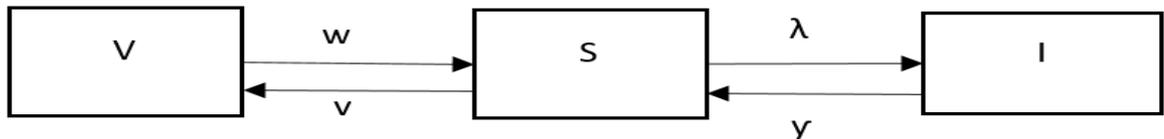
Epidemiological models allow us to investigate the process of spreading infectious diseases, to make a forecast for the future, to determine the effectiveness of preventive measures (e.g. vaccination). The basic principle of constructing an epidemiological model for a specific infectious disease: the whole population is divided into several categories; the model is a dynamic system that changes in time, therefore, when passing a certain period of time, a part of the population moves from one category to another [1]. There are the following categories in epidemiological models:

- S – susceptible: sensitive to infection;
- I – infectious: infected with an infectious disease that is of interest, can infect others;
- R – recovered (or removed): persons who have received immunity;
- E – infected, but not infectious (cannot infect others yet);
- V – vaccinated, immunized, not available for infection.

The main categories include: susceptible S and infectious I . The model may have additional categories: infected E , recovered (or removed) R , vaccinated V . Depending on the particular infectious disease, its epidemiological model may have certain features, and therefore there are different types of models.

The strength of the infection λ is the probability that a certain person will be infected at a certain time. The rate of recovery γ is the probability that a certain person will be recovered at a certain time. As an example, consider the SIS model without taking into account changes in population size and age structure of the population. Where, N - all population, S - susceptible, I - infectious, λ - infection strength, γ - recovery rate, t - time period [2].

If the model SIS adding vaccination, we get SISV model:



where, N - all population, V - vaccinated, S - susceptible, I - infectious, λ - infection strength, γ - recovery rate, v - population coverage by vaccination, w - decrease of immunity, t - time period.

The system of equations is iterative, which allows us to compute a forecast of the influence of the chosen scheme of vaccination of the population on the spread of infection for the future.

Thus, using the SISV model, allows us to determine the optimal scheme of vaccination for the population to prevent the spread of infectious diseases [3].

References:

1. Tassier T. (2013). *The Economics of Epidemiology*. Berlin: Springer Science & Business Media. P. 3-24.
2. Brauer F. (2001). *Mathematical Models in Population Biology and Epidemiology*. New York: Springer. P. 3-120.
3. Anderson R. (1982). *Population Dynamics of Infectious Diseases: Theory and Applications*. London: Chapman and Hall. P. 3-47.

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DATA SECURITY

The term “information technology” in its modern sense first appeared in a 1958 article published in the Harvard Business Review; authors Harold J. Leavitt and Thomas L. Wisler commented that “the new technology does not have a single established name. We will call it information technology (IT)”. Their definition consists of three categories: processing methods, applying statistical and mathematical methods for decision-making and modeling higher-order thinking using computer programs. Information technologies began to actively develop in the 1960s, along with the emergence and development of the first information systems (IS). IBM released the first hard drive in 1956, as part of the 305 RAMAC computer system. Most digital data today is still stored magnetically on hard drives or optically on media such as compact discs. Until 2002, most of the information was stored on analog devices, but that year the digital capacity exceeded the analog device for the first time. As of 2007, almost 94% of the data stored worldwide has been preserved in digital form: 52% on hard drives, 28% on optical devices and 11% on a digital magnetic tape. It has been estimated that in the world, the capacity for storing

information on electronic devices has grown from less than 3 exabytes in 1986 to 295 exabytes in 2007, doubling approximately every 3 years.

Data security means protecting digital data, such as those in a database, from destructive forces and from the unwanted actions of unauthorized users, such as a cyberattack or a data breach. Data security refers to the process of protecting data from unauthorized access and data corruption throughout its lifecycle. Data security includes data encryption, tokenization, and key management practices that protect data across all applications and platforms. Organizations around the globe are investing heavily in information technology (IT) cyber defense capabilities to protect their critical assets. Whether an enterprise needs to protect a brand, intellectual capital, and customer information or provide controls for critical infrastructure, the means for incident detection and response to protecting organizational interests have three common elements: people, processes, and technology. Examples of data security technologies include backups, data masking and data erasure. A key data security technology measure is encryption, where digital data, software/hardware, and hard drives are encrypted and therefore rendered unreadable to unauthorized users and hackers. One of the most commonly encountered methods of practicing data security is the use of authentication. With authentication, users must provide a password, code, biometric data, or some other form of data to verify identity before access to a system or data is granted. Data security is also very important for health care records, so health advocates and medical practitioners in the U.S. and other countries are working toward implementing electronic medical record (EMR) privacy by creating awareness about patient rights related to the release of data to laboratories, physicians, hospitals and other medical facilities. Data security refers to protective digital privacy measures that are applied to prevent unauthorized access to computers, databases and websites. Data security also protects data from corruption. Data security is an essential aspect of IT for organizations of every size and type. Data security is also known as information security (IS) or computer security. I believe that data protection today is an important component of the use of information technology, so this topic is relevant for the development and finding ways to improve modern ways of data protection.

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ARTIFICIAL INTELLIGENCE IN OUR DAILY LIFE

Artificial intelligence often sounds like some far-off science fiction concept, but it's actually behind a lot of things you encounter in your daily life.

Simple artificial intelligence even filters your incoming emails, diverting spam away from your inbox. It works better than software rules because it learns what could be spam based on the content of the email. The artificial intelligence even builds a model based on your preferences, what is spam to you may not be spam to another user.

Artificial intelligence goes so much further than recommending a book or filtering your emails. Let's take a look at the other ways we can measure the impact of artificial intelligence in everyday life.

Artificial Intelligence Powers Your Virtual Assistants. You encounter it every day. Think of all those times YouTube suggested a video or TV show. How often do you ask Siri or Google a question? Each time, you're interacting with artificial intelligence. These voice assistants find the information and return the answers to your device, or they control other apps to achieve the desired result.

Using anonymized location data from smartphones, Google Maps can analyze the speed of movement of traffic at any given time. Maps can more easily incorporate user-reported traffic

incidents like road repair and accidents. It means Maps can reduce commutes by suggesting the fastest routes to and from work.

Financial Companies Use Artificial Intelligence To Monitor For Fraud. Consider how many people have a bank account, the number of credit cards that are in circulation. How many man hours would it take for employees to sift through the thousands of transactions that take place every day?

Financial companies often use artificial intelligence to monitor transaction requests since algorithms process information so quickly. They spot patterns in your transactions and alert users to suspicious activity.

Artificial Intelligence Lies Behind Airline Autopilot. In fact, an average Boeing 777 pilot spends just seven minutes manually piloting the plane, though much of those seven minutes is spent on takeoff and landing. The airplanes use a combination of motion sensors and GPS to track their position in flight. This is the best use of the technology, where the impact of artificial intelligence in everyday life is barely felt.

None of these advances are possible without artificial intelligence. As you can see, all of our lives are impacted by artificial intelligence on a daily basis. Whether we are using our smartphones, surfing the internet, buying products online, using navigation, wasting time on social media or listening to songs on our favorite music streaming service, those recommendations are based on what you have bought or watched.

The algorithms learn from those purchases, using them to suggest other things you might enjoy. Artificial intelligence lies behind those algorithms, and it is impacting our choices in one way or another.

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MODERN TECHNOLOGIES IMPROVING THE PRESENT AND IMPACTING THE FUTURE

Every time you go out on the street in a big city, you see a lot of people who are so passionate about their smartphones and tablets that they practically don't pay attention to the world around them. Digital dependence is growing, evoking images of unhappy citizens in the "Matrix", chained to a chair and decided to live in an illusion that replaces reality. What will be next? We will not be pessimists. Neurologists, psychologists, and researchers in the field of artificial intelligence - people, who teach computers to imitate a person and improve his thought process - say that machines also have a positive effect on our lives. They came up with the term cognitive technologies to describe how electronic devices and other tools can help and improve people's abilities, such as "mental activity, studying, storing and retrieving information from memory, and solving problems". Cognitive technologies include not only electronic gadgets, but also a number of other things that can contribute to human thinking in all areas, from pharmaceuticals to games that stimulate brain development. As Marcelo Dascal, a professor of philosophy at Tel Aviv University has noted, even basic conversational speech is in itself a form of cognitive technology since it not only helps to express our thoughts but also determines our thinking. Roughly speaking, language is a reflection of your mind. Cognitive technologies may not be included directly in the brain, but become a kind of add-on for it. Unload some of brains processes, thereby expanding the performance of the human brain outside, in fact, the "gray matter". As modern technologies in computing power are superior to the human mind, so a new generation of psychoactive substances and electronic implants may become indispensable in the

world of cognitive technologies of the future. So, we have five potential ways of such a development.

Textbooks will be truly "smart". It will be easier for students of the future because digital books will have the capabilities of artificial intelligence and will explain everything with the patience of a professor. Not so long ago for the iPad came out "smart" textbook on biology. The student could enter the question "why do you need a protein?" and get a page with the necessary information. The book's software also contained a readable map with 5,000 concepts on any topic that were related. In a study conducted by California College, students who studied using this textbook received higher grades than others.

We will live in the augmented reality. The idea of augmented reality was formed back in the 1960s when researcher Ivan Sutherland - known as the father of computer graphics - wrote an article called "Absolute Display" in which he considered the possibility of mixing digital information and human vision to create an illusion of vision through the wall. In the early 2000s, scientists from Columbia University developed bulky, but quite wearable tools that allowed the user, looking through special sunglasses, to see pop-up projections and charts about areas of New York. Since then, augmented reality has begun to capture the world.

For example, the agency DARPA is working on contact lenses that support augmented reality. Such devices can read digital information embedded directly into the landscape in the form of digital beacons.

Concerning Mental Improvement Substances. Perhaps you have seen out of the corner of your eye that more and more students (at least abroad) are using drugs, not for their intended purpose, but to increase productivity. For example, "Adderall", which is treated with attention deficit, or "Provigil", which are struggling with narcolepsy. Students hope that the drugs will increase their attention and help pass the exams.

The latest unofficial survey in Nature showed that one of five scientists allowed to study nootropics, a controversial class of drugs that increase brain productivity by changing the number of neurochemical substances, confirmed that such substances improve the supply of oxygen to the brain or stimulate neuronal growth.

This kind of brain doping is becoming more common. There are new nootropic substances that can be purchased without a prescription. One such product, Onnit Labs, Alpha Brain contains ingredients that supposedly increase the level of the natural neurotransmitter acetylcholine. The writer Ari Levo, who recently experienced the effect of this drug, noted that after taking it he had seen unusually vivid dreams and woke up earlier than usual, feeling asleep and cheerful. Left also noticed that he was "more collected and felt emotional stability." And while experts warned that the use of little-researched substances can be dangerous, there is no evidence that they are harmful in the long run. We can move objects by force of thought.

We can move objects by force of thought. You have probably heard about psychics who can bend spoons with the power of thought (psychokinesis) - that is, manipulate inanimate objects with your abilities. Well, although all the cases of such a "psychokinesis" were broken to pieces by skeptics, in recent years, scientists have made certain breakthroughs on this basis.

The key to these abilities lies in the area called the machine brain interface (IMM) and is essentially a communication channel through which your neurons send signals to external devices with the same ease with which you strain your muscles. Scientists began developing similar algorithms back in the 70s and 80s. By the mid-2000s, they began to develop electronic brain implants called neuroprostheses (neuroprostheses) that allow you to control the cursor, for example, without using additional gadgets. The technology is in its infancy, but scientists have concluded that someday such implants will be incredibly useful to paralyzed people. Like Stephen Hawking. Absolutely hopeless people with disabilities will be able to walk and act on a par with people who do not suffer from such ailments.

Others believe that once we can not only turn on the microwave or start the car, just thinking about it, but we will be inextricably linked with computers and devices that will constantly provide us with information directly to the brain. For example, it would be nice to keep the faces and names of people, as well as the dates of their birthdays on a separate shelf of the brain and, if necessary, retrieve.

We will achieve digital immortality. Perhaps the biggest limitation of human intelligence is its shelf life. You will learn all your life, but despite how clever you will end up, your body, which, in essence, is just a container, will die. People tried to overcome this by writing books and a library collection, but how hard it is to keep at least a piece of data stored in 100 billion neurons of the brain permanently.

Some futurists see the light at the end of this tunnel. What if we take and digitize the entire contents of our brain, and then download this data to a computer or robot? Entrepreneur and media magnate Dmitry Itskov recently said that such an opportunity will appear in the coming decade. But this is only the first step. Thirty years later, it will be possible to copy and download the human consciousness into a machine or even a holographic virtual body — that is, create software that copies a person.

It sounds crazy. But given the progress in the field of neurosynaptic computer chips - that is, machines that mimic neurons and synapses of the brain - we can safely say that this is possible. Look at these financing: a billion euros was allocated for the development of the Blue Brain Project — a virtual simulation of the human brain in all its complex beauty. Such chips cannot only store information but imitate the actions of real brain cells. This means that we will not only be able to create a complete copy of our brain but also to work after death, when the “container”, that is, the body, will be useless. How many plays could write Shakespeare, live it for another hundred years?

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WILL COMPUTERS PUT US OUT OF WORK?

In 1996, a world chess champion was defeated by IBM’s Deep Blue. Early in 2016 a human master of Go, a game considerably more complex than chess, lost to AlphaGo from Google’s DeepMind. As artificial intelligence (AI) improves, some predict that computers will be able to do any human task. The fictitious «steel-driving man» John Henry died competing against his machine replacement. Will computers put us out of work? Opinions differ.

Technology has long been tied to work. Computing technology in the late 20th century enabled work based on digital information, and might have the same transformative impact. Capabilities enabled by new technology can threaten older forms of work. In 1999, the US National Academy of Sciences predicted that IT would significantly transform work. The World Economic Forum said the same thing in 2016. Jobs define who people are. Most of them are more likely to identify themselves as «an accountant» or «a plumber» than as «a human being». Changes in work can have serious consequences for how people live and what it means to be human.

In this connection three most important questions should be discussed. Firstly, *will AI eventually do away with jobs?* Secondly, *will computing impact job quality?* And thirdly, *will computerization affect labor markets?*

Speaking about the first question, it should be pointed out that many AI pioneers reasoned, and still argue, that «super-intelligent» machines will do away with human jobs. If humans are needed for jobs because of what humans can do, human-like machines will replace

them. It seems logical – after all, iron horses replaced real horses. However, the argument relies on questionable assumptions. Many AI predictions have been wildly inflated. In the 1950s, there was hope that perfect machine translation from one natural language (say, Russian) to another (say, English) would arrive within one or two decades. Sixty years on, this hasn't happened. Machine translation, while better than it used to be, proved that human communication through natural language is subtle and sophisticated. It depends on the listeners' intelligence to infer meaning despite frequent errors and ambiguity. Machine translation doesn't eliminate the inferential job. Machine translation might reduce the number of translation jobs – or it might increase the number of such jobs by improving the efficiency of human translators, lowering the cost, and driving up demand.

The impact of computers on job quality is complicated. Computerization helps people prepare for and find jobs. Some use LinkedIn to identify work skills that are in demand and then acquire those skills. A vast array of YouTube tutorials enables people to develop expertise on a broad range of subjects. General websites such as Monster.com and specialized career sites like Dice.com and TalentZoo.com match individuals to jobs. Companies leverage cloud computing and the Web to deliver specialized goods and services or to expand market share.

Thirdly, technology plays a role in labor markets. New jobs have replaced those made obsolete by technology. Over the past 20 years, new occupations have emerged: Web designers, digital artists, professional shoppers, Airbnb hoteliers, and many others. Computerization hasn't diminished jobs. However, computerization is uniquely able to affect many economic sectors simultaneously – agriculture, mining, oil and gas extraction, construction, manufacturing, communications, publishing, education, health, finance, and so on.

Therefore, it should be noted that labor markets are well developed and have dealt with past disruptions effectively. They can benefit from digital technology. Nevertheless, some aspects of how computers will affect jobs will remain unclear.

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THE MAIN ADVANTAGES OF CLOUD STORAGE ON THE VIRTUALIZATION TECHNIQUES

Cloud storage is a cloud-computing model in which data is stored on remote servers accessed from the Internet, or "cloud." It is maintained, operated and managed by a cloud storage service provider on storage servers that are built on the virtualization techniques. There are three main cloud storage models: public, private, hybrid.

More and more educational institutions are teaching courses that involve picture or video editing, creating animations or composing music, all of which require a vast amount of storage space. As in most areas of IT, much has been made of moving storage into "the cloud". For a particularly large educational institute, a high capability cloud service provider can provide storage and organization for all involved. The public sector, including education departments, can enjoy the same benefits of virtualization and cloud services that commercial organizations. However, educational institutions IT departments are overlooking a strategic view of how to use cloud computing in education. In addition, that should be how cloud technologies and working practices associated with a virtualized data center can improve all areas of a educational institutions IT departments.

WHAT MAKES CLOUD STORAGE DIFFERENT. The difference between the purchase of a dedicated appliance and that of cloud storage is not the functional interface, but merely the fact that the storage is delivered on demand. The customer pays for either what they

actually use or in other cases, what they have allocated for use. Data services such as compression and reduplication can be used to further reduce the actual space consumed. The management of this storage is typically done out of band of these standard. Data Storage interfaces, either through an API, or more commonly, though an administrative browser based user interface. This interface may be used to invoke other data services as well, such as snapshot and cloning.

INTRODUCING CDMI. The Storage Networking Industry Association™ has created a technical work group to address the need for a cloud storage standard. The new Cloud Data Management Interface (CDMI) is meant to enable interoperable cloud storage and data management. In CDMI, the underlying storage space exposed by the above interfaces is abstracted using the notion of a container. A container is not only a useful abstraction for storage space, but also serves as a grouping of the data stored in it, and a point.

CLOUD STORAGE PROVIDERS. There are various providers of cloud storage: Apple iCloud, Dropbox, GoogleDrive, Mega, Microsoft SkyDrive, Amazon, CloudDrive.

References

1. [researchgate.net/publication/262599481_Cloud_Storage_in_Education](https://www.researchgate.net/publication/262599481_Cloud_Storage_in_Education)

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ARTIFICIAL INTELLIGENCE

Artificial intelligence (also known as AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. In computer science AI research is defined as the study of «intelligent agents»: any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

This is a result of computer revolution whereby systems developed behave intellectually, reason rationally and have the ability to effectively interpret the environment in real time. Artificial intelligence outperforms every scientist or mathematician in their way of thinking. They have made it possible to simulate complex activities that need professional expertise. Chess playing program is an excellent example of an intellectual system of AI. The specially designed chess engine which plays as the human opponent is capable of counting millions of moves which is simply impossible to human beings.

Artificial intelligence comes with a series of advantages with the most basic ones such as:

- ✓ costs reduction;
- ✓ speed, flexibility;
- ✓ reliability;
- ✓ durability;
- ✓ duplication.

In relation to cost reduction an artificial intelligence system can perform a task that currently is handled by several workers thus it cuts wage costs. AI is capable of providing an immediate response hence depicting the real time experience. In addition to everything mentioned above an Artificial Intelligence system has no time limitation and has no moods like human beings. These systems are designed to last for extremely long periods of time. Organizations can use them repeatedly whereas it is impossible with human beings who tend to

die. The systems can be connected to different devices such as computers, smartphones, and tablets amongst others without altering their performance.

However, it is evident that everything that has advantages and disadvantages therefore the limitations that come along with artificial intelligence include:

- ✓ high costs in terms of acquiring, operating, and maintaining;
- ✓ impossibility of being used in isolation;
- ✓ they can only handle specified tasks that they are designed for.

For example an artificial intelligence system designed for medicine field cannot be used to control aircrafts.

In conclusion, it is worth saying that artificial intelligence systems have been useful tools in solving complex problems that seem to be beyond the level of human thinking. Although the characteristics of these systems are drawn from human intelligence, they exhibit more intelligence than the human beings themselves. This is just the beginning in computer revolution and more improvements are likely to be seen in the near future.

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EDUCATION AND IT TECHNOLOGIES

A student today does not even technically have to go to a school to receive an education. Online schools have quickly become an acceptable alternative for a brick-and-mortar education. Online courses give students with busy schedules like working adults and parents the opportunity to get an education. Similarly, home-schooled children now have access to structured online lessons. While some educators still question the effectiveness of online schools compared to face-to-face instruction, it is hard to deny they have become a mainstay of modern education.

The way students search for information has been impacted by computer technology. Instead of a trip to the library, students go online to access vast amounts of information. Large digital collections provide students with searchable text, engaging multimedia and interactive content.

Teachers making use of computer technology have more ways than ever to engage their students. PowerPoint presentations with rich multimedia such as graphics, videos and animations appeal to the visual learners in the classrooms. Multi-touch smart-boards go further by getting the students involved. Whether it is an elementary school student matching animals to their natural habitats or a chemistry student assembling molecules with the fingers, smart-boards add a kinesthetic dimension to the learning experience. All of this equates to an increase in motivation and interest that drive students to want to learn more.

Computer technology has brought many components of class management online. Through Learning Management Systems such as Blackboard and the open-source Moodle, students enroll for classes, access important documents and take online quizzes. Discussion takes place in forums and wikis and teachers send feedback and grades all in a virtual space. Online schools make it possible for non-traditional students such as a working adult or a parent taking care of a child to earn a degree from an accredited online school despite their busy schedules.

Distance communication technologies are being used to communicate information to large groups of people over the Internet. For example, a college class may use distance learning technology to conduct a weekly meeting to go over assigned reading, while a group of business associates may choose to conduct meetings with their West Coast office via video conference. The ability to share a single screen is helpful for both online classrooms and business associates.

If developed properly, online classes may increase efficiency and course productivity. To supplement lectures, teachers can provide access to tools that facilitate discussion and active participation. In an online environment, teachers can reach students with different learning styles more easily. For example, they could post a video lecture for those who learn best by listening, a diagram, photos or video for those who learn best by seeing and an interactive game for those who learn by doing. Online assessments may help teachers identify those students that need some extra attention, making it less likely that these students slip through the cracks than in a traditional setting. An advantage of distance communication technology is that it allows participants to meet in a single online location from literally anywhere in the world. A participant often only needs to create a username and password to be able to join an online meeting.

References

1. [Электроний ресурс] – Режим доступу: <https://www.theguardian.com/teacher-network/teacher-blog/2013/jun/19/technology-future-education-cloud-social-learning>
2. [Электроний ресурс] – Режим доступу: <https://www.sony.co.uk/pro/article/projectors-what-is-the-role-of-technology-in-education>

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THE ROLE OF INFORMATION TECHNOLOGY IN OUR LIVES

Information and Communications Technology (ICT) obviously plays an important role in the modern world, since today we live in the information age era. With ICT, the company can make the business easier to happen with the client, supplier and the distributor. It is also very important in our daily lives. The lack of appropriate information at the right time will result in low productivity, low quality of the research work, and waste of time to pursue information and even to do research which actually had been done by other people from other countries.. Nowadays ICT cannot be separated from our daily needs. It is an integral part of our everyday life. There is not a single millennial (a person born in the first decade of the 21st century), who can picture a single day of his or her life without ICT use.

Information and Communication Technoligy has a great impact in our daily lives. For example, we can read our local newspaper using the online newspaper. Another example is we still can get connected with our family, relatives, or colleagues even if we are abroad by using the electronic mail, yahoo messenger, call conference, or video conference.

Digital computer and networking has changed our economy concept to the economy with no boundary in time and space because of ICT. It brings a lot of advantages for economic development enabling millions of transactions can happen in an easy and fast way.

ICT has become an integral part of everyday life for many people. It increases its importance in people's lives and it is expected that this trend will continue, to the extent that ICT literacy will become a functional requirement for people's work, social, and personal lives.

The use of ICT in education add value in teaching and learning, by enhancing the effectiveness of learning, or by adding a dimension to learning that was not previously available. ICT may also be a significant motivational factor in students' learning, and can support students' engagement with collaborative learning.

Information and Communications Technology is basically our society's efforts to teach its current and emerging citizens valuable knowledge and skills around computing and communications devices, software that operates them, applications that run on them and systems that are built with them.

As a matter of fact, we are living in a constantly evolving digital world. Information and Communication Technology has an impact on nearly every aspect of our lives, it influences our:

- working – we work online;
- socializing – we make friends online;
- learning – we study online.

Here it is worth mentioning that digitalization of education is getting more and more pressing these days. There is a logical question that is being heard more and more loudly – if people have an opportunity to work online, why can't they have an opportunity to study online? Even today there are instances when educational technology and e-learning are very successfully applied, and both teachers and students have an opportunity to be more educationally creative and exempt.

The digital age has transformed the way young people communicate, network, seek help, access information and learn. We must recognize that young people are now an online population and access to the world happens through a variety of means such as computers, TV and mobile phones.

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SONOLUMINESCENCE: SOUND INTO LIGHT

The History: Sonoluminescence (SL) was discovered accidentally in 1934 by two German scientists at the University of Cologne as a result on their experiments with sonar. In 1989, Felip Caitan and Lawrence Crum produced the first single bubble SL.

The Process: Sonoluminescence is the conversion of sound energy into light energy. Sound waves are aimed at an air bubble trapped in a flask.

Properties: Sonoluminescence can occur when a sound wave of sufficient intensity induces a gaseous cavity within a liquid to collapse quickly. This cavity may take the form of a pre-existing bubble, or may be generated through a process known as cavitation.

