IQ Intelligent actuators for renewable energy in **solar power plants**

The Andasol 1 plant in the Spanish province of Granada is Europe's first parabolic trough power plant and the world's largest solar power plant. The plant's 510,000 m² collector surface area provides a generating capacity of 50 MW, enough to meet the annual electricity demand of 50,000 households or 200,000 people.

Andasol 1 Solar Power plant, Granada, Spain.

The success of Andasol 1 and sister plant Andasol 2 has reinforced the argument for the construction of similar renewable energy plants, many of which are now in progress throughout the world.

The parabolic trough is constructed as a long parabolic mirror with a Dewar tube running its length at the focal point. Sunlight is reflected by the mirror and concentrated on the tube, where it is absorbed by heat transfer oil flowing through it. The oil is used to heat steam in a conventional turbine generator.

At both of the Andasol sites Rotork IQ intelligent electric actuators with Pakscan 2-wire digital control have been specified for valve control in all areas of the generating process.

Pakscan digital control

Rotork Iberia worked closely with the plants' engineering company, to integrate an economical and efficient actuation and control system into the overall plant design.

The decision to use Rotork's Pakscan 2-wire digital control was assisted by the system's extremely long range bus capabilities and cost savings. Designed specifically for the spacious environments associated with the majority of valve actuator installations, Pakscan can operate a loop of up to 20 kilometres in length without any deterioration in communication performance or the need for repeaters. This has enabled over one hundred actuators at each Andasol site to be controlled and monitored with a single bus loop. Each loop is supervised by a Pakscan P3 120 channel master station, which provides the communication interface with the plant's control centre.

Mike Howard, Rotork System Sales Engineer, with an IQ actuator and Pakscan P3 Master Station.

Control, monitoring, interrogation and configuration of each actuator is also available at the master station, offering increased flexibility to the operator. In addition, thanks to the web server installed as standard in the P3 master station, the operator in the main control centre will always have a clear picture of the condition of all the actuators on the loop at all times, even in the event of a failure of the main plant control system.

Isolating and modulating actuators

The main pipework circuits on a parabolic trough power plant comprise of the HTF (Heat Transfer Fluid) thermal oil pipes that carry the heat transfer oil around the mirrors, the steam plant and the power generation circuits. In addition, a liquid salt heat storage circuit is installed to enable electricity to be generated for up to 7½ hours after the sun has set.

In all plant areas, on-off valve control has been achieved using IQ multi-turn and IQT quarter-turn electric actuators. For the control valves on each of the networks, IQM modulating actuators were selected, equipped with Rotork Folomatic proportional controllers and CPT current position transmitters, operating from a 4-20 mA control signal.

For the long term

Data loggers within each actuator facilitate diagnostics by recording historical operating data and valve torque trends.

Using Rotork's IQ-Insight software, this data can be analysed in the office to predict any potential operating issues. Maintenance can therefore be planned in advance. A second contract has since been awarded for Extresol 1 and Extresol 2, two similar plants which will be operational in 2010.