

Optimising process performance



Process knowledge is key to success in optimising refining process performance, reports Randy Wagler, Senior Product Manager, Honeywell Process Solutions.

Hellenic Petroleum is the largest oil refining company in Greece. A consortium of nine subsidiaries and several additional companies; the main activities are refining of crude oil, marketing of petroleum products, and exploration and production of hydrocarbons. It operates three refineries in Thessaloniki, Skopje and Aspropyrgos in Greece, as well as a network of 1,400 service stations, meeting some 73% of domestic fuel demand. The company also operates some 300 forecourts in Albania, Georgia and the Republic of Macedonia.

Faced with stringent environmental regulations and declining refining margins, Hellenic needed to find new ways to meet its production goals and overall financial objectives at the Aspropyrgos refinery. The company identified that the best way to keep margins up would be by optimising performance and finding the best combination of feed and processes to produce valuable products. However, the challenge was the sheer number of processing units that needed to optimise

performance. The refinery has a reformer, isomerisation unit, benzene saturation unit and two naphtha hydrotreaters. All are large-scale, multivariable applications with various controlled variables, manipulated variables and disturbance variables to be accounted for and optimised.

The solution

Hellenic entrusted the task of optimisation to Honeywell, which studied the processes at the Aspropyrgos refinery and identified the areas that could yield maximum benefits with little investment. Maximising the MON (motor octane number) of the reformat and isomerate pool, maintaining the LSR-HSR (low sulphur residue to high sulphur residue) balance, controlling benzene and optimising the cutpoints of the naphtha splitters and stabilisers emerged as some of the key optimisation objectives.

The solution involved implementing Profit[®] Controller and Profit Optimizer from Honeywell's Profit Suite™ product line for advanced control and optimisation of these critical processes. Profit Optimizer is dynamic, allowing optimisation to continue even when the process is not steady. It has the ability to span multiple process units or entire process plants to deliver improved plant profitability and overall plant control. The software integrates with Profit Controller applications to deliver cost-effective and user-friendly solutions to real-time optimisation (RTO) problems. Rather than steady state, Profit Optimizer relies on measured process

relationships and fully leverages dynamic process information that resides in the underlying Profit Controller applications. Using this approach, Profit Optimizer is able to deliver the economic benefits of traditional steady-state RTO with a dramatic reduction in engineering effort.

One drawback in conventional MPC (model predictive control) technology is that it requires specification of CV (controlled variable) reference trajectories. Profit Controller removes this requirement, using Honeywell's patented Robust Multivariable Predictive Control Technology (RMPCT) and its patented funnel design to enable a simultaneous determination of both the MV (manipulated variable) moves and the CV trajectories. A total of 10 Profit Controllers were installed under the Profit Optimizer application at the Hellenic refinery to control operations of the different units. Four console operators were installed across two control rooms.

With Profit Controller, a single performance ratio is available for each controlled variable to adjust the desired control response independently from the other controlled variables. This approach is more intuitive than setting interactive weighting factors on application variables as is typically necessary in competing multivariable control products. Increased economic results in a user-friendly environment and project payback periods of less than a year were some of the important benefits of the Honeywell Profit Suite installation. By using Profit Controller and Profit Optimizer, the Hellenic refinery was able to significantly reduce benzene content, translating into an increase in cost savings and overall refinery profitability – the result of more efficient production. ●

Hellenic Petroleum experienced several benefits as a result of implementing Honeywell's control and optimisation solution:

- Improved gasoline complex performance through closer adherence to the plant schedule.
- Simplification of the gasoline complex blend scheduling task.
- Improved constraint handling by the units through debottlenecking.
- Optimised cutpoints of the naphtha splitters, reformat splitters and light naphtha stabilisers.
- Optimised naphtha feed rate to the complex.
- Improved control of total reformat benzene content resulting in lower operating costs.
- Reduced steam usage for debutanisers and splitters.

Hellenic Petroleum's Aspropyrgos refinery, Greece

Source: Hellenic Petroleum