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AUTOMATION AND HEAT CONTROL IN POWER ENGINEERING

Solving the Problems Concerned with Modernization of Power Unit Monitoring and Control Systems Using the Distributed Facilities and Technologies Available in the SARGON Computerized Automation System. Part 1: Tools of PTC "Sargon" for Distributed Systems

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Abstract—The first part of this article describes the tools intended to construct distributed automated process control systems for the main thermal power equipment of power stations that are available in the SARGON computerized automation system.

Keywords: automated process control systems (APCSs), SARGON computerized automation system, distributed system

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The period of time for which the facilities used to automate technological processes become physically worn and outdated (the latter may become even sooner than the former) is much shorter than the service life of the main thermal power equipment of power stations. In view of this circumstance, the problem of expediently modernizing the monitoring and control systems (MCSs) of operating power units has always been a topical issue and will remain so in the future.

Till the late 20th century, the point of view in favor of a sweep-away approach for putting automated process control systems (APCSs) in use dominated, according to which the existing MCS had to be fully replaced. On the other hand, the use of advanced computerized automation systems or suites (CASs) for modernizing the control systems used in the majority of power installations was impossible due to a shortage of money available for investments. The obvious need for using modern monitoring and control facilities and a constantly growing cost of secondary instruments were factors that prompted the key suppliers of APCSs to gradually master the technology of fitting process equipment with automated control systems in several stages. Specialists of ZAO NVT-Avtomatika pioneered the development of such technology in the mid 1990s and have implemented it in the SARGON computerized automation system.

Although partial multistage modernization of MCSs has received general acceptance but still remains an intricate issue. The following matters present the most serious difficulties with such modernization:

(i) A limited space is available for placing new equipment.

(ii) The new monitoring, measurement, and control circuits must be matched with the unchanged part of the MCS.

(iii) The erection and adjustment work must be accomplished within a tight time schedule.

(iv) A limited financial support is usually provided for modernization.

Smaller expenditures of money for partial modernization of an MCS as compared with the use of new construction or sweep-away approach are achieved due to the fact that the new (modernized) system uses a considerable part of the equipment and materials available in the existing MCS. However, it should be noted that in the majority of operating power units, it is impossible to replace the central part of the relay and instrument-based control system by a modern CAS without subjecting the existing instrumentation and control devices (I&C) and their connections to essential modification. In this paper, we discuss the typical problems arising during multistage modernization of MCSs, as well as methods for solving them that have been developed by NVT-Avtomatika specialists based on the 15-year experience gained from carrying out such works. A detailed review of the automation tools NVT-Avtomatika specialists use for modernizing MCSs is beyond the scope of this paper and can be found in [1–7]; nonetheless, a brief characterization of these tools is required for the description of the proposed solutions that is given below.