Some facts about sonoluminescence:

The light flashes from the bubbles last between 35 and a few hundred picoseconds long, with peak intensities of the order of 1–10 mW.

The bubbles are very small when they emit the light – about 1 micrometre in diameter – depending on the ambient fluid (e.g., water) and the gas content of the bubble (e.g., atmospheric air).

Single-bubble sonoluminescence pulses can have very stable periods and positions.

Spectral measurements have given bubble temperatures in the range from 2300 K to 5100 K, the exact temperatures depending on experimental conditions including the composition of the liquid and gas. Detection of very high bubble temperatures by spectral methods is limited due to the opacity of liquids to short wavelength light characteristic of very high temperatures.

Mechanism of phenomenon: The mechanism of the phenomenon of sonoluminescence is unknown. Hypotheses include: hotspot, bremsstrahlung radiation, collision-induced radiation and corona discharges, nonclassical light, proton tunneling, electrodynamic jets and fractoluminescent jets and quantum explanations.

In 2002, M. Brenner, S. Hilgenfeldt, and D. Lohse published a 60-page review that contains a detailed explanation of the mechanism. An important factor is that the bubble contains mainly inert noble gas such as argon or xenon and varying amounts of water vapor.

Chemical reactions cause nitrogen and oxygen to be removed from the bubble after about one hundred expansion-collapse cycles. The bubble will then begin to emit light. The light emission of highly compressed noble gas is exploited technologically in the argon flash devices.

Sonoluminescence applications:

1) Superminiature chemical laboratory. Dissolved in water reagents will be present in the plasma during a sonoluminescent outbreak. By varying the parameters of the experiment, it is possible to control the concentration of the reagents, as well as the temperature and pressure in this spherical "microtube".

2) Compact thermonuclear reactor;

3) Effective Energy generator.

Sonoluminescence unites physics, chemistry, optics, and fluid mechanics into one beautiful and simple system, and its study has sharpened our understanding of the wonderful subtleties in all four fields.

Sonoluminescence raises fundamental questions concerning water. Answering them has pushed the limits of our understanding further than we once thought possible.

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GOOGLE BRAIN

Every year scientists put a lot of efforts to bring more and more modern technologies in our lives to make it easier and better. One of them is Google Brain.

The Google Brain Team is a special machine intelligence team which is focused on deep learning. The main idea of this team is that openly disseminating researches are critical to a healthy exchange of ideas, which in turn leads to fast and innovative progress in the field as a whole. Their purpose is to make machines very intelligent like people and make people's lives better. To do this they spent a lot of time on deep researching of appropriate learning studies which were mostly focus on building highly flexible models which learn their own features from the bottom to top and make efficient use of data and computation. They believe that their innovation is very useful for the developing world and modern people. They have already applied this approach to many different problems, like in spaces like healthcare, and so on. Their expertise in systems also allows them to build tools to increase ML research and make it more important and practical to everyone.

Researchers on the Brain team have no limitation in their experiments and developments: they have freedom to set their own research plan and define their own level of engagement with existing products. They have a possibility to choose between doing more basic and methodological research or more applied research as necessary to produce the most compelling results. Due to the fact that many of the advances which they develop at present may take many years to become useful and available for other people. Their main idea is connected with the statement that making substantive progress on hard applications can help drive and sharpen the research questions they study, and in turn, scientific breakthroughs can spawn entirely new applications that would be unimaginable today.

They constantly believe that openly disseminating research can be critical to a healthy exchange of ideas, which can lead to making any progress easier and bringing more and better innovations in the field as at all. They regularly publish their research in different scientific magazines, and also they present their tools, such as TensorFlow, like an open source projects for everyone. Beyond simply disseminating their work, they also pay a lot attention on training new ML experts through different internships and other programs, like the Google Brain.

In addition, they also publish their articles about their achievements in online technical journal which is called Distill.pub. This was established by Brain team members Chris Olah and Shan Carter. In addition a special forum is provided their, so people who are interested in this subject can ask questions and get answers.

Being a part of Google and Alphabet, the Google Brain team has possibilities and access to projects which we can not find anywhere else. Their fundamental research goals allow them to communicate very close with many other teams, so they can make unique contributions to products across the company. For example, in 2017 their collaborations with different companies and teams have successfully deployed their technology in numerous products. For example, Search, Translate, Photos, and DeepMind's AlphaGo system.

In conclusion, we would like to say that the Google Brain team work very hard to make their products on a very high level, their work together with other very well-known companies, and one day they believe that their products can make our lives better and easier.

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THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN TRANSPORTATION

In recent years, the transportation domain is beginning to apply Artificial intelligence in mission-critical tasks (for example, self-driving vehicles carrying passengers) where the reliability and safety of an AI system will be under question from the general public. Major challenges in the transportation industry like capacity problems, safety, reliability, environmental pollution, and wasted energy are providing ample opportunity for AI innovation. It should be noted that research into artificial intelligence (AI) has experienced a surge in the last few decades. This was built largely on pioneering results from the 60's and 70's, including the utilization of advanced neural networks (NNs). It has even taken inspiration from biological behavior for methods like fuzzy logic or genetic algorithms (GAs). The A.I. is widely applied in solving of different transportation problems. Currently, there are several ways in which artificial intelligence is being used within transportation. Artificial intelligence is vital within these driverless vehicles due to their processing, control and optimization capabilities. Within autonomous vehicles, real-time data transmission and processing is a vital function and any disruptions to these processes could prove catastrophic in a real-life scenario. An AI's ability to manage the transmission and processing of received data as well as optimize connectivity to ensure the best connection is always used will help make autonomous vehicles safer and much more widespread.

Another way in which artificial intelligence technologies are used within transportation is traffic management systems. Due to its processing, control and optimization capabilities, artificial intelligence could be applied to traffic management and decision-making systems in order to enhance and streamline traffic management and make our roads smarter. The predicative abilities of AI are also of huge benefit to traffic management systems as they are able to recognize the physical and environmental conditions that can lead to or be the result of heavier traffic flow and congestion. They can then in turn automatically suggest alternate routes to relieve any traffic that may have formed. A smart freight locomotive is equipped with sensors including cameras that capture track, front and back, and the cab of locomotive. The data from the sensors is fed to machine-learned analytic applications which aggregate the data right there on the edge gateway, enabling onboard real-time decision-making.

Moreover, nowadays, there really is an app for everything. This includes AI-powered real-time traffic updates through services such as Google Maps. Using location data collected from users smartphones, these apps are able to predict and analyze traffic conditions in the local area so as to better inform a person's travel plans.

As for passenger transportation, people are often surprised to find out that one of the earliest adoptions of artificial intelligence within transportation was, in fact, the autopilot systems used in almost every commercial aircraft in service. While today it may not sound as futuristic as other applications in which AI is being tested, it is still an essential part of modern air travel. For example, the New York Times reports that only seven minutes of an average Boeing flight are controlled by a human with the rest being handled by a computer. Unsurprisingly, the human-controlled parts of the flight are mostly during both take-off and landing.

Besides, artificial intelligence is also now being used in law enforcement capacities and is helping to identify and catch those who drink and/or text while driving. This can often be a challenge to human officers due to the speeds at which vehicles and passengers can come into and out of view, however, with artificial intelligence, this is no longer such an issue. By using advanced analytical and data processing capabilities, AI could help to detect and identify when a driver is drinking or texting behind the wheel and alert any officers within the local area to intercept them.

In conclusion I would like to say that everything we love about civilization is a product of intelligence, so amplifying our human intelligence with artificial intelligence has the potential of helping civilization flourish like never before – as long as we manage to keep the technology beneficial.

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NETWORK SECURITY

Security of a network may vary from confidentiality, integrity, availability, authenticity to auditing. Most of these variations can be realized using conventional encryption and public key infrastructure (PKI) although to boost security of corporate network, one need to install a firewall especially for systems connected to internet, VPN networks have provided businesses and Cooperate companies with a better solution of handling security risks associated with interconnection of computers besides having firewall.

Virtual Private Network (VPN) is a data network connection that makes use of the public telecommunication infrastructure, but maintains privacy through the use of a tunneling protocol and security procedures. It is called "virtual" because it depends on the use of virtual connections that is temporary connections, but consists of packets routed over various machines on an ad-hoc basis. It is an implementation of a private network on top of the Internet technology infrastructure using modem switching or routing hardware, encryption, authentication, packet tunneling and firewalls.

The Point-to-Point Tunneling Protocol (PPTP) developed by Microsoft in conjunction with other technology companies, is the most widely supported VPN method among Windows clients and it is the only VPN protocol built into Windows 9x and NT operating systems. PPTP is an extension of the Internet standard Point-to-Point protocol (PPP), the link layer protocol used to transmit IP packets over serial links. PPTP uses the same types of authentication as PPP (PAP, SPAP, CHAP, MS-CHAP and EAP).

PPTP is used in conjunction with the Microsoft Point-to-Point Encryption (MPPE) protocol to create a secure VPN. PPTP has relatively low overhead, making it faster than some other VPN methods. Though criticized in the past for various security flaws, many of these problems have been addressed in current versions of the protocol. Using EAP authentication greatly enhances the security of PPTP VPNs. EAP uses digital certificates for mutual authentication (both client and server) and highest security.

Multi Protocol Layer Switching (MPLS) fuses the intelligence of routing with the performance of switching. It provides significant benefits to networks with a pure IP architecture, those with combined IP and ATM and those with a mix of other Layer 2 technologies. MPLS technology is a key enabler of scalable VPNs, making it easy for service providers to efficiently use then existing networks to meet future growth. Its end-to-end QoS enables rapid fault correction of link and node failure. MPLS also helps deliver highly scalable, differentiated end-to-end IP services with simpler configuration, management and provisioning.

MPLS is primarily deployed in the core of a service provider's network. It enables routers at the edge of a network to apply simple labels to packets (frames). ATM switches or existing routers in the network core can switch packets according to the labels with minimal lookup overhead. MPLS integrates the performance and traffic management capabilities of data link Layer 2 with the scalability and flexibility of network Layer 3. MPLS can be implemented on networks based on IP, ATM and Frame Relay.

The problem of computer and network security is an extremely complex one especially with developments of businesses and need to carry out transactions over public network that's the internet. Many security tools and technologies have been put in place to combat these risks that corporate networks and companies are exposed to. A well designed VPN yields better results in terms of security of networks based on the protocols used to realize it.

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TECHNOLOGY INNOVATION – MODERN TRENDS AND OPPORTUNITIES

It is known that technology is moving at an incredible pace. We live in an amazing era where things like autonomous cars, personalized medicine and quantum computing are becoming real as we speak. Artificial Intelligence, crypto-currencies, advanced automation, deep learning and concepts like Universal Basic Income are about to reshape our world.

The years to come will bring impressive technological breakthroughs with massive impact on our lives, markets and societies. In our connected world, with the unprecedented level of information, knowledge and ideas exchange, innovation is happening continuously, at scale and in several forms. It is driven by corporations, secret labs, universities, startups, research scientists or simply by thousands of creative individuals across the globe.

The most promising developments in the wider information technology spectrum are as follows:

1. Artificial Intelligence. Everybody is talking about Artificial Intelligence these days. And yes, in many cases, the topic is covered with exaggerations and hype. Fortunately, the overall A.I. progress and the pace of the underlying technological innovation easily justifies this hype. Consider the progress achieved in fields like Deep Learning and areas such as Computer Vision and Natural Language Processing are worth mentioning.

In the next couple of years, one can expect to see significant innovations on how A.I. is used to solve major problems, for instance the Fake news problem, security and safety online, more accurate medical diagnosis, intelligent personalized experiences and improved knowledge

discovery. Digital assistants will be able to communicate naturally. They will be able to seamlessly capture the context and respond proactively with smart recommendations, in the right form and optimal timing. Smarter homes will be able to adapt to 'situations' and the mood of particular individuals or the family as a whole.

2. Natural User Interfaces. It's all about seamless experiences: voice-driven interactions – not only voice commands, but more advanced, natural dialogues and forms of communication combining multiple signals in meaningful, streamlined experiences. At the same time, haptic offers significant opportunities for innovation. Haptic is about recreating the sense of touch by applying force feedback, vibrations, or motions to the user. Startups like Lofelt develop such applications for gaming, AR, VR, and entertainment while Ultrahaptics is working on 'invisible touchless interfaces'. And this is where AI, Natural user interfaces, AR and VR and Touchless User interfaces based on Gesture Recognition are all blended together in smart, innovative scenarios empowering end-users.

3. Augmented Reality. Augmented reality is what we get when physical and digital worlds blend into a single experience. Typical examples are Microsoft HoloLens and Google Glass. Again, this is an area that will grow rapidly as the opportunity for innovation is unlimited: content experiences, content discovery, data exploration and visualizations, intelligent and contextual object annotation, dynamic physical world mapping and discovery, industrial applications for field workers – are just some examples of the applications which will empower the ways we understand our world.

4. Blockchain. Blockchain is one of the most disruptive technologies out there. Its distributed, decentralized and immutable properties make it the ideal way to store and track data across numerous domains and use cases. Some significant new applications and novel scenarios beyond crypto-currencies and fin-tech are seen in this field. Startups are already working on novel concepts that make sense to leverage blockchain. In the years to come, some of these will disrupt social, government and even political aspects of our world.

5. Robotics. Robots are already here, in one form or another. Regardless the particular class – humanoids, nanorobots, military, industrial etc. – the progress is impressive. On one hand it is the advances in terms of hardware, sensors and operating software; on the other hand, it is the progress of Artificial Intelligence which makes possible to integrate cognitive services and dramatically increase Robot's capabilities for real-time decision making. In the near future we will start to meet Robots with proactive behaviors, advanced context understanding, able to adapt to human sentiment, enforce personalities and communication styles.

Technology innovation can take many forms – for instance novel software implementing new algorithms and data processing models; or new hardware components (sensors, processors, components); or improved user interfaces offering seamless experiences; it can also happen at a higher level, in the form of new processes, business models, monetization engines etc. And this is the real opportunity for the developers out there – to combine all latest technologies and advances and build unique user experiences, empowering their end-users; to leverage reusable APIs and the capabilities of cloud computing, the rich content available in the public domain, the knowledge, the ideas and even the global connected communities to make an impact by solving major problems in novel ways.

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CURRENT ISSUES OF INFORMATION SECURITY

Every day, people are increasingly dependent on technology, unfortunately, they understand less and less. This is the greatest threat to world cyberspace. IT is in every sphere of

our life: private life, education, medicine, industry, services sector, etc. Here is an example from our university. In our university, many classes are held in computer laboratories to facilitate the learning process, most of the university data is stored in computer databases, and there is also an online system called “Leader”, where students have online access to lectures and tests.

Virtually all modern electrical appliances have computer chips, software, and Internet access. Each of us plays a role in ensuring security in cyberspace, respectively, in ensuring our own information security and privacy. If we are not part of the solution to this problem, then we are part of this problem. And it is inevitable.

With the transition of the world society to information society, the problem of protecting the right of an individual, social and state confidentiality of certain types of information becomes increasingly acute. Problems of breach of information security exist for the individual as well as for enterprises and corporations, and for the country as a whole.

Cybercrime is growing. The current protection against cybercriminals primarily depends on the users themselves, who are mostly frivolous and careless about electronic payments and their personal data. It is the personal data that is provided to the bank, which is the most valued by fraudsters, namely: last name and first name, mobile phone number, and email address. Regardless of our attitude to these things, the attacker knows their value well and knows how to monetize or use them for their own benefit. Very often, personal data is intercepted in public places with open Wi-Fi access while using email or social networks. More than a third of cases of data exchange on the Internet occurs using un-recommended technologies and with the threat of infection of a computer system. However 95% of cases of information security breach occur because of the users. It often happens, because people have extremely outdated operating systems on their devices; they do not use anti-virus programs, and that in its turn leads to self-downloading of malicious files. Among other careless things performed by the users are sloppy surfing the net (moving on dubious links), banal not using passwords or using standard passwords and using a single password for all accounts.

The main ways to protect your device against unauthorized access to information in computer systems are authentication, authorization (determining access rights of a subject to an object with confidential information) and encryption of information. The most important mechanism of modern means of ensuring comprehensive protection of information is the system of access control to resources. In the theory of computer security, there are many access control models that differ in both the level of protection and the complexity of implementation and administration. Since the process of ensuring information security is a continuous process, the existing methodology for designing a protected system is an iterative process of eliminating found weaknesses, inaccuracies and faults.

Many users of cyberspace do not have basic knowledge of information security, which is why data and material resources are lost. It is necessary to engage in self-study in this area. The main thing is to follow the elementary rules and not to make rash actions. In a certain sense, cyberspace is a big cesspool, where among the heaps of rubbish there are useful and safe materials. It is important to remember that there is no better antivirus for your computer than your own brain.

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IMPACT OF THE INSTANT MESSAGING TECHNOLOGY ON HUMAN INTERACTIONS

Every year technologies interfere with our everyday lives more and more and there are different opinions about this subject. While Internet and mobile technology help us to keep in

touch with those, who are far away from us, or to find new friends and colleagues overseas, we cannot deny the fact, that they destroy the meaning of interactions with each other we used to have, disconnect us from the world around us, and lead to an imminent sense of isolation in today's society. In the last few years, serious concerns have been raised about humans spending more and more time on their devices, becoming addicted to them, stopping the interaction with each other in 'real life' to stare at their mobile screen instead.

Instant messaging (IM) technology is a type of online chat that offers real-time text transmission over the Internet. For the first time instant messaging appeared on multi-user operating systems like Compatible Time-Sharing System (CTSS) in the mid-1960s. Parallel to instant messaging were early online chat facilities, the earliest of the kind was Talkomatic (1973) on the PLATO system, which allowed 5 people to chat simultaneously on a 512x512 plasma display. During the bulletin board system (BBS) phenomenon that peaked during the 1980s, some systems incorporated chat features which were similar to instant messaging. The first such general-availability commercial online chat service (as opposed to PLATO, which was educational) was the CompuServe CB Simulator in 1980, created by CompuServe executive Alexander "Sandy" Trevor in Columbus, Ohio. Early instant messaging programs were primarily real-time text, where characters appeared as they were typed. This includes the Unix "talk" command line program, which was popular in the 1980s and early 1990s. Modern, Internet-wide, GUI-based messaging clients as they are known today began to take off in the mid-1990s with PowWow, ICQ, and AOL Instant Messenger. As of 2010, social networking providers often offer IM abilities. (Wikipedia.org)

There are 4.92 billion mobile users globally. That is equal to 66% of the total population and is 5% increase from 2016. From 2016 to 2017 mobile services use has grown by more than half of the previous year's growth. We went from 81 million new mobile users in 2016 to 222 million new users in 2017. (wearesocial.com) The number of texts being sent is on the rise, especially among teenagers aged from 13 to 17. According to Nielsen, the average teenager now sends more than 3,339 texts per month. (cnn.com) 89% of people always have their smartphone easily accessible. (ctia.org) 97% of Americans, in particular, text at least once a day. (pewinternet.org)

Technology has affected human interactions in various ways. Individuals now depend on technology devices or programs to converse with one another, rather than to meet up face to face. Individuals have forgotten how important it is to interact with one another and experience the true emotions or feelings that live interaction brings to someone. One can easily fake an emotion over a text since the other party is not witnessing what they are truly feeling. There is something slightly real and valuable about talking with someone face to face. This is significant for friends, partners, potential employers, and other various people who are an integral part of our everyday life. Technology has had a major impact on human interactions and nowadays it is becoming a socially acceptable norm. (groupeightcommunication.wordpress.com)

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ENCRYPTING RANSOMWARE PETYA TARGETED UKRAINE

A new strain of the Petya ransomware started propagating on June 27, 2017, infecting many organizations.

Similar to WannaCry, Petya uses the EternalBlue exploit as one of the means to propagate itself. However, it also uses classic SMB network spreading techniques, meaning that it can spread within organizations, even if they have patched against EternalBlue.

Petya is a family of encrypting ransomware that was first discovered in 2016. The malware targets Microsoft Windows-based systems, infecting the master boot record to execute a payload that encrypts a hard drive's file system table and prevents Windows from booting. It subsequently demands that the user make a payment in Bitcoin in order to regain access to the system.

Variants of Petya were first seen in March 2016, which propagated via infected e-mail attachments. In June 2017, a new variant of Petya was used for a global cyberattack, primarily targeting Ukraine. The new variant propagates via the EternalBlue exploit, which is generally believed to have been developed by the U.S. National Security Agency (NSA), and was used earlier in the year by the WannaCry ransomware. Kaspersky Lab referred to this new version as NotPetya to disambiguate it from the 2016 variants, due to these differences in operation. In addition, although it purports to be ransomware, this variant was modified so that it is unable to actually revert its own changes. Check Point noted that while it had achieved fewer infections than other ransomware active in early 2016, such as CryptoWall, it contained notable differences in operation that caused it to be "immediately flagged as the next step in ransomware evolution". Another variant of Petya discovered in May 2016 contained a secondary payload used if the malware cannot achieve administrator-level access. The name Petya is a reference to the 1995 James Bond film GoldenEye, wherein Petya is one of two weapon satellites that carries a "Goldeneye" – an atomic bomb detonated in low Earth orbit to produce an electromagnetic pulse.

On 27 June 2017, a major global cyberattack began (Ukrainian companies were among the first to state they were being attacked), utilizing a new variant of Petya. On that day, Kaspersky Lab reported infections in France, Germany, Italy, Poland, the United Kingdom, and the United States, but that the majority of infections targeted Russia and Ukraine, where more than 80 companies initially were attacked, including the National Bank of Ukraine. ESET estimated on 28 June 2017 that 80% of all infections were in Ukraine, with Germany second hardest hit with about 9%. Experts believed this was a politically-motivated attack against Ukraine, since it occurred on the eve of the Ukrainian holiday Constitution Day. Kaspersky dubbed this variant "NotPetya" as it has major differences in its operations in comparison to earlier variants. McAfee engineer Christiaan Beek stated that this variant was designed to spread quickly and that it had been targeting "complete energy companies, the power grid, bus stations, gas stations, the airport, and banks". It was believed that the software update mechanism of M.E.Doc (uk) — a Ukrainian tax preparation program that, according to F-Secure analyst MikkoHyppönen, "appears to be de facto" among companies doing business in the country—had been compromised to spread the malware. Analysis by ESET found that a backdoor had been present in the update system for at least six weeks prior to the attack, describing it as a "thoroughly well-planned and well-executed operation". The developers of M.E.Doc denied that they were entirely responsible for the cyberattack, stating that they too were victims.

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CYBERCRIME: THREATS AND METHODS OF FIGHTING

The processes of globalization, including the globalization of information technology, provide unlimited opportunities to influence on individual and society. One of the negative consequences of the development of information technology is the emergence and development of new forms of crime – the crime in the sphere of high technologies, when computers or

computer networks serve as the object of criminal attacks, and as well as means or method of committing crimes.

The emergence of crime in the sphere of computer information and telecommunications is associated with the advent of computer networks and the creation of information environment. As computer technology in various fields of activity become more and more using and increased, so the number of crime rise too.

Cybercrimes cause damage to the world economy amounting to 445 billion dollars a year, according to a new report by the Center for Strategic and International Studies (CSIS). The authors of this report point out that cybercrime – is a growing industry that harms trade, competitiveness and innovations.

The largest losses bear the largest economics in the world, and the leaders among them are the United States, China, Japan and Germany, losing \$ 200 million annually. The losses associated with the leakage of personal information, such as the theft of the credit card is 150 million. In the USA, about 40 million people, about 15% of the total population, are faced with theft of personal information by hackers. In Turkey, this kind of crime affected 54 million people, in Germany – 16 million, in China – more than 20 million people.

The basic types of cybercrime are the following:

1. Hacking
2. Virus dissemination
3. Logic bombs
4. Denial-of-Service attack (DoS)
5. Phishing
6. E-mail bombing and spamming
7. Web jacking
8. Cyber stalking

The only realistic way to fight cybercrime is by demolishing the jurisdictional and territorial boundaries that exist between nations and harmonizing legal protection thereby preventing the appearance of «Computer safe havens».

We should point out that the governments have recognized the need to ensure the legal protection. The EU, in a Communication on «Creating a safer information society by improving the security of information infrastructures and combating computer-related crimes», laid out four key points that must be present in any cybercrime policy:

- the adoption of adequate, substantive, and procedural legislative provisions to deal with both domestic and transnational criminal activities;
- the availability of a sufficient number of well-trained and well-equipped law enforcement personnel;
- the improvement of the cooperation between all stakeholders, users and consumers, industry, and law enforcement; and
- the need for ongoing industry and community-led initiatives.

The G8 has become increasingly active in the fight against cybercrime, since 1995. While lacking the institutional structure of other intergovernmental bodies, its membership ensures that it has a significant influence in setting international policy agendas. It has adopted several declarations with respect to computer and cybercrime. In 1997 it adopted a set of ten principles. The main principle has to do with harmonizing the criminal laws to prevent the emergence of safe havens for cybercriminals.

The UN is made up of agencies that deal with many international issues. It is an Intergovernmental institution with interests mainly in the developing countries. In relation to computer crime, one of its concerns is to help and provide developing countries with capacity and expertise to deal with computer crime issues.

Therefore, summing up the above-mentioned information, we can say that the phenomenon of cybercrime is currently perceived as a very important and urgent problem, for the settlement of which effective legal methods are used. There is also a need for as many actors of international relations as possible to apply the legal norms in their legislation that will prevent the commission of cybercrime.

