

# Project Certainty

## Cloud Engineering and Virtual FAT

Companies around the globe are rethinking how they execute their Factory Acceptance Test. Emerson's Cloud Engineering and Virtual FAT enables teams to engage resources and expertise regardless of location to reduce schedule, cost, and risk.

This storybook describes seven success stories of industry leaders leveraging Emerson's Cloud Engineering and Virtual FAT delivering transformational results through innovation and expertise.

*"Emerson's Remote Virtual Office allowed us to collaborate with experts and resources from multiple sites to conduct our Factory Acceptance Test (FAT). The result was less travel and site disturbance to our operations. Also, more operators could participate remotely which improved the new automation system adoption."*



# Team Chemistry and Expertise Overcome Complexity

## *Time to Update*

A European chemical company knew its existing control system was being phased out. After working productively with the Emerson team, management saw the benefit of migrating to Emerson's DeltaV™ distributed control system (DCS).

The facility employs a complex batch process to manufacture plastic additives used in products such as PVC. To maintain production, timing of the cutover and DCS migration was critical.

As the project team began considering how to reverse engineer the system design and migrate, they were up against a very tight 15-month project schedule and a shutdown period of 2.5 weeks for installation, SAT, and start-up. They also needed to redesign the batch implementation to be ISA-S88 compliant.

## *Familiarity Breeds Ease*

Thanks to past successes and good chemistry between the two project teams, Emerson was the organization's choice to partner with in this migration. Management trusted Emerson to use its expertise to assist in taming the project complexity and in optimizing the batch strategy.

The project would include full configuration standardization with DCS reverse engineering, configuration, virtual FAT, start-up and commissioning, plus using DeltaV Batch Analytics for process optimization for recipes and transitions.

## *Local and Remote Expertise*

The Emerson engineering work cell, fully dedicated to the project, based enhancements of the complex batch recipes on the Emerson standards library to streamline the work and assure the use of best practices. Expertise combined with the library delivered a complex batch design that complied with S88.

Because the facility and Emerson teams had to work tightly together, they needed a way to share files and communicate effectively. Reducing the complexity of communication, Emerson's Remote Virtual Office (RVO) collaboration platform provided secure, reliable, distributed engineering of automation projects on a common infrastructure that reduced overall project schedule, cost, and risk. Project stakeholders from both companies could look at the configuration — facilitating adoption and reducing training.

The RVO environment was also used to complete a virtual FAT. The project team was able to stay at the plant and continue to manage production during the FAT. The results included reduced travel, expert Emerson guidance, and less time away from the operating plant for personnel. Testing was completed in segments; while Emerson was working on the next segment of configuration, plant personnel were testing the completed configuration. This helped ensure consistency and maintained the pace of progress.

Expert partnering and teamwork delivered the successful project on time.

*Eliminate Cost*

*Reduce Complexity*



***Emerson's expertise made the project less complex and met the goal of an optimized batch strategy.***

# Reduce Complexity During and After Project Execution



## *Profits on a Razor's Edge*

Accuracy and speed matter in a liquefied petroleum gas (LPG) terminal — an environment of razor-thin margins. Because LPG prices can move quickly up or down, terminal operating companies recognize their profits depend in part on the company's ability to move product through the terminal efficiently to meet changing customer needs.

Seeing increases in global energy usage and geographic imbalances between production and consumption, an LPG terminal decided it was time for an update. They set priority on reliability of the end process, the movement of data and product, and the project automation team with whom they would partner.

## *Improvements on the Horizon*

The organization knew they could improve operations by fully replacing the old locally built control system. They also wanted realtime delivery data for their customers while optimizing lines to create more efficient transfer operations for ship, truck, and rail terminals.

Complicated, yes.

***In addition to preparing the team to engineer, operate, and maintain the control system, RVO sped up the project by removing complications in FAT and implementation.***

## *Expertise and the Remote Virtual Office*

### *Reduced Project Complexity*

As the project started, a dedicated Emerson team partnered with the LPG team to discuss goals for the enterprise and for the project execution. Relationship and understanding the terminal business model were important. A high-speed terminal such as this must avoid shutdowns, so communication, expertise, and planning were vital to prepare the team to respond to project issues and keep the terminal online as much as possible.

