

Minimize risk to quality by using consistent, integrated batch processes.



Batch Control and Operations

DeltaV™ Distributed Control System

DELTA V™


EMERSON™

Stay Competitive

You're asked to do more with less—while meeting customer demands for on-time, on-spec products.

With growing global competition, you're challenged to get your batch products to market faster, and in many industries, you're pressed to meet regulatory requirements; yet you need manufacturing flexibility to quickly respond to changing customer demands.

To get products released sooner, you need better information flow, reduced paperwork and its accompanying risk of error and omission.

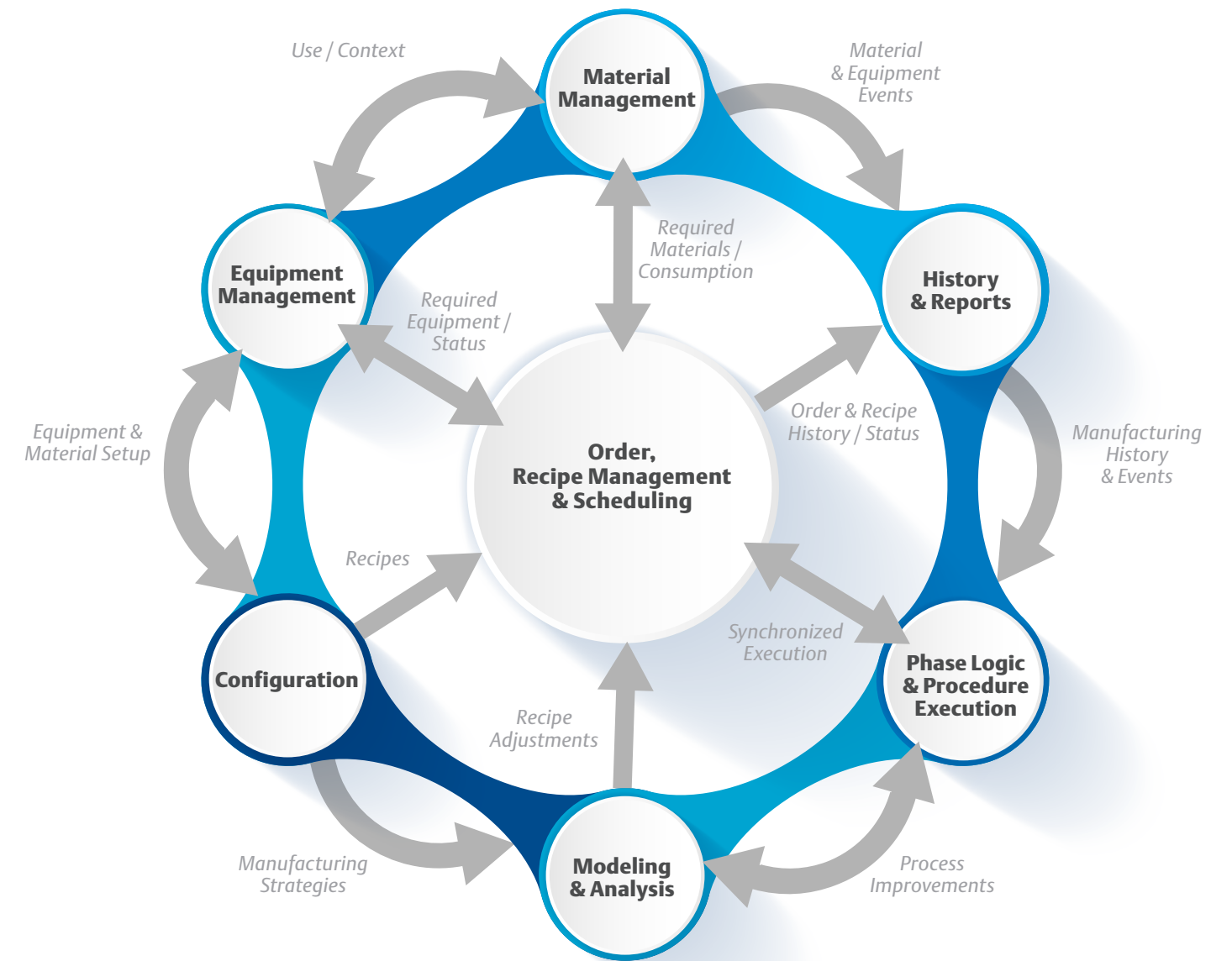
These are the just a few of the challenges Emerson has in mind when deploying DeltaV Batch – part of the suite of integrated tools for the DeltaV™ distributed control system.

