



DeltaV™ Solutions in Refining

Delivering enhanced operations and production flexibility in refining leveraging Emerson's DeltaV process control, safety systems, and software solutions worldwide.



Introduction

Emerson has a long history in supplying controls and instrumentation to the refining industry. This history goes back to the 1970s with Fisher AC² analog controllers, to Fisher PROVOX™ and Rosemount System 3 (RS3™) distributed control systems (DCS), to the modern DeltaV DCS successfully controlling and optimizing refinery performance. The DeltaV DCS and Emerson automation and instrumentation technology today are helping refiners across the globe drive top quartile performance in safety, reliability, sustainability and production.

Emerson has deep experience in both greenfield [e.g. North West Redwater Sturgeon Refinery in Canada] and brownfield refining modernization projects with over 1,200+ operating systems and over 1 million I/O in refineries with installations on all major process units. Emerson has developed considerable expertise in Main Automation Contractor (MAC) retrofits and hot process cutovers.

Emerson has a long tradition of migrating and modernizing legacy control systems to the DeltaV DCS and DeltaV SIS, with over 6,400 successful projects since year 2000 to end of 2021. Our considerable project list includes many refinery sites such as Shell Deer Park USA, Motiva Norco USA, Valero Pembroke UK, BP Whiting USA, Preem Lysekil Sweden, Rompetrol Constanta Romania and Lukoil sites in Russia and Eastern Europe. These organizations have already realized the benefits of early startup, reduced FAT/SAT schedules, and destination involvement for local ownership and commitment.



DeltaV in refineries and refining-related sites across the globe.

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Project Successes

North West Redwater Sturgeon Refinery, Alberta, Canada

- Greenfield project, one of the newest refineries to be built in North America
- Unique one-step process to convert diluted bitumen to ultra-low sulfur diesel
- Emerson acted as Main Automation Contractor
- *“The Emerson project came in under budget and the quality of their equipment and engineering services has been exceptional.”*
- NWR Chief Engineer - Automation

Valero Pembroke, Pembroke, UK

- Site modernized with DeltaV Automation System
- Highlight is the gasoline blending system
- Enabled in line blending direct to vessel
- Eliminated blended product storage, allowing reallocation to other uses
- *“Overall, the project team identified process improvement opportunities, delivered one-time capital benefits of several million dollars, and provided a sustainable blending optimization solution that has already contributed significant ongoing annual operational savings and is expected to continue for many years forward”*
- Valero project team

BP Whiting, Indiana, US

- Emerson acted as the Main Automation Contractor for the refinery’s modernization program
- Four new major processing units – crude distillation, coking, gas oil hydrotreater and sulfur complexes – were automated with DeltaV DCS and DeltaV SIS
- Controls for the Fluid Catalytic Cracker complex were also modernized with the DeltaV DCS during the same period
- Unique program involving both greenfield and brownfield projects
- *“Emerson’s ability to quickly assemble key resources at our site allowed us to maintain our aggressive project schedule.”*
“We could not have completed this without Emerson’s dedication and support”.
– BP Whiting Automation Program Manager

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Refinery Processes Experience

Since the early days of DeltaV DCS and subsequently DeltaV SIS, Emerson has been delivering and installing DeltaV-based solutions in all stages of the refining process, providing end-to-end process control and protection for refiners. Emerson has experience with all the major licensed refining process technologies including UOP, Axens, Foster Wheeler, KBR and more.

