

Energy Efficient and Always On-Spec

Emerson's Integrated Distillation Solution



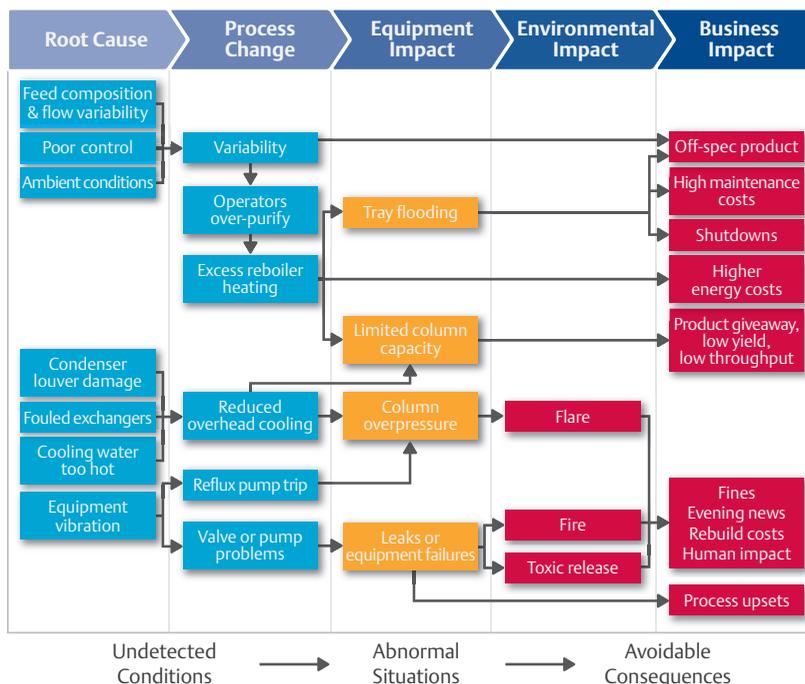
Seeking On-Spec Distillation that Uses Less Energy?

Distillation is one of the most energy-hungry steps in your whole plant—it can account for 40 percent of energy consumption and half of total production costs. And energy prices are headed up.

The story is almost always the same: When changing weather, feedstock variations, unreliable equipment, and other factors start to affect distillation, operators avoid making off-spec product by using far more energy than necessary. This keeps quality high. But an overly pure, expensive-to-make product still sells for the same price as a less-refined product. That means profit loss.

Blame inadequate process control and a lack of clear insight into process variables. It's not uncommon for two-thirds of control loops to underperform or run in manual, and operators often don't trust automatic control. So they get uneasy when they can't get quick data about feedstock and product composition. That's a recipe for chronic inefficiency, low yield, and reduced throughput.

Impact of Poor Distillation Performance



Common Threats to Distillation Column Performance



DISTILLATION COLUMN OVERPRESSURE

A failing reflux pump or condenser fan can cause column overpressure and flaring—and even reportable incidents and fines. Other causes can include coolant loss, louver failure, and controller failure.



