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**DIGITAL TECHNOLOGIES FOR CONTROL OF HEAT COOLING
SUPPLY SYSTEMS AT INDUSTRIAL FACILITIES: INCREASING
EFFICIENCY, ECONOMY AND RELIABILITY**

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Abstract. Currently, industrial facilities are facing increasing demands on the efficiency, reliability and cost-effectiveness of heat and cooling systems. The article discusses the use of modern digital technologies to control such systems. SCADA systems, IoT sensors and predictive analytics play an important role in optimizing heat and cold supply management processes at industrial facilities.

Keywords: SCADA system, IoT sensors

Introduction. Heat and cooling systems are an important component in industrial facilities where it is required to maintain optimal temperature conditions for production processes. Due to the constant increase in energy consumption and changes in legislation in the field of energy efficiency, industrial enterprises are striving to introduce new technologies to optimize heat and cooling systems. Digital tools such as SCADA systems, IoT sensors and predictive analytics provide opportunities for automation of control and monitoring of heat and cooling systems, which allows to increase the efficiency, cost-effectiveness and reliability of these systems.

Features of digital control technologies for heat and cooling systems: SCADA (Supervisory Control and Data Acquisition) systems allow operators to monitor and manage processes in real time, as well as analyze data to optimize the operation of heat and cooling systems. The use of IoT sensors allows you to collect information about the condition of equipment and environmental conditions, which helps to prevent emergencies and optimize maintenance costs. Predictive analytics allows you to predict energy consumption and take measures to reduce costs,

which leads to a reduction in energy consumption and an improvement in the efficiency of heat and cooling systems.[1]

Research methods. To achieve this goal, the following research methods were used:

1. Analysis of literary sources - a review of scientific publications on the research topic was conducted to identify the main trends and achievements in the field of digital technologies in heat and cooling supply.

2. Engineering calculations - the calculation of energy consumption and efficiency of the heat and cooling system using various digital technologies has been carried.

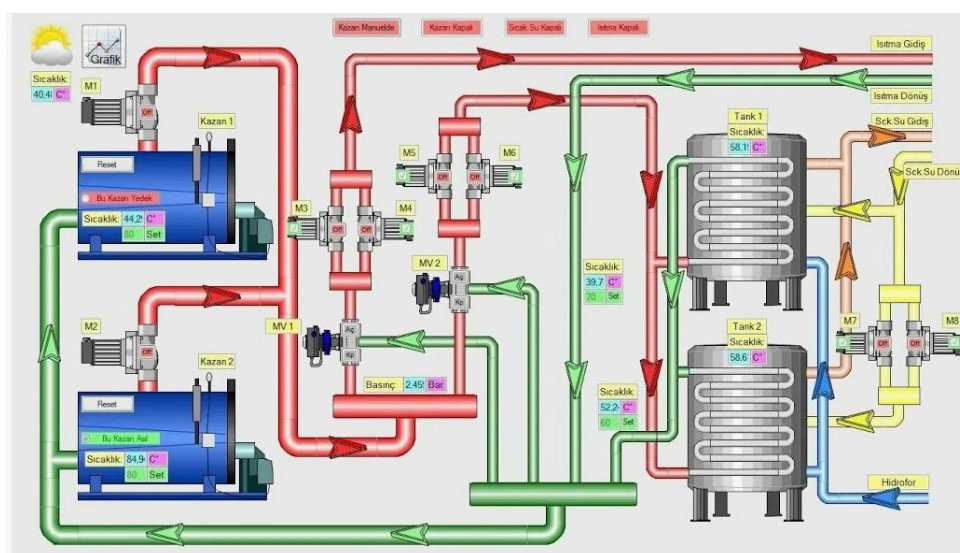


Fig.1-The use of Scada elements and IoT sensors in production.

Examples of successful implementation of digital technologies: Many industrial enterprises have already successfully implemented digital technologies for managing heat and cooling systems, which has led to significant improvements in the operation of these systems.[2] For example, the use of the SCADA system in a food production plant allowed operators to monitor and optimize cooling processes in real time. One of the successful examples of the introduction of digital control systems at an industrial facility is Alfa-Thermo, which has implemented a system for monitoring and controlling heat and cooling supply at its production

facility. Thanks to this system, it was possible to significantly improve the efficiency of the system, reduce energy costs and equipment maintenance, as well as increase the level of safety and reliability of operation. SCADA systems allow remote monitoring and control of heat and cooling supply processes. They provide operational analysis of data on temperature, pressure, refrigerant flow and other system parameters. This allows operators to make quick decisions to optimize the operation of the system and prevent possible emergencies.[3]

IoT sensors are used to collect data on the technical condition of equipment and environmental conditions. They can be installed on the equipment of heat and cooling systems to monitor its operation in real time. Thanks to this, operators can quickly respond to any deviations from the norm and carry out maintenance in a timely manner.[4]

An example of the successful implementation of digital heat and cooling technologies in an industrial enterprise is ABC, which introduced the SCADA system and IoT sensors in its production in Fig.1. Thanks to this, it was possible to reduce energy consumption by 15% in the first year of operation. It was also possible to improve the reliability of the system and reduce the risk of accidents.[5]

Conclusion. The introduction of such systems makes it possible to reduce maintenance and operation costs, improve the safety of production processes and improve the working conditions of employees. The advantages of digital technologies include the ability to remotely monitor and manage, analyze large amounts of data, automate processes and increase the reliability of the system.

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