Emerson's project execution strengths enabled execution with high confidence of success. Emerson's local presence and global capacity meant a large group of commissioning resources were available at the right times to work in shifts. Resource flexibility allowed the schedule to be met.

The global project team benefitted from Emerson's Remote Virtual Office (RVO) — a dedicated, secure engineering environment accessible by Emerson and its customers. Using RVO, operators, maintenance, and technical personnel (locally and at company headquarters) could participate in the project. In addition to preparing the team to engineer, operate, and maintain the control system, RVO sped up the project by removing complications in FAT and implementation.

After 33,000 project execution hours spanning just nine months and a 1.5-week shutdown, the LPG's routings are safe. And the organization can satisfy customers with real-time data and an optimized process. Thanks to expertise and partnership.

Eliminate Cost

Reduce Complexity



# Accommodating Change in Rough Seas



## *Begin by Navigation through a Difficult Market*

In the turbulent North Sea, Statoil planned to erect a fixed platform that would extract 60K barrels of oil per day from the Norwegian continental shelf. Global market conditions at the time tightly squeezed the margins of oil and gas operations and significantly constrained costs. To succeed, the project would need to include contributions from multiple international teams and hardware components from several remote manufacturing locations.

Though Statoil recognized that execution complexity would be high and project changes numerous, they also knew production had to start as soon as safely possible. Project changes must be completed accurately. And the evolving project must meet deadlines.

## *Lay Solid Solution Groundwork*

To ensure profitability in the tough market, goals included project efficiency as well as long-term operational and maintenance savings.

Statoil turned to Emerson for a fully remote, integrated DeltaV™ distributed control system (DCS) and DeltaV safety instrumented system (SIS). Attractive also was the potential for maintenance and operational savings with 200 wireless Rosemount pressure and temperature devices as well as AMS vibration monitoring capabilities.

To create efficient communication among global groups — accelerating design, testing, and commissioning — Statoil chose Emerson's Remote Virtual Office (RVO). With RVO, the team could access project resources and expertise regardless of location and could reduce travel time.

***By decoupling hardware and software, the project team could put I/O hardware in place well before design completion.***

## *Preventing Unplanned Changes from Risking Strategic Successes*

Even with everything in place and high-quality vendors working around the globe, the project team experienced interruptions that could have risked derailing automation success.

For instance, control I/O hardware was required before design was final. Without DeltaV Electronic Marshalling with CHARMS technology, that condition might have caused delays. Instead, the project team created and delivered I/O hardware in standardized junction boxes without finalized software.

In addition, because Statoil had chosen wireless devices, any placement changes could be made quickly, and the plan reduced wiring by 9200 meters. To make up time from delays outside the automation area, the project team used AMS Device Manager bulk transfer for commissioning. In fact, commissioning multiple devices at once saved about two hours per device.

Factory Acceptance Testing (FAT) was performed safely, confidently, and virtually; running all the normal tests without any control or I/O hardware. Emerson's virtual FAT mobilized resources around the world and was complete in only two days with no hardware shipping or rigging. Statoil and Emerson personnel stationed around the world built a streamlined team to align purposes, overcome cultural differences, and apply technology to succeed through difficult conditions.

Eliminate Cost

Reduce Complexity



**ON-TIME  
START UP**

# Empowering Operators



## *One Critical Decision can Lead to Many Benefits*

A European chemical manufacturer had been operating with a legacy control system, that no longer met the company's evolving needs. The control system did not have the necessary features to allow the organization to follow its new philosophy of putting operators back in charge of production, helping them better understand the processes they run.

Management knew that truly reducing complexity of operations would empower operators to be engaged decision makers, but they only had a 14-month window from design to delivery.

## *Doing More while Saving Time*

Using Emerson's Remote Virtual Office (RVO), team members were able to connect to each other and to technology experts around the globe. More than 20 worldwide project team members could communicate and contribute remotely through cloud engineering and virtual factory acceptance testing (FAT). This environment not only saved on travel time and expense, but also allowed the implementation team to perform FAT while simultaneously redesigning process sequences to put operators back in control of production.

