

# Pain-free migration keeps the steam flowing at Cartagena

Power plants need to upgrade control systems to improve reliability and efficiency, but also want to avoid extended outages. The Cartagena CHP plant (pictured below), owned and operated by Iberdrola subsidiary EnergyWorks, successfully balanced these demands and achieved a pain-free system migration.

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**W**hile control systems that were installed ten years ago may have been considered 'state-of-the-art' at the time, they now lack the flexibility and advanced control capabilities of more modern systems. In addition, their speed of response may compromise a plant's ability to react to changes in demand.

However, the desire to improve plant performance through a control system upgrade is very often outweighed by concerns over extended downtime and missed generation opportunities that can have a huge impact on plant income. Balancing potential plant performance improvement levels with lost revenue that could occur as a result of both planned and potentially unplanned downtime is an important consideration.

The need to improve control system performance while ensuring that system migration would not affect operations was exactly the problem facing the EnergyWorks Cartagena power plant located on the south eastern coast of Spain.

The 95 MW power plant is a twin-gas-turbine combined cycle cogeneration facility, which provides power to the grid and around 300t/h of steam to the neighbouring SABIC polycarbonate manufacturing plant. The plant includes two additional fuel boilers, which are used to provide extra steam.

The plant was built in 2001 and the control systems were in need of a significant upgrade to improve responsiveness and ultimately help maximise production efficiencies and extend the life of the plant. However, because of the intimate relationship between the power plant and polycarbonate production, EnergyWorks was concerned about interrupting the supply of steam, as well as lost revenue while the facility was off-line. The benefits of the systems upgrade therefore had to be balanced against the plant's obligation to maintain the supply of steam to SABIC.

## Seizing the opportunity

An opportunity arose to perform the control system migration when SABIC decided on a scheduled outage of its Lexan-1 plant. During this time, the demand for steam would be reduced from around 300t/h to 170t/h. This coincided with a scheduled outage for the CHP plant, providing EnergyWorks Cartagena with an opportunity to upgrade its control systems with minimum disruption.

Emerson Process Management took up the challenge of ensuring that the migration



project ran smoothly and was completed on time. The scope of the work included the installation of new Ovation™ controllers and an Ethernet network to replace the existing FDDI network. The operating software was upgraded to Windows 7 and Server 2008. The workstations were replaced while the existing field devices and I/O modules were retained. All of this work was completed during the 10-day scheduled shut down of the plant.

A key factor in the success of this project was the close co-operation between EnergyWorks and Emerson prior to the outage, as well as during the execution phase.

The control systems at Cartagena are split into two sections, one covering the CHP plant and the other covering the separate fuel boilers. The upgrade was performed in two phases to minimise revenue lost due to the power station being off-line, and ensure a continuous supply of steam for SABIC.

Various components of the project were completed in advance of the shutdown, including transfer of the existing control logic to the new Ovation controllers.

On-site work included upgrading of the fibre optic cables to provide additional data capacity and the installation of a parallel control system for testing. This comprised the new network hardware, controllers, servers and workstations, and control system applications.

Following installation, the new hardware and migrated application algorithms were fully tested using tie-back simulation to verify analogue controls and graphics, provide feedback on field equipment such as motors, and simulate digital point feedback including on/off or open/closed status.

As part of the advance planning, EnergyWorks Cartagena analysed the process to determine which control loops needed to be

kept on-line during the separate shut downs of the CHP and fuel boilers in order to maintain the local operation of auxiliary services. These critical control loops were copied across controllers of the subsystems (CHP and fuel boilers). Since they all belong to the same system platform and share engineering tools, copying control loops across controllers was accomplished quickly and efficiently.

During the first phase of the outage, the CHP was shut down and steam was provided by the fuel boilers. Emerson engineers worked in the CHP control room replacing the network and controller hardware, servers and workstations. When this part of the project was complete, EnergyWorks – supported by Emerson – started the CHP and ran it up to full load. This meant that the supply of steam to the plastics plant could be switched from the fuel boilers back to the CHP.

During phase 2 of the project, the fuel boilers were shut down and Emerson replaced the network and controller hardware, servers and workstations, and tested the new system for correct functionality.

## Improved performance, no interruption

This was a particularly challenging project with very tight timescales. But the advance scheduling and planning ensured that the upgrade was completed within the scheduled 10-day outage period – minimising lost revenue and without interrupting the supply of steam to the plastic production site.

Following the upgrade, reliability and efficiency has improved and the plant is able to respond more quickly to changes in customer demand. The Ovation system also provides EnergyWorks with a platform designed to easily incorporate the latest developments in communications, data processing and advanced applications. 