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Development of an automated system for controlling temperature and humidity in production rooms.

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Annotation:*The article discusses automated temperature and humidity control systems in production rooms. First, general information about cooling systems, their types and properties is provided, and typical and various designs of temperature and humidity control systems for production rooms are analyzed, and then the implementation of these technologies in such systems is considered.*

Keywords: *temperature, humidity, production room, automatic control system.*

Аннотация: *В статье рассматриваются автоматизированные системы управления температуры и влажности в производственных комнат. Вначале выдано общая информация про систем охлаждения их виды и свойства а также проанализировано типовое и различные построения систем управления температурой и влажностью производственных комнат, а далее рассматривается внедрение данных технологий в подобные системы.*

Ключевые слова: *температура, влажность, производственная комната, система автоматического управления.*

In the modern world, namely in the age of high technology, there remains a need for workers and employees to create comfortable working conditions. The main goals of the ventilation system are to provide the premises with a microclimate, as well as purify the air from harmful substances. By supplying a manufacturing plant with clean air at a comfortable temperature for the working personnel, work efficiency increases. As part of this trend, there is a need to automate the ventilation system. Current developments help provide better working conditions.

There are several types of ventilation systems, which are classified as follows:

- Method of air pressure and movement;
- Purpose – supply and exhaust;
- Service area – general and local;
- Design – channel and without channel.

Natural ventilation is the simplest type of ventilation, since ventilation occurs naturally and does not require special equipment.

There are situations when the power of natural ventilation is not enough and then there is a need to install artificial ventilation. The peculiarity of its work is that, the useadditional equipment that facilitates the forced movement of used air, replacing it with clean air, as well as maintaining the specified air parameters. The distinctive quality of such systems is air treatment, namely air purification, heating, cooling and humidification.

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The purpose of controlling the ventilation system is to ensure and maintain the required air quality standards in the working area of the premises. Local automation is usually used to control the ventilation system. One and the most important disadvantage of such regulation is that it does not take into account the real air and heat balance of the building, as well as weather conditions. Thus, we can say that the ventilation system is not operating optimally.
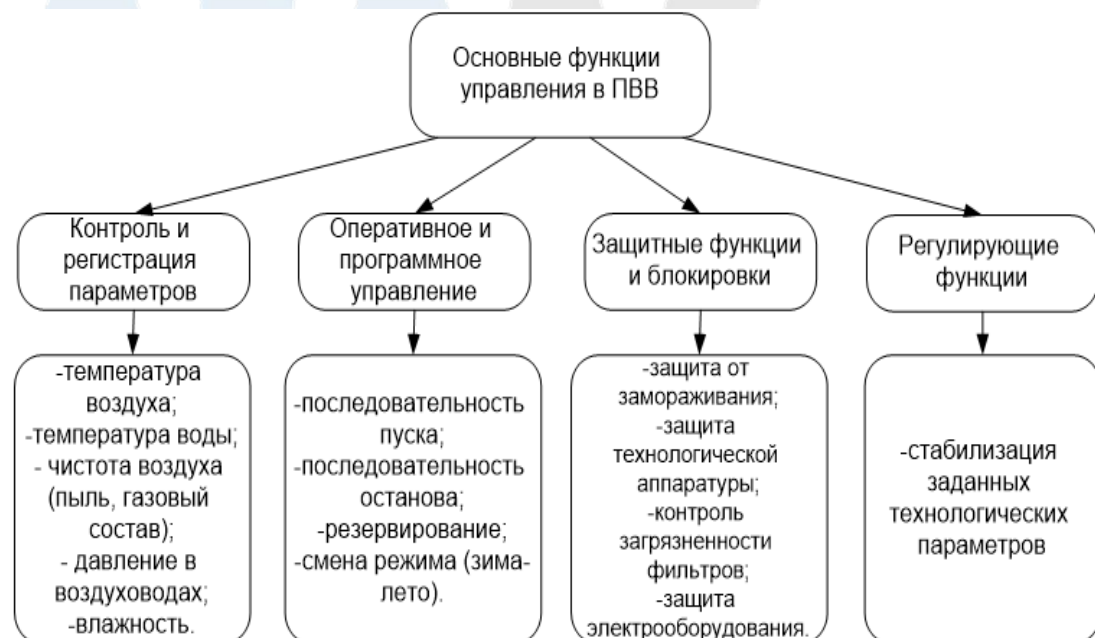
By implementing optimal control of the ventilation system, you can not only increase operating efficiency, but also reduce the cost of energy resources. But for this it is necessary to use a complex of software and hardware.

