



Achieve Repeatable Golden Batch Outcomes.

Capture higher margins in your
batch process by improving cycle
times and Right-First-Time metric.

Industry Facts You Need to Know

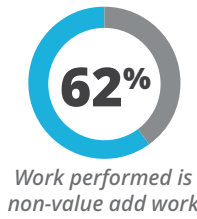
IMPROVE RIGHT-FIRST-TIME METRIC

- ➔ Many facilities operate with a Right-First-Time metric between **40-70%**
 - Bad batches increase cycle times because they require rework or worst case, even scrapping



IMPROVE LABOR EFFICIENCY

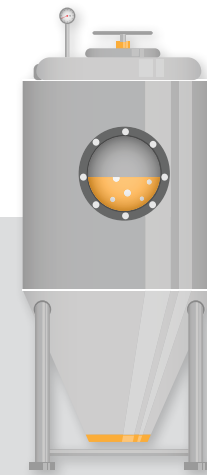
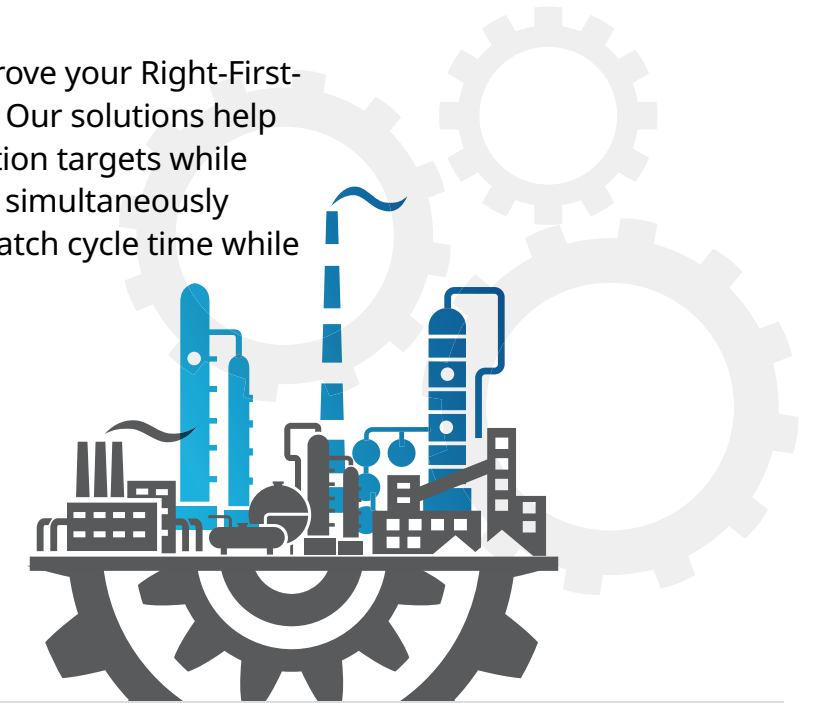
- ➔ Users tell us that up to **62%** of work performed by staff is non-value add
 - Including unnecessary operator rounds that waste precious hours on the process
 - Manual measurements have inherent safety risks to employees



Improve Your Right-First-Time Metric

We know that “Golden Batch” is a term often used to describe the ideal batch against which all other batches are compared.

Emerson provides solutions to help you improve your Right-First-Time metric in the batch reactor application. Our solutions help you consistently hit your quality and production targets while having a safe and reliable operation. We can simultaneously help you increase production and improve batch cycle time while lowering operation and maintenance costs.



APPLICATION CHALLENGES

Achieving and repeating Golden Batch outcomes is your goal. We can help you with these major challenges, so you can consistently hit quality and production targets while having a safe and reliable operation.

Eliminate out-of-spec batches

Reduce scrap and rework

Ensure HS&E performance

Improve batch cycle times

The Value of Emerson's Comprehensive Solutions



Emerson can help you obtain consistent results to replicate the Golden Batch. Statistical insight and measurement capabilities can improve your Right-First-Time metric and batch cycle times - increasing overall performance.

