BP Gelsenkirchen
Leading European Petrochemical Supplier Boosts Production and Reduces Specific Energy Costs

The Challenge
As a leading petrochemical supplier to the European market, BP must manage the demands of large-scale operations and the complex and constantly changing web of production processes, operating conditions, and market dynamics for a wide range of products. To maximize profitability across the entire production lifecycle, BP continuously seeks to more effectively control the many variables that influence product quality and production rate. Specifically, BP Gelsenkirchen sought the ability to better handle the variations in feed to the units, reduce energy consumption, and operate closer to the desired product spec limit.

Rockwell Automation Optimizes Aromatics Unit
BP began working with Pavilion Technologies (now a Rockwell Automation company) in 1998 on deploying advanced process control (APC) in the aromatics unit 5. After demonstrated success increasing production and reducing operating costs on the aromatics unit 5, BP continued to deploy Rockwell Software’s APC solutions, from Rockwell Automation, in 1999 for the C3/ C4/C5 separation in the cold section of the olefins unit 4. In 2000, BP selected Rockwell Automation to provide an APC solution for two aromatics units and the olefins unit 3, standardizing on the Rockwell Software’s APC solution – Process Perfecter® – for the entire petrochemical site in Gelsenkirchen.

The same year, BP entered into a strategic alliance with Rockwell Automation, standardizing on the Rockwell Software advanced process control solutions for its polyolefins business units.
One BP Gelsenkirchen APC implementation was designed to optimize the Aromatics 4 unit over a wide range of operating conditions. Control objectives included maintaining the desired specifications of product streams while minimizing energy consumption. Rockwell Software engineers worked closely on-site with plant management to develop a specific solution utilizing Process Perfecter.

Process Perfecter combines steady-state optimization with model predictive control to manage process setpoints and production targets. It allows plants to use both linear and non-linear predictive modeling to enforce process constraints and optimize operations relative to production, quality, and economic objectives.

Process Perfecter works for single and multi-unit problems and can easily scale to develop a consolidated control strategy for entire process trains. Its steady-state solver provides move-by-move optimization of process variables, making it applicable to even the most complex control problems.

![Figure 1](image-url) Reduction of specific energy consumption in the raw o-xylene column

**Process Perfecter Creates Significant Benefits**

BP Gelsenkirchen production management was very pleased with the measurable operating efficiencies achieved as a result of using the Rockwell Software Process Perfecter APC solutions.

Process Perfecter reduced specific steam consumption in Aromatics 4 while also enabling closer operation to the specification limits in the extractive distillation process. It reduced o-xylene losses and enabled easier feed changes to different units within the plant. Additionally, Process Perfecter enabled a more stable operation at high throughput and achieved a high operator acceptance.

There are advanced control applications for the isomar unit, xylene distillation, extractive distillation and the Parex unit in the Aromatics 4 plant. The xylene distillation is fed with the bottoms flow from the deheptanizer of the isomer reaction unit.

M- and p-xylene are separated in the xylene distillation as the light ends, which are processed in the Parex unit, in order to produce p-xylene. The heavier boiling components are separated into a C9+ cut and a raw o-xylene cut, which is purified in an extractive distillation unit.

BP Gelsenkirchen also noted the Rockwell Software strong teamwork approach and Process Perfecter’s ease of use as key to high operator acceptance and project success. Additionally, the Aromatics 4 project facilitated the development of new ideas for further improvements within BP Gelsenkirchen. Since its deployment in 2001, this aromatics APC solution has been online at the site, demonstrating a very high uptime. The site has deployed 45 Process Perfecter APC applications on 2 olefins and 3 aromatics units as well as on one cumene plant.