Built for batch

The DeltaV system architecture is based on the ISA88 Batch Standard. Whether it is the physical model, procedural model, or easy-to-use class-based configuration – the DeltaV system is simply “built-for-batch.”

Like the rest of the DeltaV system, DeltaV Batch fully supports compliance with the challenging electronic records demands of regulated industries for recipe and campaign management, batch history, automatic version control and change management, and electronic signature support.

The complete DeltaV Batch suite supports all process components. The batch hierarchy is built right into the system. All batch control logic for a unit, including phases, is executed in the DeltaV controllers.



Totally Integrated Batch Solution

Easier Batch Operations Enhance Productivity

DeltaV Batch includes process cells, unit modules, phases, equipment modules and control modules. From recipe scheduling to device control to advanced control; from simple sequencing to multi-stream formulations, the DeltaV system makes your batch operations easy.

Because DeltaV Batch is an integral part of DeltaV, it uses the same intuitive drag-and-drop engineering interfaces to make configuring your recipes easy. You enter data once into a common global database – no data mapping is needed. In DeltaV Operate, your operators can easily access all batch and process information in a single, integrated environment.

When used with Emerson's Syncade™ Smart Operations Management Suite, DeltaV Batch offers a comprehensive operations management solution to optimize work processes plant-wide.

Increase Quality and Reduce Batch Variability

Batch Analytics gives you valuable insight into your process

Safely producing maximum yield while meeting product quality specifications at minimum waste is not only difficult, but can be very costly.

In a complex, dynamic and highly correlated environment, multiple batches often run concurrently— and a problem occurring in one unit may also negatively impact batches in units upstream or downstream of it.

DeltaV Batch Analytics provides easy-to-use engineering tools to generate models of your batch processes based on the process data that you are already collecting. These models can then be leveraged as a batch runs to detect real-time process faults and anomalies that impact product quality or throughput. The models make end-of-batch quality predictions as the batch executes to leverage the multi-variant information buried in the data to make informed production decisions.

Batch Analytics is designed to leverage the continuous and batch data that DeltaV captures through an easy-to-use tool to generate models. This avoids the need for the advanced statistical skills that would otherwise be required to deploy multi-variate models.



Bridging the Gap Between Quality and Control



Lost, re-worked, or reduced quality batches cost manufacturers millions of dollars every year.

Batch Analytics combines historical information, multivariate analysis and a patented method to reconcile inherently misaligned batch data to:

- **Predict** end of batch quality parameters.
- **Detect** faults in real time.
- **Provide** impact-based list of reasons operators use to take effective action.
- **Minimize** batch-to-batch variation.

Flexible Manufacturing

Maximize throughput and avoid manual selection errors

Fast-response flexibility calls for control software that is easy to use and modify. DeltaV Batch software provides manufacturing agility, starting with the automatic allocation of your process units to maximize throughput and avoid manual selection errors.

To simplify equipment selections and minimize error potential, you can define equipment trains to select the valid equipment paths through which the process can flow. DeltaV Batch lets your operators use aliased units to select, change, or update recipes during execution. The result: improved operator productivity and increased right-first-time performance.

The single recipe workflow environment and modular, reusable software libraries in DeltaV Batch enable you to dramatically reduce engineering and verification time.



- **DeltaV Batch Executive** is the engine that coordinates all batch processing activity; it also creates detailed batch history records and schedules recipes and resources. It can be made fully redundant for processes requiring higher uptime assurance just like DeltaV controllers.
- **DeltaV Recipe Studio** is a powerful yet simple-to-use application for graphically configuring recipes and formulas for successful batch production.
- **DeltaV Campaign Manager** creates and manages campaigns by specifying the recipe, formula, equipment, and number of batches that are to be run within the campaign. This can free operations staff from the task of populating batch lists for upcoming production and minimize data entry errors in batch creation. A web service enables external applications to programmatically interact with the DeltaV Campaign Manager to specify, and initiate batches.