SECTION 5. ENERGY EFFECIENCY

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ANALYSIS OF METHODS ON THE EXTINCTION OF THE PERIOD OF OPERATION OF ENERGY EQUIPMENT

Today we are faced with the problem of reliable and safe operation of thermal and nuclear power plants in Ukraine. The number of power units that have exhausted their park resource exceeds 70%. There is no way to replace the outdated power equipment with a new one due to the high cost of new power equipment. An increase in the lifetime of power equipment may amount to 20-30% of the cost of construction of a new power plant, which suggests an extension of the life of the utility from an economic point of view.

The aim of the work is to provide scientific substantiation and to develop an integrated approach to extending the lifetime of energy equipment with the use of low-cost technologies for modernization and management of residual resources. This will increase the useful life of the plant and will reduce the cost of rebuilding the HPP and the NPP, and will ensure the reliable operation of the power equipment. However, existing methods for extending the lifetime of power equipment are very laborious, complex and insufficiently precise [1]. For example, in the calculations of the boundary conditions for objects of complex geometric form, the structural changes in the elements of the power equipment that arose during the entire lifetime were not fully taken into account [2]. Therefore, a method is developed which is based on the development of a mathematical model, which allows, by setting only the initial and boundary conditions of the steam at the inlet and the heat transfer (return) through the walls in the pipeline, to obtain the required distributions of the temperatures, their gradients and the stress-deformed state necessary for us to calculate the residual resource of object. The proposed method can significantly save time and take into account the gas dynamics of the behavior of the working body in a more complete manner than the classical approach. In this case, it can be argued that the accuracy of the calculation will be greatest.

In the first place, the geometric model of the stop valve of the wet-steam turbine K-1000-60 / 3000 is being constructed, valve areas with the highest temperature gradients are considered for optimization of calculations. A mathematical model of the thermal, stress-strain state and low-cycle wear of metal valves is developed taking into account the existing damages of design constructions and repair and renewal changes of elements in the process of operation on the basis of 3D-spatial analogues. The strength analysis is then carried out taking into account the level and temperature distribution of the heat-receiving surfaces. The gas dynamics of steam behavior in the valve is taken into account in full volume, than in the classical approach. After analyzing the result, you can make recommendations for extending the life of such power equipment as a valve. Thus, the problem of increasing the reliability and durability of not only valves, but also of all power equipment is solved.

References

1. НД МПЕ України. Контроль металу і продовження терміну експлуатації основних елементів котлів, турбін і трубопроводів теплових електростанцій. – Типова інструкція. СОУ-Н МПЕ 40.17.401:2004. – Офіц. вид. – К.: ГРІФРЕ: М-во палива та енергетики України, 2005. – 76 с. – (Нормативний документ Мінпаливенерго України, Типова інструкція).
2. РД 34.17.440-96. Методические указания о порядке проведения работ при оценке индивидуального ресурса паровых турбин и продлении срока их эксплуатации сверх паркового ресурса [Текст]. – М., 1996. – 98 с.

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SEARCH FOR OPTIMAL USE OF POWER SOURCES

Global demand for electricity is increasing every year. As a result, demand for resources such as oil, natural gas and coal, etc., is increasing annually. At the same time, global emissions of carbon dioxide and other pollutants associated with electricity production are increasing. There is also an increase in the use of renewable energy through the expansion of wind, solar energy and hydropower. The use of renewable energy sources contributes to lowering pollutant emissions, for example, in 2017 the biggest drop in emissions came from the United States, driven by higher renewables deployment. [1].

“The significant growth in global energy-related carbon dioxide emissions in 2017 tells us that current efforts to combat climate change are far from sufficient. For example, there has been a dramatic slowdown in the rate of improvement in global energy efficiency as policy makers have put less focus in this area.”- said Dr Fatih Birol, the IEA’s Executive Director. In Ukraine, according to the rating of TOP-100 pollutants, energy generating companies and mining companies are among the first places to pollute the environment [2].

The choice of the optimal option use energy is complicated by a large number of parametric spatial problems, which, in the context of a significant increase in anthropogenic load and the introduction of new ones and the use of existing alternative energy sources, has become even more urgent.

To solve the problem of choosing the optimal version of the use of a power source with uninterrupted supply and the minimum emissions of pollutants into the environment, algorithms for finding the shortest path in the graph were considered, introducing the system in the form of a graph $G = (V, E)$ with a dedicated source vertex $U_{ij}(y_k)$, where i - type of source; j - maximum power of the i -th source; y_k - the parameter on which the vertex depends U_{ij} (parameters can be ecological safety, economic efficiency, etc.) and the vertex $Q_r(y_k')$, where r - is the serial number of the vertex ($r = 1, \dots, N$); y_k' - amount of energy that is necessary for use. Among the algorithms for finding the shortest path in the graph, Breadth-First Search algorithm [3] was used in the case where the number of $\min(y_k)$ values among all vertices $U_{ij}(y_k)$ is greater than 1 and the A* algorithm in the case where the number of $\min(y_k)$ values among all vertices $U_{ij}(y_k)$ is 1 and the known heuristic function that measures the weight of a path from the source to the final vertex.

The shortest way in the graph displays the best option the choice of using the source of electricity with minimal impact on the environment.

References:

1. International Energy Agency. Global energy demand grew by 2.1% in 2017, and carbon emissions rose for the first time since. (2018). Retrieved 20.09.2018 from <https://www.iea.org/newsroom/news/2018/march/global-energy-demand-grew-by-21-in-2017-and-carbon-emissions-rose-for-the-firs.html>.

2. Ministry of Ecology and Natural Resources of Ukraine. TOP-100 main pollutants. Retrieved 20.09.2018 from <https://menr.gov.ua/news/31555.html>.

3. Moore, Edward F. "The Shortest Path Through a Maze," International Symposium on the Theory of Switching. 285-92, 1959.

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BUILDING ENERGY MODELLING AND CFD STUDY USING RADIANT HEATING SYSTEM

There are many approaches for energy savings in building with improving economic indicators while maintaining comfortable conditions. One of them is green building certification, which presents a system of checking buildings to see that they are built and operate in a way that protects the natural environment [1]. One of the most important issue during green certification process is modeling the energy-efficiency parameters, fulfillment the requirements for the thermal comfort of the premises and observance of environmental restrictions of building before starting construction works. For studying these indicators, specialized software for modelling energy consumption of buildings is needed.

The purpose of this work is to create a building energy model in Energy Plus program for dynamic modeling, analysis and comparison of different cases for different characteristics of the heating system [2]. As an example, the heating system with infrared water panels was accepted. Firstly, the model of the building in the Energy Plus software environment was created; heating system load was determined; space comfortable conditions were analyzed. The model for visualization of the results has been created in the design interface of Energy Plus – Design Builder. Input data includes enclosure structures with their parameters. The simulation of the operation of infrared water heating systems was performed with the output of the following data: air temperature, radiant temperature, the operative temperature, thermal energy consumption of the building, expected average rating of comfort (Predicted Mean Vote – PMV) [3].

After simulating the layout of temperature distribution was received and analyzed. It can be concluded that the distribution of air temperature in case of radiation heating systems application is uniform without considering the natural/mechanical (Fig.1) ventilation system, while addition of ventilation inlets and outlets and the organization of air exchange in the room greatly affects the unevenness of the temperature distribution.

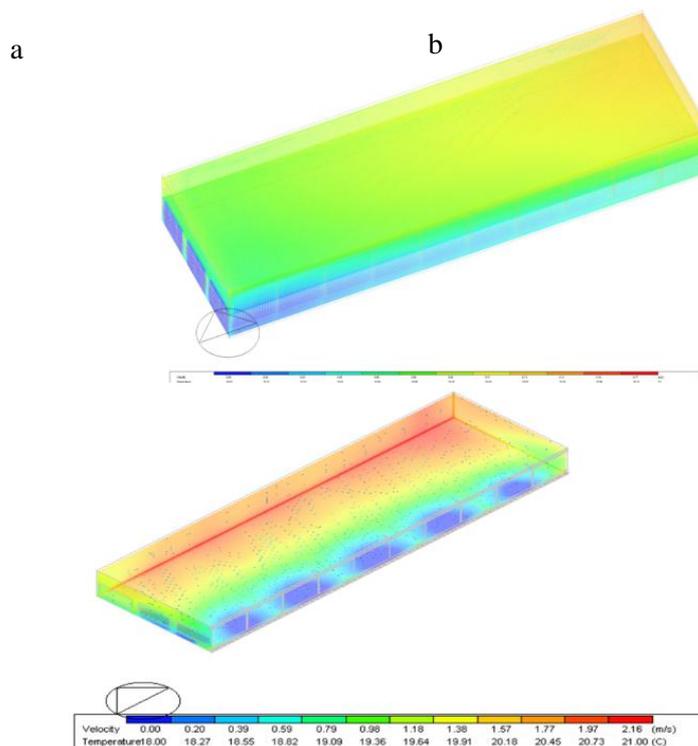


Figure 1 - The contours of the air temperature in the wall layer of the external enclosing structures (a - without ventilation, b – with ventilation)

References

1. Green certification. Available at: <https://dictionary.cambridge.org/dictionary/english/green-certification>
2. EnergyPlus: creating a new-generation buildingenergy simulation program /D. B. Crawley, L. K. Lawrie [and others] // Energy and Buildings. – 2001. – Vol. 33. – P. 319-331.
3. The official website EnergyPlus Energy Simulation Software. Available at: https://energyplus.net/sites/all/modules/custom/nrel_custom/pdfs/pdfs_v8.6.0/InputOutputReference.pdf

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NANOFLUIDS AS A PERSPECTIVE WORKING FLUID FOR TWO-PHASE COOLING SYSTEMS

Nanofluid is a colloidal solution consisting of a carrier fluid and disperses nanoparticles with characteristic sizes of 1 - 100 nm. As a carrier fluid water, organic liquids and polymeric solutions can be used. Solid nanoparticles are usually particles of chemically stable metals and their oxides. Nanofluids based on carbon nanotubes are also often used. An important feature is their diameter varies from one to several nanometers, and their length can reach tens, hundreds and even thousands of microns. Carbon nanotubes or tubular nanostructures (nanotubes) are artificially created in laboratory conditions. These are one or multiwall follow cylindrical structures derived from carbon atoms and possess exceptional mechanical, electro-physical and physical properties. Carbon nanotubes consist of graphite, but have different from graphite characteristics. They do not exist in nature and their origin has an artificial foundation. The body of nanotubes is synthetic, created in laboratories from the beginning to the end.

For the first time the possibility of forming nanoparticles in tube form was detected for carbon. At present such structures are derived from boron nitride, silicon carbide, transition metal oxides, and some other compounds. The diameter of such nanotubes varies from one to several dozens of nanometers, and the length reaches several microns.

Active research in science and technology enables the development of existing technical solutions for industry. Reducing the mass-size characteristics, increasing the working parameters and extending the lifecycle of installations require the improvement of systems which ensure their stable operation. Modern problems of energy industry dictate the need for miniaturization of cooling systems and development of efficient methods for heat dissipation. One of the effective options to intensify heat exchange processes is to increase the heat conductivity of the coolant (liquid) by adding solid nanoparticles with high thermal conductivity into it.

At present numerous scientific groups in many countries of the world (USA, Korea, China, Japan, England, etc.) are actively involved in the study of the properties of nanofluids and their practical application. Although this topic is being actively studied, many problems remain poorly understood, and the results are often controversial. First of all, such ambiguity depends on the complexity of obtaining a homogeneous medium, the gaps in understanding the physical processes in nanofluids, starting with their preparation, the feature of experimental technique and the reliability of results. At least equal difficulty arises in creating physical models which describe the processes of heat exchange, since the properties of nanofluids are poorly understood and are not yet fully explored.

Taking into account compact dimensions and high heat transfer characteristics, thermosyphons and heat pipes have become an important element of the design of cooling systems. They have the equivalent thermal conductivity by several orders of magnitude higher than most heat-conducting metals (as copper, silver). Therefore, the use of such coolants in two-phase thermosyphons and heat pipes enables them to increase their heat transfer capacity as a part of cooling systems, which improves the temperature of objects used for modern electronic equipment.

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PROSPECTS FOR GASIFICATION WASTE IN UKRAINE

The utilization problem of industrial and domestic waste in Ukraine is too acute. Experts point out, that the situation has the verge of an ecological disaster.

Experience shows that considerable amounts of money are needed to burn waste, in addition, significant emissions of harmful substances into the atmosphere are formed. Therefore, highly developed countries switch from direct burning to resource saving and energy saving technologies, using it as a source of alternative energy.

Every year, in Ukraine 11-12 million tons of household waste are generated, which has an equivalent to 3 millions of m³ of natural gas per thermal potential. One of the methods for using this potential is the gasification.

Gasification is the process of transforming the organic part of the raw material into combustible gases at a high-temperature (1000-2000 °C) combustion with insufficient, for complete combustion, access to oxygen. In the role of an oxidizer are: air, oxygen, and water vapor act. In the vertical shaft, which is called the gas generator, the gasification process takes place.

The installation has three active zones: thermal decomposition of fuel and recovery. At the outlet, the gas is suitable for use, but it has a low calorific value. Passing it through several filters and cooled is possible to raise significantly its heat of combustion. Emissions from synthesis gas combustion are the same, and in some cases even lower than for natural gas combustion.

Combustible components of the synthesized gas are hydrogen (H₂), carbon monoxide (CO), methane (CH₄) and other hydrocarbons. The caloric content of resulting gas depends from the type of waste and moisture and is approximately 1100-1500 kcal / m³ (4.6 - 6.3 MJ).

Often formed generator gas is used as a fuel. After cleaning from H₂S, CO₂ it can be used as raw material for ammonia, and a mixture of reagents - for the production of methanol and liquid hydrocarbons.

The gasification method has several advantages over direct burning of biofuels, the main of which: high energy efficiency (95%); low linear velocities of gas flow in the generator provide a minimum transfer of particles, which significantly reduces the cost of cleaning equipment; allowable amount of nitrogen oxides in flue gases; the ash does not contain mechanical cramp. One of the major disadvantages is the high cost of equipment.

Gasification allows to dispose simultaneously the large volumes of industrial and domestic waste, and also to receive the necessary thermal energy. Today, the projects exist which are developed to allow produce and sell electricity to the country, receiving a "green" tariff. The average payback period is 5 years. Today, when you enter the facility "green" tariff for biomass is 0.11147 euros per kilowatt / hour.

References:

1. Kopytov, V. V. (2012). Gasification of condensed fuels. Moscow, Russia: INFA-Engineering.

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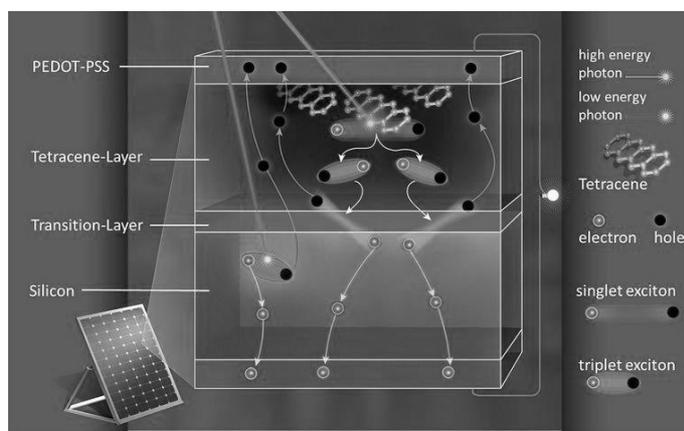
INCREASING THE EFFICIENCY OF SOLAR PANELS

One way to get electricity is to use solar panels. Solar panels (module, panel) are photovoltaic generators. The principle of their work is based on the photovoltaic effect of the physical properties of semiconductors (photocells): light photons knock out electrons from the outer shell of atoms. One of the important parameters of solar panels is efficiency. The main material used to make panels is silicon, but its efficiency is only about 20%. This efficiency is an important indicator for solar panels. It shows how many percent of the absorbed solar energy is converted into electricity [1].

In theory, the limit for silicon solar cells is 23,9 % but scientists have worked fruitfully to come to the conclusion that this limit can be bypassed.

Increasing the efficiency of silicon panels can be due to the inclusion in the solar cell of layers of organic molecules. These layers start the quantum-mechanical process, as a result, the amount of electric current doubles. The principle of the new technology is conceived in the following: usually one photocell is generated from the photon, consisting of negative and positive electrons, but scientists have decided to construct the photocell so that some photons are used to generate two pairs of charge carriers. And they called it "multiplier" effect.

Dividing the excitons at the boundary with silicon and separating the positive charge carrier from the negative



allow to make contributions to the production of energy. Scientists assure that thanks to this method it is possible to achieve 40 % efficiency of a solar battery. A lot of experiments have also been conducted and the efficiency is further enhanced with an additionally introduced organic conductor, which is called PEDOT: PSS [2].

To sum up, the panel's efficiency will increase at the same surface area thanks to the introduction of this innovation. The solar panels are becoming increasingly popular as they are a safe and environmentally friendly energy source. Scientists should continue to improve the panels to increase their efficiency.

References:

1. Ekosystem (2018). *Ekosystem*. Retrieved from <https://www.ekosystem.lviv.ua>
2. Ecotechnica (2015). *Ecotechnica*. Retrieved 2018, October 8, from <https://ecotechnica.com.ua>

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TECHNOLOGICAL ADVANCEMENTS SURPASSING OUR EXPECTATIONS

We never before been in an era of such a rapid technological change. Of course, much more is coming. The continuing rise of artificial intelligence and cloud-based computing, new developments of things, conversational platforms and other areas in the internet have made the list.

Much like cell phones are now capable of doing more than making calls, cars can do much more than drive and park. In recent years, the automotive industry has worked hand-in-hand with major technology companies in order to deliver the most advanced, the safest and the most comfortable vehicles out there. Cars are becoming large smart devices with advanced emergency braking capabilities, mapping technology for autonomous driving, better fuel efficiency and cars service as a form of transportation.

Even though automobiles have changed significantly since their introduction, the pace of improvements in automobiles is increasing – especially related to advancements to combat their negative impacts. Some futurists predict the appearance of autonomous autos – self-driving cars – within the next decade.

There are no shortages of ways in which cars are improving the lives of drivers and other vehicles around them in terms of safety, getting from point A to point B with less of a hassle and entertaining us throughout the process. In the coming years, the automotive industry is expected to progress even further, taking us one step closer to more connected and digitized environment. The app Blinker is one of such technological advancement that is giving control back to consumers, allowing them to buy, sell and finance cars all on their smartphone.

Some of the greatest minds in the tech industry have joined forces with automotive companies in order to improve the way our vehicles operate these days. The rise of electric vehicle technology is helping to reduce carbon emissions without breaking the bank as more companies are designing cars with electric motors.

Technological advancements have certainly surpassed our expectations of what can be integrated into cars. However, some of these advanced features we have looked at may come with hefty price tags. Nonetheless, we can still hope for a time where technology becomes more efficient and cheaper, allowing for all these cool and futuristic features to be implemented in cars of every price range.

For a long time, the sole purpose of a car was to take us from point A to point B as fast as traffic conditions would allow us to. However, rapid advancements in technology has led to a

surge in demand from many of us – we want to have more comfort, entertainment, functionalities, and so on in our cars than ever before. In that vein, we have come up with a wishlist of the things we would like to see (from a geek’s perspective) in cars of the future.

Automobiles of the future will be as different from today as the first automobiles differed from the horse and buggy. Driverless cars will be significantly more energy-efficient, safer, less damaging to the environment, and more economical to operate than any mode of transportation in the human experience. The transition to the future of autos will not be quick, taking at least a dozen or more years to replace the existing fleet of automobiles in the country. Rebuilding the nation’s highways and roads to accommodate the new technology is likely to take even longer as the nation’s leaders wrestle with conflicting national priorities. The pace of technological improvement will continue to increase, but the benefits of those improvements are not likely to be fully realized until 2050 or later.

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ROBOTIC GEARBOX

Progress does not stand still, and the desire of a person to make his life more convenient, pushes him to new inventions. Trying to make life easier for the driver due to numerous traffic jams, car manufacturers are constantly improving their offspring, applying all sorts of innovations. So to the manual transmission on the car came up with an automatic clutch. Putting together the concepts of automatic and mechanic, the designers received a device called a robotic gearbox, combining the pros and cons of both units.

The device is a robotic gearbox

Many car owners believe that the robotic box is a regular machine with some features. But it is not. The developers took the manual box as the basis for the design, more reliable than the automatic one, adding to it special devices responsible for squeezing the clutch with gear changes.

In conventional mechanics, the driver directly manages the gear shift with clutch release. He independently, focusing on the road situation using the clutch pedal with the gearshift lever, selects the necessary gear according to the time of its inclusion. The inventors decided to exclude the driver from this chain, entrusting all actions to automation and computer. By installing actuator assemblies, they made it possible to automatically switch the robotic box, the basis of which remained the mechanics.

The robotic mechanical gearbox, combined the positive aspects of the mechanics and machine breakdown - fuel economy, ease of repair, etc. with the ability to drive in automatic mode without using the clutch pedal. At the same time, she retained the possibility of manual control using a lever or shift paddles on the Tiptronic principle.

Principle of operation

The robot box works with the help of actuator units. Receiving information about the speed, engine speed, ABS and ESP sensors from the on-board computer and acting through their mechanical part, they squeeze the clutch, move the synchronizers in the box, choosing the necessary gear. The servo, responsible for the clutch, taking the necessary command, disconnects the primary shaft with the engine. At this time, the second servo, selecting the desired gear, turns it on. After switching on, the first actuator restores the clutch, and the car continues to move.

Pros and cons of a robotic gearbox

- The robot box, made on the basis of mechanics, is highly reliable compared to the automatic and variator;

- The working volume of the robotic box is much less automatic, and, therefore, less the amount of oil used;
- The clutch of the robot has a resource increased by 30 percent;
- Almost all modifications have the function of manual gear shifting according to the Tiptronic principle on the machine;
- The robot is cheaper in production and repair compared to variable-speed and automatic boxes;
- The robotized gearbox weighs much less than the automatic one, which gives it an advantage for installation on small cars;
- Allows you to reduce fuel consumption under equal conditions compared with all other types of transmissions.

In addition to the advantages of the robot has the following disadvantages:

- The gearbox is a robot with an electric servo has a significant switching delay of 2 seconds, which causes discomfort during acceleration and dynamic driving;
- When using a hydraulic drive, brake fluid is applied, which is constantly under pressure, speeding up the switching process to 0.05 seconds. But the hydraulic drive is significantly more expensive in the device, it increases the energy load of the motor, being a lot of expensive cars or sports cars;

• On the usual robot there is no possibility of adaptation to the driving style of the driver. If the machine can adjust, then the robot supports only one style, which is installed as firmware in the control unit.

Preselective gearbox. Moving in the right direction. Because of its shortcomings, the gearbox robot was greeted by the first buyers rather negatively. The main complaint was that the robot works with jerks during movement. But the designers, seeing the prospect of the design in its simplicity and low cost, did not abandon production, continuing the search for a solution.

To remedy the situation, in order to avoid delays in switching, manufacturers suggested using a box with two independent clutches. This solution allowed to completely get rid of jerks and delays, increasing the dynamics of the car, adding comfort to the driver with passengers.

Double clutch made it possible to include the subsequent transfer when the gear is already engaged, moving to it without interruption in the operation of the box, retaining the traction in full. Therefore, another name for a dual-clutch box is pre-selective, which means pre-selected.

If a regular box in a device has one primary and secondary shaft, then this one received two in its design, intended for even and odd gears. In this case, the primary shafts are inserted one into the other according to the principle of the matryoshka, connecting each engine with a separate multi-plate clutch.

When you turn on the first gear on one of the output shafts at the beginning of the movement closes the first clutch, the car starts to move. Smart electronics, realizing that the second gear should be closed on the next secondary shaft, but the second clutch remains open, without causing conflict in the box. As soon as the required speed is reached, the first clutch will be simultaneously disengaged with the second one engaged. And so on. When braking, the process is similar, only in the opposite direction. It turns out that such a box simultaneously includes two gears, which once again confirms its name preselective.

Advantages and disadvantages. Combining the best of all developments, dual-clutch transmissions have become more economical and faster than conventional mechanical ones. At the same time, they are more comfortable for passengers than others. Having small dimensions, robots are more preferable in use for small cars in comparison with automatic boxes.

The disadvantages of a pre-selective box are its difficulty in repairing at high production costs. Until recently, there was also a problem with the transmission of large torque, but now it has already been solved.

Summing up. And today, many famous manufacturers, such as Audi, Volkswagen, Opel, Fiat, and even Porsche, have recognized the promise of this trend, more and more inclined to use robots in mass production. Considering all the positive aspects in reducing the cost of production, robotic boxes will soon come fully into the life of motorists, significantly pushing the mechanics with automatic.

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PLATE HEAT EXCHANGERS

A plate heat exchanger is a part of recuperative heat exchanger where heat transfer area is made with thin metal sheet. These heat exchangers are applied in chemical, metallurgy, food and other fields of industry also plate heat exchanger is used in hot water system. A plate heat exchanger can be used for transfer heat from liquid working medium such as oils (lubrication system), antifreeze (liquid cooling system), fuel (fuel system).

Types of plate heat exchanger:

1. Dismountable plate heat exchanger;
2. Brazed plate heat exchanger;
3. Welded plate heat exchanger;
4. A plate heat exchanger with fins.

Concept of working plate heat exchanger is based on transfer energy from hot stream to cool stream through block of the plates. In the process of heat exchange mediums do not mix. Mediums contact one with other through plates. Width of plates isn't more than 1 millimeters. Motion's scheme of transfer mediums is organized so that hot and cool mediums move on different side of plate.

