

УДК 681.2

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The Manufacturability of the Devices

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The 20th century will go down in history as a century of breakthrough in many areas of scientific and technological progress. These include nuclear physics, aviation, rocket technology, space, genetics, and, of course, instrumentation. The development of most advanced areas of science and technology would be unthinkable without modern systems of measurement, control, management, analysis and processing of information.

Everything is developing very quickly in the instrument industry: physical effects used for measurements and primary transducers, methods of receiving, processing, storing and transmitting information, design principles, materials, mass and size characteristics, etc. More recently, instrumentation was considered as part of mechanical engineering. Today, this is a huge independent subject area, divided into a number of sections that are difficult to relate to each other. For example: measuring devices and systems, control system devices, electronics, radio electronics, microwave electronics, microelectronics, computer technology, optics, optometry, etc. - different areas of instrument engineering.

Under the technological design is understood as a set of its properties, which provides the lowest cost of labor, funds, materials and time during the technological preparation of production, manufacture and repair of the product under the specified conditions of production and operation.

Manufacturability is a relative concept. It is different for different enterprises, depends on the type of production, depends on the equipment of the enterprise. At the same time, manufacturability is a complex concept. When testing the product for manufacturability, the relationship between all stages must be implemented:

- production: procurement, machining, assembly, control and adjustment.

When working out the product design for manufacturability, each product should be considered as an object of design, production and operation.

Manufacturability of the product is characterized by:

- compliance of the product design with modern technology;
- economy and convenience in operation and repair;
- to what extent the possibilities to use the most economical and productive manufacturing methods are taken into account in relation to the specified output and production conditions [1].

Production manufacturability reduces the labor intensity and cost of manufacturing the product. Production manufacturability is shown in the reduction of time and money for: design preparation of production; technological preparation of production; production and Assembly of the product.

Design preparation of production includes:

- the separation of units into its component parts;
- layout of assembly units with standard and unified parts;
- correct dimensioning, taking into account the unity and constancy of databases;
- creating a configuration of parts that allow you to use modern technological processes;
- creation of a product design that allows Assembly by methods of full or partial interchangeability.

In accordance with the standards, testing the design for manufacturability should begin with the preparation of the technical specification for the design of a new product. This work continues at the stages of development of preliminary and technical projects. At the stage of development of working documentation, technological control of design documentation for all parts is carried out, with the exception of documentation for standard fasteners and purchased parts.

Technological preparation of production provides: use of structural dismemberment; rational selection of the workpiece; correct choice of technological equipment; selecting the optimal roughness; use of standard and group technological processes.

Manufacturability in manufacturing and assembly provides:

- assembly without disassembly;
- easy access to the adjustment and adjustment points.

Operational manufacturability reduces the labor intensity and cost of servicing the product when preparing it for operation, preventive and maintenance, as well as during repair.

Thus, the technological design of the product must meet the requirements of manufacturing, operation, and repair.

Assessment of the design's manufacturability can be qualitative or quantitative. Providing a high-quality assessment of the manufacturability of the design is achieved by the experience of the designer and technologist. Quantitative evaluation is performed using a system of indicators and is mainly applied to assembly units and specified products. Technological indicators can be basic and auxiliary in importance, and absolute and relative in terms of expression [2].

Requirements for technological design are determined by the technological equipment of production, which depends on

the volume of output and type of production. If the type of production adopted during design testing for manufacturability does not correspond to the design for a given volume of output, the technologist must correct individual design decisions.

References:

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2. Kuznetsova, T. I. English for students of optics / T. I. Kuznetsova. – Leningrad: Mechanical engineering, Leningrad Department, 1978. - 154p.