- **DeltaV Batch Historian** automatically collects and displays recipe execution data from the DeltaV Batch Executive and process alarm/event data from the DeltaV Event Chronicle into a SQL database for ready reporting access and data archiving. The History Analysis application enables web-based access to batch event and continuous historian information for anyone, anywhere.
- **DeltaV Recipe Exchange** provides an open, programmatic interface to the DeltaV recipe management system. Recipe Exchange is based on an XML schema enabling the use of web services to import and export DeltaV recipes.
- **DeltaV Batch Analytics** contains a powerful, easy-to-use, multi-variate modelling tool to execute the model and display it to plant staff.

Faster Time to Market



Some of the most common challenges for plant managers is maximizing capacity utilization and managing inventory and workflow across various plant functions to assure “right-first-time; right-every-time” production. Emerson’s batch solution responds to these challenges by enabling integration of the production assets with scheduling and ERP systems, automating production procedures, and eliminating production errors. The impact is reduced cycle time, better capacity utilization, reduced waste and rework, improved delivery performance and reduced inventory.

DeltaV Batch provides comprehensive ISA 88/95 standards compliance and covers your product order from start to finish. To meet FDA 21 CFR part 11, OSHA, and ISO requirements, DeltaV Batch incorporates action confirm/verify via electronic signatures, with an additional verifier name and password if required.

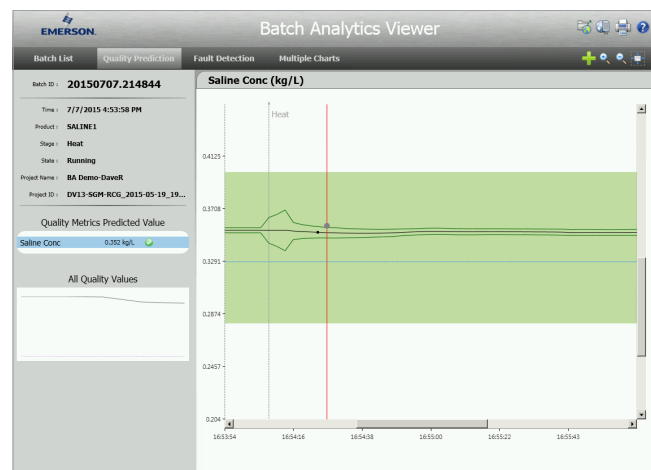
Electronic logging of data eliminates traditional paper-based clipboard entries to track issues associated with the batch. Comments can be entered on the fly, viewable by all who have sufficient privilege and associated to the batch history.

The DeltaV system’s recipe development environment requires no programming or specialized automation skills, so operations personnel can develop the master batch record without external help. Using a single, supported product also reduces your cost to maintain it. Typical custom solutions come with the risk that the integration software may require maintenance as the manufacturing execution (MES) and/or distributed control system is upgraded to a new version.

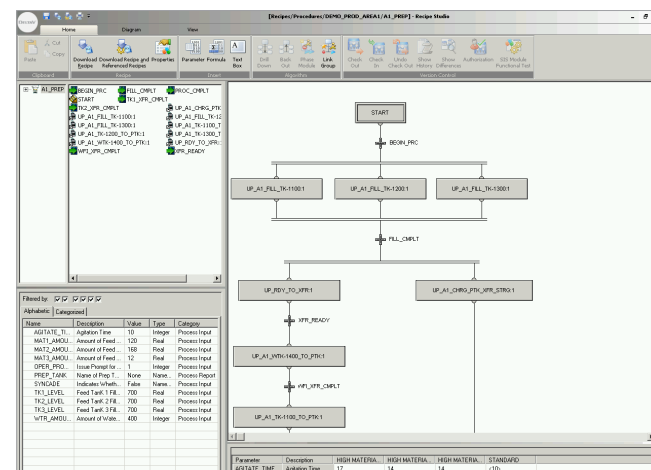
With DeltaV Batch and integrated Syncade functionality, Emerson opens and expands the recipe management environment to support a plant’s primary production processes and electronically connect the enterprise resource planning (ERP) systems with production equipment control, distributed control systems, programmable logic controllers (PLC), and/or supervisory control and data acquisition (SCADA) applications. This adds real-time production control, along with data collection for industry-required reporting and improved production performance.