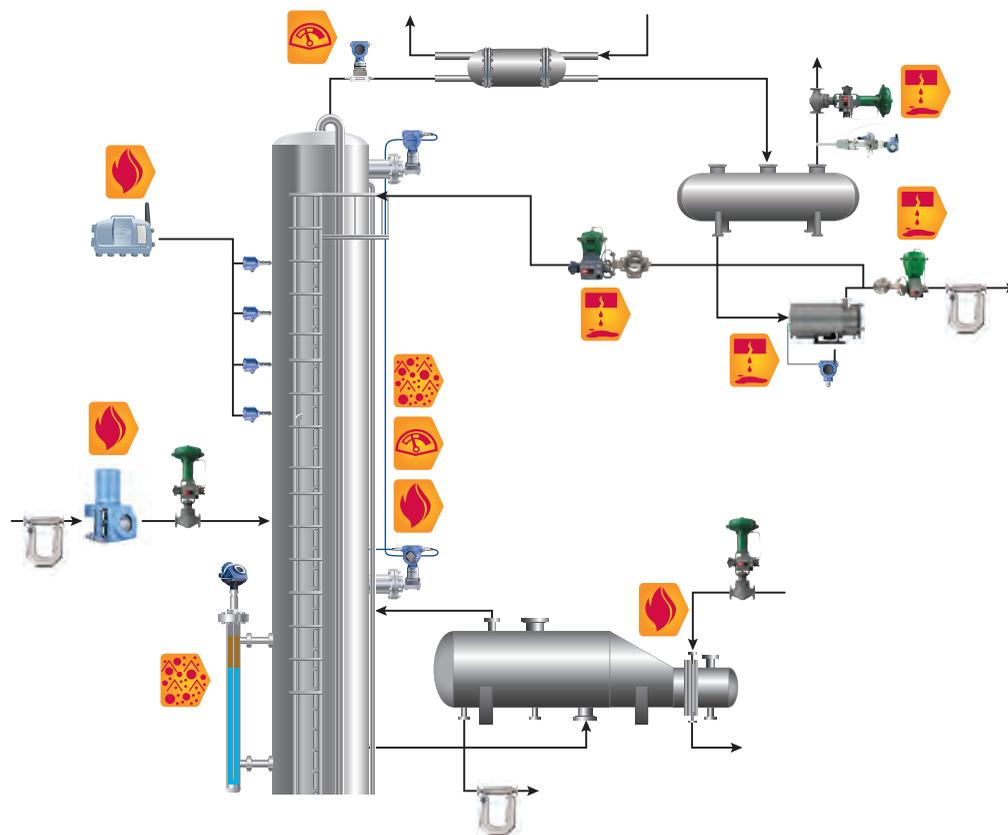
ENVIRONMENTAL INCIDENTS

Leaking valve packing and pump-seal failures can release gases and spill liquids. These can result in fires, reportable incidents, fines, and worker exposure to harmful materials.



EXCESSIVE ENERGY USE

Process variability can lead operators to over-purify in order to prevent off-spec production. This reduces yields, energy efficiency, and column capacity. Variability can result from weather conditions, feed composition changes, pressure changes, and poorly performing control loops.



FLOODING

Excessive upward vapor flow impedes downward liquid flow. This causes accumulation of liquid in the column and separation suffers. Flooding forces operators to reduce vapor rates and reboiler duty, and to rework off-spec products. Severe flooding harms tray effectiveness, which reduces column capacity, increases maintenance costs, and can force a shutdown.

What if you could...

Anticipate change and mitigate variability using online analysis. With Emerson's full suite of analytical and measurement devices, you'll provide your control room with real-time data about key process variables, including feedstock and product composition. With accurate, reliable information, your operators will be able to keep distillation on-spec and highly efficient. Our predictive diagnostics add an additional layer of foresight, allowing you to anticipate equipment problems early enough to schedule preventive maintenance when it's most convenient.

Get better data and make better decisions by seeing into the process like never before.

Without any need for power and control wires, our wireless monitoring solutions quickly and inexpensively add measurement capabilities—even in places that were previously inaccessible, or where wired devices would have been too expensive to consider. You'll have a clear view of every part of your process, and a full understanding of what needs to happen—when it needs to happen.

Get the most from advanced control—implement in weeks, maintain with ease, and increase uptime.

With Emerson's advanced process control solutions, you'll be able to automatically operate at limiting constraints while efficiently utilizing energy. You'll also be able to calculate optimal tuning parameters and use real-time models to apply closed-loop product-quality control. That level of control means better energy efficiency, yield, and throughput—and puts your operation in a higher class.

Protecting your profit

Industry experts estimate that over-purifying on distillation columns often uses more than 12 percent excess energy and shaves 7 percent off of production. Care to get that back?

INPUT

a. Typical amount of steam used*	168 million lb./yr.	76,200 mt/yr.
b. Average steam cost**	\$10/1,000 lb.	€16.83/mt
c. Average annual steam cost (=a x b)	\$1.68 million/yr.	€1.28 million/yr.
d. Incremental production credit/profit	\$17.50/ton	€14.73/mt
e. Average column production	600,000 tons/yr.	544,310 mt/yr.

ENERGY BENEFITS

f. Typical steam savings	12%	12%
Projected Annual Steam Savings (= c x f)	\$201,600	€153,893

OPERATIONAL BENEFITS

g. Typical throughput increase	7%	7%
h. Projected throughput increase for average column (= e x g)	42,000 tons/yr.	38,100 mt/yr.
Projected Annual Increase in Product Profit (= d x h)	\$735,000	€561,069

TOTAL ANNUAL PROFIT IMPROVEMENT	\$936,600	€714,962
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* Assuming 20,000 lbs./hr. (9.072 metric ton/hr.), with 350 operating days per year.

