

A photograph of an industrial blending tank in a refinery or chemical plant. The tank is a large, horizontal, stainless steel vessel mounted on a metal platform. It is surrounded by orange safety railings. A set of metal stairs with orange handrails leads up to the platform. In the background, there are more industrial structures, including a large orange vertical tank and various pipes and conduits.

**Maximize blending performance
in any market, at the lowest cost.**

Integrated blending solutions for refining and chemical
Improve quality, reduce costs, and maximize asset utilization.



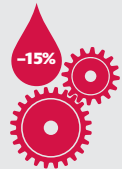
Blending the right product at the lowest cost, regardless of feedstock variability? If only it were so easy.

Whether your focus is on blending fuels, crudes, lubes and greases, or specialty chemicals, meeting your production plan means making the right amount of the right product as consistently and efficiently as possible. It can be difficult to blend on-spec the first time, every time, and maintain throughput around the clock. Cost overruns can have a major impact on your business—especially if you're unable to minimize cycle times, handle changing feedstocks, prevent equipment issues, and limit the use of high-cost components. And at the same time, you must maintain a high level of operational flexibility to capitalize on changes in market demand and to ensure that you're compliant with the latest regulatory standards.

U.S. refiners lose about \$3 billion each year due to quality giveaway.



On average, lube and grease manufacturers lose 10 to 15 percent of potential production capacity due to poor cycle times.



The average refiner running multiple crude types loses 4.5 percent of production due to crude switches.



At least a third of specialty chemical manufacturers are running a second shift just to meet production.

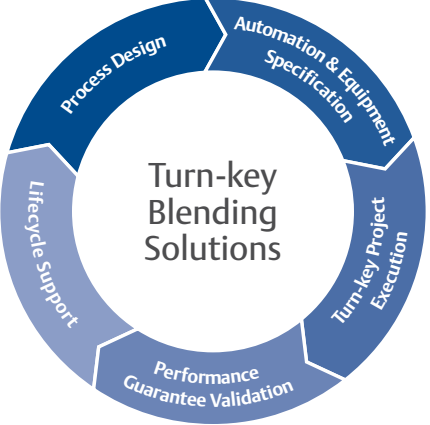


Unpredictable batch cycle times are one of the leading issues that cause manufacturers to miss production targets. Emerson's clean-in-place solutions allow for faster, less labor-intensive cleaning procedures that can help reduce cycle times and improve asset utilization.

Emerson's comprehensive solutions enable on-spec production with greater flexibility than ever before.



With over 50 years of experience in blending process design and automation, Emerson has the broadest portfolio of end-to-end solutions for blending and transfer applications in the industry. In addition to consulting, project management, and local product lifecycle support services, Emerson offers fully integrated, turn-key solutions tailored to help you enhance the performance and profitability of your entire blending operation. Working alongside Emerson's experts, you'll not only be able to minimize risk and reduce operator error, but also meet your production plans in any situation.



For over 50 years, Emerson's team of blending experts have helped manufacturers by designing and implementing plans to improve their overall production process—all with a performance guarantee.

Upgrade to a more flexible and profitable fuel blending operation.

Emerson's experts can help you optimize your process for today's clean-fuels market. With online property analysis and advanced in-line blending control, you'll be able to minimize quality giveaway while reducing tankage, ensuring compliance, and reliably meeting production targets—even amid fast-changing market demand.

Fuels ► p5

Hit lube and grease cost and quality targets with greater consistency.

You'll find it easier to achieve faster cycle times, flexible recipe management, improved production control, and better asset utilization by relying on Emerson's experts to take your lube and grease blending operation to the next level of performance—all while reducing your infrastructure needs and eliminating waste.

Lubes and greases ► p7

Gain the insight needed to blend a wider array of crude feedstocks.

Emerson's crude blending services and technologies give you the process insight needed to accommodate a wider range of crudes by predicting how new crudes will impact equipment health and production decisions downstream, and by analyzing how they should be blended to fully capture their potential value.

Crudes ► p9

Take the guesswork out of profitable specialty chemical blending.

Emerson's blending experts are uniquely equipped to help you minimize cycle times and increase the accuracy of your specialty chemical blending batch process. You'll have the ability to improve equipment availability, reduce the need for manual intervention, eliminate bottlenecks, and achieve more right-first-time blends.

Specialty chemicals ► p11



Fuel blending

Enhance operational flexibility, improve quality control, and increase throughput.