Extending DeltaV Batch to include operations management increases right-first-time; right-every-time manufacturing by extending electronic procedural control over manual paper-driven processes, tracking materials usage and providing comprehensive manufacturing automation from the production order through product disposition. Syncade Workflows guide the operator and provides access to reference documentation (such as Standard Operating Procedures and Material Safety Data Sheets) which can eliminate errors and ensure accurate data is collected, with any omissions flagged during production.

Agile manufacturing also requires secure, highly-validated information exchange between levels of the ISA95 information hierarchy. DeltaV Batch provides web services through a secure, service-oriented architecture (SOA) gateway to allow enterprise planning systems to make informed scheduling decisions and initiate advanced unit and batch operations. These secure transactional communications work with the firewalls, smart switches, and other high-security requirements you deploy as part of your cybersecurity initiatives.



Batch Analytics Viewer



DeltaV v13 Recipe Studio



Maximize capacity utilization while managing inventory and workflow across all of your plants, simultaneously.

Compliance with Confidence

Configuration changes by unauthorized users can lead to costly mistakes to your product and regulatory non-compliance.

DeltaV Batch embeds version control and audit trail capabilities to automatically capture changes as they occur in the system. Every configuration change – from recipes to graphics – can be authorized, approved and automatically captured. Recipes offer an approval process so updated recipes only go into production when all required personnel have signed-off.

And with AMS Suite: Intelligent Device Manager, this audit trail extends to your intelligent field devices to automatically capture changes, extend calibration intervals, and reduce maintenance costs.

Version-to-version comparisons track all changes

- Configuration Audit Trail in DeltaV Batch, allows only users with appropriate security privileges to make configuration changes. The system automatically captures all changes in the configuration history and provides version-to-version comparisons, including what changed, who made the change, when, where and why they were made. If a change isn't working as hoped, rollback functionality enables easy return to a previous version.

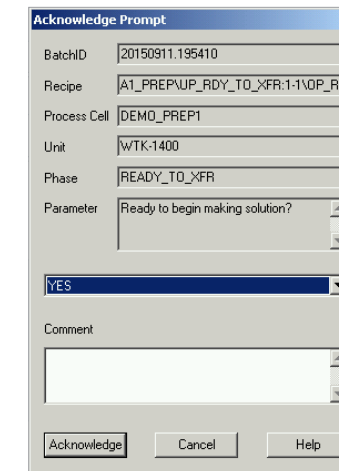
Electronic signatures

- Electronic signatures ensure that recipes run per the specified procedures. With DeltaV any operator action can be confirmed with one or two levels of signature authority. An electronic log is also available to capture operators' observations during a running batch. All signatures and comments are stored with the batch history. This extends the batch record and provides information for further detailed analysis of the batch.

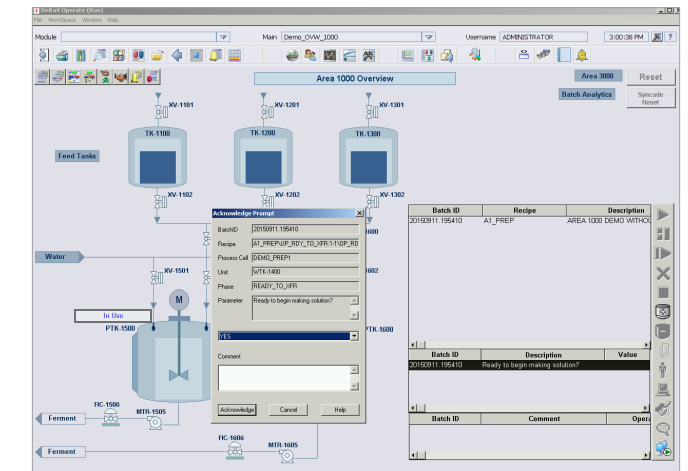
Pre-set security privileges

- Not knowing who performed what tasks—or worse, having an unqualified operator perform a task for which they were not authorized—can lead to lengthy and costly investigations. During investigations, product cannot be shipped, decreasing your company's profitability and delaying your customer orders.
- The DeltaV system's function-based security lets you control who can perform tasks in the system. An authorized user's name and password, along with a verifying user's name and password, if required, are needed to execute the action.
- All of this information is automatically recorded as part of your history.

Simulate Process for Right-First-Time Batch



Batch Control with Prompt



Integrated Batch Operating Environment

Know when, where, and why changes are made to avoid costly errors.

