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IMPROVING DETAIL ACCURACY IN THE PROCESSING OF CYLINDRICAL DETAILS IMPROVING THE INFLUENCING METHODS

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Annotation
The article describes detail processing experiments with a circular body shape and effective methods are mentioned. Practical skills in working with processing machines are described on the outer cylindrical surfaces of the details. Currently, the requirements for processing accuracy have increased significantly, which is due to the special requirements of product exploitation. The purpose of this work is to explore effective ways to control accuracy.

Keywords: precision, control, processing, detail, measurement, surface, orientation, machine tool.

ПОВЫШЕНИЕ ТОЧНОСТИ ДЕТАЛИЗАЦИИ ПРИ ОБРАБОТКЕ ЦИЛИНДРИЧЕСКИХ ДЕТАЛЕЙ СОВЕРШЕНСТВОВАНИЕ МЕТОДОВ ВОЗДЕЙСТВИЯ

Аннотация
В статье описываются эксперименты по обработке деталей с круглой формой тела и упоминаются эффективные методы. Практические навыки работы с обрабатывающими станками описаны на наружных цилиндрических поверхностях деталей. В настоящее время требования к точности обработки значительно возросли, что связано с особыми требованиями эксплуатации изделия. Целью данной работы является изучение эффективных способов контроля точности.

Ключевые слова: точность, контроль, обработка, деталь, измерение, поверхность, точение, станок.

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Introduction

Accuracy is one of the main indicators of any machine and tool. It is impossible to prepare an absolute exact detail, since in the process of its preparation various errors are born. That is why different accuracy is achieved in mechanical processing.

The accuracy of the detail generated by mechanical processing will depend on a number of factors and is expressed in:

a) deviation of the detail or its individual constructive elements from the correct geometric shape;

b) deviation of the actual dimensions of the detail from its nominal dimensions;

v) deviation of the surfaces of the detail, the axes from the exact position between them (e.g.: deviation from mutual parallelism, deviation from mutual perpendicularity, etc.

The cost and labor cost of mechanical processing will depend on the required detail accuracy. The higher the accuracy of the detail, the higher its cost, 19 accuracy qualities are defined depending on the service function of the details, ranging from **IT**01 to **IT**17. With an increase in the ordinal number of the accuracy quotient, its Put area increases. **IT**01,0,1 for flat parallel final measurement tools, **IT**2,3,4 for boundary calibers and products with separate accuracy, classification accuracy, **IT**5 to **IT**12 for dimensions of adjacent details with a different detail surface in the assembly process, and finally **IT**13 to **IT**17 for dimensions with low precision. In the conditions of gross and multi-series production, the accuracy of the details is achieved mainly as a result of adjusting the machine tools to the desired size. In the case of fine series and grain production, however, additional finishing operations are provided at the expense of application and the use of highly skilled labor. Since the accuracy of the detail in production conditions depends on a number of factors, it is prepared not on the accuracy that they can be taken, but on economic accuracy. Economic accuracy refers to the accuracy of the details obtained under normal production conditions at a minimum cost of mechanical processing, based on the normal time consumption using technological precision machine tools and cutting tools, using normal skilled labor depending on the type of work. Removable accuracy refers to the accuracy of detail that can be obtained in a separately created production situation, despite the increase in the cost of mechanical processing, using a highly skilled labor force and not taking into account the time consumption.

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Literature Review

The accuracy of the preparation of the detail is influenced by the following main factors:

1. The uncertainty of the bench.
2. Accuracy of preparation of cutting and auxiliary tools.
3. Adjustment of the machine to the required size and installation error of the cutting tool.
4. Installation and basing error of detail.
5. Technological processing system (deformation.
6. Deformation of the technological processing system under the influence of heat during the cutting process.
7. Cases when the detail changes its dimensions during the verification process after processing.
8. Measurement errors.
9. Errors of the worker.

Analysis and Results

Under the force acting on the technological machining system, the machine tool details the detail being processed and the deformation of the cutting tool is the bikrligi of the technological machining system. In Metal Cutting Machines, the cutting, device compressive forces and other forces formed during the processing of details affect the detail being processed, the cutting tool to the machine details. As a result, deviations in the correct geometric shape are observed, such as their deformation, change in the position of the cutting edge, change in the size of the detail

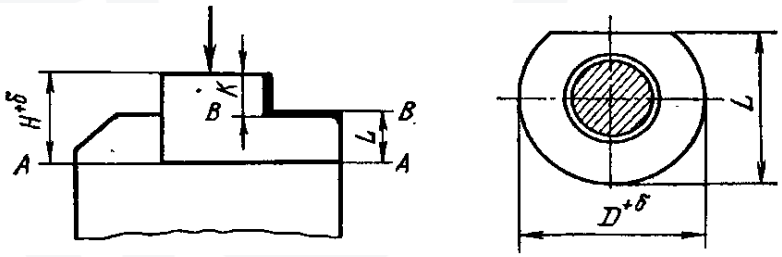

Fig 1. Installation of details on flat and cylindrical surfaces.

As can be seen from the above, the strength of the technological processing system has a huge impact on the accuracy of detail preparation.

