

ANALYSIS OF THE METHODS OF DETERMINING WEAR OF PARTS

Demchenko M., recipient of higher education "Master's" degree

Dmytro Motorny Tavria State Agrotechnological University, Zaporizhzhia, Ukraine

Special methods are used to study the wear resistance of machine parts. The main requirements for wear determination methods are the minimum time for the wear determination test; undesirability of frequent disassembly and reassembly of nodes; the parts during the test should not wear much.

The methods can be divided into 2 groups:

1) Production, which include the micrometering method, the method of indirect assessment of changes in the operational characteristics of the joints of parts;

2) Laboratory: weighing of parts, determination of wear products in lubricants, method of radioactive isotopes, method of artificial bases, profiling.

The micrometric measurement method is based on determining the linear dimensions of parts that were in use by measuring with universal means (micrometers, calipers, indicators, etc.) before and after wear [1].

Advantages of the method: direct measurement, simplicity, availability, possibility of observing wear surfaces. Disadvantages: the length of the tests and high labor intensity, the dependence of the results on the deformation of the part, the inevitability of assembly and disassembly.

Evaluation of wear by changes in the operational characteristics of a connection or node is widely used in production. Thus, the wear of oil pump parts can be determined by the drop in lubricant pressure; wear of parts of the piston group of the engine - due to the passage of gases into the engine crankcase; wear of movable joints - due to changes in their temperature during operation.

The mass total wear of surfaces is determined by the weighing method based on the change in the mass of the part (sample) before and after the test. This method cannot be used if the main type of wear is plastic deformation of parts. Advantages: accuracy of measurement, simplicity and availability, the possibility of observing wear surfaces.

Disadvantages: the need to disassemble nodes, the complexity of measuring linear wear, the need for thorough cleaning.

Determination of wear products in lubricant consists in chemical analysis of used lubricant. At the same time, colorimetric, polarographic methods and methods of spectral analysis are used. To determine wear by the content of wear products in the lubricant, its samples are periodically taken from the cavities of the operated object, and the intensity of wear is determined by the number and composition of wear particles (iron and other elements).

Due to their high informativeness and low labor intensity, the most common methods are spectral analysis [2, 3].

Advantages: does not require disassembly and special training, has high sensitivity, the ability to trace the dynamics.

The disadvantage of the method is the impossibility of determining the wear of each individual part.

The method of radioactive isotopes is based on the determination of the amount of radioactive substance in the lubricant with special counters. The radiation intensity of the lubricant is recorded by special devices (counters) and is an indicator of the intensity of part wear.

Advantages: does not require disassembly, has high sensitivity and speed of research.

Disadvantages: expensive equipment, the need to take special protection measures, the complexity of the activation process.

The method of artificial bases consists in applying a new part of a special recess (hole) with a predetermined geometric profile to the working surface.

The amount of linear wear is determined by the change in the size of the recess after a certain period of operation.

Advantages: the ability to evaluate the wear of the part during a long test and to apply the method to determine the wear of parts made of soft alloys and connections with high contact stresses.

Disadvantages: the increased labor intensity is 1.5 times greater than with micrometering.

The profilography method is based on determining with the help of a profilograph very small wear in such parts as piston fingers and plungers.

Advantages: high accuracy of measurements, the possibility of determining roughness, waviness.

Disadvantages: increased labor intensity due to disassembly-assembly operations, difficulty in removing profilograms, impossibility of researching details prone to plastic deformations.

References.

1. В'юник О. В., Д'яков В. О. Методика дослідження зносу деталей шестеренного насосу // Технічне забезпечення інноваційних технологій в агропромисловому комплексі: матеріали III Міжнародної науково-практичної інтернет-конференції. Мелітополь: ТДАТУ, 2021. С. 541-545

2. Дашивець Г. І., Новік О. Ю. Контроль технічного стану двигунів методом спектрального аналізу моторного мастила // Науковий вісник ТДАТУ. 2015, вип. 5, том. 1, С. 140-145.

3. Н. Dashyvets. Assessment of wear and technical condition of engines // Технічне забезпечення інноваційних технологій в агропромисловому комплексі: матеріали V Міжнародної науково-практичної інтернет-конференції. Запоріжжя: ТДАТУ, 2023. С. 266-269.

Research supervisor: Viunyk O., engineer, sin. teacher