International Journal of Engineering and Information Systems (IJEAIS)
ISSN: 2643-640X
Vol. 5 Issue 3, March - 2021, Pages: 189-191

The Main Energy Saving Measures In Industrial Enterprises And Their Effectiveness

Abdullaev Elnur, Umirzakov Azim

Faculty of Power engineering and Radio electronics, Jizzakh polytechnic institute, Jizzakh city, Uzbekistan
Uchqun8822@gmail.com

Abstract *— This paper discusses measures to improve energy efficiency in industrial enterprises, analyzes their impact on performance indicators, and describes their advantages and disadvantages.*

Keywords: system electrospinning, automated systems, informational and analytical system, rabbi process, reactive engine.

Introduction

Energy efficiency measures in industrial plants can be divided into several groups depending on their efficiency. Energy efficiency measures for industrial enterprises are divided into 3 types.

1. Energy efficiency measures. At the same time, energy saving measures are carried out with practically no additional costs. These activities include improving the quality of service of technological equipment; increasing labor discipline; activities such as compliance with technological requirements.

2. Average energy saving costs. These measures will be implemented through a partial reconstruction of the power supply system. That is, the replacement of the power supply system with some elements (transformers, cable lines, etc.) that go beyond the limits of energy consumption; implementation of reactive power compensation, etc.

3. Measures to improve energy efficiency. These actions can be accomplished by a complete reconstruction of the power supply system. Complete reconstruction of the power supply system of the enterprise; introduction of energy-saving technologies at the enterprise; introduction of an automated technical accounting or analytical information system, etc.

The above energy saving measures can be roughly divided into 3 types.

1. Operational activities.
2. Activities related to reconstruction.
3. Measures identified as a result of scientific research.

Operating activities. Operation of electrical equipment within the established regulatory parameters, improving the quality of service, maintaining technological electrical equipment in optimal operating conditions, etc. The main operated electrical equipment in the manufacturing industry is the electric drive and lighting equipment.

The main part of electricity consumption at the enterprise falls on the electrical machines of technological machines. Optimization of driving modes and adjustment of the power steering ensure high economic efficiency. Various factors can influence the inefficiency of electric drives. Reasons for inefficient electric motors:

- overload;
- work at low or high voltage;
- poor power supply;
- poor condition and service;
- low energy consumption by consumers.

Energy saving measures on electric drives include:

- rational choice of engine power;
- replacement of an engine with high energy performance;
- limitation of the operating mode and intensification of the work process;
- regulation of power quality;
- maintaining minimum operating modes;
- changing the engine clutch scheme depending on the application;
- adjustment of engine speed in accordance with technological requirements;
- adjusting the engine flow in accordance with the instructions;
- reactive power compensation.

Materials and methods

When operating the power grid, it is necessary to pay attention not only to the load values and operating modes of the transformers, but also to the phase symmetry. If this symmetry exceeds 15%, consumers are advised to move from one phase to another. Table 1 summarizes energy efficiency measures and their effectiveness in the operation of electrical equipment. These activities are most effective because of their duration.

- The main elements of the power supply system are transformers; what can lead to their ineffective work:
- overload;
- work at low or high voltage;
- poor power supply;
- poor condition and service;
- low energy consumption by consumers.

Table 1.

Energy saving measures during the operation of electrical equipment

№	Energy saving measures	Results	Energy saving,%
1.	Timely lubrication of the bearings of working machines	Reduces stress	up to 20%
2.	Timely cleaning of ventilation ducts	Reduces stress	up to 20%
3.	Fan capacity regulation	Reduces stress	up to 8%
4.	Restricting Equipment Salt Handling	Salt reduces waste	up to 1-5%
5.	Conversion of motors from "delta" to "star"	Reduces loss of energy	up to 1-5%
6.	Replacement of low-power motors	Reduces loss of energy	up to 1-5%
7.	Application of automatic machine switching	Reduces loss of energy	up to 2-5%
8.	Support for high-speed motors in short-acting motors	Energy recovery	up to 2-5%
9.	Installing equipment with high FIC	Reduces loss of energy	up to 2-15%

To reduce excessive losses in transformers, the following measures will be taken:
• reasonable choice of power, location and number of transformers;
• limitation (or loss) of the operating mode;
• removal of one of the low-voltage transformers at two transformer substations; power recompensation.