Using a computer, you can find the optimal operating mode and determine the appropriate control action. As a result, the computer and the complex, consisting of software and hardware, form an automated ventilation control system. The role of a computer can be either a control panel for the supply ventilation system or a computer with a modeling program, which, based on the data obtained, establishes the optimal operating mode of the ventilation system.

Automatic control system – a set of devices designed to obtain a finished product from initial raw materials by automatically changing one or more parameters of the control object. In the case of a supply ventilation system, the finished product is air with specified parameters (temperature, humidity, etc.) in the production room.

The basis of the automatic control system for supply ventilation, as in any control system, must include feedback. Control actions are generated based on information obtained using sensors located at the facility. Each automatic ventilation control system is developed based on air treatment technology. The supply ventilation system can include both a heater (air heating) and an air conditioning system, which must be reflected when designing the automation.

Picture 1

In accordance with the standards, the mandatory control parameters are:

• Temperature and pressure in the common pipelines and at the outlet of each heat exchanger;

• Temperature of the outside air supplied after the heat exchanger, as well as the temperature in the room;

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• Standards for harmful substances in the exhaust air (gases, combustion products, non-toxic dust).

When designing an automatic system, remote control is often provided; this is necessary to change the basic parameters of the system. This control is carried out using converters or sensors, the values of which can be displayed on the control panel or computer monitor.

One of the main functions that needs to be implemented is the "start sequence". To ensure normal start-up of the supply ventilation system, it is necessary to take into account:

• Preheating of the heater. If you do not start warming up the air heater in advance, cold air can trigger the antifreeze protection. Thus, when starting the system, you should open the supply air dampers, open the water heater valve and warm up the heater. Typically, this function should be activated when the outside temperature is below 12 °C.
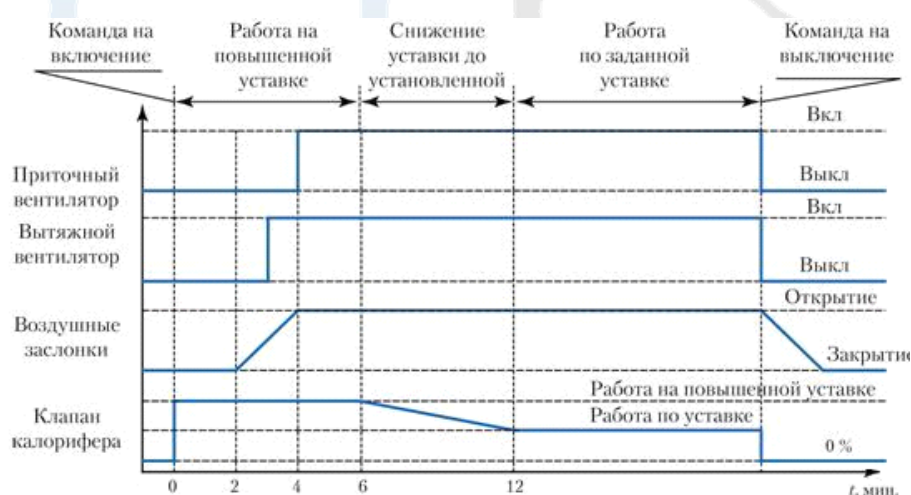
• Preliminary opening of air dampers. This is due to the fact that not all dampers, when closed, can withstand the pressure drop caused by the operation of the fan.

• Distribution of electric motor starting moments. This function is necessary in an automated ventilation system since asynchronous electric motors often have high starting currents. If you start the fans and air damper drives at the same time, then due to the heavy load on the electrical network, the voltage will drop significantly and the engines will not start

Many important functions that need to be provided for when designing an automatic control system for supply ventilation are the "stop sequence". When shutting down the system, the following must be considered:

• Delay for stopping the supply air fan in systems with an electric heater. After removing the voltage from the heater, it should be cooled for some time using a supply air fan.

Based on the above options, you can create a cyclogram of the operation of the automatic control system (Figure 2.):

CONCLUSION

The presence of a ventilation system is necessary to ensure air exchange inside the building by removing excess moisture, heat, and harmful substances. Its presence is one of the main conditions for ensuring life. If there are no types of ventilation systems in the room, this is harmful

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to the human body, harmful substances are not removed, and leads to the formation of fungi, since condensation forms in the absence of air exchange.

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