

Advanced Control Project Yields Three Month Payback for Petrogal



Profile

Petrogal, a division of Galp Energia, is Portugal's largest oil refiner and one of the largest contributors to the Portuguese economy. Galp has annual revenues of EUR 6.9B and a net income of EUR 114.5M. Petrogal is involved in various business activities within the oil and natural gas sector, including exploration, production, supply, refining, petrochemicals, and logistics & distribution.

The Sines Refinery is Petrogal's largest production plant, producing 225,000 barrels per day, converting crude oil into a wide variety of refined products, such as motor gasoline, diesel, aviation fuels, Liquid Petroleum Gas, and heavier fuels. The refinery's distillation capacity is 10.4M tons per year and its storage capacity runs to 3.4M cubic meters, of which approximately 50% is dedicated to crude oil. The refinery's main business activities are focused on markets in Spain, Portugal, and Africa.

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Dora Nogueira
Head of Process Control Team
Galp Energia – Petrogal – Sines Refinery

Business Challenge

Over the last ten years, there has been an intense focus on process automation modernization at Petrogal's Sines Refinery. The overall effort has been focused on achieving optimum levels of production required to respond to the changing needs of the market. The modernization vision included complete automation of the refinery, from the field instruments to the Distributed Control Systems (DCS), which would be integrated with information systems for the control and monitoring of all the process information and data.

As part of its focus on modernization, Petrogal management recognized that a key factor for the optimization of each business process would be the improvement of data information visibility through process information integration, coupled with Advanced Process Control (APC) to improve unit economics. Petrogal expected to achieve the following business objectives by implementing information management and advanced process control solutions at the Sines Refinery:

- maximize throughput
- maintain quality control at its maximum while adhering to regulation compliance
- identify improvements in real-time operations at the plant and enterprise levels

Solution

During the selection process, Petrogal tasked AspenTech with an APC pilot project using DMCplus™ for the reconfiguration of the Crude Distillation Unit (CDU). This pilot project included factory modeling & simulation, predictive control, and control & optimization for on-line quality control and LP optimization of the atmospheric distillation and fractionation process units of the refinery.

The project methodology included a successful performance risk sharing between AspenTech and Petrogal, which was considered a key differentiator factor for AspenTech. It was based upon performance criteria to be accomplished subject to bonus and penalty terms of payment.

The project was successfully deployed in order to take advantage of revamping control equipment during a Year 2000 refinery turnaround. "We did a plant control test run analysis of the payback for implementing APC on the CDU unit, comparing the results with and without AspenTech products. Based upon our experiment, we found a payback of three months," said Nogueira. On average run, Petrogal found an approximate return on investment of less than six months.

Following the success with the CDU, Petrogal selected DMCplus for advanced control and InfoPlus.21™ (IP.21) for its information management system and as its corporate-wide standard.

Petrogal also chose to implement Aspen IQ™ for inferential calculation and AspenWatch™ for control performance monitoring and diagnosis.

There are a total of four main DMCplus controllers implemented at the Sines Refinery:

- **Crude Distillation Unit** – two main DMCplus controllers (CDU and DIP)
- **Fluid Catalytic Cracking Unit (FCC)** – two main DMCplus controllers (FCC and DEPROP)

The CDU APC project was installed with two main DMCplus controllers, one for the crude and fractionation section and another one for the desisopentanizer section. This split was determined based on the different ranges of time to reach steady-state. The biggest DMCplus controller has a set of eight subcontrollers respectively for each of the four sections of the two furnaces, the preheat train, the main column, the debutanizer column and the splitter column. The Desisopentanizer DMC controller has three sub-controllers.

In 2002, Galp Energia and AspenTech started another APC project for the process units of the FCC and the two vacuum distillation units (VDU) at the refinery. By December 2002, the FCC DMCplus controllers were successfully commissioned with an approximate return on investment of less than six months.

Today, IP.21 is one of Sines' key platforms, with a database of approximately 50,000 tags used by engineers and technicians to monitor and optimize the performance of the operations, maintenance, corrosion, and a variety of processes related to the daily analysis required to optimize and run the refinery. The data, which includes five years of history, enables plant managers to continually perform root cause analysis and analyze and compare operational performance at any plant and across the enterprise.

Business Benefits

Dora Nogueira attributes much of the success to the operation team's sense of project ownership, which stems from their continued participation in the implementation, from basic engineering up through the final commissioning. "One of the major reasons for our success has been

About AspenTech

Aspen Technology, Inc. is a leading supplier of enterprise software to the process industries, enabling its customers to increase their margins and optimize their business performance. AspenTech's engineering solutions, incorporating Hyprotech's technologies, help companies design and improve their plants and processes, maximizing returns throughout their operational life. AspenTech's supply chain manufacturing solutions allow companies to run their plants and supply chain more profitably, from customer demand through to the delivery of the finished product. Over 1,200 leading companies rely on AspenTech's software every day to drive improvements across their most important engineering and operational processes. AspenTech's customers include Air Liquide, AstraZeneca, Bayer, BASF, BP, ChevronTexaco, Dow Chemical, DuPont, ExxonMobil, GlaxoSmithKline, Lyondell Equistar, Merck, Mitsubishi Chemical, Shell and Unilever. For more information, visit www.aspentech.com.

because we encouraged a close working relationship between Galp Energia and AspenTech. AspenTech always focused on the needs of the operations team because in the end they will be the ones to capture the benefits. A close relationship continues to enable us to overcome any technology, resource and capital constraints and ensure success."

Some of the major business benefits include:

- **Maximum throughput for every unit** – in the first year of operation, Petrogal calculated that the *throughput increase would be between 6–7% under ideal conditions and 3–4% under average conditions*
- **Increased stability of operations** – an aggregated real-time view of the process allows easy access to view where the process limitations lie and how those limitations may be relieved
- **Quick payback** – Petrogal received payback on its investment in less than three months under test run conditions (CDU unit) and six months (FCC unit) on average run

Vision

The VDU's DMCplus controllers are expected to be commissioned in 2003 and a performance test run is expected to be done subsequently to evaluate the overall ROI for both the FCC and VDUs. Both APC projects were managed together in order to maximize synergies and minimize implementation costs without reducing the control applications quality levels.

Regarding the future use of AspenTech's products at Petrogal, Nogueira notes, "Middle- and long-term plan of investments is aimed at using the technology and expertise of AspenTech's tools and people at the Sines Refinery to improve profit on a continual basis and maintain competitive and sustainable advantage within the highly competitive business of oil refining." A few examples include implementing advanced process control on other main process units, such as the visbreaking and alquilation units, as well as real-time optimization for units with a high potential for improving their operating margins.



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