

DRIVING ECONOMIC AND ENVIRONMENTAL VALUE AT SARLUX REFINERY

Advanced Process Control Delivers
Economic and Environmental
Value at Sarlux Refinery

SARAS Case Study

CUSTOMER QUOTE

“We believe
in advanced
process control.”

Sonia Sulis, Advanced Control
Department Supervisor, Sarlux

Honeywell

ADVANCED PROCESS CONTROL DELIVERS ECONOMIC AND ENVIRONMENTAL VALUE AT SARLUX REFINERY

The latest advanced process control (APC) system installation in a partnership that spans a quarter of a century delivered 10% steam savings reduction and lowered carbon emissions by 6,200 tonnes/year with a return on investment (ROI) in less than six months.

BENEFITS

A primary driver for implementing an APC system at a refinery or petrochemical plant is potential cost reduction, which is realized by optimizing production, reducing energy consumption, and improving product quality. With the emergence of net zero goals and the effort to reduce greenhouse gas emissions, including carbon dioxide (CO₂), many industrial sites are re-evaluating operations to improve efficiency in an effort to not only reduce cost but also lower emissions.



The recent APC installation of Honeywell Profit™ Suite R502 at the Sarlux refinery in Sardinia, Italy, resulted in cost savings for the owner and helped reducing CO₂ emissions.

BACKGROUND

A subsidiary of Italian energy company Saras Group, now part of Vitol, Sarlux operates one of the largest refineries in the Mediterranean. Located on the Sarroch industrial site, Sarlux is the largest single site in the region, with a capacity of 300,000 barrels/day, which constitutes approximately 20% of Italy's refining capacity. It is

a top-tier site in terms of complexity and size, with a Nelson's complexity index of 11.7, and focuses on high-conversion to high-value products.

Historically, plant optimization focused on yield maximization and high-value product giveaway reduction. While energy savings has always been a consideration, it has not usually been a high priority. However, with the increased global focus on reducing emissions, energy efficiency and CO₂ emissions reduction have become significant economic and environmental drivers. These considerations contributed to Saras'

decision to invest in new APC systems for its petrochemical production units integrated with its refining operations.

Sarlux has a long history of using APC, with more than 10 applications in use prior to this installation. The site started implementing APC solutions with applications in its three crude units and fluid catalytic cracking unit and then expanded into additional secondary process units, including its reforming and alkylation units. Because of its early investment in applying APC solutions Sarlux has a highly skilled internal APC team and has developed some of its control schemes internally.

Capitalizing on a long-standing relationship with Honeywell and an existing site license for Profit Suite—part of a Connected Plant portfolio that provides solutions for optimizing operations, improving stability, and sustaining plant performance—Sarlux elected in 2023 to begin preparations to implement an additional APC application at the Sardinia plant.

CHALLENGE

SARAS had realized efficiency gains from prior installations of APC systems and wanted to capture comparable benefits from an additional installation. The goals were to maximize throughput, save energy, maintain quality control, and reduce Scope 1 CO₂ emissions by applying an automated system on the FORMEX units that are used to split aromatic components into high purity benzene, toluene, and xylene streams.

SOLUTION

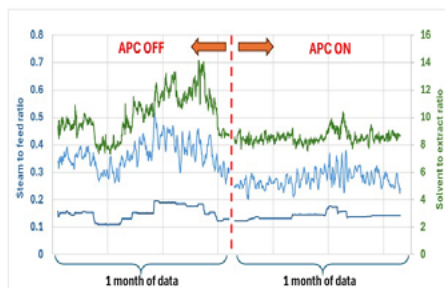
The advanced control applications installed on the FORMEX units were created using Profit Suite R502 on a third-party license and were developed by Alpha Process Control, a Honeywell Process Solution Channel Partner. Based in Pisa, Italy, Alpha Process Control has worked with SARAS since 2013 and has executed more than 200 APC and optimization projects across the globe including Europe, Asia, the Middle East, and the Americas.

Prior to this APC implementation project, the SARAS production team hypothesized that the medium pressure steam to the benzene distillation column section was being kept higher than necessary to avoid off-specification benzene product. Although the SARAS team wanted to optimize the benzene column, they were hindered by the fact that laboratory samples were available only on the feed stream, so they had no composition measurements from the bottom of top of the column. Working with the highly

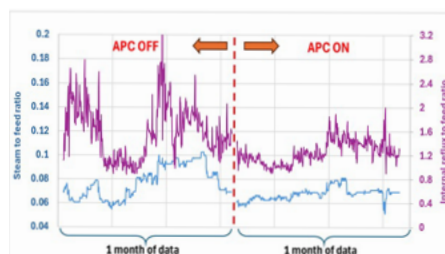
skilled Sarlux APC team, Alpha Process Control performed a system analysis to understand the processes and products used. The team developed a rigorous column simulation and considered a wide range of feed quality options.

The APC team used the results of the simulation and analysis to develop two applications to optimize the FORMEX extraction section layout and benzene distillation column layout, focusing on the solvent: extract ratio and the internal reflux: feed ratio. The final system APC solution for the extraction section and benzene distillation column used 13 manipulated variables (MVs) and 17 controlled variables (CVs).

The applications were designed to be almost entirely autonomous. Under normal operating conditions, the operator is only required to set the feed targets for the two sections.



Extraction section: Steam rates reduction due to improved control of the solvent-to-extract ratio set at 8.5



Benzene distillation section: Steam rates reduction due to improved control of the internal reflux to feed ratio.

Implementing the APC enabled the refinery to achieve three critical energy optimization goals:

- Saving low-pressure steam on stripper and the distillation aromatic column
- Saving medium-pressure steam on the distillation benzene column
- Increasing product quality by minimizing giveaway on specific requirements.

With these systems in place as of January 2024, Sarlux captured a combined total of 10% steam savings from the three energy optimization goals and reduced Scope 1 CO₂ emissions by 6,200 tonnes/year with an ROI realized in less than six months.

PLANT SECTION	APC EFFECT	STEAM SAVING*
Stripper column	Solvent reduction	4%
Solvent distillation column	Solvent reduction water reflux reduction	11%
Benzene distillation column	Optimization	15%
Total		10%

*Calculations provided by Sarlux, not Honeywell. Honeywell does not verify the accuracy of this data.



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