Crude Distillation Units	Atmospheric Vacuum
Cracking Units	Fluidized Catalytic Conversion (FCC) Residual Catalytic Conversion (RCC)
Isomerization Units	
Alkylation Units	Hydrofluoric (HF) Acid Sulfuric Acid
Catalytic Reforming Units	Continuous Catalyst Regeneration Fixed Bed Petrochemical Production
Coking	Delayed Coker Needle Coker Sponge Coker
Hydrocracking	
Hydrotreating	
Visbreaking	
Asphalt Units	
Oil Movements/Offsites	
Blending	Gasoline Diesel Crude Lubes & Greases
Hydrogen Units	Pressure Swing Adsorbers (PSA)

Treatment Plants	Effluent Feed water
Utilities	Steam Boiler Fired Heaters Heat Exchangers
Sulfur Complex	Sulfur Recovery Amine Unit
Petrochemicals	Aromatics Solvents Propane DeHydrogenation Methyl Tert-Butyl Ether (MTBE) Paraxylene
Sulfur Complex	Sulfur Recovery Amine Unit
Biofuels	Ethanol Biodiesel Green diesel Methanol to Motor Fuels
Lubricants	
Sustainability	Carbon Capture Chemical Recycling Depolymerization Hydrogen – Green & Blue

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Summary of Benefits


Over the years, refiners that have DeltaV and DeltaV SIS have enjoyed benefits like:


 **2%** increase in mechanical availability.


 **35%** energy savings from SmartProcess implementation.


 **10%** reduction in gasoline inventory (1 day of production through reduced re-blending /storage).

 **1.8M** per year from Improved energy and yield optimization on crude unit.

 **2M** per year reduction in quality give-away.

 **3-7M** per year margin increase from increased effective/reliable use of opportunity crudes.

 **10M** benefits (9 month payback) from residual feedstock characterization on coker and hydroprocessing units.

 **1.7M** benefits (6 month payback) from reduction in O2 with mass-based fuels control in fired systems.



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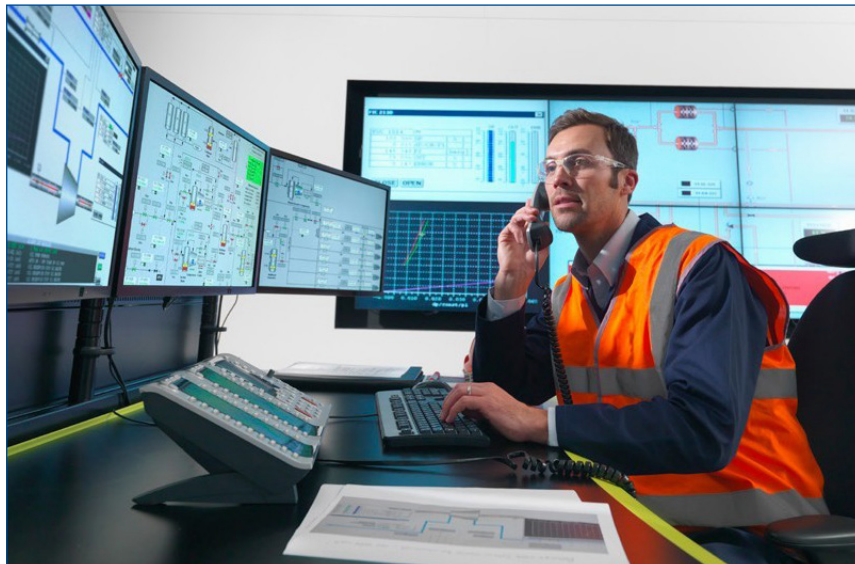
Key Emerson Technologies in Refining

Emerson combines innovative technology and engineering to improve capital efficiency and boost project schedule reliability—helping to address the billions of dollars lost due to project excesses each year.

Our technology and engineering-based program is designed to help industrial companies achieve Top Quartile performance and recover more than \$1 trillion in operational losses globally.

Advanced Control

Smart Process™ Optimization Software



Pre-engineered advanced control applications that optimize processes such as blending, fractionation, distillation, fired heaters and compressors.

DeltaV Advanced Control



DeltaV Advanced Control and SmartProcess applications include model predictive control, loop monitoring and adaptive tuning, quality prediction, and constrained optimization.

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Key Emerson Technologies in Refining

Controllers & I/O

DeltaV PK Controller



Can be implemented for a wide variety of applications from small-scale skid units to large-scale traditional control applications.

