“The utility optimization scheme at our site not only provides the most economical and optimal production scenario in terms of unit loading and fuel selections, but also delivers multi-period financial insights enabling us to make longer term operational and contractual decisions. The results were and are really amazing.”

- Joao Coelho, Advanced Control and System Leader, Repsol Polimeros Sines, Portugal

**Background**

Repsol Polimeros is the largest chemical company in Portugal and a member of Repsol, an integrated international oil and gas group with activities in over 30 countries. The company operates a petrochemical refinery located in Sines, Portugal, approximately 160 km south of Lisbon.

The Sines complex has six fuels available in various amounts for the production of heat via three high-pressure steam boilers (120 bar, 520 degrees C, 190 t/h) and one medium pressure auxiliary boiler (45 bar, 400 degrees C, 50 t/h). The high-pressure steam is distributed over five steam headers at different pressure and temperature levels via either a 35 MWe back pressure turbine with two extractions or several pressure-reducing and de-superheating stations. A 22 MWe condensing turbine is available to produce extra MWe if needed. Two parallel feedwater streets with heaters, de-aerators and hot water tanks are also available to feed the boilers with clean and conditioned water. The necessary pumping capacity is provided by several electrical and turbo pumps.

The Sines site used to operate using two feedwater streets—the condensing set as well as the back-pressure turbine—and multiple boilers controlled by a Honeywell Experion® Process Knowledge System (PKS) based on C200 controllers and SIL 3 burner and boiler protection. The facility also relied safety systems previously installed by Honeywell.

**Benefits**

The global utility optimization solution employed by Repsol Polimeros calculates the optimal production scenario based on an economical and physical model of the plant power station within its process and mechanical constraints. This solution enables utilities to minimize their variable costs in order to maximize profitability. It is particularly beneficial in operational scenarios involving: multiple fuels at different cost and CO₂ emission levels, units (boilers/turbines) with different characteristics and efficiencies, steam headers with pressure and de-superheating stations, and redundant feedwater production streets.

The optimization solution is also helpful in instances when there are different electricity contracts with constantly changing prices and process demands. Operations personnel receive essential information enabling them to act in the best interest of the entire site.
Repsol improves business performance with advanced utility optimization solution

Advanced utility optimization scheme.

The multi-period (from hours to years with any time resolution) and multi-case (different loadings, unit enabling/disabling) capabilities of the solution provide insights on “what if” scenarios covering longer periods of operation. As such, industrial facilities can assess the financial impact of certain choices and perform sensitivity analyses looking forward into the future.

For Repsol Polímeros, utilization of this optimization solution not only generated in-depth knowledge of physical and financial relations, and thus challenged certain KPIs or the way they were calculated and reported in the past, but also provided objective financial justifications for future improvement projects.

Additionally, the ROI from the solution was realized in terms of days—making it even more attractive. This result was achieved due to Honeywell’s extensive knowledge of the Sines power station, and its ability to provide effective control and protection systems as well as fine-tuning and consultancy.

Challenge
Due to increasing prices for fuels and electricity, and the volatility of the market, Repsol Polímeros explored various available technologies before selecting a solution from Honeywell based on the extensive knowledge of the site and ease of integration with Experion PKS open system software. The utility optimization problem, however, remained challenging since it not only presented a number of critical variables, but also involved switching unit on/off decisions as well as non-linearities of the model.

For the Sines facility, electricity prices were based on three different contracts:

1) Import electricity price based on market pricing with a 15-minute resolution.
2) Back-pressure export price to Repsol internal.
3) Condensing set export price to the Portuguese grid under the CHP law at a 15-minute resolute and based on the total month export.

Different price regimes for the hour-of-the-day, day-of-the-week and season-of-the-year (including holidays) made the model challenging from a mathematical standpoint.

Solution
Repsol Polímeros’ utility optimization solution is based on Microsoft® technologies such as MEDEX (Microsoft Excel® Data Exchange), Excel, Visual Basic, Microsoft Task Scheduler, Honeywell’s water & steam properties Excel add-in, and Frontsys’ mathematical solver Excel add-in. In conjunction with these technologies, Experion Server points and Human-Machine Interface (HMI) solutions provide flexibility in defining, solving, integrating and maintaining the optimization approach, allowing station personnel to run the application on-line and off-line on multiple laptops and servers—even at home.

About Experion PKS
Experion PKS integrates an advanced automation platform and innovative software applications to improve users’ business performance and peace of mind. Unifying people with process, business and asset management, it helps process manufacturers increase profitability and productivity. Experion PKS is the only automation system that focuses on people—making the most of the knowledge they hold. By integrating disparate data across facilities, making the most of resources and people, and feeding it all into a unified automation system, users can achieve an operation that’s more proactive, efficient and responsive.

For More Information
Learn more about how Honeywell’s Experion PKS solution can optimize your operational performance, visit our website www.honeywellprocess.com or contact your Honeywell account manager.

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