In today's highly competitive, low-margin clean fuels market, successful product blending is critical to your bottom line. At the same time, meeting production targets can be difficult due to excessive touch-up blends, lengthy QA processes, and equipment failures. High-cost components, tankage requirements, slowdowns, and quality giveaway can all impact profitability. And poor asset utilization combined with process limitations and antiquated technology can restrict your ability to meet changing market demands. By tapping into Emerson's extensive blending experience and comprehensive offering of technologies, you'll have a prime opportunity to improve throughput, reduce costs, and increase the flexibility of your fuel blending operations—all while improving overall refinery profitability.

What's your challenge?



U.S. refiners lose about \$3 billion each year due to quality giveaway.



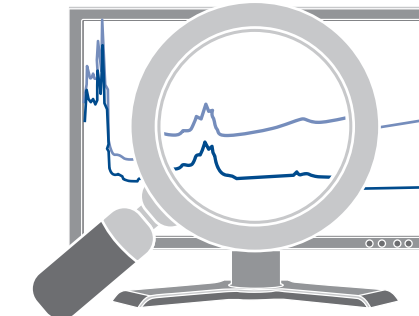
What's your opportunity?

One European refinery reduced octane giveaway by 0.13 MON and RVP giveaway by 0.9 psi by upgrading its blending operation. Along with labor reductions, optimal component usage, and lab time savings, this translated into a combined savings of \$14 million in the first year.

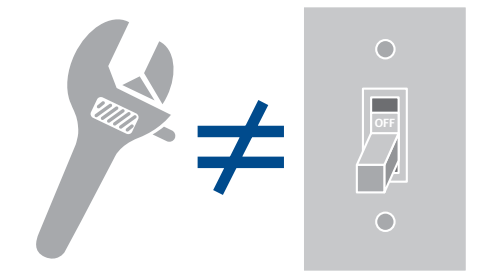
Achieve production goals by improving efficiency and throughput



In-line Blending shortens cycle times and increases the effective capacity of your blending system. ▶ p20

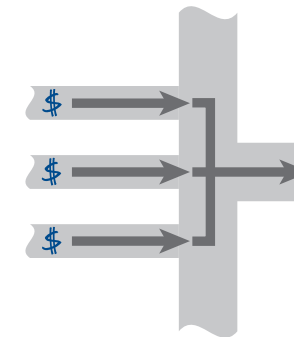


Online Analysis improves the number of right-first-time blends and lessens the time needed for lab analysis. ▶ p15-16

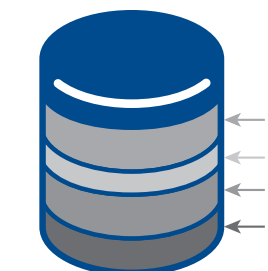


Predictive Maintenance helps identify and prevent equipment failures before they cause slowdowns or shutdowns. ▶ p15-16

Improve profitability with a more cost-effective blending system



Blending Optimization ensures that the least-costly components are used to blend on-spec product. ▶ p15-16



Online Analysis minimizes quality giveaway by quickly and accurately measuring component properties. ▶ p15-16



In-line Blending helps decrease tankage requirements and curtail inventory carrying costs. ▶ p20

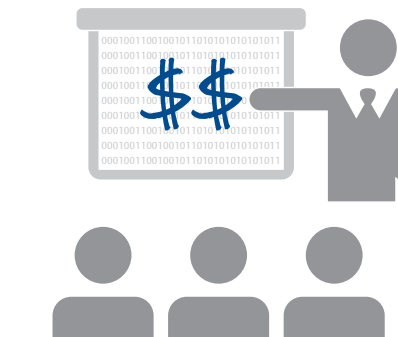


Predictive Maintenance reduces maintenance overhead and helps prevent expensive slowdowns. ▶ p15-16

Meet changing market demand by blending with greater flexibility



Guaranteed Process Design makes it possible to increase operational flexibility and easily meet capacity, quality, and optimization KPIs. ▶ p13-14



Integrated Digital Architecture allows you to make better business decisions at the control level and beyond. ▶ p15-16



Training helps mitigate the loss of experienced blending personnel and enhances operator productivity. ▶ p13-14





Lube and grease blending

Strengthen quality control, cut costs, and improve operational flexibility.

