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SURFACE QUALITY CONTROL AFTER GRINDING

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Abstract
In order to increase production efficiency and improve product quality, great importance is attached to measurement techniques, primarily the development and implementation of automated measurement systems that increase the efficiency of existing controls, reduce the number of controllers, and actively receive information about product quality.
Objective: To identify technological deficiencies and defects in mandrels and recommend advanced techniques and technologies for their improvement, as well as to increase labor efficiency by introducing them into production.

Keywords: Prototyping, presses, smoothing, Lathes for drilling, tapping, countersinking, and boring.

Introduction

In order to increase production efficiency and improve product quality, great importance is being attached to measurement techniques, primarily the development and implementation of automated measurement systems that increase the efficiency of existing controls, reduce the number of controllers, and actively receive information about product quality.
In the mechanical engineering industry, inspection is not used as a means of separating finished products into suitable and unsuitable ones, but rather to obtain dimensions within a given range, either manually or automatically, by a metal-cutting machine operator, to prevent and eliminate the production of unsuitable products, as well as to establish acceptable processing modes that ensure high productivity and high quality of the processed surface within the permissible range of shape and deviations. Such measuring instruments are called active control instruments.

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The use of active control devices increases labor productivity, provides the opportunity to service multiple machines and comprehensively automate the technological process of metalworking, increases the quality of the processed product, and in turn increases the accuracy, resource and reliability of the product. Active control devices used in industry can be divided into two main groups. Active control devices in the processing process - that is, the size of the processed surface is measured directly or indirectly, and the information obtained is used to automatically or manually change the processing mode, as well as to stop when a given size is reached. These devices measure the value of the processed size by moving the working surface of the cutting tool relative to the mounting base or the workpiece in the direction of the change in the size of the processed part. Such processing networks include, for example, internal grinding, external circular grinding (grinding), honing, surface grinding with multiple passes over the surface being processed, etc. Active control devices are also used in areas where the working surface of the cutting tool is “set to size” after processing to a given size, that is, at a certain distance from the base of the cutting tool or the workpiece or tool axis being processed. The information about the size obtained from the active control device, that is, information about the approach of the processed size to the permissible limit, is used to signal the change of the state of the working surface of the cutting tool, to stop processing, to stop the equipment or to call the tool. Such processing networks include centerless circular grinding, grinding, honing, surface grinding in one pass, etc. In such cases, when the machining tool moves in the direction of the change in the dimensions being processed, the spindles use active control tools, and the random errors of the machining are not large compared to the dimensional limits.
The main task of active control tools is to reduce the influence of systematic and random factors affecting the machining of the machine tool-tool-tool-part (machine tool-tool-tool-part SPID) system: cutting tool wear, temperature deformation, elastic force deformations caused by non-uniformity of the allowance, mechanical properties of the material being processed, tool wear and other factors. In a number of cases, active control tools make it possible to avoid taking into account the temperature error caused by the non-constant temperatures at the beginning and end of the work. In this case, the active control tool either stabilizes the machining mode at the end of the machining, or directly measures the temperature, or

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measures the temperature according to the temperature deformation and makes corrections to the equipment.

Active control devices are mainly used in the final processing of parts, such as grinding and honing. This is explained by the high demands on machining accuracy and the dimensional tolerance of the cutting tool. In the final and rough processing, active control devices electronic measurement principles are broad It spread . the reason is death speed of movement, signal the possibility of adapting to the desired and convenient form , to create equipment good developed elements the presence of a base, also secondary standardized between say what organizer cuts existence, as well as account, alarm and the team is needed in the form to take opportunity is the existence of. The measurement electronic principle I love you. of giving modern in methods and in metal cutting machines active control use of tools scale expanded.

Active control doer electronic equipment processing to give and q ti a few seconds died quickly and power under It is used in polishing machines. Such equipment cutter "following" transmission to the device allows, the workshop given within the borders real transfer price holds, this is AIDS system hardness enough since he/she is not dead and usual transmission other mechanisms to the reasons done right possible to increase it's not was. A row advantages existence due to pneumatic equipment (distance measurement, external dimensions) floor not being and measurement devices construction simplicity, contactless measurement, measurement information to take, high accuracy) is widely used.