** Assuming 1.31 USD = 1 EUR



Customer Proven

"We implemented Emerson's SmartProcess distillation application and the embedded MPC with the help of their control experts. In the first phase, MPC helps us maintain a project accomplishment of about 18 percent energy savings over past performance. The second phase is currently underway, and the project effort has achieved about 6 percent improvement on some of our biggest energy users so far. Although the performance of the system in the long term remains to be seen, we are hopeful the SmartProcess distillation application and MPC will help us maintain these savings—without other adverse impacts."

David Johnson

Maintenance and Engineering Manager, Huntsman Corporation

Scan this code to see how one customer decreased energy costs and increased throughput.



Interested in improving distillation performance? Learn more at www.EmersonProcess.com/Distillation

Emerson's Integrated Distillation Solution

SOFTWARE



SMART DIGITAL CONTROL

Emerson's Smart Process Distillation Column Optimizer application for the DeltaV™ digital automation system works with smart field devices to improve product quality, recovery, and energy efficiency. The DeltaV advanced process control solution's built-in linear program optimizer allocates utilities and automatically operates at limiting constraints. It allows closed-loop product-quality control with real-time models based upon composition data, and it calculates optimal control moves for safe, stable operation.



NETWORK INTERFACE



SMART WIRELESS GATEWAY

Connects to IEC 62591 (WirelessHART®) self-organizing networks with any host system.



INTELLIGENT FIELD DEVICES



ROSEMOUNT ANALYTICAL GAS CHROMATOGRAPH

Quickly measures overhead and bottoms compositions with field-mounted capabilities adjacent to the sample source. This localized installation reduces operating cost while allowing closed-loop control of product quality, reducing energy use and quality give-away, and increasing product recovery.



MICRO MOTION CORIOLIS FLOWMETER

Directly measures the mass flow of gas and liquid streams and liquid density—including compressible or supercritical fluids—allowing quick reactions to process changes, improved product-quality control, and high turndown capabilities.



ROSEMOUNT ELECTRONIC REMOTE SENSORS

Measure differential pressure to detect flooding, overpressure, and excessive energy use. Design reduces maintenance by using two digitally linked sensors instead of impulse piping, which liquid can clog.



CSI WIRELESS VIBRATION TRANSMITTER

Provides early warning of excessive vibration and impending damage in pumps, compressors, and other rotating equipment. Determines root causes and guides action. Optional functionality can identify premature bearing wear and failure.



ROSEMOUNT PRESSURE TRANSMITTER

Features Statistical Process Monitoring (SPM) and advanced diagnostics capabilities that can detect early column flooding and tray malfunctions.



ROSEMOUNT WIRELESS TEMPERATURE TRANSMITTER

Cost-effectively measures temperature profile of distillation columns. High density measurement technology allows for up to four independently configurable RTD, thermocouple, ohm, millivolt, and 4-20 mA inputs.



ROSEMOUNT MULTIVARIABLE FLOWMETER

Measures differential pressure, static pressure, and process temperature to perform fully compensated mass and energy flow calculations 22 times per second. Allows tighter control of critical process parameters.



ROSEMOUNT GUIDED WAVE RADAR

Accurately measures tower levels regardless of fluid density and viscosity—even in extreme temperatures.



FISHER VALVES AND DIGITAL VALVE CONTROLLERS

Precisely control reboiler, reflux, and feed rates for higher yield and efficiency. Reduce fugitive emissions and use advanced diagnostics to enhance performance between shutdowns.

ADDITIONAL OPTIONS



AMS SUITE FOR MAINTENANCE

Uses predictive diagnostics to identify developing asset problems, allowing maintenance personnel to schedule repairs, which reduces downtime and costs.



SMART WIRELESS THUM ADAPTER

Allows devices compliant with HART 5 (and later revisions) to wirelessly transmit measurement and diagnostic information that was previously unavailable.

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Emerson Process Management
1100 W. Louis Henna Blvd.
Building One
Round Rock, Texas 78681-7430
www.EmersonProcess.com/Distillation