Blending lubes and greases presents several unique challenges. Today there are increasing numbers of product and OEM specifications to meet and customers who want smaller batches, higher delivery frequencies, and shorter lead times. Hitting quality targets can be difficult due to contamination, poor process control, human error, or raw material variability. And if you're unable to respond quickly enough to changing demand because of lengthy cycle times or poor process design, you can miss the chance to make up your losses. Working with Emerson's blending experts, you'll be able to get more out of your existing assets, increase the percentage of right-first-time blends, and keep costs low, while ensuring that your operation is flexible enough to respond to changing market demand.

What's your challenge?

On average, lube and grease manufacturers lose 10 to 15 percent of potential production capacity due to poor cycle times.



What's your opportunity?

A lube manufacturer increased production from 35,000 to 55,000 tons. It achieved a 68 percent capacity increase by redesigning its blending process to produce both large and small batches which enabled it to easily respond to changing market demand.



Consistently meet product quality targets



Integrated Process Control helps ensure right-first-time blends and improve production control. ▶ p15-16

A
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B
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C

Optimized Process Design enables more efficient pigging and less manual intervention. ▶ p13-14

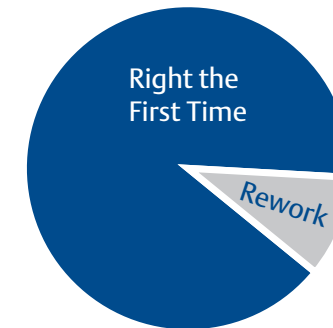


Clean-in-Place technology allows for more reliable and cost-effective cleaning of equipment. ▶ p17, 18, 21



High-Accuracy Dosing Systems help eliminate manual dosing errors and enable right-first-time blends. ▶ p17-21

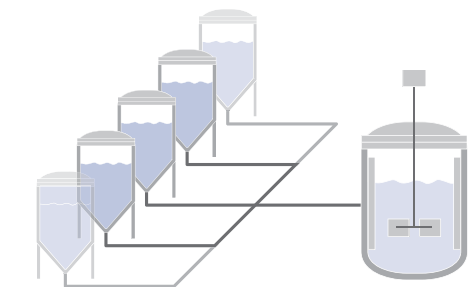
Control production costs and boost profitability



Integrated Process Control reduces costly touch-up blends and the need for manual intervention. ▶ p15-16



Piggable Solutions eliminate flush and lessen piping complexity, maintenance, and space requirements. ▶ p22



Optimized Process Design helps minimize infrastructure needs, including piping and tankage. ▶ p13-14

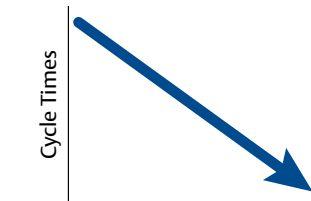
Improve operational flexibility to better meet market demand



Guaranteed Process Design gives you greater production flexibility and the confidence to maintain capacity. ▶ p13-14



Integrated Process Control allows for better recipe management. ▶ p15-16



Clean-in-Place solution shortens cycle times by allowing for faster changeovers and set-ups. ▶ p17, 18, 21



Piggable Solutions enable multiple successive transfers through one line without contamination. ▶ p22



Crude blending

Maximize the full value of a wider range of crudes while protecting your assets and maintaining capacity.

Processing lower-cost opportunity crudes has become increasingly essential to the profitability of your operation. However, as you're challenged to accurately blend a wider range of crudes with greater variability, failing to achieve the correct blend can create crude unit and downstream availability issues due to fouling and corrosion. Capturing the maximum value of opportunity crudes can be impossible without the ability to quickly adapt to new and changing feedstock properties. And often, many different crude types are blended in a single tank due to storage limitations, which can make it difficult to determine crude properties. Emerson's extensive refining expertise and crude blending solutions give you the flexibility and insight needed to overcome these challenges and meet your production goals with confidence, day in and day out.

What's your challenge?



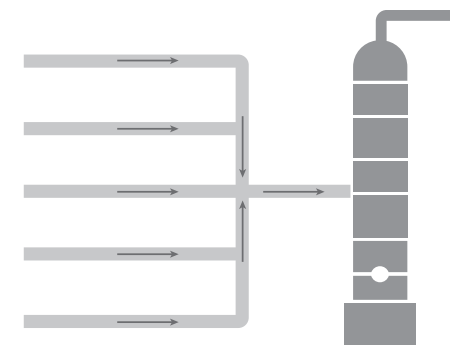
The average refiner running multiple crude types loses 4.5 percent of production due to crude switches.