Electronic Marshalling with CHARMs



Electronic Marshalling delivers the flexibility to add I/O anywhere in the plant without affecting control room cabinets.

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Key Emerson Technologies in Refining

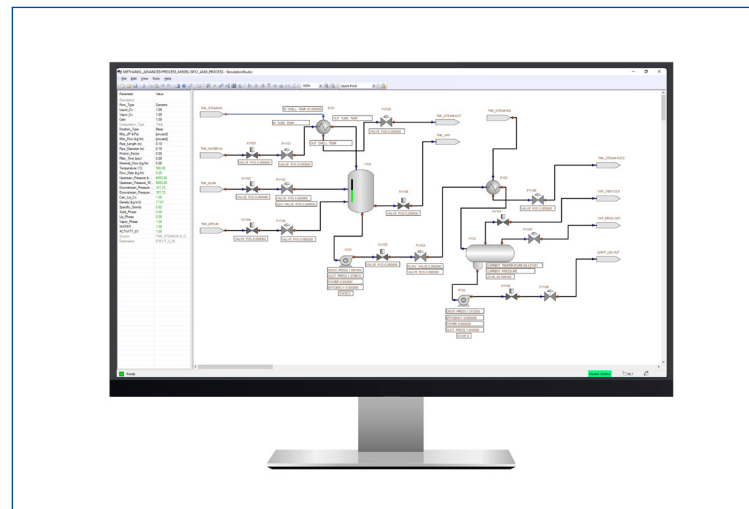
Digital Transformation Platform

Data Analytics



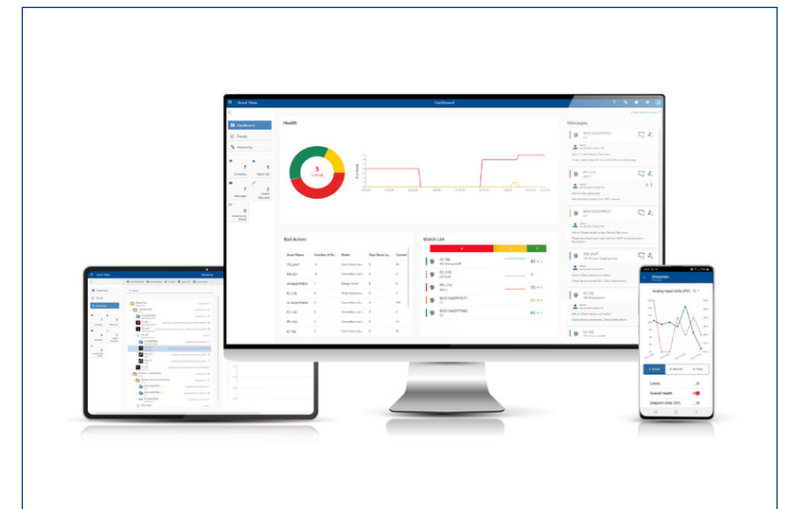
Enable proactive decision making through actionable knowledge and insights.

Digital Twin and Simulation



An “offline” DeltaV system for software testing, system development, operator training, and ongoing system maintenance and support.

Asset Performance Monitoring



Move from reactive states to proactive, strategic planning and deliver a sophisticated, holistic view of assets in the facility or across the enterprise.

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Key Emerson Technologies in Refining

