WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 5, May., 2022

# IMPROVING THE TECHNOLOGY OF MANUFACTURING PARTS TO REDUCE COSTS

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## Abstract
This work is devoted to improving the technology of manufacturing parts in order to improve the quality of workmanship, a given productivity and low cost. This goal is achieved by developing a non-standard fixture that provides high accuracy and efficiency without changing the position of the part, which leads to an increase in productivity and a reduction in the machining cost for mass production.

**Keywords:** Control flange, pump – regulator, block – contactors, automating the production process, soldering, silver, tin-lead, lead-cadmium solders.

## Introduction
The development and introduction of producing the latest machine designs, mechanisms, and devices that correspond to the current development level of science and technology are possible with the availability of high-performance machine tools and qualified specialists.

Modern mechanical engineering is developing in fierce competitive conditions, and its development goes in the following directions: a significant increase in product quality; reduction of processing time on new machines due to technical improvements; increasing the intellectual equipment of the machine-building industry. Every 10 years of the development of science and technology are characterized by the complication of technical objects by 2...3 times. Given that the period of new technological development processes in the industry is significant (5 years or more) and the efficiency of processing is also growing slowly, the main reserve for improving the economic performance of machine-building production remains to increase the degree of work process continuity, primarily by reducing the auxiliary and preparatory and final time. This task in mechanical engineering is solved mainly by automating the production process and improving the control of the production process.

The modern strategy for the development of machine-building production in the world suggests the creation of fundamentally new materials, a significant increase in the automation level of the production process, and management ensuring the product release of the required quality in a given time frame at a minimal cost.

To achieve the goals in the socio-economic development of production systems, a set of measures is needed in each of the directions: improving the principles of organization and methods of production planning; introducing new, improved, and existing technological processes; increasing the level of automation in design and manufacturing. At the same time, it is necessary to advance in all the indicated strategic directions, since none of them is sufficient in itself.

The "Control flange" detail is the main element in the "Block - contactors" assembly, which, in turn, is included in the "Pump - regulator" NR-59 unit.

"Pump - regulator" NR-59 is designed for fuel supply and regulating the main circuit of the RD-33 engine and fuel supply to the afterburner at low flow rates. It works both in conjunction with the electronic automatic control system and independently in case of failure in the electronic system.

"Block - contactors" is designed to supply an electrical signal to the HP-59 unit, by changing the angle of the control lever.

The control flange is made of corrosion-resistant (stainless), (demartensite -ferritic class) steel 14Kh17N2L.

This steel is widely used in the aviation industry. Steels of this type are characterized by high manufacturability. They are well deformed in hot and cold states and are well soldered and welded. After welding, heat treatment is usually not required. Only in some cases, with a complex shape of the welded elements, heat treatment after

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ISSN: 2776-0979, Volume 3, Issue 5, May., 2022

welding is recommended. Soldering is carried out with silver, tin-lead, and lead-cadmium solders. The latter has the highest strength of all used solders with a large margin of ductility at low temperatures. Figure 1 shows a general view of the part.