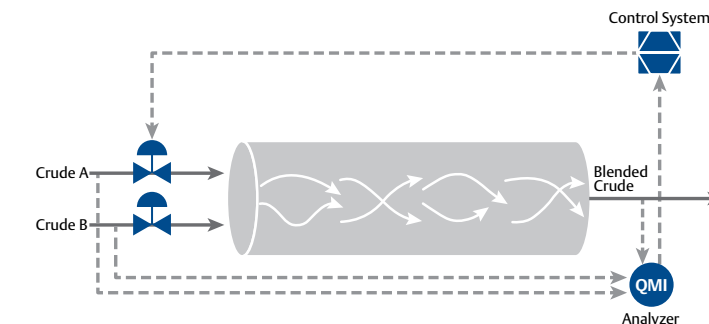
What's your opportunity?

A large North American refiner projects that it will gain an additional 800 hours of capacity per year by reducing the production losses associated with the 200 crude switches it performs annually.

Accurately blend a wider range of crude feedstocks

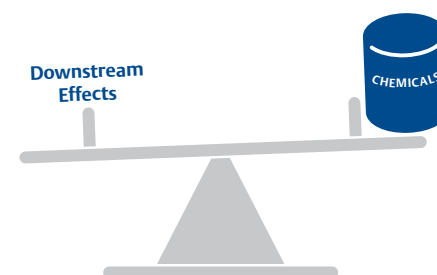


Online Crude Characterization gives immediate insight into crude properties, allowing you to maximize value. ▶ p15-16

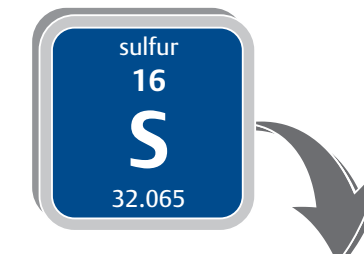


Feed Forward and Feedback Control allows you to accurately blend to the TBP curve for optimal crude unit utilization. ▶ p15-16

Avoid equipment availability issues

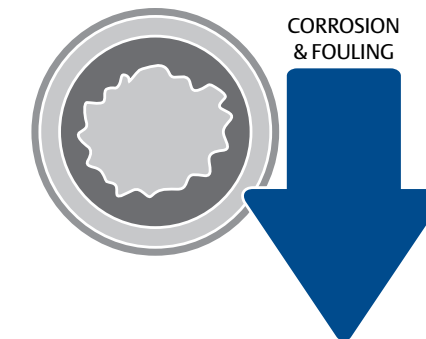


Online Analysis allows you to adjust additive dosage levels to minimize effects on downstream assets. ▶ p15-16



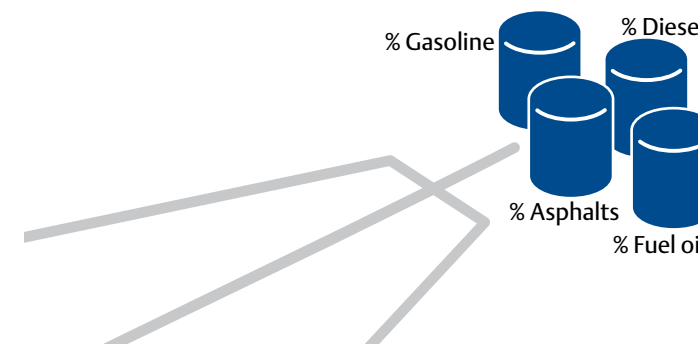
Meet regulations and avoid downstream effects

In-line Blending makes it easier to blend to the desired sulfur targets and compatibility index. ▶ p20

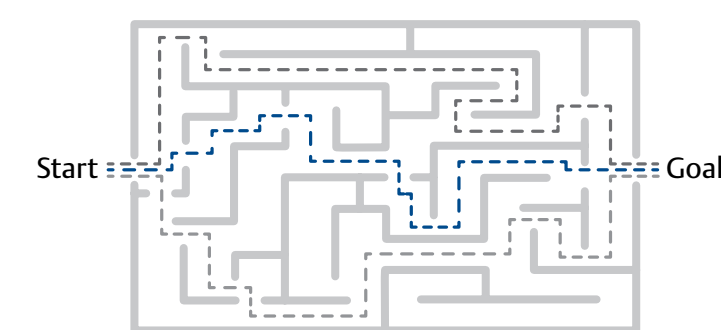


Predictive Monitoring identifies potential asset issues and reduces the impact of corrosion and fouling. ▶ p15-16

Maximize the value of opportunity crudes



Accurate Crude Blending and Characterization provides the flexibility to optimize downstream product yields. ▶ p20



Guaranteed Process Design gives you the operational agility to confidently meet changing market demands. ▶ p13-14



Specialty chemicals blending

Shorten cycle times, improve batch accuracy, and easily meet production targets.