Heat exchanger blocks are packed with plate with the same terrain tightly pressed one to another. In the places where liquid can be mixed lying seal as well as it is mounted in periphery. Each lead plates turn around relatively previous plates make rows of channels for passage of water. Heat and cool stream of water is alternating in the block gathering in collectors which was form

High intensity in process of heat transferring achieves due to using revers of heating and heated mediums.

Plate heat exchangers have row of benefits:

1. Difficult shape makes developed turbulence.
2. High coefficient relative heating surface.
3. A plate heat exchanger has high efficiency.
4. Revers of working medium can be applied.
5. Easy to clean and repair this type of heat exchanger.
6. Low level of pollution.
7. Small size that means cheaper than other types of heat exchangers.
8. Reliable construction of heat exchanger.

Such as other heat exchangers, plate heat exchanger has disadvantages:

1. Doesn't work high pressure and temrature.
2. Can't work with large fluence diefference.
3. Potential for leak.
4. Higher pressure drop.
5. The narrow spacing between plates can become blocked by containments in the fluid.

To extend sphere of application a plate heat exchanger need develop new types of seal or use welded plate heat exchanger where seal is not used. Nonferrous or alloy metal can be used to withstand higher pressure but these types of metal are more expensive. Seldom a plate heat exchangers cost too expensive that use them aren't rational. Also need use only clean transfer medium to reduce pollution between plates. To avoid pressure drop need use more powerful pump.

SECTION 6. ECOLOGICAL SAFETY

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EVERYONE CAN SAVE ECOLOGY USING SOLAR PANELS

Nowadays population on Earth is around 7.6 billion people and everybody uses the energy of planet. We are living at time of scientific progress where everything is powerdepend.

We pulled so many resources from the planet so it is reckless not to think about alternative energy. It is any energy source that is an alternative to fossil fuel.

It does not exist any perfect source but we want to describe potentially a path toward clean, renewable power. Geothermal energy. It is more sustainable than fossil fuels. This type of energy is obtained from extremely high temperatures found at the core of Earth. Solar energy is an alternative power energy. There are two forms: thermal and photovoltaic. Solar photovoltaics are the technology what we call "solar panels," and a lot of homes and businesses have them on their roofs. Hydroelectric power plants are one of the more widely debated alternative power sources due to the significant, harmful environmental impacts of dams. But it is and we can talk about power of water. And the last one is a wind farm. The wind farm is like a hydropower plant, but without dam. The fuel is wind so environmentally friendly that nature makes it one of the best renewable energy. Negative side of this technology is sometimes disrupting the migratory patterns and lives of birds and bats.

Mostly these methods to save our planet are expensive and hard at realization. But everybody can do some tips for improving our life and save ecology. For example, to install solar panel.

Why solar panels? Firstly, availability. In our latitudes, the sun can be used as a fairly energy-generating resource. Efficiency of modern solar panels allows you to install them in almost any latitude of the earth. Secondly, autonomy. You do not need to connect to a centralized electricity supply system and depend on energy supply companies. Thirdly, ecology. Photocells do not cause carcinogenic emissions and don't increase the level of greenhouse gases. We need not to destroy forests or consume non-renewable fossil energy. Cause the problem of destroying forests is the main problem nowadays. Fourthly, no licensing. So far, our country hasn't adopted any legislative guidelines on the mandatory licensing of electricity generation through photocells.

Where to install solar panels? Photoelectric cells will be able to provide electricity in the buildings such as country houses, cottages, mobile homes, buildings located far from the main transmission lines.

There are different classes and types of these devices. This division depends on the needs for which solar panels are used. There are low-power solar panels - for charging cell phones, PDAs and other similar electronics. Universal solar panels - for feeding a wide range of

consumers. Photographic plates, fixed on the substrate. This is a workpiece for device that will provide houses with the necessary electricity.

Solar modules are made to provide a power of 6 to 185 watts with output voltages of 12 and 24 volts. Solar panel is consisted of gerator, solar charge controller, battery, inverter, connection box.

Solar panels generate electricity that accumulates in a rechargeable battery. Further, the inverter converts the voltages from 220 V and 50 Hz batteries. Like any equipment, the solar system may fail. The main rule is not to overload the system. You need to carefully calculate how many power you will use.

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ECOLOGICAL PROBLEMS OF KAMYANSKE

Since ancient times nature has served man, being the source of his life. For thousands of years people lived in harmony with environment and it seemed to them, that natural riches were unlimited. But with the development of civilization man's inference in nature began to increase. Everybody knows that ecology depends on our human attitude toward nature and it's no secret, that nowadays the world ecological situation is difficult. The degree of pollution of water, air, soil increases and is consider being a serious international problem.

Speaking about the problems of pollution I can't say about the ecological problems of my town. Kamyanske is an industrial town. It is situated on the river Dniro. It's the central part of Ukraine. The history of my town is connected with the history of metallurgical plants. Kamyanske grew near the plant. Our town is an industrial centre of our country.

Air pollution

I have been living in the Kamyanske for many years and had a lot of chances to watch the negative impact. The main problem of our town is the pollution of air. One of the main sources of this type of pollution is industry. Numerous factories and plants release into the atmosphere a lot of waste such as poisonous chemicals and, what is worse, particles of heavy metals. This process not only produces harmful effects on the atmosphere, but influences man's health as well. People suffer from lung diseases more and more often or have headaches, breathing such polluted air.

So powerful industrial complex significantly affects the ecological state of the city. In a relatively small area are 62 industrial enterprises of different industries, located mainly in the central part of the city. In the industrial structure of the city dominated by metal metallurgy (67%), chemical industry (18%), coke (5%), machinery (2%), construction materials, electricity, wood, food, light other industries .

Seven major plants are the most dangerous, causing the release of major pollutants. Among these enterprises the most powerful release produces "DMK".

Due to fluctuations in the production capacity of urban and industrial environmental protection activity in their work is a gradual reduction of air emissions.

Waste, created by people may occur in the form of gases or particles of solid and liquid matter which appear as a result of burning fossil fuels. Burning of garbage also contributes to the problem. Air is an integral part of the ecosystem which is absolutely essential for all the living beings to be alive, so it's really important to make it clean and to take care of it.

Lithosphere and soil pollution

Soil pollution is one of the largest problems in our today's world. It can be defined as a contamination of air, water and land from man-made waste. Nowadays there aren't any cities and hardly any rural areas that remain clean and unpolluted.

Technology used in enterprises solve the problem of complex and efficient use of raw materials, in this regard, the significant amount of industrial waste, the accumulation of which poses a real threat to human health and the environment. Industrial waste number is constantly increasing. They decades mainly disposed directly near the Dnieper, increasing the danger of pollution.

SECTION 7. MODERN TECHNOLOGIES IN BUILDING

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MODERN TECHNOLOGIES IN CONSTRUCTION

It's no secret that technology is revolutionising literally every aspect of modern day life. The construction industry, continually being updated and upgraded with the latest technology, is one such example of this.

So, what can we definitely expect the future to hold for construction?

Such as: Virtual reality, Machine Learning, Aerogel insulation, Smart roads and other.

Virtual reality has finally made its way out of the gaming industry fully into the real world. Winter Construction used 4D virtual reality models to fully immerse owners and other stakeholders in the environments of planned construction during planning and design stages for major projects including an airport hotel and a zoo parking and entertainment complex.

Machine Learning. Smartvid.io constantly analyzes photos, videos, and other visual data coming from the job site, and looks for safety violations (failure to use PPEs, for instance), as well as tagging items by room and associating them with plan data. This allows folks in the job trailer or the office to quickly find visual information about the site without having to sort through masses of data. Additionally, it makes it easy to identify visual data to use for marketing purposes.

Aerogel insulation. We think technologies like Smartvid.io are going to transform the way companies do business in 2018, by making existing data more accessible and easier to use to improve everything from quality and timelines to safety and marketing.

Smart roads. Sometimes known as 'frozen smoke', aerogel is semi-transparent and is produced by removing the liquid from a gel, leaving behind the silica structure which is 90% air. Despite being almost weightless, aerogel holds its shape and can be used to create thin sheets of aerogel fabric. Aerogel fabric is beginning to be used within the construction industry, due to its incredible insulation properties. Aerogel insulation makes it extremely difficult for heat or cold to pass through and has up to four times the power of fibreglass or foam insulation.

Also known as smart highways, smart roads are the future of transport and involve using sensors and IoT technology to make driving safer and greener. They give drivers real-time information regarding traffic information (congestion and parking availability for example) and weather conditions. This innovative technology can generate energy, charging electric vehicles on the move, as well as for street lights.

The construction industry is repeatedly criticised for being inefficient and slow to innovate. The basic methods of construction, techniques and technologies have changed little since Roman times. But the application of innovation in the construction industry is not straight

forward. Every construction project is different, every site is a singular prototype, construction works are located in different places, and involve the constant movement of personnel and machinery. In addition, the weather and other factors can prevent the application of previous experience effectively. The term 'advanced construction technology' covers a wide range of modern techniques and practices that encompass the latest developments in materials technology, design procedures, quantity surveying, facilities management, services, structural analysis and design, and management studies.

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HOW TO CHANGE CONSTRUCTION USING FUTURISTIC TECHNOLOGIES

Many things in our everyday life we have already used to were absolutely impossible some decades ago. Technologies are rapidly developing, bringing more comfort into our lives.

Millions of pounds are invested in maintaining, fixing and restoring roads, buildings and bridges annually. Self healing concrete would add years to a building's life and be an enormous help time-wise and financially. The science behind this technological marvel shows itself when water enters a crack. This reactivates the bacteria that were mixed in during the mixing process. When the bacteria are activated, it excretes calcite which then heals the crack.

Transparent aluminium is a bullet-proof new state of matter that is almost as strong as steel. Despite its herculean strength, it looks like glass which is four times weaker and shatters easily. Transparent aluminium is a new material and a see-through metal that is just breaking through the construction industry and adds a futuristic feel to buildings.

Aerogel is semi-transparent and is produced by removing the liquid from a gel, leaving behind the silica structure which is 90% air. Despite being almost weightless, aerogel holds its shape and can be used to create thin sheets of aerogel fabric. Aerogel fabric is beginning to be used within the construction industry, due to its incredible insulation properties. Aerogel insulation makes it extremely difficult for heat or cold to pass through and has up to four times the power of fibreglass.

Robotic swarm construction was designed based on how termites work. Termites work together like a 'swarm' and construction robotics are programmed to work together in this manner. Four-wheeled robots are programmed in each instance to build a certain design and come with sensors to detect the presence of other robots, so that they can work together.

3D printed houses are a glimpse into the future of construction. That home will involve creating parts off-site and constructing the building on another occasion. The 'printer', which is similar in look to a small-scale crane, sets layers of concrete mixtures. 3D printed homes could be a great solution for quickly covering the housing needs of people who have been affected by physical disasters such as tsunamis, hurricanes and earthquakes or for those in poverty.

Also known as smart highways, smart roads are the future of transport and involve using sensors and IoT technology to make driving safer and greener. They give drivers real-time information regarding traffic information (congestion and parking availability for example) and weather conditions. This innovative technology can generate energy, charging electric vehicles on the move, as well as for street lights.

Smart bricks are modular connecting bricks and are similar to 'Lego.' Made out of high strength concrete and developed by 'Kite Bricks', smart bricks are versatile and come with substantial thermal energy control and a reduction in construction costs. As they are modularly designed, they are easy to connect and have space for insulation, electricity and plumbing.

Vertical cities may soon become reality as the world's population grows and land

increasingly becomes scarce. They are tetris-like buildings of towers for thousands of people to inhabit. Supporting blooming population, vertical cities are a space-saving solution to preserve land for food, nature and production.

Construction technology trends will always follow a typical pattern – how to build quicker and smarter, and more environmentally friendly. So construction inventions and construction materials will always advance to make our life more comfortable.

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WILL UNDERGROUND SYSTEM IN DNIPRO BE LENGTHENED IN A FEW YEARS?

Since 1995 Dnipro has been expecting the extension of its single metro line for 4 km and the construction of three new stations, suspended due to lack of financing.

Mayor of Dnipro Borys Filatov signed a €224m contract on July 28 with Turkish construction company Limak for the construction of a 4 km extension of the city's metro line.

The Dnipro Metro is a single-line metro system that serves the city of Dnipro, the fourth largest city in Ukraine by population. The metro was the third system constructed in Ukraine, after the Kyiv and Kharkiv metro systems, respectively, when it opened on December 29, 1995.

The Dnipro Metro consists of one 7.1-kilometer line and 6 stations. The line starts at the Vokzalna station, near the city's central railway station in the east and ends at the Pokrovska station in the western part of the city.

To be built in bored tunnels, the extension would run southeast from the current terminus of Vokzalna into the city centre. Stations are to be built at Teatralna, Tsentralna and Muzeina, with Tsentralna due to open ahead of the other two, as it is expected to have the highest passenger numbers.

The New Austrian Tunneling Method (NATM) will be used during the construction, so the strength of the surrounding soil to the greatest extent possible will be used to strengthen the tunnel structure. In other words, ground conditions drive the tunneling operation.

The NATM construction method is about flexibility—drilling and designing depending on the results of the ongoing monitoring. The operation occurs sequentially to take most advantage of the ground conditions. Additionally, NATM installs ground support on the go and on an as-needed basis, adding reinforcement to the shotcrete where necessary. The final, permanent support is usually (but not always) a cast-in-place concrete lining placed over a waterproofing membrane. This construction method yield a more cost-effective, flexible tunneling operation when compared with the other methods.

In comparison with the "Soviet method", the trunks that are being built by the Turkish company Limak, increased the width of the building by 2.5 times. Thus, the speed of lifting the earth increases 11 times!

The depth of the trunk is 45 meters. Below, only tunnels for metro rolling stock will be located.

It is worth noting that the emergence of new metro stations in the city marks the beginning of global changes in the transport infrastructure.

Thanks to new stations, the city centre will be freed of the stream of cars, and people will be able to get to bedroom district from the centre more quickly by the subway. This will contribute to the formation of new transport hubs.

According to an archaeologist Yuri Fanygin, work on the construction of the metro in the city helps to make new archaeological discoveries.

Recently, he was able to find a small Whistler at the construction site of the metro, which is already 1000 years old. He added that about a hundred years ago some child used this whistle as a toy.

Yuri assumes that while the trench was being dug up, the toy was thrown to the surface from the very depth. It is worth noting that the construction of the metro will last for a long time, which allows us to hope for new archaeological finds.

Scientists are waiting for discoveries during the construction and Dnipro citizens are looking forward to using underground system in their everyday life.

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MAGDEBURG WATER BRIDGE IS THE LONGEST NAVIGABLE AQUEDUCT IN THE WORLD

This unique bridge—a water bridge across water—connects East and West Germany over the River Elbe near the Town of Magdeburg, close to Berlin. Completed in 2003, it connects Berlin's inland harbor with the ports along the Rhine River. Several news reports cite the bridge as being Europe's largest water bridge as well as the longest navigable aqueduct in the world.

In Germany, architects have devised a water bridge that connects two water-bodies, not just by concrete but by water itself. The Magdeburg Water Bridge, is an ingenious architectural offspring that functions as an effectual conduit between the Elbe-Havel and the Mittelland Canal, crossing over the River Elbe in Germany. Being the largest canal underbridge in the continent, the Magdeburg Water Bridge allows the vessels to move between the Rhineland and Berlin comfortably.

The bridge was built since the course of the River Elbe is at a considerably lower height as compared to the two canals which have a confluence point at Magdeburg near the country capital, Berlin. Due to receding water levels of the river, the cargo carrying barges and vessels faced a lot of problems because they to firstly climb upstream from one canal point, then downstream with the route of the river and then again upstream to reach their docking destination at the other canal point, crossing a distance of nearly 12 km in totality.

The 918 meter-long Magdeburg Bridge is the longest navigable aqueduct in the world. The water bridge has a width of 34 meters with a water depth of 4.25 meters for the vessels to pass through. At least 24,000 metrical tons of steel along with over concrete 68,000 cubic meters were used to build the Channel Bridge, allowing large commercial vessels to pass through. The Canal Bridge comprises two parts such as the Main Bridge and the Approach Bridge. The bridge also features a double lock that was constructed to enable vessels to descend from the level of the bridge and Mittelland Canal to that of the Elbe-Havel Canal. In addition, a single lock was built at Rothensee in order to help vessels descend from the bridge level to the Elbe and the Magdeburg harbour. Though following a similar structural design, both bridges follow a different design approach and this change in design is illustrated by the tall concrete towers positioned on the three abutments. The Main Bridge is a 3-span continuous steel beam bridge, while the Approach Bridge is a multi-span steel beam bridge.

The idea generation of the Bridge Channel is not contemporary. On account of the exceedingly pivotal and arduous trade route that the vessels needed to undertake in the olden times, engineers at the start of the 20th century had proposed to design such a bridge which would connect the two water bodies without any excess strain or time-lapse caused to the vessels. . The waterway was more than 80 years in the planning, as construction started in the 1930s, but was halted during the Second World War. The bridge took six years to build at a cost

of about half a billion euros. In addition to the building of a bridge, the project also included the extension of the Elbe-Havel Canal.

In terms of architectural envisioning, the Magdeburg conduit is an example of exemplary superiority. It might not be ranked among the prestigious wonders built across the world, but it does feature in a unique and unsurpassed designing of its own.

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LA SPÉCIFICITÉ DE LA PRODUCTION ET DE L'UTILISATION DU MATÉRIEL AGRICOLE EN FRANCE ET EN UKRAINE

Le matériel agricole constitue une vaste gamme des outils techniques, destinés à augmenter la productivité du travail dans l'agriculture à l'aide de la mécanisation et l'automatisation des opérations individuelles ou des processus technologiques. Grâce à l'utilisation du nouveau matériel agricole, le complexe agro-industriel a la possibilité d'introduire l'ingénierie de haute technologie et perfectionner l'industrie des machines agricoles. Les machines spéciales simplifient considérablement le labour du sol, la récolte et le semis des cultures.

Le tracteur, comme le moyen de transport agricole le plus compact et le plus pratique, a eu une grande extension dans les pays à un grand potentiel agricole, parmi lesquels figurent traditionnellement la France et l'Ukraine. Cependant, les caractéristiques et la spécificité de son utilisation, ainsi que la production de leurs propres tracteurs et d'autres équipements agricoles en France et en Ukraine présentent certaines différences.

La France est l'un des principaux pays européens de haute technologie où les nouvelles technologies se développent dans presque toutes les directions. Elle est aussi connue par son utilisation des technologies modernes et efficaces dans le complexe agro-industriel qui comprend les industries mécaniques, en particulier, la construction des tracteurs. Mais le pourcentage d'équipement importé, y compris l'achat de pièces, dépasse le pourcentage de l'utilisation de la technique nationale française. Parmi les tracteurs de la production française sont connus seulement Renault Agriculture, une filiale du groupe automobile Renault. Mais 90% des modules techniques pour les tracteurs sont produits par des sociétés françaises. L'usine Massey Ferguson à Beauvais est totalement orientée sur la satisfaction des besoins des agriculteurs du monde entier. C'est la plus grande usine de tracteurs d'AGCO en Europe et la plus grande entreprise de tel genre en France avec la capacité de production de 20 000 tracteurs par an. Parmi les machines agricoles importées en France on peut citer les marques les plus populaires tels que John Deere, New Holland, Claas, Fendt.

Le processus de l'utilisation du matériel agricole est géré par les CUMA (Coopératives d'Utilisation de Matériel Agricole). Les spécificités de leur travail sont dans les achats ou l'acquisition des machines qui manquent en vertu d'un contrat de location. Les agriculteurs mettent en commun leurs ressources et peuvent utiliser les moyens techniques sur la base de la coopération des producteurs.

Le pourcentage de l'utilisation d'équipements neufs importés et de matériel agricole français par les agriculteurs français est également très élevé grâce aux avantages de prêt du gouvernement. Pour l'achat du matériel agricole les fermiers et les agriculteurs peuvent collecter des fonds à raison de 3 à 4% par an. En outre, une exploitation agricole française reçoit en moyenne environ 12 000 euros de subventions par an. Le potentiel de l'utilisation des machines agricoles en Ukraine est également très important, ce sont les chiffres sur des superficiesensemencées qui prouvent cela. En termes des superficiesensemencées l'Ukraine se trouve au

même niveau que la France, mais le volume du marché de ses équipements agricoles est 7 fois inférieur de celui de la France.

Selon les données de l'Institut d'économie agraire, les agriculteurs ukrainiens bénéficient de principaux types des machines agricoles seulement à 50%. Environ 75% des tracteurs sont en retard en dehors de la période d'amortissement. La part de la technique nationale ne dépasse pas 30%. C'est seulement 2% du parc des tracteurs qui est mis à jour chaque année. Avec l'achat de nouvelles machines agricoles, le marché du matériel d'occasion importé est aussi très développé en Ukraine. Parmi des machines de haute puissance les plus populaires avec la capacité de plus de 300 ch sont les marques John Deere, New Holland, Massey Ferguson, Claas, Fendt, Challenger, Case. Le marché des tracteurs de labour (80-100 ch) en Ukraine est représenté par le tracteur Bélarus.

L'Ukraine, ayant des productions puissantes de machines agricoles, telles que KhTZ, ELVORTI « Chervona Zirka», l'usine de Kobzarenko, ne fournit pas assez d'équipements pour elle-même. On n'achète que des dizaines, voire des unités de marques nationales des tracteurs KhTZ, YuMZ, Kyi, KhTA et Koval par an.

La tendance principale de 2017 a été caractérisée par l'augmentation de la popularité des tracteurs dans le segment de 150-200 ch, qui prend actuellement de l'ampleur. Actuellement en Ukraine sont apparus des échantillons des tracteurs capables de satisfaire une telle demande, ce sont des tracteurs des séries KhTZ-170, KhTZ-160, ayant des taux élevés, même par rapport aux normes internationales. Les spécialistes affirment qu'avec un financement approprié du secteur du génie agricole, la question de confirmation de la fiabilité des tracteurs nationaux peut être résolue dans les plus brefs délais.

Bibliographie:

1. Каталог сельскохозяйственной техники и оборудования. - [Электронный ресурс]. – Режим доступа: <http://selhoztehnik.com>
2. Сельское хозяйство и промышленность во Франции / Николая Перрен «Украина и Франция – две большие сельскохозяйственные страны» / ж-л «Пропозиція». - [Электронный ресурс]. – Режим доступа: <https://propozitsiya.com/nikolya-perren-ukraina-i-franciya-dve-bolshie-selskokozyaystvennye-strany>
3. Ринок тракторів в Україні/ М. Грицишин, Н. Перепелиця// Спецвипуск ж-лу «Пропозиція». Сучасна техніка для сучасного аграрія. - [Электронный ресурс]. – Режим доступа: <http://propozitsiya.com/rinok-traktoriv-v-ukrayini-0>
4. Christian Descombes. Encyclopédie des tracteurs fabriqués en France des origines à nos jours, Paris, E.T.A.I., 2000 (2e édition) - Renaud Gratier de Saint-Louis
5. Gamme longue Massey Ferguson souffle ses cinquante bougies/ Corinne le Gall// l'article de le journal « La France Agricole ». Machinisme. Entreprises © La France Agricole – Par des agriculteurs, pour les agriculteurs. – [Электронный ресурс]. – Режим доступа: www.lafranceagricole.fr

SECTION 8.

HUMANITIES AS AN INTEGRAL PART OF PROFESSIONAL TRAINING

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ENGLISH PHRASEOLOGICAL UNITS AND THEIR TRANSLATION IN THE TEXTS OF ORATORY STYLE

The theme of our work is “English phraseological unit and their translation into Ukrainian in public speeches”. The purpose is to analyze the translation of phraseological units in the texts of public speeches and to determine the peculiarities of their translation.

Phraseological units are an essential component of public speech. Speakers often use phraseological units in their performances in order to create a specific imagery and influence feelings of the audience.

While translating it is very important to accurately convey the content and imagery of phraseological units. However, there are many features and problems, related to the translation of phraseological units. Possible difficulties during the translation of phraseological units have been identified: pun, national coloring, allusion, change of content and / or form of the phraseological unit by the speaker. An adequate transmission of the stylistic function of the phraseological unit in oratorical speech presents particular difficulties in cases where the author of the text knowingly violates the traditional norms of use of the phraseological unit or when the individual components of the idiom are changed.

We have analyzed translations of 18 public speeches of British and American speakers and phraseological units, which were used there. We have discovered the two main ways of translation - phraseological translation and non-phraseological. Phraseological translation contains the following types: a full phraseological equivalent, a partial phraseological equivalent, a phraseological analogue, and an individual equivalent.

This is the extract from Barack Obama's speech after the results of Presidential election in 2016. In this example the speaker used the idiom «to lick one's wounds» which has a meaning «to spend time getting back your strength or happiness after a defeat or bad experience». While translating interpreter manages to convey imagery with the help of equivalent «зализувати рани» with the meaning «оговтуватися, набиратися нових сил».

You can also observe the examples of partial phraseological equivalent and phraseological analogue. We have come to the conclusion that the various types of phraseological translation were used more often (52%). Out of phraseological methods of translation, the most commonly used one is phraseological analogue (63%). Out of the non-phraseological methods of translation, the most commonly used one is descriptive translation (49%).

In the analyzed translations, the following grammatical, lexical and semantic transformations were found: grammatical substitution, addition, omission, syntactic substitution, syntactic assimilation, specification, antonymic translation, integral restructuring.

In general, most of the examples examined from the public speeches were adequately translated into Ukrainian. Translators were able to convey the meaning of the original units correctly, preserving their figurative character and stylistic functions, if possible. However, there were some mistakes that we have found and classified.

