

Automation and Control of Technological Processes

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5311000 - Technological processes and production automation and control, (by industry)*

ANNOTATION

This article provides detailed information on the size of automation systems in the process of creating a technical project, the basics of design and justification of the choice of complexes of technical means to implement them, as well as determining the estimated cost of automation systems.

KEYWORDS: *Technology, automation, design, automatic circuits, experimentation, design, collaboration, engineering.*

Construction of new industrial facilities and reconstruction of existing ones will be carried out on a project basis. The project consists of a set of technical documentation, which includes in principle justifying the need for construction or reconstruction of the facility, calculations required for the manufacture of non-standard equipment, as well as for all types of construction and installation work and drawings.

Depending on the complexity of the project, the project will consist of certain parts. The project may include technical and economic, technological, construction, plumbing, electrical, automation and other components. The control and automatic adjustment and control of technological processes, which is a part of the automation project, is carried out by an organization specializing in this field or the automation department (group) of the Institute of Technological Design. The project includes control and measuring instruments, regulators, automation and signaling devices, technical documentation used at the projected facility to ensure the rational operation of technological processes and safety in the operation of equipment.[1]

The basis for the design is the organization that makes up the technological part of the project and or the assignment given by the customer. In some cases, the organization implementing the automation project is also involved in the task. Design tasks include:

- a) the structure of the projected object, a brief description of the technological process, the characteristics of the device and equipment;
- b) the result of controlled and adjustable quantities indicating the characteristics of the environment;
- c) Permissible errors in control and adjustment and functional characteristics of devices.

The design of control, automatic adjustment and control systems can be carried out in accordance

with special instructions. Technological control objects (BTOs) should be analyzed in detail at the design stage of production process automation systems. It is necessary to have an analysis system, to study the production process in terms of technical equipment and technology, quality of raw materials and finished products, the organization of process management. In the process of analysis, the technological processes of specific production are studied, the quantities representing the process are determined, and the interrelationships between them are found.

The results of the BTO analysis are to identify specific issues in the effective structure of the automation system. The simplest structures of an automation system are equally centralized systems (Figure 21.2, a). Such systems are used in production processes (TJs) that are not functionally connected or weakly interconnected. These systems create individual control points (BPs) for each site or production unit, which are equipped [2] with all the necessary tools for automation. They solve the following tasks: measurement and control of technological quantities, signaling of their limit values, maintenance of parameters determined by technological regulations. These systems use common automation solutions for the same type of TJ, regardless of the differences in the characteristics of the design and the product being processed. It is about choosing the right adjustable size and control points that provide the automation system with the necessary and accurate information.

Currently, the automation of production processes is characterized by different levels of equipment. Technological control facilities - units, devices, production systems and workshops - are increasingly equipped with centralized automation systems. (Figure 18.2, b) all information is output. Experience in the use of centralized systems in production has revealed a number of shortcomings, such as: the reliability of the automation system is reduced due to the inability to correct errors in the MBP; The cost of technical equipment for the MBP and communication lines has increased, which has made it more difficult for day-to-day businesses to carry out repairs and maintenance at the MBP due to the collection of all operational information in the MBP.[3]

Centralized automation systems for complex objects, which can be included in most modern enterprises, are becoming more widespread, depending on the level of use of computer technology (XT) to process and analyze large amounts of information coming to the MBP. The collection of BTO information in the MBP allows it to be used operatively to achieve optimal management of the facility, which not only increases the overall technological equipment and product quality and reduces the consumption of raw materials, but also provides a new management organization - technical and economic. provides operational calculation of indicators, coordination of the work of individual production units and the enterprise as a whole. HT tools with automation systems in the design scheme are called automatic process control systems (TJABS).[4]

The design of technological process automation systems is carried out in one and two stages. In a two-stage design, a technical design (TL) is created and in the second stage, working drawings (ICH) are created. In a one-stage design, the two stages are combined and are called a technical working project (TIL). Single-stage design is much more convenient. In this case, it is advisable to design projects of automated systems of simple objects and to introduce simple standard projects or reuse of cost-effective individual projects.

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