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## Intelligent Power Consumption Management Systems

Ugleva E.M.<sup>\*</sup>, Zmieva K.A., Kuznetsova E. V.

*Research and Education Center «Energy Efficiency in Industry», Moscow State University of Technology «STANKIN», Moscow, Russian Federation, 127994*

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### Abstract

In this paper we consider problems of creating and introducing intelligent management systems as one of the most important mechanism of increasing energy efficiency in industry. Operating principles of intelligent electric power distribution systems developed in MSTU «STANKIN» for AC and DC grids on industrial plants are described. Essential devices composing the systems are considered, their technical characteristics are described. Experimental results are presented.

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### 1. Introduction

Sufficient and constant energy providing is an important condition of national economy development. Permanently growing energy consumption, rates increase, significant losses while transmitting and distributing energy make necessity of energy saving and efficiency in all fields of national economy one of the major state problems. Nowadays creating effective energy supply systems is one of the world's most prospective trends of fuel and energy complex efficiency increasing. Increasing of efficiency and stability of consumers energy supply systems is achieved by means of equipping them with firmware and information

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<sup>\*</sup> Corresponding author: Tel.: +7-915-234-12-59; fax: +7-499- 973-31-52  
*E-mail address:* [kotik-fox@yandex.ru](mailto:kotik-fox@yandex.ru).

analysis and managing components which provide reliable and high-quality transmission of electric power from source to receiver at proper time and in proper amount [1, 2]. Such systems are called «intelligent» or «smart».

Globally speaking, «intelligent» network is a complex of technical means which allows to change characteristics of electrical grid immediately. On technological level aggregating of electrical grids, energy consumers and producers in united automatized system takes part, this system being able to monitor and control operating conditions of all its parts in real time [2].

Now in many developed countries active and successful introduction of intellectual energy supply networks is held. As a result of using intelligent systems in the USA electrical grid peak loads have decreased, electricity invoices have decreased by an average 10% , electricity cost having grown by 15%. In Europe financing programmes of «intelligent» networks in an amount of \$750 bln for next 30 years is provided. Nowadays the most active and widespread development and distribution of technology SmartGrid is seen in Denmark [3, 4].

According to «Energy Strategy of Russia for the period up to 2030», one of top-priority directions of scientific and technical progress in the field of electric energy industry is creating new-generation highly-integrated intelligent system-forming and distributing electrical grids in United energetic system of Russia.

## 2. Developing intelligent energy-saving electric power distribution system on industrial plant

According to stated above, MSTU «STANKIN» is carrying out researches on creating on an industrial plant an intelligent energy-saving electric power distribution system designed to increase efficiency of using electric power by means of making an automatized adaptive system for managing consumers with regard to individual peculiarities of equipment used on the plant. Operational scheme of system under development is shown on fig. 1.

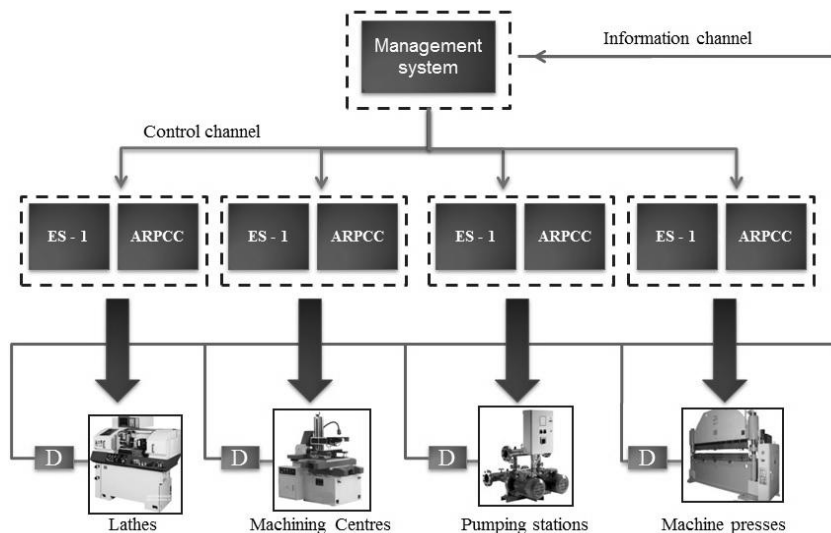


Fig.1. Principal scheme of intelligent electric power distribution system on industrial plant

The system under development includes:

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