Discussion

A lighting network with optimal use of electric lighting and natural light allows you to save energy by using electricity efficiently. In many agricultural sectors, especially longer ones, voltage fluctuations are more common. Typically, the voltage drops below the reference. Reducing the voltage by 1% reduces the light flux in incandescent lamps by 3-4%, in fluorescent lamps by 1.5% and in DRL lamps by 2.2%. Lamps are usually overloaded. This leads to high power consumption and losses.

In order to avoid voltage drops, it is advisable to use voltage stabilizers to increase the voltage or reactive power supply of capacitor banks by connecting them to the daytime schedule in the lighting network.

In addition, organizational measures can significantly save energy. These include light colored walls and ceilings, lamp lighting, window cleaning, and so on.

With electric lighting, you can save energy by constantly cleaning your lamps, making good use of natural light, and turning off your lighting equipment in a timely manner. Illumination in dirty and dusty buildings is 8-10 times less. For this reason, higher wattage lamps are used more frequently.

Some businesses have seasonal jobs. In most cases, electrical equipment is in constant operation. It is advisable to install an automatic power off device that only works during activities or in the dark. In rural areas, the voltage drop occurs by a few p ercent at the end of the network. Therefore, the power of the lamps is usually increased. When the voltage decreases by 1%, the lig ht current decreases by 3-4%. It is recommended to use reactive power coverage equipment and voltage stabilizers to prevent voltage fluctuations in the network. Organizational measures are also important to save energy. These include: regular cleaning of lighting equipment, cleaning of walls and ceilings.

Electric lighting accounts for about 15% of the electricity consumption in the enterprise. The use of modern energy saving electric lamps is very economical.

The economic efficiency of the actions taken can be determined by the following expression:

$$\Delta W_e = \Delta P_{light} \cdot t_{light} + (P_{light} - \Delta P_{light}),$$

here, ΔP_{light} - reduced power of lighting equipment, kW;

t_{light} - annual operating time of lighting equipment, hour;

P_{light} - previous power of lighting equipment, kW;

Δt - reduction of annual working time, hours.

Conclusion

One of the main reasons for excessive electricity consumption is poor maintenance of electrical equipment. Consequently, improving the quality of services due to the above measures will have a great economic impact on the republic.

References

[1] Mirzaev, Uchkun and Abdullaev, Elnur, Mathematical Description of Asynchronous Motors (April 15, 2020). International Journal of Academic and Applied Research (IJAAR), 2020, Available at SSRN: https://ssrn.com/abstract=3593185 or http://dx.doi.org/10.2139/ssrn.3593185

[2] Mirzaev, Uchkun and Abdullaev, Elnur, Experiment of Open-circuit Voltage in 'EPH 2 Advanced Photovoltaics Trainer' Laboratory and Types of PV Cell (April 30, 2020). International Journal of Engineering and Information Systems (IJEAIS) Vol. 4, Issue 4, April – 2020, Pages: 41-46; ISSN: 2643-640X, Available at SSRN: https://ssrn.com/abstract=3623014

[3] Mirzaev, Uchkun and Abdullaev, Elnur, Study of the Electrical Characteristics of a Solar Panel for Multi-Residential Apartments Using a Computerized Measuring Stand 'Eph 2 Advanced Photovoltaic Trainer' (2020) . International Journal of Academic Engineering Research (IJAER) ISSN: 2643-9085 Vol. 4, Issue 4, April – 2020, Pages: 59-61 , Available at SSRN: https://ssrn.com/abstract=3622045

[4] Mirzaev, Uchkun, Experiment of Open-circuit Voltage in 'EPH 2 Advanced Photovoltaics Trainer' Laboratory and Types of PV Cell (April 30, 2020). International Journal of Engineering and Information Systems (IJEAIS) Vol. 4, Issue 4, April – 2020, Pages: 41-46; ISSN: 2643-640X, Available at SSRN: https://ssrn.com/abstract=3623014

[5] Mirzayev, U. and Tulakov Jakhongir Turakul ugl, J. T."THE MODERN METHODS OF USING ALTERNATIVE ENERGY SOURCES" // Central Asian Problems of Modern Science and Education: Vol. 4 : Iss. 2 , Article 165. 19-29 Pages

[6] Acarnley PP. Stepping Motors: A Guide to Modern Theory and Practice. 4th ed. London, IET; 2002. Pages: 85-86

[7] Hendershot JR, Miller TJE. Design of Brushless Permanent-Magnet Motors. LLC. Motor Design Books;