Here are a few ways Emerson can help you achieve consistent Golden Batches:

- Eliminate out-of-spec batches**
 - Obtain tighter recipe control and reduce out-of-spec batches with highly accurate mass & density measurement from Micro Motion™ Coriolis Mass Flow Meters.
- Reduce scrap and rework**
 - Achieve reliable measurement despite challenging conditions caused by turbulent agitation, dusty environment, narrow vessels, or thick layers of dense foam with the Rosemount™ 5408 Level Transmitter - Non-Contacting Radar.
 - Improve batch results with more accurate temperature control without penetrating the process with Rosemount X-well™ Technology.
- Ensure HS&E performance**
 - Reduce safety risk by keeping the reactor pressure within safe operating conditions. The Rosemount 3051S Series Pressure Transmitter helps you reduce cycle times by optimizing reactor gas purging and additions.

Improve batch cycle times

Eliminate manual sampling to reduce cycle times and safety risks with the Micro Motion Fork Viscosity Meter (FVM) which rapidly responds to viscosity changes for better reactor control and final product quality.

Reduce batch cycle times with real-time pH measurement using the Rosemount RBI pH/ORP Sensor which can help improve product quality to allow reactions to proceed correctly, resulting in higher yields.

Capture higher margins in your batch process by improving cycle times and Right-First-Time metric.

Product Solutions

Emerson will collaborate with you to meet your batch goals.

On the next few pages, see how our product solutions have helped customers meet their goals of ensuring quality, increasing throughput & reliability, managing labor and maintenance costs, as well as increasing safety. Let's start a conversation on how our team can work with you.



ENSURE QUALITY



INCREASE THROUGHPUT & RELIABILITY








MANAGE LABOR AND MAINTENANCE COSTS



INCREASE SAFETY



GOAL: ENSURE QUALITY

Issues	Solutions	Featured Products
Inaccurate material additions is creating high variability in the quality of batches negatively impacting right-first-time metric	Implement direct mass measurement of batch material additions to reduce variability	 <p>Micro Motion Coriolis Mass Flow Meter - measures mass directly and the density measurement can be used to confirm the correct ingredient has been added and check final quality, reducing off-spec batches</p>
Inability to detect potential batch issues in real-time due to reliance on manual sampling	Real-time measurements such as density, viscosity, pH, and conductivity can help predict batch quality, eliminating manual sampling delays, and preventing off-spec batches	 <p>Micro Motion Fork Density Meter/ Fork Viscosity Meter - eliminates manual sampling of density and viscosity measurement for better reactor control and final product quality</p>  <p>Rosemount RBI pH/ORP Sensor and Rosemount 400 Contacting Conductivity Sensor - reduce reliance on manual sampling, reducing off-spec product</p>
Inaccurate interface detection contaminates final product during liquid separation	Implement interface detection solutions	 <p>Rosemount 5300 Level Transmitter - Guided Wave Radar interface measurement helps determine exactly when separation is completed and reduces out-of-spec batches from pumping out too early</p>  <p>Rosemount 400 Contacting Conductivity Sensor and Micro Motion Fork Density Meter (FDM) - detects interface of liquids flowing out of the reactor eliminating product contamination and accidental wasted materials</p>



GOAL: INCREASE THROUGHPUT AND RELIABILITY

Issues Solutions Featured Products

Reactor heating and cooling rates are not optimal increasing batch cycle times

Monitor cooling water flow rates and steam flow rates to optimize reactor heating and cooling rate to reduce cycle times



Rosemount 8700 Series Magnetic Flow Meter - reduces batch cycle times by controlling the cooling rate with instantaneous enthalpy measuring heat input/takeaway



Rosemount 8800 MultiVariable Vortex Flow Meter - controls the flow of steam to maintain reactor temperature and reduce batch cycle times by heating faster

Difficult to add additional measurement points to improve heating and cooling rate