Technological processing system strength is understood as the ability of an elastic processing system to resist deformation under the influence of force.

$$J_T = R_u/u, \text{ kg/mm},$$

where: JT- is the strength of the system; Ru- is the radial organizer of the shear force; u - is the displacement (deformation) of the shear edge.

The inverse concept of strength is referred to as adaptability, or:

$$\omega = \frac{1}{J_T} \text{mm/kg} \Rightarrow \frac{1000}{J_T} \text{ mkm/kg.}$$

Deformation under the influence of fastening forces for processing details. The accuracy of the details has a significant effect on the forces formed when fastening them for processing. It is clearly visible when installing thin-walled details in three-punch cartridges under the influence of force during fastening. Thermal deformations and internal stresses. Of particular importance in finisher processing operations is the deformation of the detail being processed and the details of the workbench, which is formed by the action of heat. This type of deformation is of particular importance in the processing of it 5 and it 6 in the quality accuracy. Under the influence of heat, the detail size may increase and become smaller after cooling. The same bench details also change their size from the effects of heat and cause errors during technological adjustment. Effect on the accuracy of measuring the quality of the surface of the detail after processing. After processing, the surface purity of the detail affects the measurement accuracy as follows. The measurement is performed on the vertices of the unevenness if the surface has a high roughness. In the process of work, these peaks are quickly crushed, and the actual nominal indicator of the detail is uncontrolled.

Accuracy of different processing methods

The accuracy required in processing is obtained using different methods on different machines.

When machining holes, **IT**7 quality precision is ensured through the methods of clean sanding, polishing, pithing, delivery processing using abrasive stones, honing, superfinishing. In some cases, carefully processed these methods provide **IT**5, **IT**6 accuracy qualities.

When machining the hole, **IT**9, **IT**10 quality precision is ensured by clean magnification, clean burn expansion, one-time whisking.

In the holes, the **IT**11 quality precision is provided by the methods of drilling with the help of conductors on the lathe or revolver machines, and on the riveting machines.

In holes **IT**12 - **IT**14 accuracy can be obtained using drilling or chopping expansion methods.

The shafts are provided in **IT**15, **IT**16 precision qualitatively by twisting twice on the grinding machines after processing on the lathe machines.

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To the shafts, the dog is flushed on the grinding machines after the lathe processing for processing at the accuracy of 17 qualities.

It is enough to use clean processing chisels on the lathe machines for clean processing in the accuracy of the **IT** 9, **IT** 10- classification to the shafts.

The shafts can be used in black and clean processing of chisels on buckles and revolver machines for processing A at 11 classification accuracy.

It is enough to direct the shafts with the help of normal chisels on the lathe machines for processing **IT**12 – **IT**14 quality accuracy. Control and inspection tools are also used in the processing of external cylindrical and end surfaces - gauges, templates. With these tools, the size is not measured directly, but the suitability of the product is determined by the size and shape of the surfaces within the limits specified by the drawing and technical conditions. The work pieces are indicated for roundness and cylinder strength in the drawings that are processed along the outer cylindrical surfaces.

Round deviation 1 is the greatest distance from the actual profile points to the adjacent circle (Fig 1).

Separate types of deviations from roundness are ovality (Fig 2A) and incision (Fig 2B).

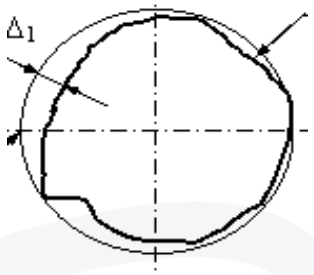

Fig 2A. Deviation of roundness

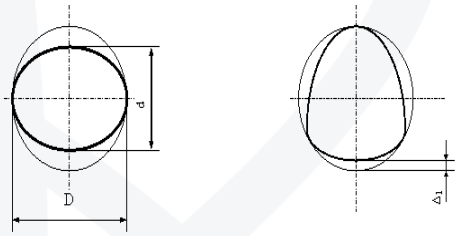

Fig 2B. Group. Separate types of deviations from roundness: a-Oval; b-cut The ovality, numerically equivalent to the deviation from the cylinder, is defined by the equation.

Deviation from cylindrical 2 is the greatest distance from the actual surface points to the adjacent cylinder within the normalized field (Fig 3).

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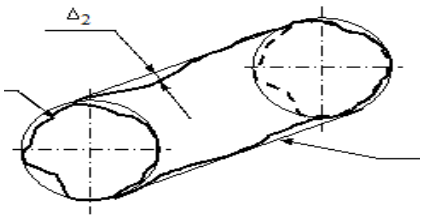

Figure 3. Deviation from cylindrical

In the absence of a deviation from the axis alignment in space, as well as an incision with an odd number of surfaces, a deviation from the cylindrical shape - 2 can be defined as a half-difference of the diameters of the largest D and smallest d. measured in six directions

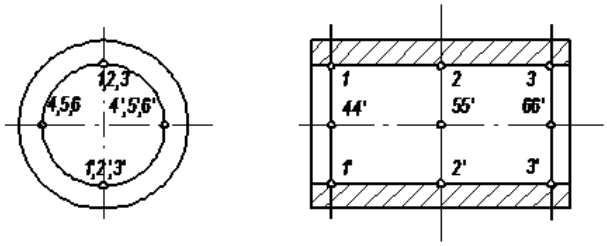

Fig 4. Deviation from cylindrical

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