The development of mechanical engineering constantly depends on the quality of the equipment being produced, that is, its technical level, efficiency, and the reliability of technical control methods that are an integral part of the technological process.

One of the important directions of development of modern mechanical engineering is engine building and also production of internal combustion engines. Modern internal combustion engines (car, tractor engines) consist of hundreds of details, 60-70% of which are rotating bodies, and the crankshaft, gas distribution shaft, piston are undoubtedly the details that determine the technical and economic classification of the engine. These details contain from several tens to several thousand active control parameters, and the importance is that the main controlled parameters should be controlled on the surface of rotation and when turning the

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parts according to the technical conditions. For example: the angle of rotation of the cam profile - the quadrilateral lift or the angle of rotation - the coordinates of the radius vector of a point on the cam surface are given in the form of a table. As a result of monitoring a number of machine-building enterprises, it was found that the methods and means of controlling the main parts of internal combustion engines, camshafts, crankshafts and parts connected to these parts, are at an extremely low technical level. Except for a small number of enterprises equipped with modern measuring instruments manufactured abroad, enterprises have only optical dividing heads and length gauges, which cannot control the dimensions of the parts based on the requirements of the drawing. As a result, the labor consumption during control is very high (2-3 shifts are spent on controlling one camshaft), which does not allow for the operational inspection of all manufactured parts. It should also be noted that today's existing automated dimensional control devices, which are traditional in design and perform control by touching a moving head along the three-coordinate X, Y, Z coordinates, are not adapted to control rotating objects.

Based on the above, research aimed at increasing the accuracy and productivity of rotating parts, allows designers, technologists, fabricators and supervisors to control technical control quickly and accurately, using automatic measuring methods and tools, based on the requirements of design documents.

It is worth noting that in rotating bodies, the indicators to be controlled are found in the body details and in the rotating details. A study of the frequency of measurements that cause measurement network problems in industrial production showed that 84% of all measurements can be divided into 4 groups, the most common of which are:

hole diameters 47%,

the distance between two holes is 21%,

The distance between two deficits is 8%,

The distance between two holes in depth is 8%,

Measurements related to the measurement of rotating surfaces account for 80% of the total measurements.

Thus, the structure of parts and the structure of controlled parameters in mechanical engineering indicate that the main part of the controlled parameters are rotating

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surface parameters. Therefore, improving the technical level of control of these parameters is of great interest.

Analysis of the structure of internal combustion engine parts and the dimensions controlled in them showed that among the rotating body parts of the engine, the camshaft and crankshaft, as well as the connecting parts and control (standard) blocks are the most complex and accurate. The importance of these parts is that they contain a complex of indicators that cannot be controlled by existing means in the production of rotating bodies, as well as extremely high accuracy (control and standard blocks).

Therefore, it is of great importance to analyze the indicators controlled during the technological process of manufacturing parts that are complex in shape and important for the efficient and reliable operation of the engine. Technical control of such parts is currently a complex task in many engine manufacturing enterprises.

Analysis of the technical requirements for camshafts shows the following:

-The profile of the lobes is given in the table of elevations of the quadrilateral or in the table of polar coordinates of the profile. Along with the table of elevations and radii, a table of velocities and accelerations of the quadrilateral is also given.

-According to the drawing requirement, the elevation of the four is controlled relative to the base neck. However, in production, additional control of the elevation is required, namely, relative to the axis of the technological centers, relative to the axis near the cam necks, relative to the axis behind the cam. This requirement was first implemented in this work and indicates the need for additional calculations.

Conclusion

1 Radial force can be quite large for heavy workpieces. In this case, it is important to base the tool on a fixed workpiece bore.

2 The permissible height of the workpiece is influenced by the hole diameter and coefficient.

3 Boring is mainly performed after pre-drilling, countersinking, milling, reaming, grinding, etc. When the microprofile of the initial surface roughness is transverse, the boring process produces a surface with a low degree of cleanliness.

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