
AUTOMATION AND HEAT CONTROL IN POWER ENGINEERING

Fitting the Russian Power Industry with Automated Control Systems: New Challenges and New Solutions

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Abstract—The main results of activities accomplished by the Interavtomatika Company for the last five years are presented. The problem of alternating the generations of applied computerized automation systems is considered. The effect the situation in the energy market has on the solutions for fitting power equipment with automation systems is shown. Special attention is paid to the problem concerned with participation of power units in controlling the operating parameters of power systems.

Keywords: level of automation, combined-cycle power plants, steam power installations, computerized automation systems, control of power system operating parameters, training simulators

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A lot of changes have occurred in the power industry as a whole, in its automation systems, and in the activities performed by the Interavtomatika Company for the five years since the time the preceding anniversary edition of the journal *Thermal Engineering* (No. 10, 2008) devoted to Interavtomatika was published. First, this relates to the composition of plants fitted with automated control systems (information about the commissioned projects is given in the table). Earlier, the scope of power units fitted with automated control systems included predominantly traditional steam power installations [1] (coal-fired and gas-and-oil-fired ones), whereas at present, combined-cycle power plants (CCPs) have come to the forefront. Second, in the first 15 years of its work, Interavtomatika's main activities were focused on retrofitting the monitoring and control systems (MCSs) of existing plants, whereas in recent years construction of new generating capacities has become much larger in volume, and in the predominating majority of cases these are CCPs.

An important change is also observed in retrofitting tasks, although they have become smaller in amount. Plants subjected to partial retrofitting carried out within the scope of automatic frequency and power control systems (AFPCSs) aimed at fulfilling the requirements of common and selective primary and automatic secondary control of frequency (CPFC, SPFC, and ASFC, respectively) [such partial retrofitting was quite popular in the 2000s] have become noticeably fewer in number. The customers have appreciated, and for absolutely good reasons, essential advantages of full retrofitting, which, in particular, is pointed out in [2], and adopt exactly this, more radical

but more fruitful way of retrofitting a power unit (provided that a sufficient amount of money is raised).

By now (the mid 2013), the number of projects developed and commissioned by Interavtomatika specialists has totaled around 120. More than 60 of them are projects of automated process control systems (APCSs) for large power units with a capacity of 100 MW or higher. In addition, 25 else projects, 15 of which are for large power units, are planned for commissioning in 2013. The figure shows the schedule of APCS projects for different types of large power units that have been commissioned by Interavtomatika for the entire time of its work.

Below, some of the fundamentally important aspects of the work performed by Interavtomatika for the past five years are considered. The lines of these activities are reflected in the articles of this issue.

ALTERNATION OF THE GENERATIONS OF COMPUTERIZED AUTOMATION SYSTEMS

For a long period of time, namely, from the commencement of Interavtomatika activities to the mid 2000s, the Teleperm XP-R system [3] served as the basic computerized automation suite/system (CAS) [3] using which the APCSs developed for large power units were constructed. The use of this CAS, which unites the lower level of a decentralized structure constructed on the basis of controllers (the TPTS-51 equipment) and the OM-650 upper-level system implemented according to a client–server architecture and running under the control of the UNIX operating system, made it possible to achieve an essentially higher level of fitting domestically made power-gener-