Blending specialty chemical products requires exacting process performance. To protect your operation's profitability, you must overcome long and unpredictable blend cycle times and the need for excessive end-of-batch adjustments. Too many out-of-spec batches can have a significant impact on your margins, especially if you're also limited in your ability to meet changing market demand due to process limitations, antiquated technology, or poor asset utilization. Emerson's blending experts and expansive portfolio of blending products and services can help you eliminate bottlenecks and gain greater recipe control while hitting production targets with improved operational flexibility and less need for manual intervention.

What's your challenge?



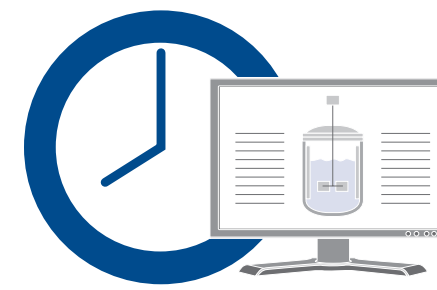
At least a third of specialty chemical manufacturers are running a second shift just to meet production.

What's your opportunity?

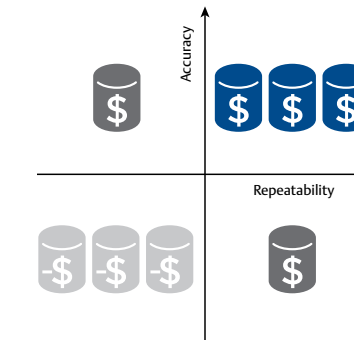


A North American specialty chemical manufacturer collaborated with Emerson's blending experts to design and configure an in-line blending system that allows it to blend up to nine components at a time directly to tanks, trucks, or rail cars, freeing up reactor time and increasing production volume.

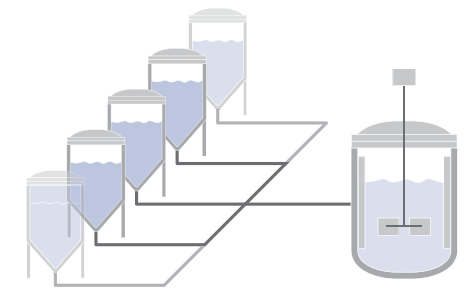
Achieve shorter and more consistent batch cycle times



Batch Control Systems improve recipe management and help ensure on-time batch set-ups. ▶ p15-16

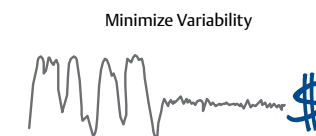


In-line Blending increases batch accuracy and repeatability by reducing the need for manual intervention. ▶ p20



Optimized Process Design allows for more compact systems while still ensuring timely blend additions. ▶ p13-14

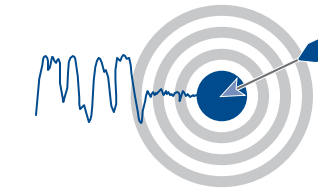
Increase the number of on-spec batches



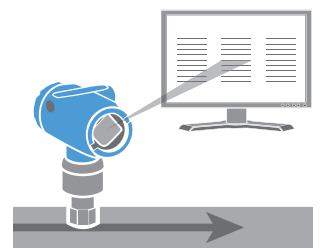
Process Insight gives you a clearer picture of each batch process and helps minimize product variability. ▶ p15-16



Piggable Transfer prevents cross-contamination during transfers. ▶ p22

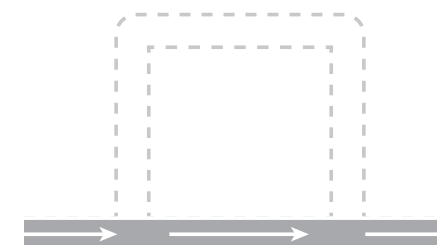


Integrated Process Design improves repeatability and accuracy while reducing batch variability. ▶ p15-16



Accurate Measurements give you data needed to make better decisions that affect batch accuracy. ▶ p15-16