- Getting batch manufacturing right the first time is critical to meeting your customers' expectations.
- With DeltaV Simulate, you don't have to delay development of your automation system configuration, logic checkout, and operator training until your automation system is delivered. DeltaV Simulate lets you use all of your DeltaV software for training and development so you don't have to purchase duplicate system hardware.
- This means you can simulate all recipe and process elements using exactly the same software provided in your on-line system at a fraction of the cost. With the simulate suite you can also explore DeltaV system features before purchasing them.
- Simulation playback provides an ideal environment for operator training and process simulation. It all adds up to reduced training and testing time, so you not only get to market faster, but you get the right product the first time and every time.

Improve Operations Efficiency

Operators struggle on a daily basis with the inefficiencies inherent in paper-based equipment logbooks. These can include limited access, missing or inaccurate data, and lack of authorization signatures where required.

Each signature and data entry instance in the equipment logbook reduces operator productivity and introduces the potential errors or inaccurate information.

For regulated environments, manufacturing records must be reviewed periodically to confirm required signatures and data collection. With each piece of process equipment needing a specific log, the number of records and the time required to review them can become overwhelming.

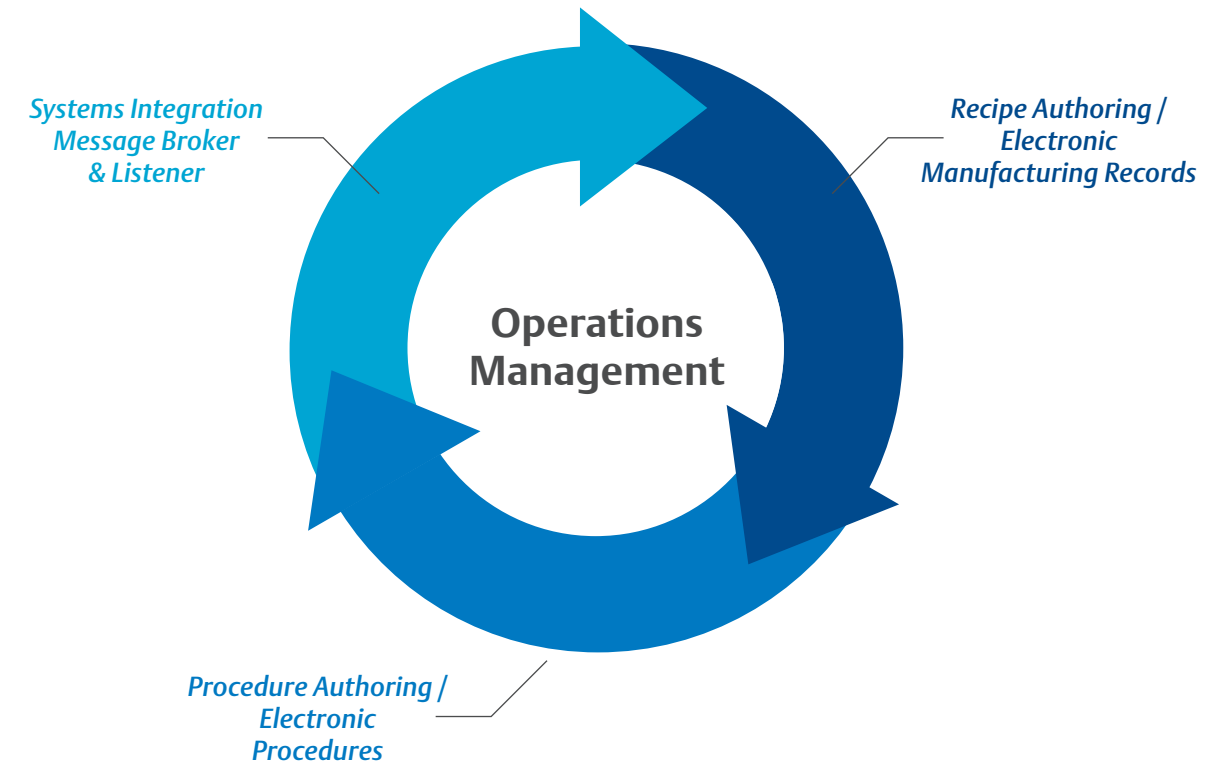
The DeltaV Batch solution eliminates the need for paper-based records by automatically capturing operator actions. It gives you the ability to enforce sequence steps and integrate reference documents such as standard operating procedures (SOPs)—which improves operator efficiency.

