The first research related to remote monitoring and control of the facilities in the electric power industry began in 1963 in the Institute Mihailo Pupin at the initiative of Belgrade Power Distribution Company (EDB). The aim of this research was to develop technologically modern and powerful system, which would be a solid ground for upgrading the control process at all electric power industry levels: energy generation, transmission and distribution.

This first systems developed as a result of research in this area were called ATLAS, later becoming the brand beyond the borders of our country. The research in this area was financed partially from our own funds and to some extent by the Ministry of Science of the Republic of Serbia. In the mid-nineties, relying on their own expertise and taking similar foreign products as a model, the Institute’s specialists developed the SCADA (Supervisory Control and Data Acquisition) program, the VIEW software package which, together with the ATLAS family hardware program (process computers, PLC equipment and data loggers), forms part of all segments of the Serbian Electric Power System.

Three decades after the first application of computers in the field of remote control, in 2004 IMP-Automation and Control started with the implementation of VIEW Power System - DCS (Distributed Control System) which nowadays represents the backbone of the system for control of thermal and hydro power plant operation. For supervision, management, statistics, data and events archiving and their analysis the software package POWER VIEW 6000 is used.

The up-to-date equipment incorporated into DCS allows more reliable supervision, improved regulation and a higher automation level in block control. In addition, higher security and reliability of operation, process optimisation, enhanced operation efficiency and flexibility, shorter start-up and shut-down times, faster fault location as well as easier and faster fault elimination are provided. These advantages result in reduced plant operation costs which make the block more economical and the required modernization investment fully justifiable. It should be mentioned that a thermal block being out of operation for just a single day makes a loss in the amount of 100.000 Euro. Computerized supervision and archiving of all generator data as well as simple numerical and schematic presentation of trends changing in a particular time period represent a reliable ground for determining the length of the remaining lifecycle of the vital, highly loaded, components of the main block equipment. In this way the adjustment of plant operating modes and generation parameters of the block load and the extent of the necessary repair works and maintenance costs is determined increasing the overall security of the plant.

The investment made so far in the repair of the blocks of Serbia’s thermal power plants has increased the capacity of old blocks by almost 400 MW. Thanks to constant investments, the Nikola Tesla thermal power plants increased its production from 15.3 to more than 18 billion kilowatt hours (kWh) of electrical energy in the period 2000-2007. In the period 2004-2009, the Electric Power Industry of Serbia (EPS), during the ongoing capital repairs of TPP "Morava" (125 MW), blocks in TE "Nikola Tesla A" (210-320 MW), and "Kostolac B", "TE-TO Novi Sad", entrusted us to perform the reconstruction of the control system in these thermal power plants. Thanks to these tasks the systems developed at the Institute represent the backbone of the electrical system in Serbia. The huge technological breakthrough was achieved and the team of experts was completed, capable of performing similar tasks with high quality standards and in this way putting the Institute Mihailo Pupin in the same line with large multinational companies producing and delivering DCS systems. We are especially proud of the quality and reliability of our devices that are in the very top and are our best recommendation for the further penetration of markets around the world.
**DCS IN HYDRO POWER PLANT OPERATION**

Constant efforts on improvement of computer controlled hydro power plant operation led to the hydropower system View H-Power, with the following main features:

- Generator and block transformer control and protection systems
- Integration with new turbine governor systems LMZ Russia (Djerdap 2)
- Integration of old turbine governor systems HPP Vrla 1.
- Integration of new generator thermal protection systems (Djerdap 2)
- PLC systems standards, IEC 61131series
- Redundant control and protection systems
- Integration into the central hydro power plant control system
- Integration with AK1703 ACP (SAT Automation – Vatech) systems.

View H-Power provides an increased volume of information, new reliable sensors and multiple (redundant) supervision of quantities provide an operator with a timely warning of the violation of some process parameter values, protecting, thus, the equipment from higher wear rates and undesirable defects. All this ensures a longer equipment lifecycle.

Visual presentation functions are adapted to the needs of operating personnel and permit easy on-line monitoring of existing generator status. Archiving functions provide the possibilities of analysing equipment and personnel operation as well as diagnostics of problems, if they arise during exploitation.

**References:**

“Djerdap” power plants with 1.328 MW installed power provide about 15% of the power of EPS power plants and 20% of the total Serbia’s electrical energy generation. They consist of “Djerdap 1” Hydro Power Plant (HPP), “Djerdap 2” HPP, “Pirot” HPP and “Vlasina” HPP.

The Contract signed between the IMP - Automation & Control Ltd and the Public Enterprise for Hydro Power Production “Djerdap” involved the delivery of equipment and spare parts required to modernize the control boards of generator units and the block transformer in the “Djerdap 2” extra HPP.

This was the first job of modernization of hydro power plant which has given the opportunity to the Institute’s experts to find the best solution for the control and management of future hydro power plant operations.