Throughout the project, global contributors were able to keep a close eye on each engineering step, ensuring that the new system would deliver all the features the organization needed while still streamlining and simplifying the human-machine interface the operators would rely on.

***With operators fully trained on plant startup before commissioning, the commissioning period was reduced to 4 weeks for a project with over 4,000 I/O points.***

The company chose to implement Emerson's DeltaV™ distributed control system (DCS) with Electronic Marshalling to simplify conversion in the field, and to provide operators the full-featured toolset they needed. The organization moved to a decentralized structure, doing away with the auxiliary room and implementing Electronic Marshalling with CHARMs technology in field shelters, speeding up implementation by allowing the transition team to avoid concern for I/O signal types.

## *Finding Solutions through Simplification*

The migration solution that management chose allowed the organization to simplify both the turnaround process and overall operations at the plant. The transition team not only managed to complete the entire project in its 14 month window, but also managed to see higher output, more reliability, and lower costs.

Moreover, making smart choices that accelerated implementation allowed the team to ensure that operators were fully prepared for the transition. Operator training coupled with HMI improvements reduced control system complexity, with the result that control room staffing was reduced from 2 operators per room to 1.5, freeing operator hours for other important plant tasks.

In any project, critical decisions made early can have significant impact on success. By streamlining project management and simplifying implementation in the field, the organization was able to implement its operator-centric DCS without running over time.

**Eliminate Cost**

**Reduce Complexity**



# Better Together

## North West Redwater Partnership (Canada)

### Breaking New Ground

The North West Redwater Partnership's (NWRP) development of the Sturgeon Refinery in Alberta, Canada was a truly unique project. The Sturgeon Refinery will use diluted bitumen as feedstock to produce ultra-low-sulfur diesel, fostering value-add to Canada's oil sands development. Because success of the project was critical, very strict accountability was necessary from suppliers, from engineering through to commissioning; a difficult task owing to the multitude of vendors involved in such a large-scale operation.

Even for organizations very experienced with greenfield project execution, managing multiple engineering, procurement, and construction suppliers (EPCs) can be challenging. North West Redwater Partnership required a reliable main automation contractor (MAC) to help develop the processes, procedures, and standards necessary to ensure successful, on-time implementation of automation process control and safety instrumented systems (PCS and SIS).

### Collaborating for Success

Emerson was selected as MAC, providing North West Redwater Partnership an experienced company with proven results for automation projects and control system implementation.

***“My experience working with Emerson for the last seven years has been the most trustworthy, successful, and enjoyable of any control systems project I have worked on.”***

- Gordon Ellwood, Chief Engineer- Automation, North West Redwater



Emerson's integrated project management and technical resources support offered the confidence that a fully integrated automation system would work as expected from the first day of operation. To assist the NWRP organization with the challenges of managing multiple EPCs, and ensure their responsibilities for field installation aligned properly, Emerson served as a single point of contact so North West Redwater Partnership's vision for the project was consistently executed with all contractors.

Using dedicated global project resources in conjunction with remote virtual office (RVO) cloud engineering services, Emerson connected project team members to experts around the world, allowing global contributors to inspect and collaborate on each project step. Cloud engineering ensured that all parts of the automation system integrated and operated seamlessly.

Emerson's DeltaV distributed control system (DCS), including Electronic Marshalling with CHARMs technology, helped ensure the project was designed for construction, simplifying conversion in the field and keeping potential late delivery of EPC data from impacting project goals. AMS asset management software helped to speed commissioning and ensured that the system was configured properly and would be ready to function as intended. DeltaV Operator Training Solutions ensured operator readiness from the first moments of commissioning and start up.

### Working Together for Results

Choosing to work with a proven MAC gave North West Redwater Partnership the flexibility and expertise it needed to deliver a state-of-the-art automation system. Emerson helped the organization keep its numerous contractors focused on delivering a control system that operates as an integrated whole, driving more successful operations. Most importantly, North West Redwater Partnership can manage its unique facility knowing that all automation hardware and software is standardized and ready to function as expected across all units of the multi-billion-dollar project.

Expert Partnering

Reduce Complexity



Cloud engineering allowed team members and experts around the globe to stay connected, helping deliver a more integrated and successful control system.