The first one is inappropriate equivalent. The second type of mistakes is omission of the phraseological unit. The third type of mistake is an inappropriate calque. Usually calque is used when there's no phraseological equivalent in the language of translation. And the last type of mistake is unnecessary addition. So the main reasons of mistakes while translating phraseological units are limit of time in simultaneous translation and the use of phraseological analogue, which may be identical by form but different by lexical meaning.

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CONTRIBUTION OF HUMANITIES TO TECHNICAL SPECIALITIES

The Humboldtian model of higher education (German:Humboldtisches Bildungsideal, literally: Humboldtian education ideal) is a concept of academic education that emerged in the

early 19th century and whose core idea is a holistic combination of research and studies. Sometimes called simply the Humboldtian model, it integrates the arts and sciences with research to achieve both comprehensive general learning and cultural knowledge, and it is still followed today. The concept of holistic academic education (compare Bildung) was an idea of Wilhelm von Humboldt, a Prussian philosopher, government functionary and diplomat. He founded the University of Berlin (now the Humboldt University of Berlin) and appointed distinguished scholars to teach and research there.

The humanities traditionally form one group of disciplines which are considered to be an essential component of a liberal, or a general education. The need for applied humanities also has implications for the training and professional development of humanities instructors who teach students in technical/vocational programs. Few humanities instructors have had training in the application of the humanities to technical/vocational needs since most of these instructors were educated at universities where the humanities are taught in a traditional discipline-oriented manner. There is also a need for humanities faculty to become more familiar with the technical and vocational areas they are serving. They should be spending a good deal of time reading, taking courses, and even attending conferences related to specific technical fields.

All of the above will no doubt be interpreted by some as a betrayal of the very essence of the humanities. The humanities "purist" might maintain that any adaptation of humanities courses to the pragmatic concerns of technical/vocational programs is contradictory to the traditional conception of the study of humanities as having an intrinsic value and as something that should be pursued for its own sake. If this is indeed the traditional conception of the humanities, then it might be high time for a change.

It is of fundamental importance, however, that the humanities faculty be made to relate to the technical/vocational programs they are serving. Mention has already been made of tendencies towards elitism and isolationism on the part of some humanities departments. I would therefore suggest, as one way to overcome these problems that all humanities faculty be cross-appointed with both the humanities department and the technical/vocational department they are serving. I would further suggest that equal consideration should be given to both the humanities chairman's and the technical/vocational chairman's recommendation concerning merit increment and/or promotion for humanities faculty.

This problem gives rise to several recommendations. There is a need for a special in-service training program at each college or institute for humanities instructors, a program which is geared specifically to adapting education in the humanities to technical/vocational programs. Humanities instructors should also be encouraged to take courses in the technical/vocational areas which they are servicing. Funds must also be made available to humanities faculty for professional development, but with the stipulation that one-half of these funds be used to attend conferences which seek to integrate studies in the humanities with technical/vocational concerns.

GERMAN LANGUAGE SECTION

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HIGH – TECH - WARTUNG FÜR HOCHGESCHWINDIGKEITSZÜGE

Zuverlässige und pünktliche Züge erfordern eine professionelle Instandhaltung und zwar von der ersten bis zur letzten Minute. Seit Ende Februar 2018 verbindet der spanische Hochgeschwindigkeitszug Velaro E die Städte Madrid und Barcelona. AVE ist ein Kunstwort und abgeleitet vom spanischen Wort für Hochgeschwindigkeit - Alta Velocidad. Velaro ist der

Markenname für die Familie der Hochgeschwindigkeitszüge und ein eingetragenes Warenzeichen der Siemens AG. Nur noch 2 Stunden und 38 Minuten liegen zwischen den beiden spanischen Metropolen - bei einer Entfernung von 625 km. Mit einer Höchstgeschwindigkeit von über 300 km/h erzielen die Züge eine Pünktlichkeit von über 99 %. Die Zuverlässigkeit des Velaro E liegt mittlerweile bei 99,93% - mit weiter steigender Tendenz. Herkömmliche Züge benötigten mehr als sechs Stunden für die Strecke – der AVE S103 benötigt nur noch gut 2,5 Stunden. Zuverlässigkeit und Pünktlichkeit entsprechen derzeit einer Flottenfahrleistung von ca. 850000 km zwischen den so genannten „Vorfällen“. Als „Vorfall“ ist die Verzögerung der planmäßigen Abfahrt oder Ankunft von mehr als zehn Minuten definiert. Umgerechnet bedeutet das, dass sich lediglich alle 1360 Fahrten zwischen Madrid - Barcelona ein solcher Vorfall ereignen.

Das spanische Verkehrsministerium gab jüngst eine Statistik heraus, aus der erkennbar ist, dass sich die Anzahl der Fahrgäste auf der Strecke Madrid - Barcelona durch den Einsatz des neuen Hochgeschwindigkeitszuges mittlerweile verdreifacht hat. Zurzeit fahren pro Monat ca. 250 000 Personen zwischen beiden Metropolen, ohne Berücksichtigung der Fahrgäste zwischen anderen Zwischenbahnhöfen, z. B. Madrid - Zaragoza oder Zaragoza-Barcelona. Die Fahrgäste favorisieren den Hochgeschwindigkeitszug insbesondere wegen der Zeitersparnis, der Zuverlässigkeit und des hohen Komforts. Der Marktanteil der Bahn gegenüber dem Flugzeug stieg auf dieser Strecke um ca. 50%. Der Serviceauftrag für die Velaro E-Züge beinhaltet die umfassende Instandhaltung und Reinigung der 26 Züge, die ca. 500 000 km pro Jahr und Zug fahren. Zum Vertrag gehört ebenfalls die Instandhaltung der Werkstätten und Depots.

Damit der Betrieb reibungslos funktioniert und weiterhin eine Höchstgeschwindigkeit von über 300 km/h gefahren werden kann, arbeiten über 240 Mitarbeiter in drei Schichten rund um die Uhr an 365 Tagen im Jahr in drei Depots, darunter „La Sagra“ in der Nähe von Toledo, „Santa Catalina“ in Madrid und mittlerweile, für korrektive Arbeiten im Bedarfsfall, auch in „Can Tunis“ bei Barcelona. Eine Besonderheit ist hierbei der technische Support sowie die Reinigung in den Bahnhöfen in Barcelona und Madrid, wo mehr als 100 Personen im Rahmen eines Unterauftrags beschäftigt sind. Die Forderung nach höchster Verfügbarkeit wurde seitens des Betreibers verlangt, denn Spaniens staatliches Eisenbahnunternehmen Renfe hat sich gegenüber seinen Fahrgästen verpflichtet, im Rahmen eines Servicequalitäts-Programms den vollen Fahrkartenpreis zurückzuerstatten, falls der AVE mehr als 15 Minuten Verspätung hat. Zurzeit belegt Renfe den zweiten Platz in Bezug auf Pünktlichkeit in der Weltrangliste - 98,5% aller spanischen Hochgeschwindigkeitszüge sind pünktlich. Vorreiter ist nur noch Japan mit 99% Pünktlichkeit.

Siemens hat der weltweiten Entwicklung des Schienenverkehrs im Hochgeschwindigkeitsbereich als moderner Technologietreiber und innovativer Serviceanbieter entscheidende Impulse gegeben. Alle drei Generationen des deutschen Hochgeschwindigkeitszuges ICE 1 wurden unter maßgeblicher Beteiligung des Unternehmens entwickelt. Weitere Aufträge für Hochgeschwindigkeitszüge der Velaro- Plattform konnten in China, Russland und Deutschland gewonnen werden. Auch hier zeugen langjährige Service-Verträge - wie die 30 Jahre Instandhaltung für den Velaro RUS - von dem Vertrauen der Betreiber in das Instandhaltungs-Know-how von Siemens Mobility. Mit dem Velaro verbindet man mittlerweile also nicht nur Geschwindigkeitsrekorde, sondern auch Service auf höchstem Niveau.

ZUKUNFT VON MEHRSYSTEMSTADTBAHNEN

Bereits 2013 erhielt Vossloh Rail Vehicles einen Auftrag für neu 750 V-Gleichstrom-Train-Tram-Fahrzeuge für die neu errichtete Meterspurstrecke zwischen den spanischen Küstenstädten Alicante und Benidorm. Diese Fahrzeuge wurden gemeinsam mit Alstom (Konstruktion und Traktionssystem sowie Systemintegration), Ormans (Motoren) und Sepsa (Elektrik: Zugregelung, PIS, Data Recorderm CVS) realisiert. Im Jahr 2014 folgte dann ein weiterer Auftrag für Vossloh Rail Vehicles: Die mallorquinische Eisenbahngesellschaft SFM bestellte sechs ähnliche Fahrzeuge für 1500 V Gleichstrom.

Der Vorteil dieser Fahrzeuge ist, dass es Verbindungen in Ballungsgebieten herstellt und dabei technisch in der Lage ist, sowohl Straßenbahn- als auch Vollbahngleise zu befahren und dabei von einem System zum anderen zu wechseln. Dabei erübrigt sich durch den Einsatz von Trains-Trams, dass die Passagiere zwischen unterschiedlichen Zugtypen umsteigen müssen. Die Fahrzeuge halten innerstädtisch an den Straßenbahnhaltestellen und im Regionalverkehr an, den Haltebahnhöfen des Regionalverkehrs.

Die Fahrzeuge bestehen aus drei Wagenteilen jeweils insgesamt 36,54 m Länge und eine Breite von 2,55m. Die drei Triebdrehgestelle werden von je zwei querliegenden 140 KW-Motoren angetrieben. Das Fahrzeug bietet 92 Sitzplätze und 148 Stehplätze bei vier Personen pro Quadratmeter. Die Bereiche zwischen den Enddrehgestellen und der jeweiligen Gelenkverbindung zum hochflurigen Mittelwagen sind niederflurig ausgeführt.

Vossloh Kiepe, Düsseldorf, liefert die komplette Antriebsausrüstung. Der Antrieb der Train-Trams ist mit drei IGBT-Direktpulsrichter (DPU) ausgestattet. Diese steuern je zwei wartungsarme eigenbelüftete, vierpolige Drehstrom-Asynchronmotoren des Herstellers VEM. Das Traktionssystem für die paarweise in den Drehgestellen angeordneten Motoren ist dabei jeweils auf dem Dach montiert. Durch den Einsatz der neusten IGBT-Modul-Generation konnte der DPU sehr kompakt und mit geringem Gewicht entwickelt werden. Dabei sind die gesamte Sensorik und die Umrücker-Steuerung bereits integriert. Mit einer Gesamtleistung von 840 kW bei einem Leergewicht von 55,5 t erreichen die Fahrzeuge eine Beschleunigung von 1,2 m/s. Das Stromabnehmersystem ist auf dem Dach des Mittelwagens installiert und umfasst den Stromabnehmer selbst sowie eine Überspannungsschutzeinrichtung und einen wirkenden Leistungsschalter. Die Schutzeinrichtung verhindert Spannungen über einem bestimmten Pegel und ist unter Bedingungen wartungsfrei.

Aus Gründen der Redundanz sind jeweils zwei statische Hilfsbetriebeumrichter (HBU) in jedem Train-Tram installiert. Sie werden direkt aus der Oberleitung gespeist und versorgen alle Nebenaggregate mit einer Dauerleistung von 72 kVA und 12 kW für das Laden der Batterien, die Zugbeleuchtung die Anzeigetafeln usw. Das HBU-System besteht aus einem Drehstromumrichter und einer Batterieladevorrichtung. Die Batterien sind ausreichend leistungsstark, um im Notfall das Öffnen der Türen und das Einschalten der Leuchtstoff-Notbeleuchtung zu erlauben.

Die Fahrzeuge verfügen beidseitig jeweils über zweimal zwei 1240 mm breite Türen, die in 360 mm Höhe über Schienenoberkante den Zugang zum Niederflur-Fahrgastraum eröffnen. Der Niederflurbereich hat eine Fußbodenhöhe von 375 mm über der Schienenoberkante. Dadurch sind die Train-Trams auch für Fahrgäste mit eingeschränkter Bewegungsfreiheit zugänglich. Die großen Stehplatzflächen in den Bereichen der Doppeltüren bieten Platz für Fahrräder und Rollstühle. Die Gangbreite beträgt 579 mm zwischen den Sitzen im

Hochflurfahrgastraum und 1160 mm im engsten Bereich zwischen den Haltestangen im Niederflur-Fahrgastraum. Diese Bereiche über den Triebdrehgestellen sind jeweils zwei Stufen im Fahrgastraum erreichbar. Im Hochflurbereich beträgt die Fußbodenhöhe 900 mm, während sie im Niederflur-Fahrgastraum 360 mm beträgt und die zweite Stufe bei einer Höhe von 725 mm über SO ist Fahrgastraum und Fahrerstände sind klimatisiert.

Auf dem Dach sollen zwei 390 kW starke MTU-Verbrennungsmotoren platziert werden, die der Abgasstufe IIIB entsprechen. Diese treiben die VEM-Permanentmagnet-Generatoren an, die den 750 V-Zwischenkreis versorgen. Jedes der Fahrzeuge wird über zwei hochflurige Einstiege in 1050 mm Höhe über Schienenoberkante verfügen, die von den Bahnsteigen aus erreichbar sind. Darüber hinaus wird es zwei Niederflur-Einstiege bei 390 mm über Schienenoberkante geben.

Vossloh Kiepe, Düsseldorf, liefert für diese Fahrzeuge die komplette Antriebsausrüstung, die Klimatisierung für den Fahrerstand sowie den Fahrgastraum und das Bordnetz.

Train-Trams werden nicht nur in Spanien zunehmend nachgefragt. Grund hierfür dürfte ihre Fähigkeit sein, die Systemgrenzen Stadt- und Regionalbahn verschwimmen zu lassen. Lästiges Umsteigen zwischen verschiedenen Verkehrsmitteln und Wartezeiten an Bahnhöfen schrecken bisweilen viele Pendler von der Nutzung öffentlicher Verkehrsmittel ab. Stadtreionalbahnen legen diese Problematik bei. Für Fahrgäste beutet die Nutzung von Train-Trams einen erheblichen Zeitvorteil. Durch die Reduzierung von Umsteigevorgängen können Reisezeiten erheblich verkürzt werden. Und auch Städte profitieren: Der Neubau innerstädtischer Strecken ist nicht nur mit immensen Kosten verbunden, sondern bedeutet meist einen erheblichen Einschnitt in städtische Bausubstanzen. Die Train-Tram kann bestehende Infrastrukturen nutzen. Hierdurch werden Investitions- und Betriebskosten gering gehalten. Die Train-Tram bietet somit eine attraktive und kostengünstige Lösung für den öffentlichen Nahverkehr in städtischen Räumen.

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INTERNATIONALE VERKEHRSKNOTENPUNKTE IN BALTIK

Estland hat eine Fläche von 45100 km², das sind etwa 12% der Fläche Deutschlands. Das Land ist die Heimat von etwa 1,6 Mio. Menschen. Über 70% der Gesamtbevölkerung leben in den städtischen Zentren des Landes, wobei in Tallinn allein fast ein Drittel der Esten wohnen. Die Altstadt mit dem Toompea-Schloss auf dem Domberg trägt den Beinamen „Stadt der Türme“. Die Altstadt ist seit 1997 Unesco-Weltkulturerbe und Tallinn war 2011 Europäische Kulturhauptstadt.

Gar keine Türme hat das Empfangsgebäude des Hauptbahnhofs Tallin aufzuweisen. Der schmucklose Zweckbau am Rande der Altstadt wurde in den Jahren 1960 bis 1966 in sowjetischer Plattenbauart errichtet und bis heute mehrfach umgebaut und um ein Kasino sowie einen Hotelneubau ergänzt. Der Bahnhof ist ein Kopfbahnhof, hat sieben Bahnsteige, zwölf Bahnsteiggleise und wird von drei Eisenbahngesellschaften genutzt. Elektrifizierte Strecken betreibt die Nahverkehrsverbindungen, die Züge im estländischen Fernverkehr nach Narva, Tartu oder Pärnu werden von Edelarauttee und die internationale Nachtzugverbindung nach Moskau oder die Züge nach St. Petersburg und Riga von GoRail betrieben. Die staatliche Eisenbahngesellschaft EestiRaudtee unterhält mit zwei Gesellschaften die Infrastruktur und den Güterverkehr und ist somit die größte Eisenbahngesellschaft Estlands.

Auf zwei Etagen bietet der Baltische Bahnhof Tallinn großzügige Einkaufspassagen und

ein Reisezentrum, das als multifunktionales Servicezentrum mit Fahrkartenverkauf, Reisebüro, Post und vielem mehr ausgestattet ist. Im ehemalige Bahnhofsgelände des Baltischen Bahnhofs in Tallinn begann 1870 der Zugverkehr als die Strecke Paldiski - Tallinn - Tapa - Narva - Gattschina eingeweiht wurde.

Architekt war der deutschbaltische Architekt Rudolf Otto von Knüpfer (1831 - 1900). 1872 folgte die Strecke Tallinn - St. Petersburg und 1876 die Verbindung nach Tartu. Dieses Gelände wird heute teilweise als Busbahnhof genutzt. Die Bahnhöfe des Baltikums haben nach dem Zerfall der Sowjetunion aufgrund der, durch aufstrebende Bus-, Pkw- und Flugzeugkonkurrenz veränderten, Verkehrsströme oft an Bedeutung verloren. Eine große Ausnahme ist der Hauptbahnhof der lettischen Hauptstadt Riga wo bereits im November 2006 der 25-millionste Fahrgast des Jahres gezählt wurde.

Als internationaler Verkehrsknotenpunkt des Ostseeraumes liegt Riga in den Verkehrsströmen zwischen Osteuropa und Skandinavien, der Via Baltica nach Finnland und bildet das Drehkreuz innerhalb des Baltikums. Die nationalen und internationalen Eisenbahnstrecken nach St. Petersburg und Moskau, nach Weißrussland und nach Litauen werden von der Staatsbahn Lat- vijasDzelzceļš LDZ auf etwa 2500 km, meist mit Dieseltraktionen betrieben. Das erste Bahnhofsgelände wurde von dem Architekten Johann Felsko 1861 errichtet und unter G. Shel 1885 erweitert. Zwei weitere Stationen Daugavpils und Jurmala folgten im 19. Jahrhundert und wurden nach zwischenzeitlichen Umbauten bis 1960 genutzt. Bis zu 14 Gleise führten durch den Bahnhof im ersten Stockwerk, während in der Parterre die Fahrkartenausgabe, Gepäckabfertigung, Shopping- und Zweckräume untergebracht waren.

1965 wurde ein erstes neues Teilbahnhofsgelände errichtet, das ab Anfang 2004 in den Bau eines modernen mit großer Glasfront gestalteten Empfangsgebäudes integriert und mit ansprechenden Einkaufszeilen, zwei Supermärkten und einem Großkino gestaltet wurde.

Zahlreiche Musik- und Folkloreveranstaltungen finden turnusmäßig in der Empfangshalle statt. Ein S-Bahn ähnliches Vorortzugsystem, Oberleitungsbusse, Omnibusse und ein Straßenbahnnetz ergänzen die Andienung des Zentralbahnhofes Riga. Der Busbahnhof ist teilweise seitlich des Empfangsgebäudes gelegen, während sich auf der Bahnhofsrückseite die bekannten Markthallen befinden.

Das Rigaer Motormuseum zeigt neben der Entwicklung der Transportmittel auch Bilder vom Ausbau der Bahnhofsanlagen, alte Lokomotiven und einen historischen Waggonpark.

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ALTE UND MODERNE BAHNHÖFE FÜR DIE WEITLÄUFIGE SCHIENENNITZ

Die Hafenstadt Shanghai ist als eine der größten Städte Chinas und als bedeutende Industriestadt mit rund 23 Millionen Bewohnern in der Region ein wichtiger Eisenbahnknoten des Landes. Im Norden von Shanghais Stadtzentrum, ist der zentrale Bahnhof Shanghai Railway Station gelegt. Er wird auch von den Chinesen „The hell Railway Station“ genannt. Weitere Bahnhöfe Shanghais wie Shanghai Hongqiao, der zusammen mit dem Fernbusbahnhof und Flughafen Hongkong einen wichtigen Verkehrsknoten im Osten der Stadt bildet, und die Bahnhöfe Shanghai South Railway Station und West Railway Station verbinden das weitläufige Schienennetz. Die Shanghai Railway Station hat mit 160 Zugfahrten an 13 Bahnsteigen die meisten Reisenden im Nah- und Fernverkehr mit Zielen in Nord-Süd- sowie westlicher Richtung, wie zum Beispiel nach Beijing. Herausragend ist dabei die

Hochgeschwindigkeitsstrecke nach Peking, die mit bis zu 350 km/h befahren werden kann. Zusätzlich verkehren fünf Hochgeschwindigkeitszüge von hier aus täglich nach Beijing sowie zwei Express-Luxuszüge nach Tianjin und Kowloon in Hongkong. Insgesamt sind über 50 Hochgeschwindigkeits- und Übernacht-Schnellzüge in dieser Region Chinas täglich unterwegs. Sogenannte D-Trains benötigen von Shanghai nach Beijing nur zehn Stunden, Z-trains über zwölf Stunden und T-Trains (Schnellzüge) knapp 14 Stunden sowie die K-Trains (Regionalzüge) 19 Stunden. Sie verdichten das Angebot im regionalen Reisezugverkehr. Die Metro-Linien 1, 3 oder 4 und zahlreiche Buslinien führen zur Railway-Station bzw. in die City und in die Stadtrandgebiete.

Als in den 1980er Jahren der Nordbahnhof nicht mehr dem Verkehrsaufkommen gewachsen war, entschied die Stadtverwaltung von Shanghai, 1987 den Güterbahnhof Shanghai-Ost abzureißen und einen neuen Bahnhof Shanghai Railway Station zu errichten. Nach zwischenzeitlichen Änderungen in der Betriebsführung sowie zugehörigen Nutzungsänderungen und Renovierungen im Jahre 2006 wurde 2008 anlässlich der Welt-Expo-Shanghai im Jahre 2010 ein großes Umbauprojekt im gesamten Shanghai Distrikt durchgeführt. Dabei wurde der Bahnhof großzügig und modern mit wellenförmigen Überdachungen, Glasverkleidungen, einer großen Wartehalle, sechs großzügigen Warteräumen, bis zu 60 Fahrkartenschaltern und attraktiven Einkaufspassagen ausgebaut. Der Haupteingang von Shanghai Railway Station ist mitten im Gebäudekomplex und wird von einer großen Anzeigetafel der Zugverbindungen dominiert.

Ein pompöser, klassischer Stil war Ende des 19. Jahrhunderts typisch für die meisten neu errichteten Großbahnhöfe. Dies gilt auch für den 1871 von Architekt Jakob Friedrich Wanner am damaligen nordwestlichen Stadtrand errichteten Kopfbahnhof Zürich. Er ist mit 26 Bahnsteiggleisen und einer Frequenz von rund 400 000 Reisenden täglich, der größte Bahnhof der Schweiz. Die im Stil der Neorenaissance reich dekorierte Wandelhalle, die Lichthöfe sowie die aus einem Triumphbogen bestehende Haupteingang an der Bahnhofstrasse bestimmten das frühere Bild bis steigende Verkehrsbedürfnisse weitere Neu- und Ergänzungsbauten notwendig machten. 1902, als die Schweizer Bundesbahnen die Vorläufer Schweizerische Zentralbahn und Nordostbahn übernahmen, erfolgten umfangreiche Gleisverlagerungen aus der bestehenden Halle in den neu errichteten Nordtrakt.

1933 kam die von Eisen und Glas bestimmte querrunde Bahnsteighalle für 16 Gleise hinzu. Um auch internationale Züge abfertigen zu können, wurden hier hauptsächlich im Jahr 1995 die Bahnsteige auf eine Länge von 420 m erweitert. Bereits 1916 ließen die Schweizer Bundesbahnen ihre Strecken mit dem Einphasen-Wechselstromsystem ausrüsten. Schon 1927 waren alle vom Hbf. Zürich ausgehenden Strecken elektrifiziert - bis 1960 fast alle SBB-Strecken. Im Gleisfeld vor der Querhalle wurde 1963 vom Architekten Max Vogt ein dominierender Betonkubus errichtet, in dem sich seit 1966 das Zentralstellwerk Zürich befindet. Der unter den Gleis- und Bahnsteiganlagen verlaufende Fluss Sihl machte zusätzliche Brückenbauten erforderlich. Das Vorfeld, bestehend aus Gleisen und Bahnhofsanlagen, bildete einen Engpass im Stadtverkehr, sodass die Neugestaltung des Bahnhofplatzes mit einer unterirdischen Einkaufshalle in 1970er Jahren erforderlich wurde. Das hierbei entstandene Einkaufszentrum Shop Villa hat das ganze Jahr über geöffnet und bietet über 100 Geschäfte - nach diesem Vorbild wurden die sechs nationalen Bahnhöfe Genf, Lausanne, Bern, Basel, Luzern und Winterthur seit 2003 umgebaut und unter der Marke RailCity zusammengefasst. Seit dem Bau der S-Bahn 1990 verbinden die Ladenpassagen die unterirdischen S-Bahnhöfe Museumsstrasse und SZU Bahnhof mit der Haupthalle. Mit mehr als 2900 Zugfahrten ist der Hbf. Zürich nicht nur ein bedeutsamer Knotenpunkt für Züge aus dem In- und angrenzenden Ausland, sondern einer der meist frequentierten Bahnhöfe der Welt.