The ability to automatically log events initiated by the control system makes operators more productive. Out-of-range data may be flagged to appropriate users to assure data integrity. Ensuring all data is complete and accurate is automatic; and defining proper authorization with electronic signatures can be securely built into the workflow.

The result is reduced risk of investigations prolonged by missing, incomplete, or overlapping or conflicting paper logs.

Enterprise integration

Because many batch processes require intensive documentation, often followed by reconfiguration of production assets to make an entirely different product, the DeltaV Batch software integrates tightly with the enterprise, providing crucial information to planning, scheduling purchasing, pricing, shipping, and financials.



The Syncade Smart Operations Management suite extends the DeltaV batch system to comprehensively meet requirements for production management, material management, and quality management-effectively synchronized while eliminating duplicate efforts or manual data entry.

In the batch environment, the Syncade suite can automatically create manufacturing orders with automated downloads from the enterprise resource planning (ERP) system. The Syncade suite is easy to use, integrate, and maintain because it's built on industry standard OPC and .NET-based web services.

Syncade's service-oriented architecture (SOA) creates an integrated IT infrastructure and agile, loosely coupled dynamic applications capable of rapidly responding to changing business needs. Your manufactured products can be released sooner for sale with a fully documented, single electronic batch record.



Reduce cost of design, implementation, testing and maintenance with consistent implementation.

Services to Unlock the Full Potential of Your Batch Operations



To view the entire SureService portfolio, visit: www.sureservice.com

Legions of seasoned talent are closer to retiring and the prospect of losing accumulated experience is a real challenge for manufacturers today.

To help fill the gap of expertise, Emerson offers an array of services from opportunity assessment through design, project execution, commissioning, maintenance, performance improvement and training.

Emerson draws on years of experience from experts in the batch industries to provide performance solutions for your most challenging specialized process parameters.

- **Life Sciences.** Our pharmaceutical and biotech specialists can help you achieve competitive advantage and hassle-free control and validation.
- **Specialty Chemical.** Recognizing that no two specialty chemical operations are alike, our experts focus on maximizing your operating efficiencies and can help you identify and justify new technologies with the highest returns on your investment.
- **Food and Beverage.** Our consultants, as integral partners, can help you execute your food or beverage projects efficiently to avoid mistakes, deliver profitable results and reduce project risk.
- **Validation Expertise.** Validation can be a daunting task. To help your efforts go more smoothly, we offer validation consulting services.
- **Project Services.** Emerson project services span a wide range of commercial and contracting strategies. These vary in size and scope from basic consulting to complete turnkey responsibility for projects of any size based upon your needs.
- **Data Management Services.** Emerson's data management experts provide integrated enterprise architecture, engineering, production and asset data management solutions that will optimize your business operation.
- **Modernization and Migration Services.** Our experts help ensure success in achieving your process and business objectives through applied automation — taking the risk out of modernizing.

- **Opportunity Assessment Services.** Opportunity Assessment Services help you identify potential areas of improvement to generate the fastest return on your investment. Services include:
 - Conceptual design and feasibility studies
 - Process improvement and optimization consulting
 - Operations management master planning and data services
 - SmartProcess® pre-engineered solutions from the experts
- **Educational Services.** Emerson Educational Services can help ensure you get maximum value from your automation investment. Our global training programs are designed for ongoing operator, engineer, technician and maintenance personnel development, building practical skills through hands-on experience.
- **OTS (Operator Training Solution).** Operator training options to fit your needs include local, on-site, factory-based, and virtual as well as eLearning offerings. Simulation training for plant operators is also available to train and test operators before your process goes online.
- **Lifecycle Services.** Emerson helps you maximize business value and operational investment over the lifecycle of your system through availability, sustainability and performance improvement services. Through our global network of local and factory specialists, we deliver on the promise of improving your competitive advantage and bottom line business results.



*50% of engineering workforce eligible for retirement in 2015.**

**According to studies published by the U.S. Bureau of Labor Statistics*



Emerson's DeltaV Batch is modular and scalable to meet your needs — whether a simple pilot plant or a very complex production facility.

DELTA^V

Learn more about DeltaV Batch offerings at www.emerson.com/deltav.

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