

## Maintenance and revamping of two Hydros power stations by ABB



**Upgrading only the control part of a static excitation system to the latest technology allows the power generation installations to be revamped with reduced costs.**

In case of malfunction or obsolescence problems on excitation systems, replacing only the control part is an excellent solution as an alternative to replacing the entire panel, both in thermoelectric installations and in hydroelectric installations, guaranteeing maximum reliability of results with reduced investments and impact. Two good examples are the operations completed by ABB on behalf of Hydros, a company with headquarters in Bolzano that manages seven hydroelectric power stations in Trentino Alto Adige. Established in 2008, Hydros' goal is to exploit water resources in the Province of Bolzano to the benefit of the general public, companies and public agencies, providing electrical energy in complete respect of the environment and its natural beauty.

### The context

The Barbiano-Ponte Gardena, Marlengo, Lasa- Martello, Brunico, Prati di Vizze, Premesa and Curon installations generate a total of 1,000 GWh of electrical energy for a total installed power of 246 MW. Some of them date back to the early decades of last century and include structures with

artistic value that are preserved in their original look, whereas the machinery, electronic and mechanical switchgear and controlgear are periodically upgraded and brought up to modern technological standards. In 2012 ABB obtained the maintenance contract for 12 excitation systems in the power stations (three ABB systems and nine by another supplier) and therefore a series of surveys on the installed base were conducted. Shortly after the collaboration began, two different needs were found where changes needed to be made.

### Problems and implemented solutions

The first action was required in Marlengo power station, which exploits the waters from the Adige River. Established in 1899, expanded in 1924-1926 and radically revamped between 2002 and 2004, it has three generator units: unit 1 is made up of a 25,000 kW Francis turbine and a 30,000 kVA alternator, whereas units 3 and 4 (numbered this way for historic reasons), each include a 9,300 kW Francis turbine and an 11,000 kVA alternator. The installation is controlled remotely by the Bolzano Energy Conduction Center. The unit 1 excitation system, which was not an ABB unit, no longer provided a sufficient grade of reliability and the tuning hardware part was rather old. After analyzing several possibilities, given the ability of the ABB engineers to work on all the machines, the decision was made to conduct a revamping operation based on replacing only the control part.

The operation was carried out during a machine shut-down which had already been scheduled for other urgent operations.

The static excitation system was shipped to the ABB workshop where the complete control section was disassembled from the existing panel and new Unitrol 6000 ABB control platform was assembled, as well as auxiliaries and the interface with the existing thyristor bridge. All the power part, including thyristor bridge and de-excitation system, as well as part of the auxiliary relays, were recovered because still in good condition and compatible for operation with the new control system. When assembly was completed, testing was performed at the factory. Once the system was taken back to the power station and installed, it was tested, settled and commissioned by an ABB engineer. Since operations were completed, the installation has been operating regularly and no problems whatsoever have been found. The disassembled electronics part was stored in Customer warehouse to be used as a spare part for other machines from the same manufacturer.

It is important to point out that Hydros was able to accept the ABB proposal, definitely less expensive than completely replacing the excitation system, thanks to the fact that the

supplier guaranteed full compatibility of the existing power parts with the new control platform.

The second operation was performed on the Lasa-Martello installation, built between 1952 and 1954, which uses the waters of some tributaries of the Adige and includes a horizontal axis generator unit made up of a double impeller Pelton turbine rated 63,000 kW combined with an 70,000 kVA alternator.

There, ABB conducted a similar revamping operation on the control system for one of its own static excitation system. Since a long stoppage was not scheduled for the machine, disassembly and reassembly operations were conducted on site by the customer under the supervision of ABB engineers who then performed the necessary tests and start-up procedures.

ABB has vast experience in upgrading the control part of static excitation systems, with over 35 similar applications successfully performed since 2003 mostly on large thermoelectric installations.

ABB is the only company in Italy that consistently performs this type of operations even on machines supplied by other manufacturers.



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