Die Gleisanlage des Bahnhofs erstreckt sich über 4 km mit insgesamt etwa 100 km Gleisen und ca. 800 Weichen. Zum Hbf. Zürich zählen diverse separate Bahnhofsteile, wie der

über den Weinbergtunnel angeschlossene Bahnhof Löwenstraße, der Bahnhof Sihl Post, die Abstellanlage Herderen, die Gleishalle sowie die unterirdischen Bahnhöfe Museumsstraße und der SZU Bahnhof. Dies erklärt auch die ungewohnte Gleisnummerierung im Hbf. Zürich. 2009 gewann der Hbf. Zürich den Swiss Economic Award für die beste Dienstleistung.

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KOMBINIERTE BRÜCKE IN CHINA

Um die zentralen Gebiete Chinas mit Großstädten wie Zhengzhou (ca. 7,8 Mio. Einwohner - Hauptstadt der Provinz Henan mit ca. 92 Mio. Einwohner) zu entwickeln, sind die Verkehrsnetze für Eisenbahn- und Straßenverkehr auszubauen. Sowohl für die Hochgeschwindigkeitsstrecke Peking-Kanton und die Schnellstraße Peking-Shenzhen als auch den Ausbau des Schifffahrtsweges Yellow River (Gelber Fluss) ist diese Brücke erforderlich. Es ist eine kombinierte Brücke (Doppelstockbrücke) für die Hochgeschwindigkeitseisenbahnlinie und die Zhongyuan Straßenbrücke in der Henan Provinz. Im Oberlauf ca. 15 km entfernt ist eine Autobahnbrücke 6-spurig in Betrieb und in ca. 40 km die bestehende Eisenbahnbrücke. Im Unterlauf ca. 6 km entfernt ist ebenfalls eine Autobahnbrücke in Betrieb. Die Vorgabe war, eine kombinierte Straßen- und Eisenbahnbrücke zu realisieren, wobei es grundsätzlich folgende Möglichkeiten der Anordnung der Verkehrswege gibt.

1) Beide Verkehrswege auf gleicher Höhe:

Eisenbahn an einem Brückenrand - erleichtert die Trennung außerhalb der Brücke, führt aber zu einer unsymmetrischen Konstruktion;

Eisenbahn zentrisch - erleichtert die Konstruktion, erschwert aber die Trennung.

2) Zweistöckige Anordnung:

Die Eisenbahn ist im Allgemeinen auf der unteren und die Straße auf dem oberen Deck - das ist verkehrstechnisch sinnvoll, Straße und Eisenbahn sind völlig voneinander getrennt.

Nach Ergebnissen der Bohrungen bestehen die Bodenschichten vor allem aus feinen und mittleren Sanden und schläfrigen Böden, weichem Ton und dichten lehmigen Böden. In tieferen Lagen ist harter Ton mit linsenförmigen Körpern anzutreffen.

Bei den vorgefundenen Baugrundverhältnissen wurde die Gründung mit Grossbohrpfählen gewählt. Die Brücke ist für eine Lebensdauer von 100 Jahren zu bemessen. Die Ausbaugeschwindigkeit der Bahn wurde mit 350 km/h und für die Straßentrasse mit 100 km/h angesetzt.

Das "Yellow River" Flussbett wird nördlich und südlich im Abstand von ca. 10 km durch Dämme eingefasst. Die beiden Trassen (Eisenbahn und Autobahn) trennen sich noch vor den Hochwasserschutzdämmen in speziellen Ausfädelungsbereichen mit separaten Brücken. Die gesamte Neubautrasse wird durchgängig auf Brückenbauwerken verschiedener Konstruktionsart geführt. Der gemeinsame Doppelstockabschnitt verläuft über 9177 m und beträgt mit den Einfädelungsbereichen insgesamt für die Eisenbahn 14886 m und für den Autobahnabschnitt 22 690 m. Die obenliegende Straßentrasse mit je drei Richtungsfahrspuren weist eine Breite von 32.50 m auf. Die Gleistrasse ist zweigleisig, elektrifiziert und für einen Gleisabstand von 7,0 m auf der Hauptbrücke und im Vorlandbereich von 5,0 bis 7,0 m ausgelegt. Auf der Hauptbrücke kommt Schotteroberbau und außerhalb die Feste Fahrbahn im Einsatz. Es ist die längste im Bau befindliche Brücke Chinas. Die Stahlkonstruktion über eine Länge von 1684 m setzt sich aus zwei Teilen zusammen. Im Bereich des Flusslaufes wird eine Stahlverbundkonstruktion mit Schrägseil- überspannungen mittels sechs Pylonen über sieben Feldern mit Stützweiten zu 120 m

• 5 • 168 m • 120 m als Durchlaufträger mit einer Gesamtlänge von 1080 m erstellt. Die Pylonen sind mittig im Querschnitt angeordnet, 37 m hoch und erhalten als Seilanordnung die „Aufgelöste Fächeranordnung“. Das Tragsystem ist ein dreiteiliges Fachwerk, Knotenpunktstützung von 12 m, mit nach außen schräggestellten Hauptträgern und mittigen Längsträger mit einer Systemhöhe von 14 m.

Es werden Sphärische Lager/Kalottenlager verwendet. Die Lastabtragung der Stahlkonstruktion erfolgt über drei Lager auf jedem Pfeiler. Am Pfeiler 4 und 8 ist die Festauflagerung des mittigen Lagers angeordnet, mit jeweils einem längs- und querverschieblichen Lager. Bei den anderen Pfeilern ist das mittige Lager längsverschieblich und die anderen Lager allseits bewegliche Lager. In den Pfeilerachsen 3, 5, 9 und 10 sind erdbebensichere Abfederungen (Antivibrationsdämpfer) angeordnet.

Die reinen Eisenbahnbrücken überspannen die Dämme als Stabbogenbrücken mit Stützweiten von 97,60 m auf einer längs und quer vorgespannten Stahlbetonhohlkastenkonstruktion. Im näheren Bereich der geplanten Trasse stand für die Flussquerung keine Brücke zur Verfügung. Um die Massentransporte gewährleisten zu können wurde eine Hilfsbrücke zweispurig aus Stahl im Vorfeld hergestellt, die auch nach Inbetriebnahme von der Landbevölkerung gerne genutzt wurde.

Nach Beendigung der Unterbauten (Bohrpfähle, Pfahlkopfplatten und Pfeiler) erfolgt die Montage der Stahlkonstruktion. Die Bohrpfähle und Pfahlkopfplatten wurden im Schutz von wasserdichten Spundwandkästen hergestellt. Die vorgefertigten Stahlteile wurden auf der Montageplattform in 12 m langen Sektionen verschraubt und verschweißt und dann mit der sog. Multi-Point Synchronized Jacking und Pushing-Methode verschoben. Für diese Verschiebarbeiten wurde eigens ein neues Programm für die Steuerung und Überwachung entwickelt und im Vorfeld an Hand von Modellversuchen überprüft. Nach Fertigstellung der Stahlarbeiten werden die Betonfertigteile für die Autobahnebene aufgelegt und zeitlich parallel die Pylone errichtet.

Die insgesamt 14885 m lange Eisenbahnbrücke über den Gelben Fluss stellt einen Knotenpunkt der Eisenbahnlinie Beijing - Guangzhou und der Autobahnverbindung dar. Die Baukosten von ca. 500 Mio. EUR sind nach chinesischen Maßstäben als eher gering einzustufen.

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DIE WICHTIGSTEN TRENDS UND TECHNOLOGIEN IM BAU UND BAUINDUSTRIE 2020

In den kommenden Jahren wird die Bauindustrie sich sehr verändern. Neue Trends wie Digitalisierung, künstliche Intelligenz und BIM werden die Bauindustrie im Jahr 2020 nachhaltig verändern. In diesem Artikel erklären wir die wichtigsten Trends in der Bauindustrie.

Im Jahr 2020 werden Building Information Modeling (BIM) und die Digitalisierung sich im Bau in allen HOAI Leistungsphasen als Standard durchgesetzt haben. Auch in der jetzt noch undigitalisierten Leistungsphase 8, der Bauausführung, werden im Jahr 2020 alle Bauprojekte digitalisiert sein. Alle Beteiligten eines Bauprojekts, wie der Bauherr, Architekt, Bauleiter und Handwerker werden BIM als ihre zentrale Datenschnittstelle (common data environment) bereits von der finanziellen Planung über Bauausführung und Betrieb des Gebäudes verwenden.

Alle Prozesse und Kommunikation werden an das BIM Modell angefügt und können jederzeit von allen Projektbeteiligten aufgerufen werden. Der digitale Zwilling, das BIM Modell, enthält alle Informationen des realen Bauprojekts jederzeit für den Bauherrn bereit. Erstmals in der Geschichte der Bauindustrie werden Daten, welche in der Vergangenheit unstrukturiert und

chaotisch gespeichert wurden, systematisch zugänglich gemacht. Ineffiziente Prozesse und unzuverlässige Partner werden frühzeitig erkannt. Planungsfehler und Baumängel können durch digitale Prozesse vermieden werden, sodass Bauprojekte planbarer, steuerbarer und kostengünstiger werden.

Künstliche Intelligenz ist der zweite technologische Treiber, der die Art und Weise wie Prozesse in der Bauindustrie ausgeführt werden dramatisch verändern wird. Da Künstliche Intelligenz (KI) viele Aufgaben erleichtert, wie z. B. automatisierte Dokumenten- und Bildbeschriftung/-Verschlagwortung, bildbasierte Identifikation von Baumängeln, Terminkoordinierung aus Emails, wird es für Baufirmen immer wichtiger in Softwareprodukte zu investieren und ihre Unternehmensdaten in strukturierter Form zu organisieren. Daher sind wir der Ansicht, dass sich Unternehmen im Bausektor bis 2020 auf den Aufbau und die Nutzung digitaler Prozesse konzentrieren müssen um erfolgreich zu sein und zu bleiben.

Internet der Dinge (engl. Internet of Things IoT) ist der letzte Trend den wir beleuchten. IoT ist das Schlagwort für eine komplette Vernetzung aller Maschinen und Personen auf der Baustelle. Jedes Baufahrzeug, jede Maschine und Smartphone eines Arbeiters liefert in Echtzeit Daten über den Zustand, Prozess und aktuellen Ort, sodass sich Ressourcen auf einer Baustelle besser verteilen und organisieren lassen. Die Auslastung von Maschinen kann mit Hilfe von IoT und Methoden aus dem Bereich Big Data Analytics überprüft und verbessert werden. Durch die Vernetzung aller Arbeiter und Bauleitern mit Hilfe von Smartphones können Probleme und Baumängel in Echtzeit erhoben, bearbeitet und gelöst werden.

BIM ist aber nur ein Aspekt bei der Digitalisierung der Baubranche. Um wettbewerbsfähig zu bleiben, stehen gerade die bauausführenden Unternehmen unter dem Druck, die Effizienz in allen Geschäftsprozessen zu verbessern. Ausschlaggebend dafür sind unter anderem die oftmals geringen Margen bei starkem Preiswettbewerb und hohen Risiken, mit denen Bauprojekte behaftet sind.

Allerdings liegt das Erfolgspotenzial nicht alleine im Einsatz von softwaregestützten Lösungen. Der erste Ansatzpunkt zur Optimierung muss immer in der Organisation von Unternehmens- und Projektabläufen sowie in der Organisation der zugrunde liegenden Datenstrukturen liegen. Denn unstrukturierte Prozesse erhalten durch die Digitalisierung nicht automatisch eine zielführende Struktur.

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EWIGE INGENIEURBAUKUNST AUS STAHL UND BETON – DER BRÜCKENBAU

Schon vor 1845 hatte der Ingenieur Charles de Vignoles (1793-1875), wie die Geschichtsschreiber zu berichten wissen, „furchtbares Bauwerk“ - ein Viadukt aus zehn Holzrippenbögen mit sehr weiter Öffnung - über die Enz vorgesehen.

Der damalige Baurat Carl Etzel (1812 — 1865) und der Bauinspektor August Beckh (1809 — 1899) setzten dann aber nicht nur die Abzweigung der Westtrasse in Bietigheim durch, sondern bauten ein 287 m, 33 m hohes und auf 21 Bögen ruhendes Viadukt aus Stein über das Enztal. Der Grundstein wurde am 2. April 1851 gelegt und nachdem über 5000 t Sandstein von ca. 600 Arbeitern bei Tag und Nacht unter schwierigen Transport- und Einbaubedingungen verarbeitet waren, fand am 20. September 1853 die offizielle Einweihungsfeier statt, der wenig später am 26. September die Inbetriebnahme der „Württembergisch-badischen Verbindungsbahn“ folgte.

Im Zweiten Weltkrieg wurde das Bauwerk mehrfach bombardiert und war ab 1945 durch die Sprengung der fünf westlichen Pfeiler nicht mehr nutzbar. Nach zahlreichen Instandsetzungsmaßnahmen und dem Verfüllen einiger Bögen war die Standsicherheit nach Einziehung von Breitflanschträgern zur Entlastung der Gewölbe und dem Einbau von Stahlankern wieder erreicht. Jedoch erst unter dem Schutz einer Dauerbehelfsbrücke konnte das neue Bauwerk Enzviadukt erstellt und am 26. August 1949 dem Betrieb übergeben werden. Seit dem 18. Mai 1952 ist die Brücke elektrifiziert. Dadurch konnte der Betrieb zwischen den wichtigen Bahnhöfen Bietigheim und Mühlacker aufgenommen werden. 1958 war die Strecke von Bietigheim bis nach Karlsruhe durchgehend unter Fahrdracht. Bis zu 170 Reise- und über 200 Güterzüge befuhren die Brücke, bis dann 1991 die Inbetriebnahme der ICE-Strecke Mannheim - Stuttgart die Auslastung durch Personenzüge reduzierte. Das Enzviadukt ist aufgrund seiner Bauart, oder auch wegen der Ähnlichkeit zur Göltzschtalbrücke, nicht nur ein Anschauungsobjekt für Brückenbauingenieure, sondern auch bis heute Kulisse für Ausstellungen und Volksfeste.

Die zweigleisige Rendsburger Hochbrücke, die mit 2486,25 m Gesamtlänge den Nord-Ostseekanal und eine Bundesstraße mit ihrer Hauptbrücke in 42 m Höhe auf einer Länge von 317 m überspannt, hat Stützweiten von bis zu 140 m. Sie wurde von 1911 bis 1913 unweit des Rendsburger Hauptbahnhofes in Schleswig-Holstein als stählerne Fachwerkbrücke gebaut und überführt die Eisenbahnstrecke Neumünster - Flensburg. Eine an das Bauwerk angehängte Schwebefähre dient dem Straßen- und Fußgängerverkehr.

Das Bauwerk aus 17750 t Stahl und etwa 3,1 Mio. Nieten wurde für 13,5 Mio. Goldmark unter der Leitung von Ingenieur Friedrich Voß errichtet, am 1. Dezember 1913 fand die Inbetriebnahme statt. Um die Durchfahrtshöhe zu erreichen, mussten aufgrund der ebenen Topografie beidseitig lange, teilweise gekrümmte Rampenstrecken zwischen 51 Pfeilern gebaut werden, so dass die Rendsburger Hochbrücke eine Gesamtlänge von 7,5 km erreichte. Das Brückenbauwerk wird seit 1993 von Grund auf - einschließlich der Verstärkung der Fundamente - saniert und die Nieten durch Verschraubungen ersetzt, um die 1995 elektrifizierte Eisenbahnstrecke in den Güterzugverkehr Deutschland - Skandinavien mit einer Radsatzlast von 22,5 t und einer Meterlast von 6,4 t einzubinden.

Während der Baumaßnahmen bis 2015 wird die Brücke nur eingleisig befahren. Die Kosten sind mit 200 Mio. EUR veranschlagt. Die Schwebefähre ist 14 m lang, 6 m breit und 45 t schwer. Sie hängt mit zwölf Seilen an einem Stahlrahmen, der den Untergurt der Eisenbahnbrücke u-förmig umklammert und mit acht Rädern und elektrischem Antrieb auf Schienen rechts und links des Brückenträgers läuft. Die Schwebefähre, oder auch Gondel genannt, befördert je zweiminütiger Fahrt zwischen Rendsburg und Osterrönfeld vier Fahrzeuge und bis zu 60 Fußgänger.

Die Rendsburger Hochbrücke ist das Wahrzeichen der Stadt und eines der bedeutendsten technischen Denkmale in Deutschland. Sie wird am 23. September 2013, pünktlich zum 100-jährigen Bestehen der Brücke, als „Historisches Wahrzeichen der Ingenieurbaukunst in Deutschland“ von der Bundesingenieurkammer ausgezeichnet.

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LÄRMREDUKTION VARIIEREN

Seit vielen Jahren werden Maßnahmen untersucht und entwickelt, um die Schallemission von fahrenden Zügen zu reduzieren. Es ist bekannt, dass im überwiegend genutzten

Fahrgeschwindigkeitsbereich von ca. 50 bis 200 km/h das Rollgeräusch die Gesamtschallemission dominiert. Weitere Schallquellen, wie das Traktionsgeräusch oder das aerodynamische Geräusch werden in den angrenzenden Geschwindigkeitsbereichen relevant, dabei hängen die Grenzen vor allem von der Fahrzeugbeschaffenheit ab. Somit sind Maßnahmen, die das Rollgeräusch reduzieren, in den überwiegenden Betriebssituationen für eine Emissionsminderung sinnvoll.

Das Rollgeräusch wird hauptsächlich durch das Fahrzeugrad und die Schiene erzeugt. Durch ihre unterschiedliche Konstruktion ergeben sich unterschiedliche Frequenzbereiche, in denen beide Elemente auf die Anregung besonders sensibel reagieren und so eine hohe Schalleistung abstrahlen. Um die Anteile bei der Einzelquelle zu analysieren, muss die mechanische Anregung betrachtet werden: Sie ergibt sich aus der Oberflächenrauheit von Rad und Schiene, der sogenannten „Summenrauheit“, die kann wiederum in unterschiedliche Wellenlängen zerlegt werden kann. Entsprechend der Fahrgeschwindigkeit führen diese Wellenlängen dann zu Frequenzanteilen der Anregungskräfte. Dies bedeutet, dass die Ausprägung dieser Summenrauheit in der Form der Gewichtung von eher kurzen - oder langwelligen Bereichen die Gewichtung der Rad- und Gleisanteile im Gesamtgeräusch beeinflusst. Somit ergibt sich eine Abhängigkeit des Rollgeräusches u.a. von den Eigenschaften der Einzelquellen „Rad“ und „Gleis“, deren Oberflächenrauheiten und der Fahrgeschwindigkeit.

Zielführend ist eine Analyse der Einzelquellen im Frequenzspektrum. So kann die dominierende Einzelquelle identifiziert und eine sinnvolle Reduktionsmaßnahme ausgelegt werden. Durch streckenseitige Luftschallmessungen an vorbeifahrenden Zügen kann jedoch keine Aufteilung der Einzelquellen vorgenommen werden. Hier stehen zwei Alternativen zur Verfügung: Vollständig numerische Simulation: Alle Elemente werden modellhaft ihrer geometrischen und strukturdynamischen Eigenschaften beschrieben.

Teilnumerische Simulation: Durch eine große Anzahl von Messergebnissen bei bekannten Randbedingungen werden die Eigenschaften von Fahrzeug und Fahrweg getrennt ermittelt, die als Datenbasis für weiterführende Simulationsrechnungen verwendet werden können. Ist es naheliegend, die Abhängigkeiten der Schalldruckreduktion von verschiedenen Randbedingungen zu analysieren. Im Folgenden werden die in der Praxis wichtigsten Parameter aufgeführt und bewertet. Dieser Fall tritt dann ein, wenn der Radanteil besonders hoch ist oder der Schienenanteil besonders gering ist. Fall tritt auf, wenn das Rad konstruktiv zu höher Schall-Emission neigt oder wenn sich aus der Summenrauheit und der Fahrgeschwindigkeit eine relativ hohe Anregung in dem Frequenzbereich ergibt, in dem das Rad besonders sensibel ist.

Somit ist der Fall im Güterverkehr zu erwarten. Ein Gegenbeispiel für besonders geringe Rad-Schallanteile sind Triebfahrzeuge mit Speichenrädern. Messergebnisse zeigen jedoch, dass auch im Güterverkehr durch Schienendämpfer eine Schallreduktion eintritt - somit sind hier noch weitere Einflussparameter zu erwarten, die jedoch noch ermittelt werden müssen. Ist der Schienenanteil im Gesamtgeräusch dominant oder zumindest ähnlich dem Radanteil ausgebildet, ist ersichtlich, dass Maßnahmen an der Schiene zu einer relativ hohen Reduktion im Gesamtgeräusch führen. In Schallprognoseberechnungen werden Schienendämpfer aktuell unterschiedlich berücksichtigt. Eine detaillierte, aber noch sehr junge und daher wenig validierte Methode wurde im Rahmen des Projektes Stardamp entwickelt. Hier sind Gleis-Abklingraten der realen Strecke mit und ohne Schienendämpfer notwendig, um mittels der bekannten Twins- Algorithmen den Luftschallunterschied der Rad- und Gleis-Einzelquellen zu analysieren. Alternativ können auch Abklingraten einer Einzelschiene von ca. 10 m Länge genutzt werden, die mit Schienendämpfern belegt wurde. Mit entsprechenden Messungen wird hier ein sehr effizientes Werkzeug zur Verfügung stehen.

NATURSCHUTZ IN DEUTSCHLAND

Umweltschutz ist ein Komplex von Maßnahmen zur Erhaltung, rationellen Nutzung und Wiederherstellung natürlicher Ressourcen. Im Rahmen meiner Arbeit wurde die Vielfalt der Schutzgebiete in Deutschland und ihre Bedeutung untersucht. Solche Gebiete sind Nationalparks, Naturdenkmäler und Sanatorium-und-Spa-Zonen.

Nationalparks

Nationalparks in Deutschland sind Landschaften, die der Erhaltung der natürlichen Vielfalt seltener Tier- und Pflanzenarten dienen und für die biologische Vielfalt von großer Bedeutung sind.

Bayerischer Wald. Nationalpark Bayerischer Wald - Deutschlands erster Nationalpark, geöffnet 7. Oktober 1970 auf dem Gebiet des heutigen Kreises Freyung-Grafenau. Nationalpark hat eine einzigartige Fauna erhalten, unter denen gibt es Arten, die vom Aussterben, wie Nörgelei, Luchs, Wanderfalken, Wildkatze, Schwarzstorch, Biber, Fischotter oder gemeinsamen Wespenbussard sowie andere typische Bewohner des Bayerischen Waldes bedroht sind.

Berchtesgaden. Der Nationalpark Berchtesgaden ist Deutschlands einziger Hochland-Nationalpark in den Alpen. Es befindet sich im bayerischen Landkreis Berchtesgaden. Im Park gibt es einen Gebirgssee Funtensee (it. Funtensee), in einem Gebiet, das in Deutschland registriert wurde, die niedrigste Temperatur im Winter.

Schleswig-Holstein Watts. Der Schleswig-Holsteinische Watts-Nationalpark ist ein Nationalpark im schleswig-holsteinischen Watt. Nationalpark erstreckt sich von der deutschen Grenze im Norden bis zur Mündung der Elbe im Süden. Die nördliche Hälfte des Parks umfasst die nordfriesischen Inseln. Dort ist das Wattmeer 40 km breit.

Denkmäler der Natur. Naturdenkmäler sind einzigartig, unersetzlich, wertvoll in ökologischen, wissenschaftlichen, kulturellen und ästhetischen Beziehungen, natürlichen Komplexen sowie Objekten natürlichen und künstlichen Ursprungs. Der Olympiapark ist ein Park in München, gebaut nach dem Projekt des Architekturbüros Günter Benisch zu den Olympischen Sommerspielen 1972 in dieser Stadt. Nach vielen Jahren dient der Park immer noch als ein wichtiger Ort für verschiedene kulturelle, soziale und religiöse Veranstaltungen.

Der Botanische Garten Berlin ist einer der ältesten und größten Gärten Europas und der Welt. Hier, auf einem riesigen Territorium, gibt es grandiose Gewächshäuser, die größten Sammlungen von Orchideen, Kakteen, exotischen Raubfischen, die sich von Insekten ernähren. Nur etwa 22 Tausend Arten. Dieser Garten wurde im XIX. Jahrhundert angelegt und war zunächst ein wunderbarer Ort zur Erholung mit künstlichen Seen, Skulpturen, grünen Wiesen, Blumenbeeten und Bänken für Besucher.

Tiergarten. Dieser älteste Park (XVII Jahrhundert) wurde während des Zweiten Weltkriegs schwer beschädigt. Dann mussten die Bürger die Parkbäume fällen, um Häuser zu heizen. Doch mit der Zeit wurde der Tiergarten restauriert, viele deutsche Städte beteiligten sich an dieser Großaktion und schickten Samen, Sprossen und Setzlinge von Bäumen in die Hauptstadt. Heute blüht der Tiergarten noch. Neben gepflegten Wegen und Wiesen gibt es viele Skulpturen, Denkmäler, Denkmäler und kleine Teehäuser. Sanatorium und Erholungsgebiete. Resorts-Orte, die natürliche Ressourcen für die Behandlung und Erholung haben Bayern, das Land im Süden des Landes, ist ein weiteres sehr erfolgreiches Erholungsgebiet. Natürlich gibt es viele alpine Skigebiete, von denen einige das ganze Jahr über skaten. Eine weitere lokale Attraktion - die wunderschönen Bergseen und alten Burgen, die sich auf den mächtigen Bergen

erheben, die mit dunklen Tannen bewachsen sind. Auch in München gibt es viele Beerenfelder, wo Touristen Beeren pflücken und dort essen können.

