

YNCC Increases Production with Honeywell's Dynamic Optimization Solution



“After careful consideration of several vendors, YNCC chose Honeywell as a long-term partner for advanced process control and optimization implementation based on its technical superiority and detailed knowledge of various process solutions.”

Mr. Lee, Plant Manager, YNCC

Benefits

Yeochun NCC Company Ltd. (YNCC) in Yeosu, South Korea is the largest ethylene producer in Asia, producing more than 2.2 million tes/yr of olefins. YNCC needed to improve its operating performance to stay ahead in a fast growing and very competitive market. YNCC chose Honeywell to implement a multivariable control solution with integrated dynamic optimization because Honeywell provided the most cost-effective and practical approach. By choosing Honeywell's advanced process control (APC) solution, YNCC realized benefits in plant capacity, energy savings and reduced product variability. The solution led to the following benefits:

- Increased effective feed capacity of unit by 3 percent over previous best sustained rate
- Reduced overall energy consumption by 3.24 percent by reducing steam consumption in separation towers and energy in refrigeration circuits
- Unit operates with improved stability since implementation of advanced controls enabling YNCC to be more flexible in feed selection

Background

YNCC is a joint venture established in 1999 between Hanwha and Daelim and is a leading producer of olefins and derivatives in South Korea. With annual revenues of over \$3 billion, YNCC operates nine production units including three naphtha cracking complexes producing ethylene, propylene and mixed C4s. Other production units at the Yeosu site include three aromatics plants, an ethyl, benzene and styrene monomer, butadiene and MTBE units.



Aerial view of the YNCC complex

Challenges

YNCC's three large naphtha cracking units had been expanded. Each unit had a different plant design and a different DCS. As production capacity increased, so did the complexity around operations, control and stability. YNCC knew that with various naphtha feedstock being imported, changes in feedstock price and/or composition required flexible and responsive controls to optimize production and maximize profit. Standard regulatory controls would not be sufficient since the plant's operating constraints could vary between the cold section fractionation towers, the refrigeration compressors and the furnaces depending upon the type of naphtha being supplied.

Only an integrated dynamic optimization and multivariable control solution can successfully adapt to changing plant constraints to determine optimal operating conditions.

Solution

YNCC considered several suppliers and determined that Honeywell had the most cost-effective solutions and the necessary experience. The objectives of the optimization solution were to:

- Maximize naphtha feed to the unit subject to constraints across the complex including refrigeration constraints
- Minimize energy consumption
- Maintain a desired severity in furnaces
- Stabilize cold section operation

To achieve the objectives, Honeywell applied the following technology:

- Seventeen Honeywell Profit[®] Controller applications on eight furnaces, quench and cold section towers.
- Technip's SPYRO (SAPC) cracking models provided calculations for per pass conversion, coking rates and tube metal temperatures. Results were used by Profit Controller as controlled variables.
- Profit Optimizer with SPYRO model to provide yield predictions of key products in furnace effluent and to update gains in underlying Profit Controller applications.
- Profit Toolkit applications that validate and extract gain information from SPYRO model and calculations for use by Profit Controllers.
- OPC connectivity between Profit Suite applications and Yokogawa Centum CS.

The overall project took around 11 months to complete, although YNCC was able to see value very early on, as the benefits study identified some opportunities for improvement even without APC and optimization. A plant turnaround removed some physical constraints, but even after adjusting the benefits baseline for this, the new applications were able to increase feed rate to the unit by 3 percent.

In addition, Honeywell was able to save energy in refrigeration circuits, reducing consumption per tonne of feed by 1 percent. Combined with steam savings in the fractionation columns, total energy savings amounted to 3.24 percent.

The Honeywell advanced control and optimization solution provided a solid base for the operator training. Combined with their own experience, the solution allowed them to run the plant more consistently against multiple constraints while providing the flexibility to handle varying feedstock quality.

Mr. Lee, Plant Manager, YNCC, stated, "Honeywell has done its best to meet YNCC's requirements for the first optimization project and this will be the basis of a win-win partnership for future business. I expect YNCC will strengthen its competitiveness in the ethylene business by realizing increased plant productivity and flexibility through its APC alliance with Honeywell."

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More Information

For more information about Honeywell's advanced process control solutions including Profit Controller, visit www.honeywell.com/ps or contact your Honeywell account manager.

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