

## AUTOMATION OF PRODUCTION PROCESSES IN THE CONDITIONS OF INFORMATIZATION AND DIGITALIZATION OF THE ECONOMY OF THE REPUBLIC OF UZBEKISTAN

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### ABSTRACT

The article discusses and analyzes possible methods and the degree of automation of production in the conditions of informatization and digitalization of the Republic of Uzbekistan. The article analyzes the legislative base of the state aimed at strengthening the process of informatization and digitalization of all spheres of the economy. The concepts of local, complex, and full automation are introduced. Examples of automated control systems of real sectors of the economy are considered.

**Keywords.** Automation, informatization, digitalization, automated devices, automated control systems.

### INTRODUCTION

Today, digital technologies are rapidly penetrating into all spheres of human life. In turn, the States that have embarked on the path of such development in a timely manner are achieving success. And those countries that work in the old way are lagging behind progress.

Digital transformation processes are underway all over the world. Taking into account modern realities and trends, Uzbekistan has also begun the transition to a digital economy. So, in 2017, a new version of the Unified Portal of Interactive Public Services was launched ([my.gov.uz](http://my.gov.uz)), the National Agency of Project Management under the President of the Republic of Uzbekistan was established. And in 2018, the Digital Trust Fund was established to support the Development of the Digital Economy in order to attract and consolidate investors' funds for the implementation of projects in the field on the terms of public-private partnership, including those related to the introduction of blockchain technology.

Also, the State Program for the implementation of the Action Strategy for the five priority Areas of Development of the Republic of Uzbekistan in 2017-2021 in the Year of Development of Science, Education and the Digital Economy provides for the implementation of large-scale tasks and projects defined by the President in the field of development of the digital economy and e-government.

In order to further develop information technologies, the Presidential Decree "On measures for the widespread introduction of the digital economy and e-government" was adopted on April 28, 2020. The document sets out comprehensive measures to fulfill the tasks set. A draft Decree

of the Head of state "On the strategy for the development of artificial intelligence in the Republic of Uzbekistan in 2021-2022" has been developed and posted on SOVAZ. A new stage of development in the sphere was the signing by the President of the Decree "On the approval of the Strategy "Digital Uzbekistan-2030" and measures for its effective implementation" dated October 5, 2020. The purpose of the adoption of the document is a successful transition to the digital economy, taking into account modern realities. After all, today the share of the digital economy in the country's GDP is 2.2 percent. Automation of production processes is one of the prerogatives of the development of modern Uzbekistan.

Automation of production is the control and management of an automated production process by launching automatic devices; the highest stage of mechanized production. One of the main directions of the development of science and production, which can significantly improve production efficiency, product quality, work culture and other indicators of the production process. There are three degrees of production automation: partially automated (local), general (complex) and fully automated.

At the stage of partially automated production, the fulfillment of certain criteria (liquid level in the container, pressure, availability of containers, etc.) is automatically checked.

At the stage of general automation of production, management is carried out through a specific program on several types of automated work in one department, workshop, as an interconnected single automated complex within the organization. Production management is under the control of a human (operator).

As for the stage of full automation, it is characterized by the immutability of the production process, the immutability of the types of work and is characterized by the fact that it ensures high production efficiency.

#### **METHODOLOGY AND ANALYSIS OF AUTOMATED CONTROL SYSTEM DEVELOPMENT**

Some automated devices have been known for a long time. However, during the craft period, in conditions of small-scale production (before the XVIII century), such devices were not used in practice. As a result of the improvement of tools and mechanical devices, the creation of new machines and mechanisms (XIX century), the volume and level of production sharply increased. This state of affairs created the necessary prerequisites for further mechanization of production (weaving, metal processing, wood).

At the beginning of the XX century, after the invention of the voltage sensor, the use of electricity in production was initiated; as a result, multi-operator machine tools-aggregates and automatic lines appeared. During this period, the concept of production was formed.

Automated control devices and the development of the production process appeared simultaneously with heavy industry and mechanical engineering (30s, XIX century).

Automated devices began to be used in the heavy, light and food industries, the automation of transport was improved.

Thus, power engineering, metallurgy, chemistry, mechanical engineering, public utilities began to develop, automation laboratories were organized in institutes. By the 50s, automation was being introduced in virtually all spheres of the national economy. The HPP units switched to full automatic control, water supply systems and other branches of the national economy were automated.

Scientific aspects of production automation mainly developed in three directions.

Firstly, effective methods have been developed for studying the laws of control, dynamics, stability of objects and the influence of external factors on them. These tasks are solved by the joint efforts of researchers, designers, technologists.

Secondly, the effectiveness of the methods and the purpose of the management functions were determined. On this basis, the rules of decision-making in management were outlined.

Thirdly, perfect, simple and reliable engineering methods of measurement and processing of results for automation devices implementing control functions have been developed.

However, the process of improvement and development of production automation continued continuously. In workshops, warehouses and other production areas, information is generated and processed on keyboard devices, the collected information is transferred for processing. Sensors are used for automatic information processing.

Means of information transmission – signal converters, telemechanical equipment, signal distributors-communicators and other devices.

Mathematical and logical information processing devices – include devices of functional converters of the nature and form of information signals according to a given algorithm, for example, computers, information output media, etc.