Seen von Deutschland. Der Chiemsee, der mit Stolz das "Bayerische Meer" genannt wird, liegt 80 km südöstlich von München. Auf dem See befinden sich drei Inseln, auf denen sich die Burg und das Kloster befinden. In Chiemsee können Sie angeln, segeln und andere Wassersportarten betreiben.

Der Tegernsee erstreckt sich in den Ausläufern der bayerischen Alpen, 50 Kilometer von München entfernt. Das Klima am See ist gemäßigt gemütlich und wirkt sich in Kombination mit Thermalheilwasser äußerst positiv auf den Körper aus. Der Aibsee liegt neben dem bekannten Skigebiet Garmisch-Partenkirchen. Rund um den See gibt es viele Wander- und Radwege, darunter die schönsten Ausblicke auf die sagenhafte Landschaft der deutschen Alpen.

Medizinische Einrichtungen. Berühmt für Deutschland und seine Thermalkurorte. Der erste Name, der Ihnen in den Sinn kommt, ist natürlich das berühmte Baden-Baden, ein beliebter Urlaubsort für unsere berühmten Schriftsteller und andere berühmte Persönlichkeiten des vorletzten Jahrhunderts. Die alte Stadt Bad Kissagen, in einer ruhigen und gemütlichen Atmosphäre gelegen, bietet eine Möglichkeit zur Behandlung von Erkrankungen des Nervensystems des Stoffwechsels. Um die Gesundheit zu verbessern, können Sie die Städte Bad Griesbach, Bad Reichenhall, Bad Füssing und viele andere schöne Städte mit dem Bad Add-on besuchen, nach denen Sie ohne Zweifel sowohl physisch als auch moralisch gesund werden.
Schlussfolgerungen

Daraus lässt sich schließen, dass das Territorium Deutschlands aus einer Vielzahl von Naturschutzobjekten besteht, die eine Möglichkeit bieten, die Umwelt vor Zerstörung zu schützen. Auch Nationalparks Naturdenkmäler und Spa-Zonen ermöglichen es Ihnen, in den Wäldern, Bergen und Seen Deutschlands in der Form zu bleiben, in der sie erstellt wurden.

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DER NEUE HOCHGESCHWINDIGKEITZUG BOMBARDIER – ZEFIRO 380

Beim Bombardier-Zefiro 380 handelt es sich um den neuesten und schnellsten Zug aus der Produktfamilie Zefiro für den Intercity- und Hochgeschwindigkeitsverkehr.

Zugkonfiguration. Der achttellige Triebzug besteht aus vier angetriebenen und vier nicht angetriebenen Wagen. Die beiden Endwagen sind mit einem Führerraum ausgerüstet. Konzeptionell bilden immer vier Wagen eine Traktionseinheit. Jede Traktionseinheit besteht aus einem Motorwagen mit Führerstand (Mc), einem Trafowagen (Tp), einem Motorwagen (M) und einem antriebslosen Mittelwagen (T). Die Traktionseinheiten sind nicht identisch ausgerüstet. Ein Betrieb des Zuges ist nur in folgender Konfiguration möglich: Mc1a-1 – Tp2-2 – M2v2-3 – Td2-4 – T2-5 – M2vs-6 – Tp2-7 – Mc2a-8. Konzeptionell ist auch die Bildung von 12- oder 16-teiligen Zügen möglich. Die Traktionsanlage ist unterhalb des Fußbodens angeordnet, so dass in allen acht Wagen Sitzplätze vorhanden sind. Das äußere Design entstand in enger Zusammenarbeit zwischen Designern, Aerodynamik- und Akustikspezialisten. Das Ergebnis war ein 20% niedrigerer Luftwiderstand im Vergleich zum ICE 3 trotz größeren Querschnitt, sowie ein 9% geringerer Energieverbrauch im Vergleich mit CRH3.

Mechanischer Teil. Der Wagenkasten besteht aus geschweißten Aluminium-Strangpressprofilen und wurde mit optimaler Ausnutzung der Konstruktionsgrenzlinie gestaltet. Besonderheiten sind die Anforderungen des Kunden eines Belastungstests mit Über-/Unterdruck

sowie die Einhaltung einer Eigenfrequenz von mindestens 10 Hz im voll ausgerüsteten Zustand. Für die Bremssteuerung wurde eine gewichtsoptimierte Lösung ohne durchgehende Hauptluftleitung gewählt. Es sind zwei Wagenklassen vorhanden: 1. Klasse mit 2+2 Bestuhlung, 2. Klasse mit 2+3 Bestuhlung, die ursprünglich vorgesehene VIP-Bestuhlung wurde abbestellt. Alle Sitzgruppen sind drehbar so dass alle Fahrgäste in Fahrtrichtung sitzen können. Ein Mittelwagen ist zur Hälfte als Speisewagen ausgeführt. Jeder Acht-Wagen-Zug ist mit einem behindertengerechten WC ausgestattet.

Elektrischer Teil. Aufgeteilt ist der achteilige Zug in zwei sogenannte Train Base Unit (TBU), das heißt ein Trafowagen versorgt die beiden benachbarten Motorwagen. Die AC-Hochspannungsanlage ist über sechs Wagen (Tp2-2-M2v-3-Td2-4-T2-5-M2vs-6-Tp2-7) verteilt angeordnet und in den beiden Traktionseinheiten symmetrisch aufgebaut. Die wesentlichen Komponenten befinden sich auf dem Dach. Die zwei Trafowagen sind mit einer Dach-Hochspannungsleitung verbunden, welche vom jeweils angelegten Stromabnehmer gespeist wird. Die Primärstromrückführung ist von der Schutzterde des Zuges vollkommen getrennt und gelangt über separate Leitungen zu speziellen Radsatzerdkontakten der Betriebs Erde.

In den mit Triebdrehgestellen ausgerüsteten Mc- und M2-Wagen treiben jeweils zwei Fahrmotoren die beiden Radsätze eines Drehgestells an. Sie sind in Fahrzeugquerrichtung mit drei Befestigungspunkten an den Querträgern der Triebdrehgestelle befestigt. Die Motoren sind temperaturüberwacht. Das Getriebe stützt sich über Lager auf die Achswelle und über eine Drehmomentstütze elastisch am Drehgestellrahmen ab. Die Getrieberäder sind schrägverzahnt. Das 400 V/ 110 V-Bordnetz dient Versorgung der Hilfsbetriebe (Lüfter, Pumpen usw.) und der Komforteinrichtungen (Klima, Heizung usw.).

Zusammenfassung. Der Bombardier Zefiro 380 definiert umfassend neu das Reisen mit sehr hoher Geschwindigkeit durch die Harmonisierung der oft widersprüchlichen Anforderungen von Ökonomie und Ökologie. Der weltweit schnellste Serien-Zug ist auch der weltweit umweltfreundlichste und einer der sparsamsten Hochgeschwindigkeitszüge.

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DER HUCKEPACKVERKEHR WIE EINE WEISE DER ERHÖHUNG DER UMFÄNGE DES GUTERVERKEHRS FÜR DIE UKRAINE

Heutzutage entwickelt sich die Weltwirtschaft ständig und wird anspruchsvoller zur Transportsphäre. In diesem Fall geht es um die Umweltverträglichkeit der Beförderungen, die Unversehrtheiten der Ladung, die Wirtschaftlichkeit der Zustellung und ihrer Geschwindigkeit.

Solche Aufgaben könnte man lösen mithilfe der neuen Weise der Beförderung der Ladung – des Huckepackverkehrs. In Europa hat solche Technologie den Namen «rolling motorway» oder auf Deutsch «Die rollende Landstraße» bekommen. Der Huckepackverkehr ist kombinierte Beförderung mit dem Eisenbahn- und Kraftverkehr. So sehen solche Beförderungen die Benutzung des Eisenbahnbahnsteigs mit dem herabgesetzten Fußboden vor, auf dem die Halbanhänger, die Anhänger, die abnehmbaren Karosserien und sogar den ganzen Straßengüterzug befördern. Die Vorteile der gegebenen Art der Beförderungen sind die Senkung der Kosten des Autobrennstoffes und der Totzeit der Züge auf den Grenzautoübergängen usw.

Im Bereich des Huckepackverkehrs, besonders in England, USA, Deutschland verwendet man die Roadrailer. Sie sind die speziellen Anhänger mit dem kombinierten Fahrteil, die sich wie nach den Autostraßen, als auch nach den Schienen bewegen können. Die Roadrailer kann man zum Schlepper oder zur Lokomotive festigen. So kann man Roadrailer-Züge organisieren.

Auf den Eisenbahnkarren stellen den Halbanhänger mittels der konsequenten Vereinigung mit ihr der Stützteil des Halbanhängers fest. Die Räder der Halbanhänger steigen bei der Bewegung nach den Schienen hinauf. Mithilfe der Roadrailer kann man die Anzahl der Operationen der Beladung und des Ausladens verringern. Man muss nur 2 Überlastungen machen: die Anlage der Halbanhänger zum Eisenbahnbahnsteig im Abfahrtspunkt, und ihre Abnahme — im Punkt der Ankunft. So nimmt die Geschwindigkeit der Zustellung der Ladung zu. Auch haben die Sattelaufflieger (das beladene Auto, der Autohänger, der Kastenwagen) den niedrigen Koeffizienten der Verpackung, da die Karosserie des Roadrailer aus den leichten Legierungen der Metalle gemacht ist. So bringt die Senkung der Masse der Verpackung des Wagens zur Verkleinerung der Kosten des Materials auf den Bau der Wagen und der konstanten Kosten auf die Fortbewegung der Wagen, die bei der großen Verpackung der Wagen hoch sind.

Was betrifft die Ukraine, so wird die Entwicklung des Huckepackverkehrs im Land bald vorgesehen. So haben die ukrainische Eisenbahngesellschaft „Ukrzaliznytsja“ und das ungarische staatliche Eisenbahnunternehmen Magyar Allamvasútak (MÁV) im Mai der Jahre 2018 über die gemeinsame Entwicklung der vorliegenden Beförderungen vereinbart. Jetzt ist diese Frage aktuell, weil der Güterstrom in der europäischen Richtung stark wächst. So haben die Umfänge der Beförderungen der Ladungen mit der Bahn zwischen der Ukraine und Ungarn für 3 Monate des Jahres 2018 1071,26 T zusammengestellt, es ist auf 18,6 % mehr, als für die ähnliche Periode im Jahr 2017. Der Huckepackverkehr ist die Alternative der internationalen LKW-Transporte. Folglich wird das Problem der Überlassung der Erlaubnis für die Verwirklichung der internationalen LKW-Transporte gelöst, weil die Ladung auf die Eisenbahnbahnsteige übergehen wird und der Einfluss des Kraftverkehrs auf die Ökologie infolge minimisiert wird.

Man kann betonen, dass die Entwicklung des Huckepackverkehrs zur Modernisierung des ganzen Transportsystems der Ukraine beitragen wird. Mithilfe solcher Art der Beförderungen kann sich die schnelle Zustellung der Ladungen verwirklichen und die Umweltverschmutzung wird sinken.

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TYP C2: DIE NEUE U-BAHN

Mehr Energie im Netz. Die neuen Züge zeichnen sich durch verbesserte Diagnosemöglichkeiten zur Störungsbehebung aus. Dadurch wird die Reparatur und Wartung erleichtert und beschleunigt. Die Fahrzeuge müssen seltener und weniger intensiv gewartet werden, wodurch sich die Wagenverfügbarkeit erhöht. Auch ökologisch top: Die Züge sind besonders energieeffizient, da sie bis zu 54 Prozent ihrer Bremsenergie ins Netz zurückspeisen können. Außerdem können mehr als 95 Prozent der Fahrzeugteile demontiert und recycelt werden.

Ausgezeichnetes Design. Noch bevor die neue U-Bahn auf der Strecke war, überzeugte sie die Fachleute schon in Sachen Design und wurde mit gleich drei Auszeichnungen überhäuft. Der neue U-Bahnzug konnte nicht nur den Universal Design Award und den Red Dot Award gewinnen, sondern wurde auch mit dem wohl bekanntesten deutschen Designpreis, dem German Design Award, ausgezeichnet. Die Jury zeigte sich begeistert: «Diese Bahn ist in vielen Details ein echtes Highlight.»

Erfolgsmodell C-Zug. Seit über zehn Jahren fahren komplett durchgängige U-Bahn-Gliederzüge vom Typ C1 U-Bahngleisen. Trotz sichtbarer Familienzugehörigkeit zu seinem

Vorgänger wurde der neue C2-Zug deutlich modernisiert. Das Design wurde sowohl innen als auch außen weiter optimiert. Das Fahrzeug ist dadurch insgesamt noch kundenfreundlicher, wirtschaftlicher und ökologischer als das C1-Modell.

Mehr Platz, Sicherheit und Komfort. Der neue U-Bahnzug bietet Raum für 940 Fahrgäste auf 220 Sitz- und 720 Stehplätzen. Das sind knapp 30 Plätze mehr als beim C1-Modell.

Größere Stehplatzbereiche zwischen den Wagenteilen bringen mehr Platz für Kinderwagen und Rollstühle und sorgen dafür, dass sich alle Fahrgäste besser im Zug verteilen können. Die breiten Türen erleichtern und beschleunigen das Ein- und Aussteigen.

Farbige LED-Bänder an den Türkanten signalisieren das Öffnen und Schließen der Türen und erhöhen so die Sicherheit der Fahrgäste. Wie schon beim C1 sind die Sitzplätze teils gegenüber, teils längs angeordnet. Neu ist aber, dass alle Sitze ein Polster haben.

Optik auf dem neuesten Stand. Die Innenbeleuchtung des Zuges erfolgt vollständig über teils ringförmige LED-Leuchten, die für eine gleichmäßige und freundliche Ausleuchtung sorgen. Die überarbeitete Kopfform in Kombination mit der neuen Frontbeleuchtung bewirkt ein insgesamt schnittigeres und attraktiveres Erscheinungsbild des neuen Zuges.

„Das Ziel ist, den Betrieb mit den ersten Zügen im Sommer aufzunehmen“, sagte MVG-Chef König. Bis der C2 offiziell losrollen kann, muss er erst noch auf dem Münchner U-Bahnnetz getestet werden. Das ginge nur nachts, wenn keine anderen Züge fahren und dauere noch ein paar Monate, so König. Bis 2015 sollen dann alle Züge den Linienbetrieb aufgenommen haben.

Sieben der 21 neuen Züge sollen zur Taktverdichtung beitragen. Die restlichen 14 werden die 40 Jahre alten U-Bahnen vom Typ A ersetzen. Die MVG will mit den ersten Zügen zunächst den Zwei-Minuten-Takt auf der Linie U2 einrichten. Hier sei der Bedarf besonders groß.

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BAHNHÖFE DER WELT

Antwerpens historischer Kopfbahnhof Antwerpen-Centraal wurde nach den Marten des Center Architekten Jacques Voncke im laufenden Betrieb modernisiert. Innerhalb von zehn Jahren wurde ein Tunnel hinter dem historischen Bahnhof gebaut und dieser so auch für den Hochgeschwindigkeitsverkehr zugänglich gemacht. Ende des 19. Jahrhunderts hatte der belgische König Leopold II. die Gewinne aus der Kolonie Belgisch-Kongo genutzt, um im eigenen Land Triumphbögen und Prachtbauten erbauen zu lassen. Das Empfangsgebäude des Bahnhofs Antwerpen-Centraal von Louis de la Censerie wird vom Luzerner Bahnhof und dem Pantheon in Rom beeinflusst. Spoorwegkathedraal - die Eisenbahnkathedrale - wird das steinerne Empfangsgebäude wegen seiner gewaltigen Konstruktion im Volksmund genannt. Dabei dominiert vor allem die mächtige, kunstvoll gestaltete Kuppel, die von zehn Türmen umgeben ist und eine stattliche Höhe von 75 m aufweist. Ein weiterer imposanter Gebäudeabschnitt ist die von einem ca. 45 m hohen Glasdach in Bogenform überspannte Bahnsteighalle, die der Ingenieur Clement Van Bogaert erbaut hat. Den Höhenunterschied zwischen Empfangsgebäude und Gleishalle überwindet man durch eine neobarocke überbreite Marmortreppe, die der gesamten eklektizistischen Architektur etwas Erhabenes gibt. Doch der am 11. August 1905 eröffnete Bahnhof ist heutzutage nicht nur eine schöne Sehenswürdigkeit für Touristen, sondern auch Knotenpunkt für Reisende auf der Nord-Süd-Verbindung. Da ein Kopfbahnhof aber nicht für den Hochgeschwindigkeitsverkehr geeignet ist und selbst einen

Bogen um Antwerpen machen musste, war ein umfassender Umbau des Bahnhofs Antwerpen-Centraal notwendig. So wurde ein Durchgangsbahnhof in einem 3,8 km langen Tunnel unter dem eigentlichen Kopfbahnhof geschaffen. Der Untertunnelung fielen vier der zehn Gleise in der Belle Etage zum Opfer, doch dafür liegen im ersten Untergeschoss, in dem auch die Metro fährt und im zweiten Untergeschoss, in dem die Hochgeschwindigkeitszüge halten, jeweils vier Gleise. Jacques Voncke gelang es mit der Gestaltung der Tiefgeschosse aus einer Mischung von Stahl, Lichtsäulen und Brüstungen einen angenehmen technisch sachlichen Gegensatz zum Grandeur des Bahnhofsgebäudes zu schaffen. Der Bahnhof bietet dem Reisenden aber nicht nur seine architektonische Schönheit um Wartezeiten zu überbrücken, sondern auch Einkaufsmöglichkeiten. Der ebenfalls mit einem Glasdach überspannte Eingang am Hauptgebäude und die ausgehöhlte Straßenebene wurden als Servicebereich gestaltet, in der nahen Reisebedarf passend zu Antwerpen auch Diamanten in üppigen Auslagen angeboten werden. Antwerpen-Central ist eine 775 Mio. EUR teure ingenieurtechnische Meisterleistung. Das historische Erscheinungsbild hat nicht gelitten, sondern es wurde zukunftsfähig gemacht.

Als „Erlebniswelt mit Gleisanschluss“ übertrifft der Düsseldorfer Hauptbahnhof auch als nüchterner kubischer Backsteinbau aus den dreißiger Jahren alle Erwartungen an einen Großstadtbahnhof.

Seit 1891 stand hier die Bahnhofshalle des Zentralbahnhofs in wilhelminischen Stil, welche die Bahnhöfe der „Bergisch Märkischen Eisenbahngesellschaft“, der „Köln-Mindener Eisenbahn“ und den Rheinischen Bahnhof ersetzte, denn 1838 dampfte bereits zwischen Düsseldorf und Erkrath die erste westdeutsche Eisenbahn.

1932 bis 1936 erfolgte nach dem Abriss des dreiteiligen Empfangsgebäudes, welches schon bald nicht mehr genügend Platz von dem Neubau. Dieser wurde nach den Entwürfen der Architekten Krüger im Stil der Neuen Sachlichkeit gebaut. Unverändert bis heute charakterisiert die strukturierte Backsteinlochfassade und der 40 m hohe Uhrenturm, der ein Wasserreservoir enthielt, das ursprünglich der Dampflokversorgung diente, das äußere Erscheinungsbild des Hauptbahnhofs der Landeshauptstadt von Nordrhein-1A Testfalen.

Zur Zeiten der Deutschen Bundesbahn wurde in den 1980er Jahren bei einem mehrjährigen Umbau auch die unter Denkmalschutz stehende Fassade restauriert. Die von der Empfangshalle weiterführende Passage, die am Bertha-von-Suttner-Platz endet, wurde einschließlich des dortigen Empfangsbereichs neu gestaltet.

Ein künstlerisches Highlight sind die verkanteten Spiegelflächen, die die Decke der großzügigen Eingangshalle ziehen. Sie sollen die Bausubstanz ins rechte Licht versetzen.

Die Integration von U-Bahnhof und RegioBahnhof erforderte bauliche und logistische Höchstleistungen. Der Düsseldorfer Hbf. steht mit 20 Spannbetonbrücken von ca. 100 in Länge auf 207 Bohrpfählen von bis zu 2 m Durchmesser. Die Bahnsteigüberdachung aus vier aneinander gereihten Stellen wirken trotz ihrer Größe von 21600 m² durch die verbindenden Glasbänder nicht erstickend. Seit dem Umbau entwickelte sich der Kreuzungsbahnhof zu einem bedeutsamen Verkehrsknoten. Auf 16 Fernbahn- und vier S-Bahn-Gleisen verkehren täglich 169 Fernverkehrs-, 423 Nahverkehrs- und 550 S-Bahn-Züge.

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MODERNSTE LASER-MESSTECHNIK IM WAGGONBAU

Güterwaggons erscheinen auf den ersten Blick als sehr einfache, unkomplizierte Schienenfahrzeuge bestehend aus Rädern, Untergestell und einem wechselnden Aufbau. Dieser

Eindruck ändert sich jedoch schnell, wenn man sich moderne Produktionsstätten von Güterwagen ansieht. Sofort ist hier zu sehen, wie viel ausgefeilte Technik in den Wagen steckt. Vor allem aber erfolgt die Entwicklung eines jeden einzelnen Waggontyps immer individuell mit Blick auf den jeweiligen Einsatzzweck. Die innovativen Lösungen sind in den Waggons oftmals im Detail zu finden. Deshalb kommt im Rahmen des Produktionsprozesses der Qualitätssicherung eine besonders wichtige Rolle zu. Die DB Waggonbau Nasky GmbH verwendet hierzu modernste Messsysteme wie den Laser Trecker 3 von Automaten Precision. Der Trecker ist im Zuge eines neuen Produktes, einem vierachsigen Einseitenkastenkipper für das Energieunternehmen Vattenfall angeschafft worden. Im Vergleich zu anderen Waggons gibt es hier höhere Anforderungen an die Genauigkeit. Bei den geschweißten; bis 20 m langen Baugruppen sind Genauigkeiten von einem Millimeter eine sehr kleine Größenordnung.

Der API User Trecker erlaubt die Vermessung größerer Objekte auch aus geringer Entfernung. Der Trecker-Kopf lässt sich horizontal ± 320 und vertikal $+80$ bis -60° schwenken, so dass das Messsystem nahe an der zu vermessenden Stelle positioniert werden kann. Über die beiden Winkel und die gemessene Distanz berechnet das 3D-Messsystem die Koordinaten. Auch mehrere Positionswechsel sind durch das geringe Gewicht von nur 8,5 kg und die Messkopfgröße von 36 cm kein Problem. Der Kopf des Laser Treckers ist so konzipiert, dass der Laserstrahl weder durch einen Spiegel noch durch einen Lichtleiter durchgehen wird. Systemische Messungenauigkeiten durch Umlenkfehler werden dadurch eliminiert. Zu den weiteren Highlights des API Treckers zählt neben den kompakten Abmessungen - es gibt weltweit keinen Laser Trecker, der kleiner ist - auch die überlegene Reichweite von 120 m ohne Standortwechsel. Die Laser Trecker-Technologie basiert auf dem von API erfundenen selbstverfolgenden Laser-interferometer. Bisher setzten die Waggonbauer im Werk Nasky den Mitte 2009 angeschafften Laser Trecker nahem ausschließlich im Rahmen des Vattenfall-Projektes ein. In diesem Waggon wird die bei der Verbrennung von Kohle anfallende und mit Wasser abgekühlte (Nass-)Asche in großen Mengen weggeschafft. Der Wagen hat aufgrund der speziellen Anforderungen der Braunkohleindustrie Audi eine spezielle Innenbeschichtung, damit eine vollständige Entladung gewährleistet ist. Der Waggon stellt zudem hohe funktionale Ansprüche. So wird zum Beispiel die komplette Mulde über einen Pneumatik-Zylinder gekippt. In diesem Zuge müssen die Drehgelenke und Punctionselemente exakt zueinander passen. Das Untergestell bildet mit der Mulde eine funktionale Einheit. Die Mulde hat eine bewegliche Klappe. Diese muss nicht nur bei der Montage problemlos und leicht zusammen zu bauen sein, sondern auch im Praxiseinsatz zuverlässig funktionieren.

Ein Beispiel für eine der cleveren Lösungen, welche die Waggonbauer in enger Abstimmung mit dem Hersteller des Messinstruments gefunden haben, stellt die Vermessung im Einbauraum für die Zugeinrichtung dar. Die Wagen haben keine Puffer wie normale Waggons, sondern werden starr gekuppelt. Der Einbauraum ist so gestaltet, dass man nicht anders als mit dem Trecker messen kann, auch von außen sind Messungen nicht möglich. Deshalb ist ihre Fertigungshalle sehr staubig, deshalb verschmutzt der Reflektor schnell.

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DIE GESCHICHTE DER GLEISMESSFAHRZEUGE

Technischer Fortschritt, höhere Achslasten und höhere Geschwindigkeiten forderten bessere Messtechniken. Zur Beurteilung der Gleislage wurden seit Beginn des Gleisbaus die

vielfältigsten Messmittel und -verfahren entwickelt. Viele hatten aber einen für eine reelle Einschätzung entscheidenden Nachteil: Das Gleis konnte nur im unbelasteten Ruhezustand beurteilt werden.

Höhere Geschwindigkeit und steigende Belastungen verlangten nach einem Beurteilungsverfahren unter der rollenden Last. Im 1875 beschäftigen sich verschiedene Länderbahnverwaltungen mit der Anschaffung von Messfahrzeugen, die in der Lage waren, eine echte Betriebssituation zu simulieren und dabei das Verhalten des Gleises aufzuzeichnen.

