Oil and Gas Industry Solution

Natural Gas Liquid Fractionation Model Predictive Control (MPC) Application

Maximizing the efficiency and stability of the Natural Gas Liquid (NGL) Fractionation process

Benefits:
- Increase process stability and reduce variation
- Increase yield of the most valuable NGL components an avg. of 1 - 3%
- Reduce reboil energy consumption an avg. of 5 - 10%
- Increase production capacity an avg. of 3 - 5%
- Payback in less than 12 months

The Challenges
The objective of the Natural Gas Liquid (NGL) fractionation process is to separate the NGL liquids into product component streams of ethane (C2), propane (C3), isobutane (iC4), normal butane (nC4) and C5+ (pentane and heavier) by processing through a series of distillation towers. The challenge of NGL fractionation is to control the quality of the fractionated component product streams to key specification limits.

Product quality targets are adjusted within this range depending on product price and demand. There is an interaction between feed, feed quality, temperature and pressure in the series of towers that challenges product optimization.

In addition, as product prices vary, the maximum profit margin for the mix of products can only be achieved if the product targets are controlled by an economic optimization strategy.

Rockwell Automation recognizes these challenges and offers an application focused on delivering valuable information to help improve the efficiency, stability and economic optimization of the NGL fractionation process.
NGL Fractionation Application

The Rockwell Software Natural Gas Liquid (NGL) Fractionation application from Rockwell Automation uses Pavilion8 Model Predictive Control (MPC) and neural networked Soft Sensor™ technology to continuously drive the process to reduce overall variability and operate at peak process performance.

Pavilion8 Modeling

The MPC technology continuously assesses current and predicted operational data, compares that data to the desired results and computes and downloads real-time supervisory setpoint targets. The Pavilion8 modeling tools are robust and incorporate engineering process knowledge to allow for the most accurate, highest fidelity models to be implemented helping optimize the plant. Rockwell Automation provides a single software solution that handles linear and nonlinear processes simultaneously for easy configuration and consistent results.

In order to help maintain the economic benefits, Pavilion8 includes built-in controller performance metrics that continuously monitor key plant variables, utilization, time constraints and deviation targets. The application is easily configured for the economic specifics of the plant.

The NGL Fractionation application is designed to maximize the efficiency of the fractionation process. It achieves this through composition control of deethanizer, depropanizer overhead products, debutanizer bottoms, RVP and butane splitter overhead and bottoms products.

It also maximizes yield of the most valuable component stream by adjusting the control targets as driven by the relative economic value of each fractionation component stream. As the price of the component products change, the Pavilion8 MPC controller responds by maximizing the volume of the most valuable streams, while respecting the quality specifications of all product streams.

Furthermore, the Rockwell Software NGL Fractionation application optimizes the energy/yield trade off. As the MPC controller pushes the heavy components of a fractionation stream into distillation overhead products, pressure is minimized but energy is increased. The optimizer, within the Pavilion8 MPC software, recognizes when the energy cost in a distillation column has reached the point of diminishing marginal return and profitability and will increase heat input to maximize the volume on an overhead stream.

Application Benefits

The Pavilion8 MPC application proactively adjusts all controller variables of the fractionation plant simultaneously to achieve:

• increased process stability and reduced variation for all the distillation towers
• increased yield of the most valuable NGL component an average of 1 - 3%
• increased production capacity an average of 3 - 5%
• reduced reboil energy consumption an average of 5 - 10%

www.rockwellautomation.com