

Modern Energy-Saving Technologies for Elevators and Factors Influencing It

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ABSTRACT

the article presents valuable information about modern energy-saving technologies for elevators and the factors affecting it with an in-depth analysis. The article also discusses modern energy-saving technologies for elevators - use of energy-saving electric motors, use of efficient elevator control systems, use of energy-saving lighting, use of occupancy sensors, installation of regenerative drives, variable frequency drives use, the use of energy-saving doors, the use of efficient elevator control systems, regular maintenance, the use of elevator planning, the implementation of elevator modernization, the installation of energy-efficient elevator cabin, the promotion of energy-saving culture, the introduction of energy management system, installation of an elevator energy monitor, use of renewable energy, use of elevator sleep mode, optimization of elevator shaft ventilation, installation of solar-powered elevators, use of energy-saving elevator accessories, use of efficient HVAC systems all positively affect the performance quality of this facility. It is stated that it creates additional convenience for users along with privacy.

INTRODUCTION

Elevators are an important part of modern infrastructure, allowing people to move vertically in high-rise buildings. However, elevators consume large amounts of energy, making them one of the most energy-intensive systems in buildings. In this context, energy-saving measures in elevators are very important to reduce energy consumption, reduce operating costs and reduce carbon emissions. Energy saving measures in elevators can significantly reduce their energy consumption. Low energy consumption leads to reduced operating costs for building owners and operators, and environmental impact. Applying energy-saving measures to elevators can be expensive, especially for older buildings or elevators that require significant retrofitting. However, the long-term cost savings from reduced energy use can offset these initial costs.

THE MAIN PART

Use of energy-saving electric motors. Efficient Elevator Motors: High efficiency elevator motors use less energy than standard motors and reduce energy consumption.

Use of effective elevator control systems. The elevator control system is responsible for controlling the operation of the elevator, including its speed, acceleration, and deceleration. Inefficient control systems can lead to energy wastage because they can operate the elevator at optimal speed. Therefore, it is important to use efficient control systems that reduce energy consumption by up to 30%. Such systems typically use algorithms to optimize elevator speeds

based on passenger demand. Destination management systems group passengers according to a specific floor, reducing the number of elevator stops and thereby reducing energy consumption.

Use energy-saving lighting. One way to save electricity in elevators is to switch to energy-efficient lighting. LED lighting uses less energy than traditional incandescent or fluorescent lighting and can be used in elevator cabins and shafts. LED lights are more economical than traditional incandescent lights and can last up to 25 times longer. Replacing traditional light bulbs with LEDs can reduce energy consumption by up to 80%. In addition, LED lights produce less heat, which can reduce the load on the elevator's air conditioning system.

Using occupancy sensors. Another effective way to save electricity in elevators is to install occupancy sensors. These sensors detect the presence of passengers in the elevator and turn on the lighting and ventilation system only when necessary. This can significantly reduce energy consumption when the elevator is not in use, such as during off-peak hours.

Installing recoverable drivers. Regenerative drives are a type of technology that converts the energy generated during braking into usable electricity. Integrating energy storage systems with elevators can store excess electricity generated by regenerative braking or other energy-saving measures and use it to power other building systems or elevators during periods of peak demand. Elevators with regenerative drives can produce up to 70% less heat and use up to 40% less energy than conventional elevators. In addition, regenerative drives can extend elevator motor life and reduce maintenance costs.

Use of variable frequency drives (VFD). Variable frequency drives are electronic devices that adjust the speed of the elevator motor according to demand, reducing electricity consumption. Variable frequency drives are electronic devices that regulate elevator motor speed based on load and passenger demand. VFD drives can reduce energy consumption by up to 60% because they adjust the motor speed to match the elevator load. This not only saves energy, but also reduces wear and tear on the engine and extends its life.

Using energy-saving doors. The doors of the elevator are an important part of its operation. However, they can be a significant source of energy loss. Installing energy-saving doors can help reduce energy consumption by up to 25%. Energy-saving doors are usually made of materials with high insulation value, such as aluminum or fiberglass.

Use of effective elevator control systems. The elevator control system is responsible for controlling the operation of the elevator, including its speed, acceleration, and deceleration. Inefficient control systems can lead to energy wastage because they can operate the elevator at optimal speed. Therefore, it is important to use efficient control systems that reduce energy consumption by up to 30%. Such systems typically use algorithms to optimize elevator speeds based on passenger demand. Destination management systems group passengers according to a specific floor, reducing the number of elevator stops and thereby reducing energy consumption.

Regular maintenance. Regular maintenance is essential for elevators to function efficiently. Neglected elevators may have worn components that consume more energy than necessary. Therefore, it is important to perform regular maintenance to ensure that the components of the elevator are in good condition. This includes checking the elevator's motor, brakes, bearings, and other components. Technical service and training. Maintenance and operation of energy-efficient elevators may require special training and maintenance procedures, which may require additional resources and expertise. Elevator equipment that operates more efficiently thanks to energy-saving measures will last longer, reducing the need for replacement or repair.