Operator Performance Solutions

DeltaV Mobile



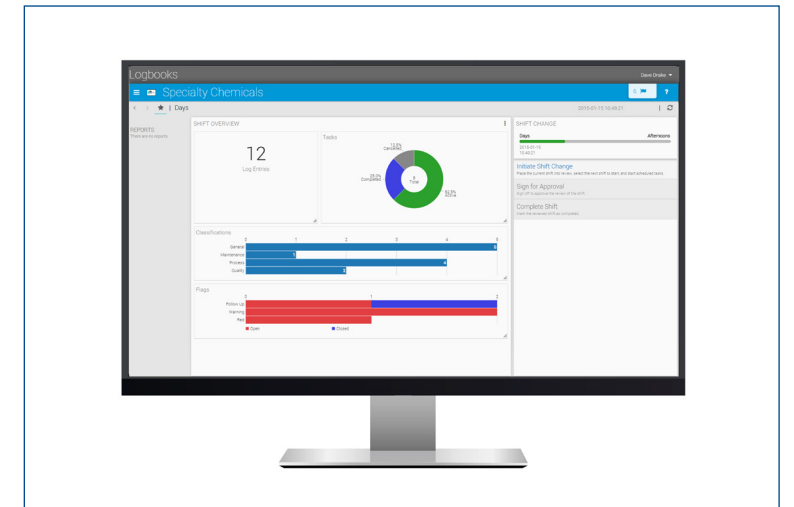
View real-time process data, historical trends, and receive alarm notifications from your mobile device – virtually anywhere.

DeltaV Live



Our first HMI to natively support HTML5- laying the foundation for universal, cross-platform graphics that are easy to design and configure.

DeltaV Logbooks



Browser-based application used to capture electronic records of operator activity as well as plan and track operator tasks during a shift.

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Key Emerson Technologies in Refining

Safety and Security

DeltaV SIS



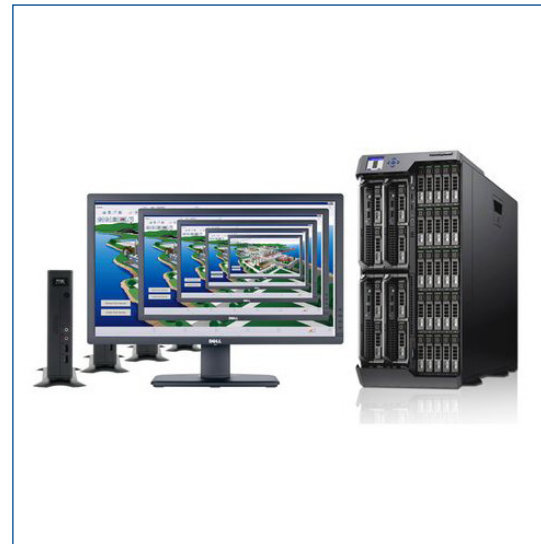
Continuously monitors your plant's safety devices' status and diagnoses the health of the entire safety loop.

Logic Solver Hardware



The DeltaV SIS has a scalable modular architecture providing unprecedented flexibility and ease-of-use.

Virtualization



With DeltaV Virtualization, you can keep your system up and running with little or no disruption or downtime for system upgrades, maintenance and security.

Cybersecurity



DeltaV DCS gives you a new level of confidence and protection from cybersecurity threats by being one of the only systems to have a top-to-bottom cybersecurity certification. DeltaV DCS is certified ISASecure SSA Level 1 and IEC 62443 compliant.

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Key Emerson Technologies in Refining

Lifecycle Services

Guardian™ Support For DeltaV DCS



Get proactive information, software updates, and 24x7x365 technical support, all specific to your products and systems.

SureService™



A set of tiered packaged Lifecycle Services that provide flexibility to engage with Emerson to support your lifecycle strategy.

Educational Services



Our Engineering, Operations and Maintenance courses help you get up to speed quickly on the DeltaV DCS and DeltaV SIS which are easy to learn, use and maintain.

[Learn more](#)

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Run Your Plant at its Full Potential



Refiners around the world have benefited from Emerson's process control technology as embodied in the DeltaV DCS and DeltaV SIS. Emerson's advanced technologies help them gain the benefits of Top Quartile performers. Operational flexibility is the driver for enhancing performance and digital transformation is the fastest and most efficient way to achieve that goal. By partnering with Emerson, refiners can more easily and safely upgrade operations to meet demand while lowering operating costs, reducing unplanned slowdowns and shutdowns, and adapting to new fuels regulations across the globe.

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