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**Международный научно-образовательный электронный журнал
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ANNOTATION At the present stage of development of production in industrial enterprises, there are two main forms of organization of production systems, which cover the production processes of everything from ballpoint pens to small parts of river transport, passenger and space ships, aggregates and mechanisms . The interchangeability of technologies, depending on the type of product, production volumes, and the characteristics of the exchange of technology with each other, is a characteristic of the interchangeability of technical equipment developed by enterprises and organizations in another country. The article discusses interchangeability. The work on improving the operational performance of specific production in industry is considered.

Keywords: Interchangeability, details, parts, errors, limiting dimensions, physical and technical dimensions.

INTRODUCTION . The rules of reciprocity are widely used in the national economy and production. These rules product (details) supplement processing without giving mechanisms and cars in the assembly directly correct usage opportunity Interchangeability on demand answer to give for all of the product (detail) functional features according to technician in documents by designating placed requirements between to be necessary .

Product indicators to the accuracy placed of requirements execution to the point of being aggressive of achievement the most main from the conditions is one .

O 'chargeability rules the product design , manufacture release and from it in use details , parts and whole of the product interchangeability provide for service does .

Interchangeability in mechanical engineering is one of the main prerequisites for

modern mass and serial production. Interchangeability simplifies the assembly of machines in enterprises and factories and ensures high performance. In addition, another condition for interchangeability is the high accuracy of the geometric parameters of parts, assemblies, components and spare parts.

The importance of interchangeability in production has been understood by people since ancient times. One of the indicators that must be taken into account in ensuring interchangeability is the dimensions of the parameters characterizing the product and its elements. Each how physicist sizes their dimensions types and values with The dimensions of the part (product) are determined . usually nominal, real and the largest and the most small permission done borderline to quantities has Usually , according to the functional task, they are calculated based on strength, stiffness, fatigue, or based on constructive considerations, and are listed in the series of nominal linear dimensions according to GOST 6636-69 . there is was from the numbers based without selectively is taken . Detail real size , permission made error with measured determined to the value , that is ready detail to size It is said that the detail borderline dimensions two are , they are the most big and eng small permission done borderline called dimensions . Emphasis yes , interchangeability rules , measurement concepts mainly geometric dimensions in the example of interpretation In mechanical engineering of mechanisms main details work 70 percent of their surfaces cylindrical to the structure For this reason , all concepts mainly cylindrical surfaces mutual from the relationship come out is determined .

So Thus , one of the conditions for the production of large numbers or multiple copies of parts is based on the interchangeability of identical parts, assemblies, spare parts and products. Interchangeability is the replacement of parts of the same name, type and size, manufactured independently, with a similar part of the same name, type

and size. For example: a part of an object (electric motor, bearing, gear, etc.) with a part of the same name, type and size (electric motor, bearing, gear wheel, etc.) It is understood as a replacement of parts (Figure 1).



Figure 1. The essence of interchangeability.

In general, the essence of interchangeability is as follows:

- ❖ interchangeability in geometric dimensions (assembly of parts);
- ❖ interchangeability in terms of kinematic dimensions, which determine the laws of motion of the working parts of the machine;
- ❖ physical, technical dimensional interchangeability, physical and chemical properties of parts.

The main essence of interchangeability is to ensure the mass production of a product in large quantities, of the required quality, and with minimal costs.

Advantages of interchangeability in manufacturing:

- ❖ simplifies the design process;
- ❖ enterprises extensive specialization and cooperation are ensured ;
- ❖ product makes production cheaper ;
- ❖ Continuous (conveyor) (method) ensures the organization of production ;
- ❖ the assembly process is simplified;
- ❖ Makes repairs easier .

The more precise the part needs to be, the more expensive it is economically. If we want to manufacture a cylindrical part, it is impossible to manufacture an ideal cylinder, there will be deviations from the correct shape along the axis and cross sections. In movable joints (with slots), deviations from the correct geometric shape of the parts lead to rapid wear and uneven movement due to limited surface contact.

In fixed joints, the deformation of the work leads to uneven tension, which leads to a decrease in strength, tightness, and centering accuracy .

A part with absolutely accurate dimensions cannot be manufactured for many reasons . The dimensions of the part will differ from those in the drawing and will have different values in different places.

High quality of machines and tools ensures their reliable and long-term operation . High-quality preparation of parts depends on the quality of raw materials and mechanical processing methods.

any detail is mainly assessed by the following indicators :

- ❖ With deviation of the actual size from the nominal size .
- ❖ Yes , yes . from the nominal form of the form alienation with .
- ❖ Detail dimensions and from the nominal axes of the planes , from the mutual location of the planes alienation with .
- ❖ Detail surface ghadir - this is the truth with a snake .