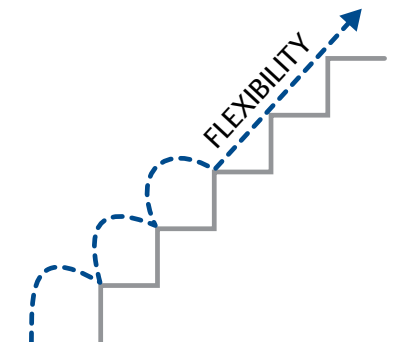
Meet rapidly-changing production requirements



Process Design Modifications can eliminate bottlenecks due to issues with piping, pumps, or connections. ▶ p13-14



Clean-in-Place solutions can dramatically reduce the complexity and duration of cleaning. ▶ p17, 18, 21



Optimized Process Design can increase flexibility by automating batch steps and simplifying changeovers. ▶ p13-14



From concept to commissioning and beyond—Emerson’s services can put you on the path to better performance.



Optimize the design of your process

- Implement a custom engineered end-to-end solution that’s right for your operation.
- Get superior process design and project management expertise all in one place.

Run safer, longer, and more efficiently

- Operate with greater certainty thanks to localized product support.
- Minimize the cost of ownership and prevent unplanned downtime.

Maximize your manpower

- Bridge knowledge gaps by leveraging Emerson’s broad blending expertise.
- Improve the return on your technology investment with well-trained operators.

Get the expertise you need—in one trusted partner.

With so many factors that impact blending performance—and as critical as blending is to your bottom line—you need a process that’s designed and able to meet production targets over its entire lifetime. Several things can stand in your way. An aging workforce means more and more experienced personnel are retiring, and their expertise is difficult to replace. Upgrading to a more automated process often involves engaging multiple vendors for design, instrumentation, controls, and construction, which can drive up project costs and increase risk. Emerson’s experts can help you not only design a more optimal blending process, but also implement it and provide the end-to-end support needed to keep it profitable.

Get the design expertise and technologies you need for success—all in one place.

Process Design and Automation Consulting



Emerson offers three types of studies: comprehensive conceptual studies, Front End Engineering and Design (FEED), and detailed engineering studies. Emerson’s blending experts work closely with you to assess your technical process requirements and can consult on everything from equipment selection and hydraulics to the right control architecture to use, project schedules, and expected ROI. For projects that include design and implementation, performance guarantees are available to give manufacturers confidence that they’ll meet accuracy, capacity, homogeneity, and contamination goals. Emerson is your one-stop-shop for both process design expertise and execution.

Keep your blending operation running safely, reliably, and efficiently.

Lifecycle Services



Fulfilling a critical part of any successful blending operation, Emerson delivers maintenance and lifecycle services that help ensure the integrity of your assets and resources. Emerson’s lifecycle services help reduce measurement uncertainty, ensure reliability and compliance, and minimize the cost of asset ownership throughout the entire lifecycle of your process. With the most expansive global network of support in the industry, including over 400 in-house service engineers, Emerson can serve your needs quickly with local support.

Save time and money on your blending modernization with Emerson’s turn-key solutions.

Project Services



By initiating, planning, and executing all of your project deliverables—from scheduling and procurement to fabrication, factory acceptance testing, and commissioning—Emerson’s blending project management and execution services can help you minimize risk, reduce complexity, lower costs, and simplify project execution. Working with Emerson, you’ll have a single point of responsibility for your entire project, and you’ll benefit from a modular turn-key approach that typically results in schedule reductions of three to four months without requiring a slowdown or shutdown.

Maximize employee effectiveness with training that can cover any workforce knowledge gap.

Educational Services



Today, many manufacturers are feeling the effects of an aging workforce to the point where they are in dire need of expertise and training that they can leverage quickly. Emerson offers a wide range of professional education services to help you train new hires, improve your current workforce skills, and adapt to new technologies. You’ll have access to a variety of training delivery methodologies and a wide range of courses offered through regional training centers or on-site at your facility. And with well-trained personnel, you’ll maximize your technology investment.

An integrated digital automation platform that can take your operation to the next level.



Achieve right-first-time quality

- Gain better insight into raw material quality.
- Meet production plans with more flexible recipe management.
- Ensure repeatable results with accurate and dependable measurements.

Gain greater process flexibility

- Seamlessly adapt to varying feedstocks and product specifications.
- Meet changing market demand.
- Reduce cycle times, with shorter periods between changeovers.

Improve throughput

- Ensure asset health with predictive maintenance.
- Get actionable data from the field to help maintain production capacity.

