IMPLEMENTATION OF STATISTICAL PROCESS CONTROL (SPC) TOOLS IN MANUFACTURING

Miroslav Žitňák[1], PhD., prof. Ing.,
Maroš Korenko[1], PhD., prof. Ing.,
Taras Shchur[2], PhD., Asoc. Prof
Lukáš Hanko[1]
[1]*Slovak university of agriculture in Nitra, Slovakia.*
[2]*Cyclone Manufacturing Inc, Mississauga, Ontario, Canada.*

The automotive industry is one of the most complex and dynamic sectors in the world, constantly evolving to meet the changing needs of consumers and the global market. Statistics have played a crucial role in this industry for decades. In all sectors, statistics have helped automotive manufacturers increase efficiency, reduce costs, and gain a better understanding of their customers.

Our focus was on the manufacturing process of instrument panels for automobiles, where we monitored vibration welding and surface weakening using a laser. In order to ensure the accuracy of these procedures, we introduced measurements of parameters into control charts. Based on these measurements, we subsequently conducted a process capability analysis, expressed through the calculation of the process capability index Cpk.
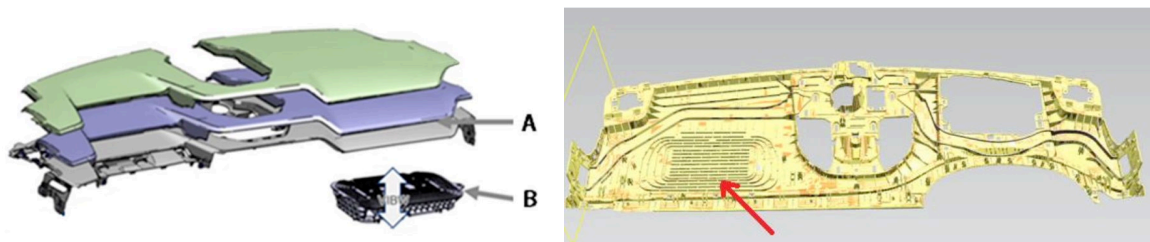

Fig. 1. Components entering the process and the laser weakening location for the airbag.

Statistical Process Control (SPC) represents a proven method utilized for monitoring and optimizing the performance of manufacturing procedures in the automotive sector. However, the implementation of SPC in this industrial field can encounter certain challenges. [1]

Addressing some of the challenges associated with the implementation of SPC is crucial, such as data collection and analysis, organizational culture, employee training, and their specific impacts on the automotive industry.

The large volume of data generated within automotive production can pose challenges when it comes to data analysis and interpretation. [2]

Kim J. emphasizes the importance of systematic data collection and

analysis to improve the effectiveness of SPC in their study. Along with co-author Lim C., they recommend that the industry recognizes the significance of the customer's voice and invests in tools and technologies that enable efficient gathering and analysis of extensive data sets [3].

Mal Owen underscores the importance of an organizational culture of continuous improvement in the implementation of SPC in the automotive industry. He suggests that organizations should foster a culture of open communication where employees are encouraged to identify and report issues within the production process. Furthermore, organizations should ensure the integration of SPC tools and techniques into the daily operations of the organization and make sure that employees are adequately trained to use them effectively [4].

Our study aligns with this statement, demonstrating that daily utilization of SPC on production lines allows employees to preempt issues and discrepancies, enabling organizations to achieve significant cost savings. One of the challenges is employee training, which can significantly impact the efficiency of SPC in the automotive industry, especially for those involved in data collection and analysis. Our study also reaffirms the importance of providing adequate training to employees engaged in the process of data collection and analysis, as it is crucial for them to understand the significance of measurements and their role in cost savings [5].

References

1. OWEN, Mal. 2013. SPC and Continous Improvement. Springer Berlin, Heidelberg, 2013. 368 s. ISBN 978-3-662-22421-2.

2. KENT, Robin. 2017. Quality Management in Plastic Processing.Wiliam Andrew, 2016. 370 s. ISBN 978-0-08-102082-1.

3. KIM, J., & LIM, C. 2021. Customer complaints monitoring with customer review data analytics: An integrated method of sentiment and statistical process control analyses. In Advanced Engineering Informatics, vol 49, [cit. 2023-03-18]. ISSN 1474-0346.

4. OWEN, Mal. 2013. SPC and Continous Improvement. Springer Berlin, Heidelberg, 2013. 368 s. ISBN 978-3-662-22421-2.

5. ANTHONY, J. 2000, Ten key ingredients for making SPC successful in organisations, In Measuring Business Excellence, Vol. 4 No. 4, pp. 7-10. ISSN: 1368-3047.