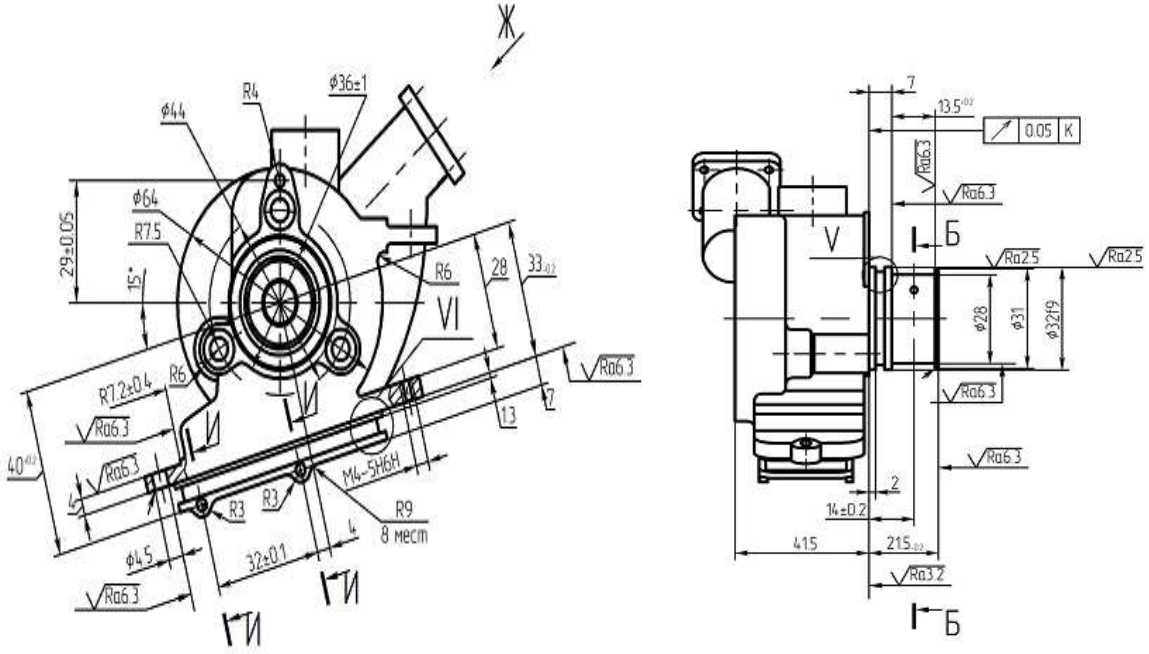


Figure 1 - General view of the part

The device is an important element of the technological system, the accuracy of productivity and the cost of machining largely depend on this. Assembly and technical control of products. The accuracy of processing (assembly), in turn, depends on the accuracy of installation in the fixture, the workpiece. The required processing accuracy is provided by a certain position of the workpiece relative to the cutting tool. The position of the workpiece during processing, like any solid body in space, is characterized by six degrees of freedom, which determine the possibility of moving and turning the workpiece relative to three coordinate axes.

In the fixture, the part is installed with its end surface on the mounting surface of the fixture ring (installation base), centered on the inner surface of the collet (double support base) and along with the cut finger (support base). The required clamping force is provided by the M12 screw, which acts on the expander sleeve and expands the collet petals.

A workpiece clamping scheme was left to develop the workpiece clamping scheme and determine the clamping force c.

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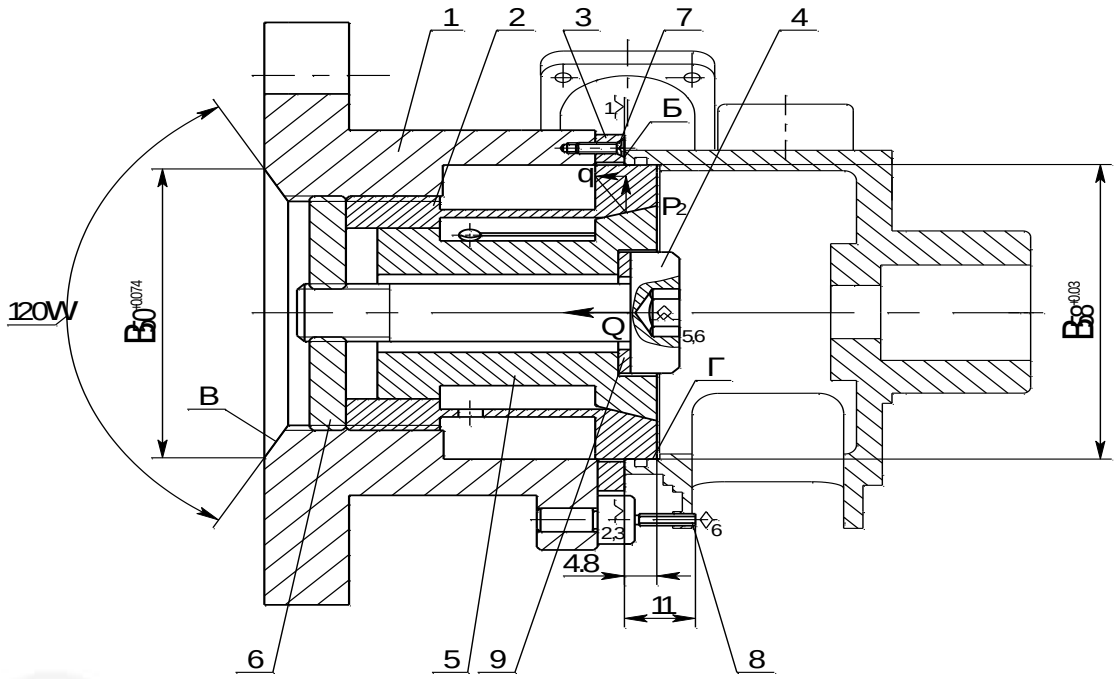


Figure 2 - fixing the part on the fixture

In the process of processing, cutting forces act on the workpiece from the side of the cutting tool, tending to scroll it in the fixture. Calculations were made using the full interchangeability method. The calculation results are shown in Table 1.

Table 1 - Calculation results

| link number | Rated value $A_i$, mm | Tolerance $T_i$, mm | Limit deviations | |
|---|---|---|---|---|
| | | | upper $\Delta_i^в$, mm | bottom $\Delta_i^н$, mm |
| A1 | 0 | 0.004 | 0.002 | -0.002 |
| A2 | 0 | 0.01 | 0.005 | -0.005 |
| A3 | 0 | 0.004 | 0.002 | -0.002 |
| A4 | 0 | 0.002 | 0.001 | -0.001 |

## Conclusion

An effective technique for obtaining a flange part has been developed to reduce the cost while ensuring the quality of workmanship. An analysis of the service purpose of the flange was made, and the principle of its operation was disassembled. It is shown that the accuracy will be provided by the adjustment method, which is cost-effective. Casting in a chill mold was chosen, with subsequent processing, so that the considered TP uses a semi-finished product as a blank. The drawing and technical requirements for the control flange of the contactor block included in the assembly were analyzed.

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