Put the power of integrated, scalable automation to work for your process.

While it typically accounts for only a small fraction of a plant's overall capital investment, automation technology is the strategic lever that helps the most profitable operations achieve top-quartile performance. Emerson's Plantweb™ integrated digital architecture is a scalable suite of intelligent systems, instrumentation, and devices that uses the power of predictive analytics to give you unprecedented insight into your blending process. With Plantweb, you'll have access to the data and analysis you need to strengthen quality control, increase operational flexibility, improve asset utilization, reduce process variability, and make better business decisions that affect your bottom line.

Solve your toughest blending challenges with a complete portfolio of automation technologies.

SmartProcess™ Blend



- Accomplish all of the control strategies required for your blender with a pre-engineered application package designed to help you make the lowest cost on-spec blend possible.

Analyzer Systems



- Minimize product quality giveaway and reduce tankage requirements with a consistent process sampling and real-time property analysis system housed in a custom-built shelter.

SmartProcess™ Tank



- Improve inventory and property management and gain better visibility of tank status and movements to support lineups to the blender.

Flow Measurement



- Reduce quality giveaway by measuring components with greater accuracy, and gain the flexibility to measure multiple product streams.

Level, Pressure, and Temperature Measurement



- Get accurate, reliable measurements from wired, wireless, and safety-certified solutions that can help you minimize process variability, improve product quality, and reduce maintenance costs.

Asset Monitoring



- Quickly and accurately identify equipment issues and corrosion before they cause costly breakdowns.

Final Control



- Enable correct lineups, ensure safe startups and shutdowns, and regulate your blending process to optimize quality control.

Integrated solution: Automatic drum decanting units



Eliminate manual errors

- Ensure complete transfer of all additives using tilting devices.
- Improve efficiencies and maximize additive usage in a safer, more efficient way with high-accuracy dosing technologies.

Minimize contamination

- Deploy clean-in-place capabilities that allow for automated vessel rinsing between batches, and that reduce downtime and safety concerns due to labor required to clean units.

Increase flexibility

- Accommodate additives with a wide viscosity range thanks to flexible unit design.

Achieve higher accuracy, optimize additive usage, and reduce dosing time.

Small additives are a critical component of lube and specialty chemical blend recipes. Manual handling of drummed additives can be labor intensive and prone to errors since operators traditionally maneuver the heavy drums, measure the right amount, and transfer each additive into the blend. Producing on-spec products requires high accuracy dosing, combined with the right sequencing when adding components. Utilizing Emerson's automatic drum decanting units, you can ease and expedite the addition of drummed components into blending batches by automatically weighing and transferring the exact amount of required small-volume additives into the blend vessel or a pre-mix tank. By automating all steps in the process, drum decanting units drastically increase operational efficiency and safety.

Integrated solution: Automatic batch blending vessels



Increase right-first-time quality

- Eliminate manual dosing inaccuracies with direct measurement.
- Remove risk of cross-contamination with clean-in-place technology.

Reduce foot print

- Save space and infrastructure with more compact design for automated batch blending.

Decrease cycle time

- Reduce downtime by automating dosing, mixing, heating, and cleaning procedures.

Ensure higher-accuracy blending, reduce cycle time, and eliminate contamination.

Blends with complex formulas require precise measurement and sequential dosing of components to achieve product quality. These operations can require extensive operator involvement and downtime to accurately measure components and clean equipment between batches. By automating these processes with batch blending vessels, you'll eliminate these inaccuracies and inefficiencies. Batch blending vessels are equipped with a blend kettle that is traditionally mounted on a load cell, clean-in-place technologies, and integrated controls to automate all steps involved in batch blending. Emerson's solution for automatic batch blending vessels can offer this configuration, as well as an alternative to load cells. By replacing load cells with Emerson's Micro Motion™ Coriolis flow meters, you will greatly improve cycle time and accuracy in dosing.

Integrated solution: Simultaneous metered blenders



Reduce batch cycle time

- Produce higher volume batches by simultaneously transferring more than one component at a time.

Improve right-first-time product quality

- Achieve on-spec blending with higher dosing accuracy.

Increase operational flexibility

- Leverage multiple component types to produce a wider variety of products using the same production assets.

Consistently meet production targets, improve asset availability, and increase throughput.