Compact instruments that require minimal straight run or no pipe penetrations



Rosemount 3051SFC Compact Conditioning Orifice Plate Flow Meter - requires minimal straight run to measure cooling water and steam flow rates to reduce batch cycle times



Rosemount X-well Technology - simple clamp on temperature measurement with no pipe penetrations to improve cooling water and steam temperature monitoring

Poor reactor temperature control is increasing cycle times and/or damaging batches

Real-time temperature monitoring to prevent temperature excursions and delays in batch heating and cooling



Rosemount 3144P Temperature Transmitter - provides the highest accuracy temperature measurement with advanced diagnostics to ensure measurement integrity



Rosemount 848T Temperature Transmitter - improves reactor temperature profile monitoring with multiple temperature measurements in a single transmitter

Steam trap leaks are increasing costs and reducing the efficiency of reactor heating, increasing cycle times

Implement real-time steam trap monitoring



Rosemount 708 Wireless Acoustic Transmitter -
- monitors steam traps to lower the high cost of steam usage
- detects leaking, cold and blow-through traps
- real-time monitoring eliminates the need for a yearly steam audit



Plantweb™ Insight Steam Trap Application - simple-to-use software with pre-built algorithms that identify cold and blow-through conditions for numerous trap types



GOAL: MANAGE LABOR AND MAINTENANCE COSTS

Issues Solutions Featured Products

High cost of routine device calibration and health checks

Leverage device diagnostics and high stability maintenance free instrumentation



Smart Meter Verification - provided on Micro Motion Coriolis meters, and Rosemount Magnetic flowmeters can help reduce maintenance cost with asset health monitoring avoiding unnecessary calibration checks



Rosemount 3051S Pressure Transmitter -
- ensure maintenance free operation with industry leading 15-year stability & warranty
- advanced diagnostics detect device faults and wiring problems

Lack of insight into pump health increases repair costs and causing process disruptions

Detect impending equipment issues so maintenance can be scheduled, improving reliability vs. run-to-failure approach



Plantweb Insight Pump Application - identifies pump health issues early to prevent major equipment damage resulting in fewer shutdowns and lower repair cost



AMS Wireless Vibration Monitor, Emerson Wireless Devices - monitor pressure, temperature and vibration of key pumps





GOAL: INCREASE SAFETY

Issues Solutions Featured Products

Prevent reactor overfills in challenging turbulent reactor conditions

Improve reactor level monitoring and high alarm level detection



Rosemount 5408 Level Transmitter Non Contacting Radar - achieves reliable measurement despite challenging conditions caused by turbulent agitation, dusty conditions, narrow vessels, or thick layers of dense foam

Rosemount 2140 Level Detector Vibrating Fork - prevents spills for improved safety and high level alarm capability

Difficult to track employees during an emergency and mustering events or when safety equipment is used

Implement location awareness technology



Plantweb Insight Location Application - Emerson's wireless location awareness solution ensures you know where your people are at all times during emergencies and mustering events reducing emergency response time

Reduce response time when safety equipment is activated

Wireless safety shower and eye wash station monitoring



TopWorx™ Safety Shower & Eyewash Station Monitoring Kits -
- provides instant notification with location when safety showers and eyewash stations have been activated
- improves first responder response time and incident reporting
- provides time-stamp verification for proof of inspections for regulatory reporting

Ensure reactor pressure does not exceed safe operating limits

Reliable reactor pressure monitoring reduces risk of over-pressure events, especially when dealing with exothermic reactions