Im Jahre 1907 beauftragte die Preußische Staatsbahn die belgische Firma van der Zypen & Charlier, einen ehemaligen sechsachsigen Salonwagen (ex Erfurt Nr. 6, aus dem Hofzug des Herzogs von Sachsen Coburg und Gotha, gebaut 1898 von Waggonfabrik Bothmann, Gotha) zu einem Gleismesswagen umzubauen. Für den Einsatz im Gleisnetz der KPEV wurden folgende Parameter gefordert:

Aufzeichnungen sollten erfolgen für:

- die gegenseitige Höhenlage,
- die Stoßeinsenkung separat für jede Schiene,
- die Spurweite sowie,
- die Bogenverläufe und der Streckenkilometer.

Weiterhin hatte die Messung gelassenen Streckengeschwindigkeit zu erfolgen. Dieses Fahrzeug hatte ein Gesamtgewicht von 54 t, welches gleichmäßig mit 9 t auf alle sechs Achsen verteilt wurde.

Da beide Messfahrzeuge sowohl im Zustand als auch in der Ausrüstung verschleßen und technisch überholt waren, entschied sich die DR 1971 bei der Waggonfabrik Simmering-Graz-Pauker einen sechsachsigen Neubaumesswagen in Auftrag zu geben. Das technische Niveau entsprach dem von diesem Unternehmen für die ÖBB entwickelten Fahrzeug, es war eines der leistungsfähigsten Messfahrzeuge im Weltmaßstab und ermöglichte Messgeschwindigkeiten bis 160 km/h. Einige Grundprinzipien wurden bei diesem Fahrzeug beibehalten: die Stabilisierung mittels Kreiselssystem, die mechanische Abtastung von Spurweite und Bogenverlauf sowie die Feststellung der gegenseitigen Höhenlage bzw. der Stoßeinsenkung. Die Messwerte wurden aber nur noch teilweise mechanisch an das Aufzeichnungsgerät übertragen. Durch ein elektronisches Induktionssystem konnten bereits Daten elektronisch aufbereitet und in der von der DR angestrebten Streckenanalysedatei übernommen werden.

Um 1993 wurden bei diesem Fahrzeug als weitere Neuerungen die satellitengestützte Positionsbestimmung, ein laseroptisches Abtastverfahren sowie eine Verbesserung an der elektronischen Auswertungsanlage eingeführt. Grundkonstruktionen, wie die Anwendung des Tragheitsprinzips der Kreiselplattform und die teilweise mechanische Übertragung von Messwerten an das Aufzeichnungsgerät, wurden beibehalten. Die anfangs vorhandenen mechanischen Tuschezeichengeräte wurden durch einen Laserdrucker ersetzt. Dieser ehemals bei der VES-A Magdeburg beheimatete Oberbaumesswagen wurde im Zuge der Bahnreform 1994 an das FTZ in Minden umgesetzt und befand sich bis 2004 im Einsatz.

Jedem Oberbaumesswagen war ein Beiwagen zugeordnet. Er diente zur Aufbewahrung der zur Wartung erforderlichen technischen Geräte, Ersatzteile und Eichmittel. Weiterhin diente er als Wohnwagen für die aus drei Personen bestehende Stammbesatzung. Der zurzeit noch im Einsatz befindliche Beiwagen wurde 1982 vom Reichsbahnausbesserungswerk Gotha (ehem. Mitropa-Werkstätten) durch Umbau aus dem Standardreisezugwagen 51 50 20-40 243 für diesen Zweck hergerichtet. Sowohl Messwagen als auch Beiwagen wurden im RAW Gotha wagentechnisch instand gehalten und erhielten Mitte der 1980er Jahre eine Heizung mit Leichtölföherung.

Messrannten wurden entsprechend der Streckenklassifizierung turnusgemäß durchgeführt. Der Messwagen hatte einen festen Umlaufplan, so dass die Dienststellen den Einsatz entsprechend vorbereiten konnten. Außerplanmäßige Messfahrten sind vereinzelt bei

hochrangigen Fahrten des Regierungssonderzuges erfolgt. An der Messfahrt hatten der Abteilungsleiter Oberbau und Strecken, der zuständige Oberbaukontrolleur sowie der Dienststellenleiter und der Streckenmeister der Bahnmeisterei teilzunehmen. Die die zulässigen Grenzwerte überschreitenden Oberbaumängel wurden vom Leiter des Messwagens auf dem Papierstreifen Tot gekennzeichnet. Diesen Messstreifen erhielt der zuständige Bahnmeister an der Grenze seines Zuständigkeitsbereiches ausgehändigt und halte sofort die Mängelbeseitigung einzuleiten.

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ELEKTRISCHE STRECKVERBINDUNGEN FÜR MEHR EFFIZIENZ UND BETRIEBSQUALITÄT

Wenn bei Schienenfahrzeugen, besonders im Personenverkehr, gehäuft technische Probleme und dadurch betriebliche Unregelmäßigkeiten auftreten, wird in den Medien sehr ausführlich und sehr spektakulär über die Funktionssicherheit und die Betriebsqualität des gesamten Schienenverkehrs diskutiert. Viele dieser imagedrängenden Schadensfälle haben ihre Ursache in Störungen der elektrischen Anlagen der Fahrzeuge. In diesem Bereich lohnen sich also die Entwicklung und der Einsatz von Bauelementen, die besonders betriebssicher und wartungsfreundlich sind, um einerseits Ausfälle von vornherein zu vermeiden und andererseits im Fall von Schäden die notwendigen Reparaturen schnell und kostengünstig durchführen zu können. Zu den sensiblen Bauteilen, von denen die Betriebstüchtigkeit stark abhängt, gehören auch die elektrischen Verbindungselemente innerhalb der Fahrzeuge.

Der neue Steckverbinder Han 24 HPR EasyCon besteht im Wesentlichen aus zwei geteilten Gehäusen. Durch die Teilung der Gehäuse in einen Deckel und eine Tülle ergibt sich ein „offenes System“, was die Konfektionierung deutlich vereinfacht. Die Vorbereitung und der Einbau können komplett frei zugänglich erfolgen, denn erst zum Schluss wird die Tülle über den fertig konfektionierten Steckverbinder geschoben.

Eine neu entwickelte Kabelverschraubung macht es möglich das Schirmgeflecht von geschirmten Kabeln sicher und vor allem sichtbar aufzulegen. Dazu wird das abgesetzte Kabel in die Kabelverschraubung eingeführt, das Schirmgeflecht wird über den Verschraubungskörper der Kabelverschraubung umgeschlagen und anschließend mit einer selbstklemmenden Schelle fixiert. Zur eigentlichen Leistungsübertragung können in diesen neuen Gehäusen sowohl die bewährten Hochstromkontakte als auch das neu entwickelte Kontaktsystem eingesetzt werden.

Das neue Kontaktsystem Han HC 250 vereint bewährte Hochstromeigenschaften mit den Vorteilen eines modularen Systems. Es umfasst einen Stift- und Buchsenisoliertkörper, Stift- und Buchsenkontakte für verschiedene Leiterquerschnitte sowie Halterahmen, um die Isoliertkörper mit den Stift- und Buchsenkontakten aufnehmen zu können. Stift- und Buchsenkontakte werden über eine Halteplatte, die Bestandteil der Isoliertkörper ist, im jeweiligen Isoliertkörper gehalten. Zusätzlich übernimmt die Halteplatte auch die Fixierung der Isoliertkörper in dem jeweiligen Halterahmen. Über die Halterahmen werden die Kontakte mit Isoliertkörpern in den Gehäusen befestigt. Dieses Kontaktsystem ist für den Einsatz in den HPR- Gehäusen vorgesehen und wird ebenfalls in die Gehäuse des beschriebenen neuen Steckverbinders einsetzbar sein. Der Kontakt eignet sich zur Übertragung von bis zu 250 A Bemessungsstrom und 2000 V Bemessungsspannung.

Die modularen Kontakte für 350 A finden beispielsweise jetzt schon Einsatz in

Schienenfahrzeugen bei der Steckbarmachung von Hochleistungsantrieben, bei Wirbelstrombremsen, bei Potenzialausgleichsleitungen oder Ladeanschlüssen für Batterien.

Die modularen Kontakte für 650 A werden hingegen bei Bahnanwendungen im Bereich der Energieübertragung von Wagen zu Wagen oder bei der Versorgung der Haupttransformatoren eingesetzt. Durch die Ausführung als Einzelkontakt ist der modulare Aufbau des Kontaktsystems möglich, der ein Höchstmaß an Flexibilität bietet, um die Bandbreite der verschiedenen Applikationen abzudecken.

CONTENTS

<i>Natalia Gustova</i>	
EFFECTOS DEL CAMBIO CLIMÁTICO SOBRE EL TURISMO EN ESPAÑA	2
<i>Rosemberg Shakti</i>	
GOOGLE X AND THE SCIENCE OF RADICAL CREATIVITY	3
<i>Shao Jie</i>	
SCIENTISTS BLASTED MIRRORS WITH LASERS TO LISTEN TO LIGHT	3
<i>Chia Maximil</i>	
INFORMATION COMMUNICATIONS TECHNOLOGY (ICT) EFFECT ON THE DEVELOPMENT OF CAMEROON'S ECONOMY	4
<i>Wu Liangyu</i>	
STRUCTURE AND CAPACITANCE OF ELECTRICAL DOUBLE LAYERS AT THE GRAPHENE-IONIC LIQUID INTERFACE	5
<i>A.A. Kyselova</i>	
SECHS WICHTIGE MEDIZIN-INNOVATIONEN: JETZT UND IN DEN NÄCHSTEN MONATEN UND JAHREN	6
<i>Roland Kesper</i>	
IM MASCHINENBAU GEHT NICHTS OHNE IT-WISSEN	7
<i>J. Weglarz</i>	
DER ROBITER IM MENSCHLICHEN KÖRPER	8
<i>David Andres Penzuela</i>	
PORTABLE 3D SCANNER	10
<i>Arvind Sommi</i>	
TINY, SOLAR-POWERED SENSORS	11
<i>Chieva Pedro</i>	
TRAFFIC CONTROL SYSTEM IN ANGOLA	13
SECTION 1. TRANSPORT TECHNOLOGIES AND EQUIPMENT	
<i>Rostislav Antohov</i>	
TRANSPORTATION SOLUTIONS OF THE VENUS PROJECT	14
<i>K.S. Babenko</i>	
MULTIMODAL TRANSPORTATION PLANNING	15
<i>I.A. Bevz</i>	
PROBLEMS AND DEVELOPMENT OF PUBLIC TRANSPORT	16
<i>A. Bolshak</i>	
ALFA-X EXPERIMENTAL TRAIN: INCREASING SPEED UP TO 400 KM/H	17
<i>K.T. Borodulin</i>	
INNOTRANS EXHIBITION LEADERS	18
<i>A.A. Dyadchenko</i>	
THE IMPORTANCE OF TRANSPORTATION TO TOURISM DEVELOPMENT	19
<i>Diana Dyka</i>	
WOMEN-ONLY TRAIN CARRIAGES: IS IT A GOOD OR BAD IDEA?	20
<i>Roman Hudzenko</i>	
TRAVEL TIME EFFICIENCY	21
<i>O.P. Karasov</i>	
COMPARISON OF ENERGY EFFICIENCY DETERMINATION METHODS FOR THE INDUCTION MOTORS	22
<i>W. I. Karnauhova</i>	
DEVELOPMENT OF AUTOMOBILE TRANSPORT IN OUR DAYS	23
<i>Olha Klymenko</i>	
THE PREVENTION OF CRIME ON PUBLIC TRANSPORT	24
	136

<i>R.M. Kompaniets</i> MODERN FLYING DEVICE - AS THE WAY OF COMMERCIAL INSPECTION OF TRAINS	25
<i>O.D. Kononenko, M. A. Hrebeniuk</i> TO THE PROBLEMS OF RAIL FREIGHT TRANSPORTATION IN EUROPE	26
<i>O.V.Kukharchuk</i> SELF-DRIVING VEHICLES IN MODERN LOGISTICS	27
<i>C.A. Litvinenko</i> ROADS OF THE FUTURE	27
<i>K.S. Maliar</i> MODERN SYSTEMS OF PASSENGER TRANSPORTATION	28
<i>N. Nazarova</i> THE FUTURE POTENTIAL BENEFITS OF ELECTRIC CARS AND SELF- DRIVING SYSTEMS	29
<i>K.V. Priymachenko</i> THE PROBLEM OF UKRAINIAN RAILWAY. IDLE CARS	30
<i>J.S. Rusanova</i> AUTOMOBILE DEPENDENCY	31
<i>O.M. Sakal</i> NEGATIVE IMPACTS OF CARS ON THE PEOPLE AND ENVIRONMENT	32
<i>A.Y. Salo</i> TECH AND THE FUTURE OF TRANSPORTATION	33
<i>S.V. Shariy</i> LE TRANSPORT DES MARCHANDISES DANGEREUSES EN UKRAINE	34
<i>A.A. Shevchenko</i> CRITERIA FOR CHOOSING A MODE OF TRANSPORT	35
<i>E.O. Sokol</i> MODERN WAYS TO MONITOR ROAD SAFETY	36
<i>P.V. Umnov</i> THE WORK OF LOCOMOTIVES WITH TRAINS	37
<i>O. Vasilenko</i> CHINA INTENDS TO BUILD A RAILWAY TUNNEL UNDER MOUNT EVEREST	38
<i>A.S. Zaporozhets,</i> FEATURES OF THE DEVELOPMENT OF THE WORLD'S TRANSPORT SYSTEMS	39
SECTION 2. ADVANCEMENTS, PERSPECTIVES, AND PROBLEMS OF ENGINEERING	
<i>D. Alekseychuk</i> BRAKE SYSTEM INSTALLATION	40
<i>B.O. Baka, M.M. Rozkovsky</i> MULTICOPTERS AND QUADCOPTERS: THEIR PROSPECTS AND APPLICABILITY	41
<i>E.R. Chernyshova</i> CYBORGS: THE TRUTH ABOUT HUMAN AUGMENTATION	42
<i>V.V. Filonov</i> ON EXPERIMENTAL AND COMPUTATIONAL INVESTIGATION OF HEAT TRANSFER DETERIORATION AND HYDRAULIC RESISTANCE IN ANNULAR CHANNEL AND SCWR 3-ROD BUNDLE	43
<i>Y.S. Filonova</i> REACTOR CORE BAFFLE TEMPERATURE DISTRIBUTION EVALUATION FOR	44
	137

SWELLING ASSESSMENT

V. Gorniaga

CAN GIANT MAGELLAN TELESCOPE HELP PEOPLE TO FIND LIVING BEINGS
IN THE UNIVERSE? 45

E. P. Kibirieva, A. A. Mishenkov

ADVANTAGES AND DISADVANTAGES OF MODERN TECHNOLOGIES 46

Y.S. Kokotina

ELECTRIC VEHICLES ARE THE FUTURE OF MOTORING 47

A.A. Kyselova

STENT RETRIEVER TECHNOLOGY 48

A.A. Kyselova

IS THERE A SLIPPERY SLOPE FROM PROTHETICS TO CYBORGS? 49

E.A. Megelbey

SPOTMINI THE ROBOT 49

Maxim More

THE EFFECTS OF THE GENE TECHNOLOGY 50

A.N. Moukhina

MODERN CONDITION OF DEVELOPMENT OF PSYCHOLOGICAL SERVICE IN
HIGHER EDUCATIONAL INSTITUTIONS OF UKRAINE 51

A.R. Palaguta

LASER EQUIPMENT IN DIAGNOSTICS AND TREATMENT OF SKIN DISEASES 52

K. Serdiuk

INVESTIGATION OF ELECTROMAGNETIC COMPATIBILITY OF TRACK
CIRCUITS WITH THE TRACTION SUPPLY SYSTEM 53

N.V. Tomilin

MODERN MEDICAL TECHNOLOGY 54

A.P. Yaryza

DRONES COULD CHANGE THE RAILWAY INDUSTRY 56

A.V. Zubko

BENEFITS OF USING MODERN SWITCH DRIVES 57

SECTION 3. MODERN ECONOMIC PROBLEMS AND WAYS OF THEIR SOLVING

A.V. Bednyak

INCREASING THE EXPORT POTENTIAL OF UKRAINE 58

D.V. Bednyak

INTERNATIONAL MARKET FOR UKRAINIAN COMPANIES 59

A.T. Butenko

THE PROBLEM OF FOOD CRISIS AND THE WAYS TO ITS SOLUTION 60

A.R. Goncharenko

THE FOOD PROBLEM AND WAYS OF ITS SOLUTION 61

D.O. Govorukha

TRANSPORT ECONOMICS 62

N.V. Karpenko

GLOBALIZATION: PROSPERITY OR IMPOVERISHMENT 62

A.D. Klimenko

WAYS OF INCREASING THE COMPETITIVENESS OF UKRAINIAN PRODUCTS
ON THE INTERNATIONAL MARKET 64

Viktoriia Kononenko

THE ENGLISH PROFICIENCY AS A KEY FACTOR OF BETTER ECONOMIES 65

<i>K.L. Laguta</i>	66
HOW THE UNDEGROUND ECONOMY AFFECTS GDP	
<i>Alexander Lapshin and Nikolai Komendantov</i>	
DIGITAL CURRENCIES OPPORTUNITIES AND THE CONS	67
<i>A.V. Litovchenko</i>	
INSURANCE AND PROSPECTS OF ITS DEVELOPMENT IN UKRAINE	68
<i>K. A. Shchur</i>	
FEATURES OF THE ACCOUNTING OF CAPITAL INVESTMENTS	69
<i>L.V. Shevchenko</i>	
PROBLEMS OF ACCOUNTING OF CASHLESS SETTLEMENTS IN UKRAINE	70
<i>T. I. Vityuk</i>	
WAYS TO OVERCOME PROBLEMS OF MANUFACTURING INVENTORY ACCOUNTING IN UKRAINE	71
<i>P.S. Volkovynska</i>	
NATIVE ADVERTISING AND MAJOR TRENDS	72
<i>P.V. Yehorova</i>	
REGULATION OF ENTERPRISES' FOREIGN ECONOMIC ACTIVITY	73
SECTION 4. INFORMATION TECHNOLOGIES	
<i>K.O. Ananieva</i>	
QUANTUM COMPUTER AS A NEW CLASS OF COMPUTERS IN FUTURE	74
<i>O.I. Bandurka</i>	
MODELING OF HYDROGENESIS YIELD DURING PLANT MATERIAL FERMENTATION	75
<i>L.O. Kursenko, O.I.Bandurka</i>	
THE SYSTEM OF CHOICE OF OPTIMAL SCHEMES OF POPULATION VACCINATION USING EPIDEMIOLOGICAL DATA	76
<i>V. A. Bazhin</i>	
DATA SECURITY	77
<i>M.O. Bedenko</i>	
ARTIFICIAL INTELLIGENCE IN OUR DAILY LIFE	78
<i>Yehor Bilokrynytskyi, Oleksij Nikolskij</i>	
MODERN TECHNOLOGIES IMPROVING THE PRESENT AND IMPACTING THE FUTURE	79
<i>Sofiia Deberyna</i>	
WILL COMPUTERS PUT US OUT OF WORK?	81
<i>O.D. Denysenko</i>	
THE MAIN ADVANTAGES OF CLOUD STORAGE ON THE VIRTUALIZATION TECHNIQUES	82
<i>R. O. Kotenko</i>	
ARTIFICIAL INTELLIGENCE	83
<i>A. Kozynets</i>	
EDUCATION AND IT TECHNOLOGIES	84
<i>D.V. Krikunov</i>	
THE ROLE OF INFORMATION TECHNOLOGY IN OUR LIVES	85
<i>V.A. Kulik</i>	
SONOLUMINESCENCE: SOUND INTO LIGHT	86
<i>A.A. Kyselova</i>	
GOOGLE BRAIN	87
<i>I.V. Leontiieva</i>	
THE APPLICATION OF ARTIFICIAL INTELLEGENCE TECHNOLOGIES IN	88
	139

TRANSPORTATION	
<i>M.Ya. Mukhin</i>	
NETWORK SECURITY	89
<i>Kirill Nenahov</i>	
TECHNOLOGY INNOVATION – MODERN TRENDS AND OPPORTUNITIES	90
<i>Y.D. Ostapets</i>	
CURRENT ISSUES OF INFORMATION SECURITY	91
<i>M.A. Steshenko</i>	
IMPACT OF THE INSTANT MESSAGING TECHNOLOGY ON HUMAN INTERACTIONS	92
<i>P. Sulima</i>	
ENCRYPTING RANSOMWARE PETYA TARGETED UKRAINE	93
<i>Bohdan Yakovenko</i>	
CYBERCRIME: THREATS AND METHODS OF FIGHTING	94
SECTION 5. ENERGY EFFECIENCY	
<i>I.S. Bednarska</i>	
ANALYSIS OF METHODS ON THE EXTINCTION OF THE PERIOD OF OPERATION OF ENERGY EQUIPMENT	96
<i>O.M. Bespala</i>	
SEARCH FOR OPTIMAL USE OF POWER SOURCES	97
<i>Y.S. Kuzmyna</i>	
BUILDING ENERGY MODELLING AND CFD STUDY USING RADIANT HEATING SYSTEM	98
<i>H.S. Martynenko</i>	
NANOFUIDS AS A PERSPECTIVE WORKING FLUID FOR TWO-PHASE COOLING SYSTEMS	99
<i>B.A. Marysiuk</i>	
PROSPECTS FOR GASIFICATION WASTE IN UKRAINE	100
<i>V.P. Mazur</i>	
INCREASING THE EFFICIENCY OF SOLAR PANELS	101
<i>A.S. Tolok</i>	
TECHNOLOGICAL ADVANCEMENTS SURPASSING OUR EXPECTATIONS	102
<i>E. A. R. Usmonov</i>	103
ROBOTIC GEARBOX	
<i>I.I. Yudin</i>	
PLATE HEAT EXCHANGERS	105
SECTION 6. ECOLOGICAL SAFETY	
<i>Anastasiia Artemenko, Hannah Tuluk</i>	
EVERYONE CAN SAVE ECOLOGY USING SOLAR PANELS	106
<i>O.O. Huba</i>	
ECOLOGICAL PROBLEMS OF KAMYANSKE	107
SECTION 7. MODERN TECHNOLOGIES IN BUILDING	
<i>D.M. Ivanushkina</i>	
MODERN TECHNOLOGIES IN CONSTRUCTION	108
<i>M. Linnyk</i>	
HOW TO CHANGE CONSTRUCTION USING FUTURISTIC TECHNOLOGIES	109
<i>N. Nushtaev</i>	
WILL UNDERGROUND SYSTEM IN DNIPRO BE LENGTHENED IN A FEW YEARS?	110
	140

<i>D. Votchenko, R. Konstantinov</i> MAGDEBURG WATER BRIDGE IS THE LONGEST NAVIGABLE AQUEDUCT IN THE WORLD	111
<i>I.O. Demianenko</i> LA SPÉCIFICITÉ DE LA PRODUCTION ET DE L'UTILISATION DU MATÉRIEL AGRICOLE EN FRANCE ET EN UKRAINE	112
SECTION 8. HUMANITIES AS INTEGRAL PART OF PROFESSIONAL TRAINING	
<i>M. D. Bereziuk</i> ENGLISH PHRASEOLOGICAL UNITS AND THEIR TRANSLATION IN THE TEXTS OF ORATORY STYLE	113
<i>M.V. Ihnashkina, D.Ye. Herasymov</i> CONTRIBUTION OF HUMANITIES TO TECHNICAL SPECIALITIES	114
GERMAN LANGUAGE SECTION	
<i>K.O. Baranyk</i> HIGH – TECH - WARTUNG FÜR HOCHGESCHWINDIGKEITSSZÜGE	115
<i>O.V. Fedenko</i> ZUKUNFT VON MEHRSYSTEMSTADTBAHNEN	117
<i>V.O. Jarema</i> INTERNATIONALE VERKEHRSKNOTENPUNKTE IN BALTIK	118
<i>A.S. Kondraschow</i> ALTE UND MODERNE BAHNHÖFE FÜR DIE WEITLÄUFIGE SCHIENENNETZ	119
<i>R.B. Kosakiws'kyi</i> KOMBINIERT BRÜCKE IN CHINA	121
<i>L. Lesjuk</i> DIE WICHTIGSTEN TRENDS UND TECHNOLOGIEN IM BAU UND BAUINDUSTRIE 2020	122
<i>A.S. Masur</i> EWIGE INGENIEURBAUKUNST AUS STAHL UND BETON – DER BRÜCKENBAU	123
<i>J.S.Masur</i> LÄRMREDUKTION VARIIEREN	124
<i>M.O. Mirkel</i> NATURSCHUTZ IN DEUTSCHLAND	126
<i>O.W.Popow</i> DER NEUE HOCHGESCHWINDIGKEITSSZUG BOMBARDIER – ZEFIRO 380	127
<i>D. O. Skubtschenko</i> DER HUCKEPACKVERKEHR WIE EINE WEISE DER ERHÖHUNG DER UMFÄNGE DES GUTERVERKEHRS FÜR DIE UKRAINE	128
<i>D.O. Stepura</i> TYP C2: DIE NEUE U-BAHN	129
<i>I.M. Stortscheus</i> BAHNHÖFE DER WELT	130
<i>W. Sukatsch</i> MODERNSTE LASER-MESSTECHNIK IM WAGGONBAU	131
<i>W. O. Tkatschenko</i> DIE GESCHICHTE DER GLEISMESSFAHRZEUGE	132
<i>T.J. Truschyna</i> ELEKTRISCHE STRECKVERBINDUNGEN FÜR MEHR EFFIZIENZ UND BETRIEBSQUALITÄT	134
	141

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