In the manufacturing process, absolutely accurate production of parts , assemblies and elements of mechanisms requires a lot of labor, is economically impossible, and sometimes even unnecessary. This is explained by the presence of a machining error Δ **and is defined as follows:**

- ❖ of the tables condition and accuracy. Machine tools that process parts often transfer their own uncertainty to the part . For example: the impact and vibration of the wheel cause surface irregularities ;
- ❖ the condition and quality of the technological equipment; the centers that install the part on the machine are damaged;
- ❖ processing mode;
- ❖ Variations in hardness of the raw product and unevenness in processing;
- ❖ temperature mode 20 ° C above ;
- ❖ deformation, elasticity of a device , tool, part (DMAD) ;
- ❖ 's qualifications and subjective errors ;
- ❖ inaccurate measurement of size .

Deviations from the specified shape and location of surfaces make assembly difficult, reduce the accuracy of dimensional measurements, and affect the accuracy of basing.

Machining accuracy is the actual values of the geometric dimensions of the manufactured part. It is understood as its compliance with the parameters in the given drawing or technical specifications.

The deviation of actual geometric dimensions from the nominal is called machining error.

Errors that occur during the processing and assembly of parts :

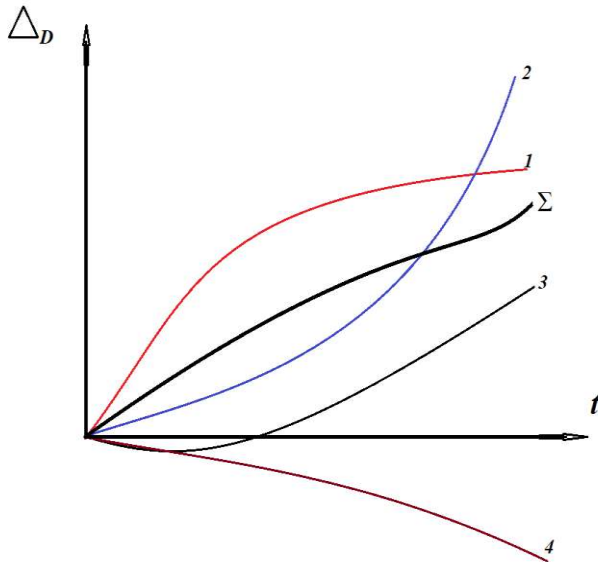
❖ regular errors (changes according to a certain law, i.e. wear of tools, deformation under the influence of temperature, adjustment of the machine tool to size , technological system (cutting force during mechanical processing of the part on the machine tool , support , spindle, guides, raw material) The material is transferred to the workpiece, the cutting tool, and the workpiece (DMAD) during machining.

❖ random errors (unpredictable value, raw material hardness, variation in cutting force).

❖ measurement error. Technological errors that affect the accuracy of machining external surfaces on a lathe are shown in Figure 2. To ensure the implementation of the principles of interchangeability, requirements are given in the technical documentation of parts or products that limit errors that occur during production. **2 - Fig.** The influence of technological errors on the accuracy of machining the outer surface diameter. 1 - tool size wear; 2 - machine tool details, elastic deformation of the tool; 3- machine tool, tool deformation due to temperature; 4- temperature deformation of the workpiece; Σ – The total influence of technological errors on the accuracy of machining the diameter . Such requirements are given in the form of a tolerance (T), in which the errors of details and items in many copies prepared according to the document $\Sigma\Delta$, required (T

) from the permissible **must** not exceed , i.e. ($\Sigma\Delta \leq T$). The accuracy (permissibility) requirements necessary to ensure the geometric accuracy of the elements of the parts are given by four parameters:

- ❖ dimensional accuracy ;
- ❖ geometric shape accuracy;



- ❖ accuracy of positioning of part surfaces;
- ❖ roughness of detail surfaces.

There is a fundamental difference between the two properties that characterize accuracy (permissibility and error).

Permissibility - this represents the requirement for the accuracy of many

samples of a single type of part, regardless of the place and time of production and prepared on the basis of technical documentation.

Error is an auxiliary characteristic of accuracy, reflecting the measurement results of a single sample part. Therefore, it is distinguished into normalized and true accuracy.

Normalized accuracy - standard A set of permissions formalized in the system and written down in technical documents.

Actual accuracy is the sum of all actual deviations of the parameters of a given part (item) sample determined as a result of measurement. This type of accuracy is established during the final processing of the part (item) based on the results of testing and control. Actual accuracy is recorded in the test report, description or forms (forms).

In production and everyday life , a phenomenon called interchangeability occurs. **For example** , if a light bulb burns out, we replace it with another one. It is no surprise that the cartridge and the connecting parts of the light bulb are compatible . Cars are assembled on an assembly line, and their parts and components may be produced not only in another workshop, but also in another city, or even in another country .

However, these parts and components are assembled without any adjustments to each other . So, the design of structures is also carried out due to the existence of the principle of interchangeability, which is used in production.

Conclusion. It can be said that the rapid development of the manufacturing industry is improving the adaptation of new technical technologies to the requirements of modern technological development. Details other countries with flexibility accuracy level and immortality and performance is to improve . One kind of the details other one types with suitable to come uniformity is to ensure . Errors reduce quality indicator from improvement It consists of

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