ПОДСЕКЦИЯ11.3. СТРОИТЕЛЬСТВО

ENERGY SAVING IN THE ENGINEERING SYSTEMS OF BUILDINGS AND STRUCTURES.

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Energy efficiency is the rational use of energy resources. In energy efficient facilities, less energy is consumed, but the level of energy supply of the building remains the same. If we compare this term with energy conservation, the difference is not saving energy, but its efficient use, not to the detriment of consumers.

Optimization example. Lighting control.

Measures taken to reduce electricity consumption in the office building.

The first phase involves modernizing the lighting system. Traditional ballasts for fluorescent lamps are replaced by electronic ballasts. This reduces the energy consumption of the fluorescent lamps by about 30%.

To further optimize energy consumption, a constant light function is additionally introduced. The goal is to keep the workplace at a constant 500 lux. A special sensor constantly monitors the level of light in the room, taking into account the intensity of natural light, sun protection systems (blinds, roller shutters, etc.), and then the data obtained are analyzed by the dimmer, which then adjusts the light output of luminaires. This method of control saves from 28 to 66% of electricity used for lighting.

Finally, lighting can be controlled by monitoring the presence of people in the room with a presence detector. If people are out and no one has manually turned off the lights, they can be turned off

automatically. The automatic control of lighting based on the presence of people in the room provides an additional savings of 13%.

Optimization example. Blind control. Blind control for optimum use of daylight.

By controlling the blinds, you can regulate the amount of natural light entering the room. Thus, there is a direct correlation between the control of artificial light and the control of blinds. If it gets too dark in the office when the blinds are closed, the light is switched on,to compensate for the lack of light. But the lighting system consumes more energy during the day, when there is natural light available. A more effective solution is to automatically adjust the angle of the blinds to the position of the sun.

The blinds open just enough to allow enough daylight into the room. With reflective louvres, it is possible to diffuse the lightto the ceiling and prevent glare. The combined use of such a solution with the function of maintaining a set level of light makes it possible to save considerable amounts of energy. According to the results of the aforementioned studies, automatic louver control and constant

level of illumination plus occupancy related lighting control, can offer potential savings of up to 40% compared tocompared to the manual control of the lighting system.

Optimization option. Blind control to maintain an optimal microclimate.

Closed blinds on the facades on the south side of the building during the summer prevent the rooms from heating up, thereby saving energy that may be needed to cool the working areas. In winter, the opposite is true. At this time of year, as much solar heat as possible should enter the building, which leads to savings in energy used for heating the rooms.

In both cases, it is necessary to link the control of the microclimate with the presence of people in the room. As long as someone is working in the room, priority should be given to controlling the blinds depending on the natural light. This applies in particular to PC-based workplaces, school rooms and conference rooms.

Example of optimization. Heating, ventilation, air conditioning.

Practical experience shows that a 1 °C decrease in room temperature can reduce heat consumption by 6 %. If the room temperature is lowered by 3 °C when the room is unoccupied, the heating energy savings will be 18 %. Since the temperature generally changes slowly, this type of control is only useful if the room is unoccupied for a long period of time.

If fans or fan heaters are used to control room temperature and air quality fans or fan coils can be controlled via KNX with a fan coil activator (FCA/S).

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The calculations on which the European standard EN 15232 is based convincingly confirm this fact, demonstrating the potential savings in thermal energy.

Thermal energy saving is ensured by controlling the room temperature using a central timer and visualization system.

Blind control has received positive feedback from teachers and students as the use of automatic shading has eliminated the need for unnecessary heating of the rooms, which resulted in a noticeable increase in comfort.

Optimization option. Ventilation.

-Air recirculation systems. It is a mixing of exhaust and supply air in order to increase its temperature during the cold season. This allows you to reduce the cost of heating in winter. In addition, recirculation helps to stabilize air distribution during cold and warm seasons;

-Air recuperation systems. They allow you to heat the cold supply air from the air that is removed from the room. Mixing does not occur;

-The use of fans with the use of dead zones. This approach allows, firstly, to ensure smooth regulation of the fan frequency, secondly, to avoid overuse of electricity when starting electric motors and, finally, to reduce the noise level of ventilation systems and energy consumption of the system as a whole.

List of references:

1. EN 15232-1:2017 on "Energy efficiency in buildings – Influence of BuildingAutomation and Control and Building Management".

2. GOSTR54862-2011. Energy efficiency of buildings. Methods for determining the impact of automation, management and operation of a building

3. The Law of the Republic of Kazakhstan dated 13 January 2012 No. 541-IV «On Energy Saving and Energy Efficiency Improvement»

4. Ensuring energy efficiencyof buildings through technology

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