

Case Study

Profit[®]Suite Helps Petkim Petrochemical's Flagship Plant Operate at Maximum Capacity



"Honeywell is one of the few companies that have proven worldwide results in advanced process control."

- Petkim

Background

Petkim Petrochemicals, Turkey's major petrochemical complex, has an annual ethylene capacity of 520,000 tons. The ethylene plant is the most important part of this Petrochemical Complex, producing raw materials and utilities for the other plants within this complex. Naphtha, from the Aromatics Plant, and imported light naphtha are cracked by steam and separated into components.

Investments in the expansion of the Ethylene, LDPE (low density polyethylene) and PP (polyvinyl chloride) plants began in 2004 and completed in 2005. The capacities of the ethylene plant increase from 400,000 tons/year to 520,000 tons.

Challenge

As Petkim's flagship plant, management wanted this plant to operate at maximum capacity. In 2010, Petkim decided to improve ethylene plant productivity by implementing advanced process controls to maximize capacity in line with plant equipment constraints and to minimize energy consumption.

Petkim selected Honeywell's Profit[®]Suite due to its technology, highly experienced engineering resources, and the cost-effective global optimization solution.

Solution

Petkim's primary objective for its ethylene plant advanced controls is to maximize the capacity and minimize energy usage. To address this objective, Honeywell proposed a unique combination of model predictive control and integrated dynamic optimizers to cover the plant, incorporating a furnace model to provide accurate furnace yield and constraint information.



Petkim Petrochemical's flagship ethylene unit uses Honeywell's Profit[®]Suite to maximize feed rate and minimize energy consumption.

The ethylene plant project includes 20 multivariable model predictive controllers, addressing:

- Cracking Furnaces, Quench Section and Cracked Gas Compressor
- Cold box and De-Methanizer Column
- De-Ethanizer Column
- Acetylene Hydrogenation Reactor
- Ethylene/Ethane Splitter Column
- De-Propanizer Column
- C3 Hydrogenation Reactor
- Secondary De-Ethanizer Column
- C3 Splitter Column
- C-450 System of C3 Splitter Column
- De-Butanizer

Honeywell's Profit® Controller, Profit® Optimizer and Profit® XL Bridge technologies were used to implement the solution. Profit® Controller's model process dynamics predicts future behavior of the process and adjusts the controller's outputs to bring all process variables to set points or within limits. If any degree of freedom is available, the controller adjusts the process to optimize operations.

Profit® Optimizer, a dynamic optimizer receives gain updates from an ethylene furnace simulation model (Technip's SPYRO), coordinates the targets for all of the underlying controllers. SPYRO provides calculations for per-pass conversion, coking rates and tube metal temperatures, as well as a rigorous cracking model for yield predictions of key products.

The overall advanced controls project for the full ethylene plant was completed in approximately 12 months.

Results

Profit@Suite Advanced controls implemented at the Petkim Ethylene plant has stabilized the operation and maximized the feed rate against equipment hard constraints, such as furnace firing limitations, furnace pressure constraint, cracked gas compressor capacity constraint. The higher feed rate, lower recycle and reflux ratios have optimized energy usage.

Comparisons of process data before and after Profit@Suite implementation have shown a 4.54% increase in feed rate and a 2.71% decrease in energy consumption. Overall, achieved benefits represent 110% of the contractual guaranteed benefits.

A Petkim representative commented: "Especially for large applications such as the Ethylene unit, Honeywell's competitive differential is its unique application design philosophy, based on the idea of separating the control problem from the optimization problem. Opposite to the design of one big application, this unique approach not only enhances robustness, but moreover renders easier application maintenance, making the constraint reporting very straightforward and easy to understand for operators."

For More Information

To learn more about Honeywell's products and services, visit our website www.honeywellprocess.com or contact your Honeywell account manager.

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