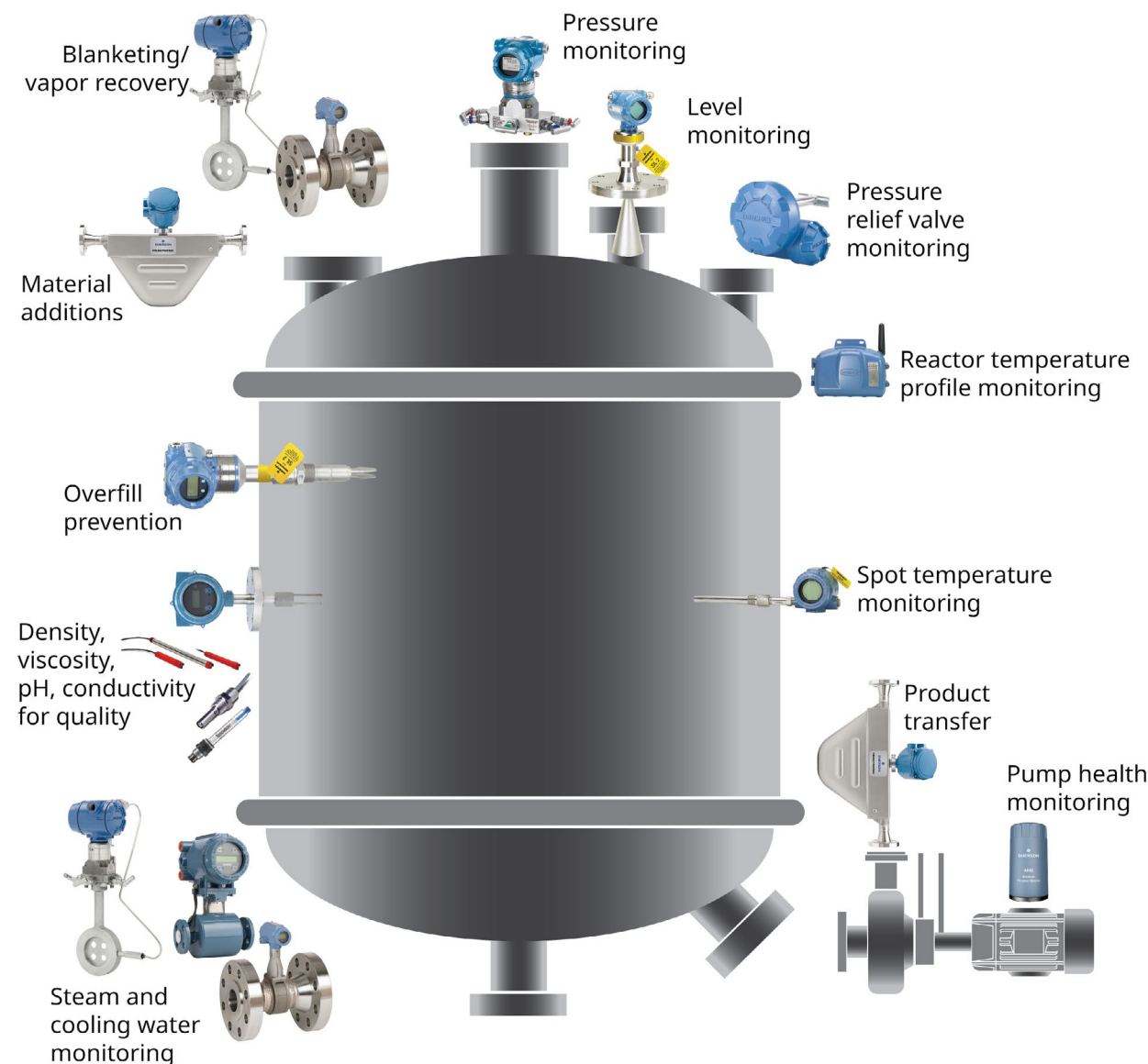


Rosemount 3051S Series Pressure Transmitter - superior long life pressure measurement under a wide range of process conditions



Plantweb Insight Pressure Relief Valve Application with Rosemount 708 Wireless Acoustic Transmitter - detects pressure relief events

Regardless of your goals and challenges, Emerson is uniquely qualified to help you. Our comprehensive solutions for the batch processing application can help you consistently hit quality and production targets while having a safe and reliable operation.



Please contact your Emerson sales representative to discuss solutions to meet your goals.

Measurement Instrumentation

The broadest range of measurement and analytical technologies for the chemical industry.

To learn more about Emerson's solutions for the chemical industry



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