By means of means of information output – a signal board, mnemonic circuits, digital devices, a cathode ray tube, printers, a human operator can observe the production process and register important parameters.

Devices that produce control signals convert non-power information signals into pulses. These impulses affect the protection, verification or operation of control devices, make them work. The collection of information and its processing devices in the complex make it possible to automate the branches of the national economy. Among other things, it is considered very important to have a set of management programs, analytical equipment and control and verification devices that ensure the optimal mode of automation of production management. For example, in hydroelectric power plants, the water coming from the source passes smoothly through the turbines of the hydroelectric unit. Automatic sensors measure the number of turbine rotations, voltage and frequency of the current produced, active and reactive energy.

Protective devices prevent accidents. The auto operator starts and stops the operation of the units according to the schedule. The dispatcher of the power system, using a telemechanics device, controls the HPP at a distance from the central console. It can be said that in Uzbekistan all hydroelectric power plants are controlled remotely.

The management of thermal power plants – thermal power plants is considered more complicated. Several hundred MW of energy in the block: "Boiler – turbine – generator - transformer" - are organized by various types of units. For example, in a block with an energy of 800 MW, there are about 1000 control objects and about 1300 controlled parameters. One engineer-operator controls the parameters of this object by means of an automatic control system.

It is also possible to automate continuously flowing technological processes in chemistry, petrochemical, gas and pharmaceutical industries, water supply, sewerage, etc.



In the thread-modal system, along with the improvement of methods of separation of cotton fiber, thermal, electrical methods are being developed that allow to effectively automate this work; winding equipment and computers are used at cotton gins.

The process of high-quality processing of cotton fiber is mainly carried out in a cyclic mode. All the main parameters in the production of thread are automatically measured and straightened. Computers are used in a high-quality mode control system.

In metal rolling, the control of rolling machines, motors, clamping device and auxiliary mechanisms is automated. With the help of computers, a material cutting system with the least waste is used.

## DISCUSSION

Today, automation of production in modern mechanical engineering is the basis for the development of technology. Along with automatic machines, multi-operational units, pneumatic, electric or mixed control systems are being created and constantly improved.

Full automation of the working cycle of numerically controlled machines for metal processing preserves their versatility.

Automation of the collection process in mechanical engineering is considered an urgent and difficult task. This gives a great economic effect. The quality of the assembled assembly and the whole product is continuously checked. At the GM-UZ avto enterprise in the Andijan region of the Republic of Uzbekistan, all work is automated.

The production of radio components, electronic lamps, ion devices, cathode ray tubes, transistors, mounting wire, electronic equipment and televisions is fully automated.

Automated devices are used in light industry and automatic control systems are used in enterprise management.

The manufacture of footwear, haberdashery products and other large industries are equipped with highly efficient automatic devices.

Automation is also of great importance in public catering enterprises. Automatic devices for processing products (rinsing, slicing, grinding, etc.) fully preserve its taste and aesthetic appearance, significantly reduce the amount of waste.

Automation also takes place in the cotton industry. Starting with the acceptance of cotton, separation into fiber, seeds, cotton wool and binding of fiber into bales, there are automation complexes for these processes. The growth in the volume of cargo delivered, the number of people transported is associated with the expansion of types of transport and the acceleration of traffic on existing lines. There is automation of the operation of railway transport, which ensures that the route is followed exactly according to the schedule and the safety of movement. So, train traffic control is automated. A lot of work on the transportation of cargo and passengers on ships has also been automated. Planes are also controlled by means of "autopilots".

For the further development of hydrometeorology, this area needs to be automated. Artificial Earth satellites and computers are of great help to people in this.

## CONCLUSIONS

Automatic production management is associated with the use of mathematical models, automatic devices and computer equipment in the management of various branches of production. The basis of automatic production management is economic cybernetics. An important task of economic cybernetics is the solution of methodical and precise problems of the relationship between man and cybernetic machines.

In addition to computers, dozens of specialized automatic devices are used in production automation, which makes it possible to automate the process of collecting information for production, its processing and thereby saves people from complex calculations, increases the creative role of production, increases the efficiency of work, makes it possible to involve people freed from the management of the production process in other work.

So, we conclude: an automatic control system (ACS) is a system consisting of a control object and a control device in which a given process is automatically performed.

A control device (UU) and a controller are a set of devices with which the main technological parameter (physical quantity) is controlled. The UU and ACS controller acts on the control object and is indicated in the functional diagrams in the form shown in Fig.1.

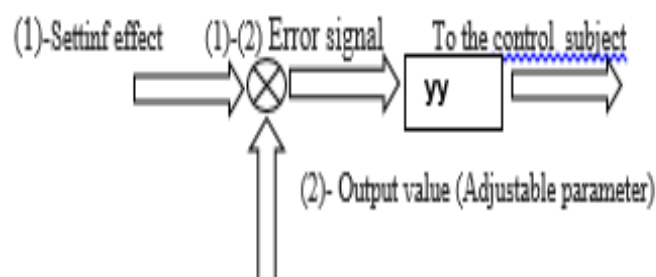


Figure 1. The UU and ACS controller acts on the control object and is indicated in the functional diagrams.

In case of an error signal  $(1)-(2)=0$ , then the ACS is at rest. In cases when  $(1)-(2)>0$  or  $(1)-(2)<0$  – The ACS is in transition mode.

## LITERATURES

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