

UDC 004

**AUTOMATION OF THE MEASUREMENT PROCESS ON THE
EXAMPLE OF A GEAR WHEEL***Yarovi Ye. S., Skrypnyk N.S.**Kharkiv National Automobile and Road University, Kharkiv*

In today's world it is difficult to imagine human life without the use of machines for various purposes – these are both simple mechanisms and more complex. Thus, analyzing the causes of technological progress, it turns out that the ingenious invention, which in different parts of the world at different times made a breakthrough in the modernization of mechanical devices, is the gear – the main element that led our civilization to progress and prosperity.

Gears are used in a wide range of torques, speeds and gear ratios. For smooth operation and efficient transmission of rotation energy by gearing, it is necessary that the teeth have a special shape. Hence the variety of varieties of gears. Whether they are the smallest or the most bulky – these are the mechanisms without which no machine can do.

The gear is a demanding detail: as effective as it is, it also requires precision in manufacturing. Their durability and reliability largely depend on the correct calculation and design of gears. The required dimensions for the most efficient work are already known and recorded in the standards, but no less difficult arises when adhering to these dimensions.

The control of gears serves not only to assess the quality of finished products – without it it is impossible to make the correct adjustment and diagnosis of the condition of dental equipment or to find violations in the technological process of their manufacture.

To fully assess the geometric parameters of the gears, it is necessary to ensure control over all accuracy standards[1]. For this purpose the control complexes of indicators providing check of conformity of a gear wheel to all established norms are developed and regulated by the standard.

Each of the control systems sets the indicators required to control the gear on all assigned accuracy standards. To control each of the accuracy standards can be selected or a complex indicator, or a private complex that characterizes this accuracy standard [2].

The most significant achievement in the control of gears in recent years has been the creation of measuring instruments with recording devices based on PCs and analyzing software of measurement results. The use of digital control systems for the measurement process has significantly improved the productivity and quality of gear control.

Automation of gear control with subsequent active control is still underdeveloped. Automatic gear production lines use automatic machines for complex two-profile control, which allow to control the indicators of the measuring wheelbase.

State Standart (GOST) allows checking not on all parameters, and on complexes from several parameters in each group. And even in this case, various metrological tools are needed [3]. As a result, the metrological laboratory, which checks the gears, should have from one to two dozen devices. Only in this case you can be sure that the gears are tested in accordance with GOST.

However, the full equipment of metrological laboratories is a thing of the past. Most companies continue to use devices, which leads to the situation of “measuring what we can, not what we need”.

Improvement of control systems and increase of accuracy, and also necessity of repeatability of measurements has led to wide introduction of gear measuring machines – universal devices for control of gear crowns.

The dental measuring machine is a means of analytical control of deviations of a gear crown. The use of this control means ensures the optimal quality of control and presentation of the results of checking the parameters of the gear ring. The obtained results give complete information about the causes of errors and allow you to use this information to adjust the technology of manufacturing parts. The disadvantages of this method of inspection include a long cycle of measurement and

the difficulty of using a measuring machine directly near the machine - being a metrological tool of very high accuracy, the machine requires installation in a specially prepared room.

The principle of operation of the dental measuring machine and traditional devices for involute control, tooth direction and tooth pitch are largely similar. In the process of measuring, the probe of the measuring machine scans the lateral surface of the tooth in profile, along the line of the tooth and consistently touches all the lateral sides of the teeth. As a result of these checks, the error of the profile, the error of the tooth line, the deviation of the steps and the error of the radial beating are determined.

There are now about a dozen suppliers of dental measuring machines in the world. Most customers prefer the highest precision measuring machines, which provide measurement of parts theoretically from the first degree of accuracy.

It should be remembered that, according to the rules, the measuring instrument must be able to measure parts for two degrees of accuracy higher than the accuracy of the actual parts.

Summing up, we can say that the automation of measurements gives a huge advantage over manual measurements: it is the accuracy and speed of measurements, the convenience of the process, if it is an electronic device - the ability to save the measurement result to a computer, etc.

Of course, manual measurement is still practiced, but automation opens the way to more efficient operation of both single production and the entire technological sphere.

References

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