Oil and Gas Industry Solution

Lean Oil Absorption Model Predictive Control (MPC) Application

Maximizing the stability and efficiency of Natural Gas Liquid (NGL) recovery in the lean oil absorption process

Benefits:
- Increase process stability and reduce process variation
- Increase NGL recovery an avg. of 1.5 - 5.5%
- Minimize loss of lean oil
- Flexibility to run ethane injection operation mode
- Stabilize pipeline gas quality
- Reduce energy consumption in lean oil absorption process an avg. of 5 - 10%
- Payback in less than 12 months

The Challenges
Operating the lean oil absorption process units is a balance between: (1) controlling the lean oil quality—as measured by molecular weight—so that it absorbs the maximum Natural Gas Liquid’s (NGL) from the raw gas feed and responds to feed rate changes and NGL feed loading; (2) controlling the NGL product quality as measured by the methane/ethane ratio; (3) running the series of towers at the optimum pressure profile to reduce energy; and (4) minimizing lean oil losses.

In addition, the lean oil absorption process is operated in either of two operating modes, depending on natural gas ethane economics: (1) NGL recovery maximization or (2) ethane rejection mode, where ethane is rejected into NG. Ethane rejection is run when NG prices are low compared to natural gas prices.

Rockwell Automation recognizes these challenges and has developed an application solution focused on delivering valuable information for lean oil absorption to help improve plant stability, NGL yields and energy savings.

Rockwell Software Solutions
Our solutions leverage Rockwell Automation’s 100+ years of industry innovation, experience and global support. Industry best practices are incorporated into every application, which is built upon a composite application framework that leverages a Service Oriented Architecture (SOA). This scalable solution, when combined with library-based content, offers personalization options that promote faster user adoption and time-to-value.
Lean Oil Absorption Application

The Rockwell Software Lean Oil Absorption application from Rockwell Automation uses Model Predictive Control (MPC) and neural network Soft Sensor™ technology to continuously drive the process to reduce overall variability and operate at peak process performance. The MPC technology continuously assesses current and predicted operational data, compares that data to the desired results and computes and downloads new supervisory targets.

Pavilion8 Modeling

The Pavilion8 modeling tools are robust and incorporate engineering process knowledge to help provide that the most accurate, highest fidelity models are implemented to optimize the plant. Rockwell Software offers a single solution that handles linear and nonlinear processes simultaneously, enabling easy configuration and consistent results.

In order to help maintain the economic benefits, the MPC software 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 lean oil absorption application maximizes the efficiency of the NGL recovery process by unifying and stabilizing control of the absorber tower, the rich oil demethanizer and the lean oil still. The application improves NGL recovery in the absorber tower by calculating the amount of lean oil used to reflux the absorber tower when it is operating in (a) maximize NGL recovery mode or (b) ethane rejection mode. In either mode, the application helps to provide that the lean oil molecular weight is controlled to the required quality and quantity to handle NGL variations from the inlet gas. It also helps to minimize the amount of methane absorbed in the lean oil. Trace amounts of methane from the absorber tower are rejected in the rich oil demethanizer using the optimum temperature profile, lean oil reflux rate and pressure profile.

The Lean Oil Absorption application controls lean oil molecular weight and methane/ethane ratio in the NGL overhead product with column pressure, reflux and reboil in the lean oil still. These actions balance the lean oil volume so it does not deplete or accumulate in the lean oil absorption plant. The application also monitors and respects all equipment hydraulic and temperature constraints in the lean oil absorption plant.

Application Benefits

This application reduces overall process variability and energy use in the NGL lean oil absorption an average of 5 - 10%. It also stabilizes pipeline gas quality and meets the required ethane quality target in the pipeline gas. The application balances the lean oil requirements and improves the ability for the system to respond to variations in the inlet gas quality. This improves plant stability and makes it easier for operators to run.

www.rockwellautomation.com