Long cycle times, asset availability, and process variability resulting in off-spec blending can make it a struggle to meet product targets on time. Using Emerson's simultaneous metered blenders, you can reduce cycle times, increase throughput, and increase dosing accuracy, saving you time and money. Emerson's simultaneous metered blenders are small pipeline-skidded solutions utilizing Micro Motion Coriolis flow meters and integrated control loops to accurately dose more than one component at a time into a header before discharging it to a mixing tank for final product production. With multiple meter runs you can simultaneously add multiple components to the blend, helping you save time and meet deadlines.

Integrated solution: In-line blenders



Reduce production costs

- Eliminate the need for mixing tanks and reduce inventory.
- Minimize time and labor costs associated with quality analysis and rework.

Increase throughput

- Simultaneously add components to simplify component handling and improve cycle times.
- Leverage tightened ratio control to ensure instantaneous production of on-spec finished product.

Boost operational flexibility

- Maintain high-accuracy measurements for a wide range of blend volumes.
- Facilitate quick response to changes in the production plan to meet customer requirements.
- Reallocate existing intermediate tankage to component or final product storage.

Achieve on-spec blending from start to finish, shorten cycle times, and reduce inventory.

Off-spec blending, missed quality targets, and capacity constraints are major concerns at your plant. With Emerson's in-line blenders, you have access to leading-edge technology for blending small volume product with dosing or a full continuous blending operation. By incorporating Fisher™ automated control valves and Micro Motion Coriolis flow meters into the in-line blending system, you'll be able to proportionally introduce blend components simultaneously and continuously to a discharge header with an in-line mixer, delivering homogenous, on-spec product ready for direct shipment via rail, pipeline, or container. In-line blending facilitates a faster production rate, enables you to get the blend right the first time, and requires minimal infrastructure—making it extremely cost-effective.

Integrated solution: Grease blending units



Meet changing market demand

- Accommodate future expansion with scalable design.
- Accommodate many types and volumes of greases.

Lower production costs

- Reduce utility costs thanks to a thermally-efficient, automated reactor.

Enhance productivity and efficiency

- Expedite production startup and achieve larger production volume in a smaller space with compact modular design.
- Reduce waste generation with clean-in-place technology.

Produce a variety of greases more efficiently in a single, automated production unit.

It is challenging enough to meet customer requirements while keeping costs down and accurately dosing and sequencing a variety of thickener types. And with the market shifting from conventional to more synthetic greases, processes will likely need to be modified to cost-effectively meet that demand. With Emerson's batch and continuous grease units, you can efficiently achieve high accuracy measurement and tightened process control at all stages of grease production. Equipped with the highest thermally-efficient reactors, grease kettles, colloid mills, and heating/cooling and vacuum systems, you will be able to automate the entire process in a compact production unit. All units feature Emerson's leading technologies, including DeltaV™ distributed control system, Micro Motion Coriolis flow meters, Rosemount™ measurement instruments, Rosemount wireless technology, and Fisher control valves for measurement accuracy and enhanced control.

Integrated solution: Piggable valves and manifolds



Reduce operating costs

- Lower total cost of ownership with Emerson's unique pig design, which requires less maintenance, pressure, and elbow passage.
- Maximize raw material usage.

Improve operator safety

- Eliminate labor-intensive flushing operations.
- Avoid product spills by eliminating hoses prone to tangling.
- Eliminate manual changeovers during product transfers.

Reduce footprint

- Save facility space with the most compact manifold design on the market that can accommodate inlets and outlets of varying sizes.
- Reduce expensive piping formerly needed for transfers.

Perform safer, cost-effective transfers while eliminating flush and contamination.

Transferring fluids during changeovers from tanks to blending units or filling lines can be challenging. To ensure the full transfer of material and avoid cross-contamination, additional raw material is used to flush the lines. In addition to costly flushing operations, operators often perform product transfers manually by carrying and connecting heavy hoses from tanks to a switch board that could have up to 1,000 connection combinations. These manual operations are prone to product losses due to spillage and safety hazards when hoses become entangled. Using Emerson's piggable valves and manifolds, you eliminate these challenges. These valves allow for automated, multiple successive product transfers through a single line without contamination. Piggable valves can be part of the inlets or outlets of a piggable manifold, eliminating manual routing of product transfers. These solutions drastically improve operator safety and efficiency while eliminating contamination and product waste.

Take advantage of the most complete offering of blending automation expertise, technologies, and services in the industry.



Emerson's global services network delivers a broad range of engineering expertise, including consulting, site studies, and local product support.

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