Biofuels Industry Solution

Distillation/Sieve Application

Increase sieve capacity and ethanol yields while reducing energy costs

Benefits:

- Increase ethanol production capacity 4-10%
- Reduce energy costs per gallon 2-5%
- Reduce base losses 20-50%
- Increase sieve alcohol yields 0.1-0.3%

Rockwell Software Solutions

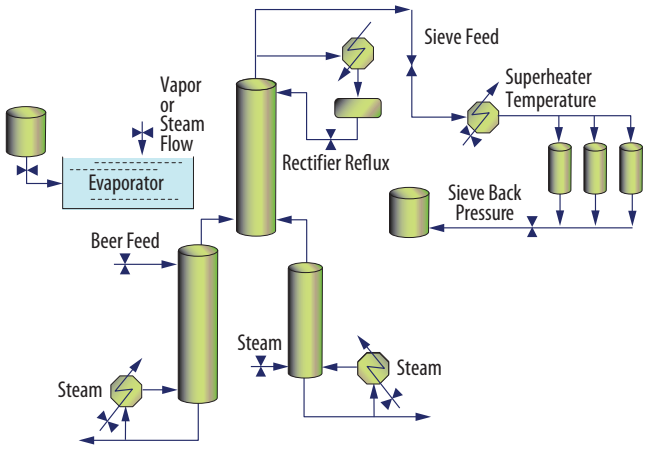
Our solutions leverage Rockwell Automation's 100+ years of industry innovation, experience and global support. Industry best practices are incorporated into every application, which is built upon a composite application framework that leverages a Service Oriented Architecture (SOA). This scalable solution,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

The Challenges

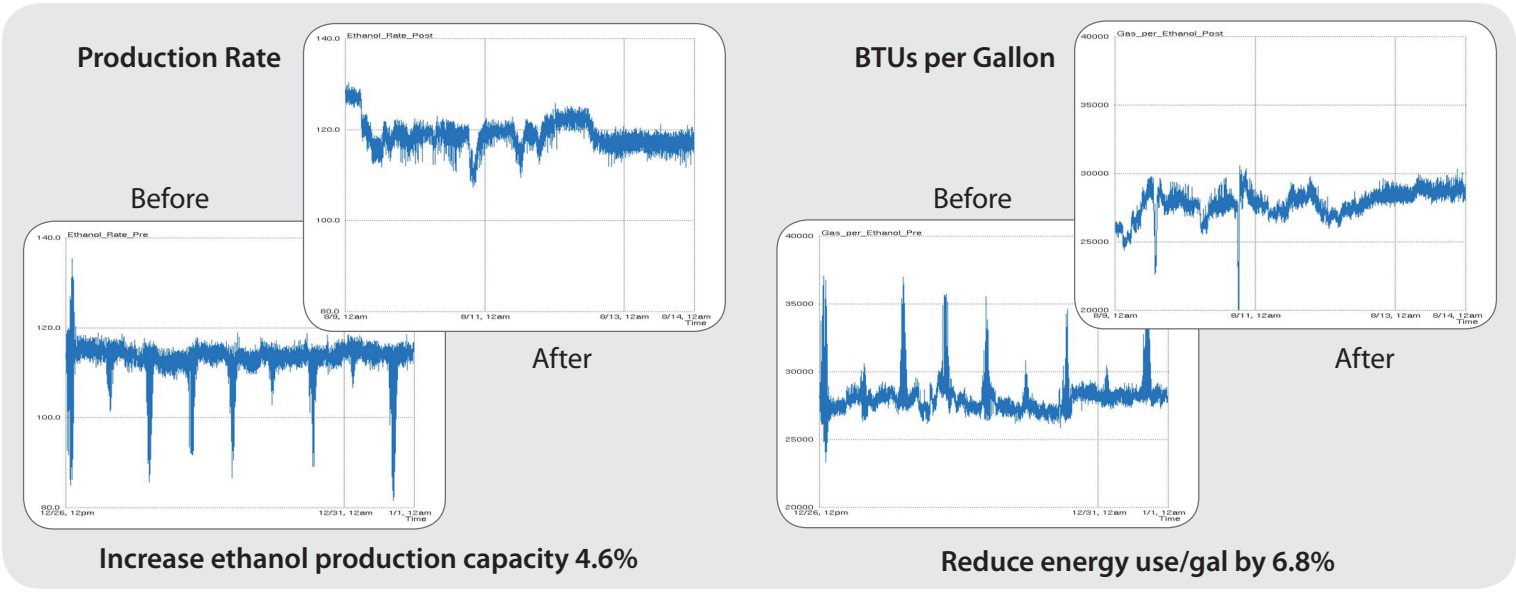
With a modernly-designed fuel ethanol facility, energy integration from heat recovery systems promotes improved efficiencies but increases the complexity of operations. It is challenging to change production rates driven by fluctuating economics, recover from plant upsets, or fully leverage energy integration as environmental conditions change.

In addition, the integration of classic multi-column distillation with molecular sieves (a pressure swing absorber) makes it very challenging to drive equipment to peak performance. Operators manage cautiously, given the difficulty of recovering from wet-sieve beads or upset column conditions. The small column, a side-stripper, typically suffers from frequent upset conditions due to its sensitivity to changes in energy or operational conditions.

Rockwell Automation recognizes these various challenges and offers an application focused on delivering valuable distillation and sieve control to help improve capacity, yields, and energy savings.



LISTEN. THINK. SOLVE.®



Improve total ethanol production rates and final product quality

Distillation/Sieve Application

The Distillation/Sieve Model Predictive Control (MPC) Application controls the ethanol production rate and final product quality by manipulating feed flow rates, energy, and sieve pressure.

Control Production

The distillation section of ethanol purification runs the overhead product at the right approach to the azeotropic maximum without overheating the reflux or wasting energy.

Production can be maximized at the highest ethanol content with a stable feed to the sieves. Mole sieve control is managed within the same quality control models as distillation, and sieve moisture and capacity are the primary control objectives.

Stabilize Reflux Proof

Reflux proof, or overhead moisture, is a secondary objective which will be stabilized but more loosely controlled. The system is configured so that distillation control can run independently from sieve control. For example, an operator can turn off sieve control or the evaporator, and the controller can maintain an overhead reflux proof at target.

Test Quality Models

The independent variables available include: beer column feed, beer column temperature (or steam), rectifier reflux, side stripper steam, sieve feed/rectifier overhead pressure, sieve back pressure, and sieve feed temperature, or more, depending on design. Distillation plant tests, including quality analysis, are part of the control model development. These tests, which will be principally based on column temperature measurements, will confirm and tune the appropriate inferred quality models or control parameters.

Control Sieve

A time clock and several controllers help the molecular sieves absorb water through temperature, pressure, and time. A properly calibrated, functioning sieve analyzer from Chino, Anton Paar, or equivalent is required. The same MPC module includes sieve models, with prediction models providing targeted ethanol product purity.

This Rockwell Software application is part of the Rockwell Automation complete solution offering for the biofuels industry.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication RSAPBF-AP002A-EN-P – May 2010