Using elevator planning. Elevator scheduling is a method of controlling elevator operation based on passenger demand. Elevator scheduling systems can significantly reduce energy consumption by optimizing elevator operation based on passenger demand. It involves grouping passengers going to the same floors and placing them in one elevator. Elevator scheduling

systems can reduce energy consumption by up to 30%.

Implementation of elevator modernization. If your building's elevators are outdated, consider upgrading them. Modernization includes the replacement of outdated components with energy-efficient and advanced technologies. This can significantly reduce energy consumption, improve performance and reduce maintenance costs. Modernization can also improve elevator safety and security.

Installation of an energy-efficient elevator cabin. An elevator car is a room where passengers ride. Installing an energy-efficient elevator car can significantly reduce energy consumption. Energy-efficient cabin components include LED lighting, efficient ventilation systems and energy-efficient materials such as high-pressure laminate.

Promotion of energy saving culture. Promoting a culture of energy conservation among building occupants and elevator users can go a long way in reducing energy consumption. Educate building occupants and elevator users on the importance of energy conservation and encourage them to turn off lights and fans when not in use. You can also install posters and signs in the elevator lobby and inside the elevator to remind users to save energy.

Implementation of energy management system. An energy management system (EMS) helps monitor and control a building's energy consumption. This can be done by measuring and analyzing energy consumption patterns and identifying areas where energy is being wasted. With this information, building managers can make informed decisions about how to reduce energy use in elevators and elsewhere in the building.

Installing an elevator energy monitor. Installing an elevator energy monitor can provide real-time information about an elevator's energy consumption. This helps building managers identify areas of energy waste and take steps to reduce energy consumption. An energy monitor can also help you identify when an elevator is performing poorly, which may require maintenance or upgrades.

Use of renewable energy. Renewable energy sources such as solar and wind energy can be used to power elevators. Installing solar panels on the roof of a building can generate electricity that can be used to power an elevator. This can significantly reduce energy consumption and the carbon footprint of the building. Additionally, renewable energy sources are becoming cheaper and more accessible, making it easier for buildings to adopt sustainable energy practices.

Using elevator sleep mode. The elevator's sleep mode is a feature that allows the elevator to enter a low-power state when it is not in use. This can significantly reduce energy consumption when the elevator is not in use. The elevator can be programmed to automatically enter sleep mode when it is not used for a certain period of time, for example at night or on weekends.

Optimization of elevator shaft ventilation. The elevator shaft is the vertical space in which the elevator moves. Ventilation is necessary to ensure that the air inside the shaft is clean and odorless. At the same time, the ventilation system can consume a significant amount of energy. Optimizing the ventilation system can reduce energy consumption by up to 30%. This can be done with variable speed drives, efficient fans and optimized ventilation ducts.

Installation of solar powered elevators. Solar powered elevators are an environmentally friendly and economical alternative to traditional elevators. They work with solar panels that generate electricity from the sun. This can significantly reduce energy consumption and the carbon footprint of the building. Additionally, solar-powered elevators are more affordable and accessible, making them a viable option for buildings seeking to adopt sustainable energy practices.

Use of energy-saving elevator accessories. Elevator accessories such as handrails, mirrors and signage can also contribute to energy consumption. Using energy-efficient accessories such as

LED lights for lamps and mirrors can significantly reduce energy consumption. In addition, the use of movable handles can reduce energy consumption when the elevator is not in use.

Using efficient HVAC systems. An elevator's HVAC system is responsible for maintaining a comfortable temperature inside the elevator. However, inefficient HVAC systems can consume significant amounts of energy. That's why it's important to use energy-efficient HVAC systems that can reduce energy consumption by up to 30%. Such systems typically use variable speed drives, high efficiency filters, and optimized fan blades.

Future trends. The integration of internet networking technology in elevators can provide real-time data on elevator usage, traffic patterns, and energy consumption, allowing building owners and operators to identify additional opportunities to optimize elevator operations and save energy.

CONCLUSION

Modern energy-saving technologies for elevators - use of energy-saving electric motors, use of efficient elevator control systems, use of energy-saving lighting, use of occupancy sensors, installation of regenerative drives, use of variable frequency drives (VFD), energy the use of energy-saving doors, the use of efficient elevator control systems, regular maintenance, the use of elevator planning, the implementation of elevator modernization, the installation of energy-efficient elevator cabins, the promotion of energy-saving culture, the introduction of energy management systems, elevator energy installation of monitor, use of renewable energy, use of elevator sleep mode, optimization of elevator shaft ventilation, installation of solar powered elevators, use of energy-saving elevator accessories, use of efficient HVAC systems all positively affect the performance quality of this facility and creates additional convenience for users.

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