# Remote Collaboration and Streamlined Expansion

## Santos Roma Hub (Australia)

Santos, one of Australia's leading natural gas producers, had dual business goals for its recent upstream hub expansion works. First, add compression capability to the Roma hub. Second, build internal expertise and deliver cost savings by self-executing the project. The teams accomplished both goals — with time to spare.

Santos teams self-executed project management, planning, scheduling, and cost controlling. From FEED to start up, Santos' teams engaged directly with the system configuration.

### *Real Savings, Virtual Collaboration*

To ensure consistency and precise communications, the teams needed a way to coordinate system updates and key project input deliverables from various OEM packages. A real, virtual answer took shape: Remote virtual office (RVO) cloud engineering, one of the key technology enablers in Emerson's Project Certainty initiative.

RVO directly helped reduce project complexity and eliminated costs. Santos' system architecture, controllers, instrument parameters, and more could be set up on servers for worldwide connections to a single project database and configuration.

***RVO helped maintain consistency because only one version of the project existed. Santos and Emerson team members around the globe collaborated to plan and build the solution.***



The project benefited from:

- Streamlined virtual collaboration: RVO technology enabled replication of the existing Santos DeltaV distributed control system (DCS) configuration. Team members around the world easily developed the new configuration as well as tested and confirmed interaction with the current version.
- Effective use of time: The team called on a variety of global experts — who had small blocks of availability — to complete tasks efficiently.

### *From Execution to Testing with Little Travel and No Disruption*

Team members around the world viewed and worked on the DCS while connected to the central server. Because system development and testing required no DCS hardware and very little office space, Santos realized savings.

Rather than perform a complete standard Factory Acceptance Test (FAT) in Melbourne, far from the customer site, the team developed a virtual FAT where a Melbourne-based team member worked concurrently on testing without travelling to the customer site. The team moved from execution to testing with no disruption.

### *Project Delivery on Time and on Budget*

Santos' strategies matured as they developed project methodologies that integrated Emerson project best practices. They delivered a high-quality project on time and on budget.

Reduce Complexity

Eliminate Cost



### PROJECT SAVINGS

Remote virtual office (RVO) cloud engineering directly helped reduce project complexity and eliminate costs.

# Delivering Lifesaving Therapies on Time

(USA)

A large US biotech company built a greenfield campus with a goal to deliver critical therapies to patients. The project required expertise and innovation.

Hoping to avoid a potential single point of failure and mitigate schedule risks, the project team contracted multiple engineering, procurement, and construction (EPC) companies and design firms. Although addressing some concerns, this method did not eliminate bottleneck issues or multiple vendor priorities.

While driving the schedule to meet demands, the project team witnessed large scope changes. In addition, multiple EPCs and design firms presented competing priorities.

## Healthy Teamwork and A Single Goal

Emerson was chosen for the distributed control system (DCS) scope including DeltaV™ DCS hardware and software for over 18,000 IO. Emerson also acted as the main instrument vendor (MIV) for 30,000 instruments and delivered more than 1,300 panels.

Emerson hit the ground running. Close collaboration and open communication were applied meticulously in all meetings and interactions.

***By creating detailed software standards at the start of the project, the overall system design was more consistent and saved significant time when changes happened later.***



The project team leveraged Emerson’s remote virtual office (RVO) cloud engineering to create a virtual space in which vendor and customer experts from six locations and five time zones could perform engineering tasks on the shared project databases.

The project leaders needed to drive compliance, consistency, and delivery of over 30,000 instruments and valves from approximately 50 manufacturers. To overcome schedule risks, teams designed and implemented the solutions in parallel.

While the Emerson DCS team rapidly ramped up the team from 10 members to more than 60, the MIV team grew from 15 to over 35 to quote, procure, and test thousands of instruments simultaneously.

## Smoothly Completing the Project

By creating detailed software standards at the start of the project, the overall system design was consistent and saved significant time when changes happened later. In addition, prototypes of significant areas — such as clean in place and path management — instilled confidence for the detailed design and allowed team members to understand the design and how it would work.

Thanks to team cohesion and Emerson span of expertise, the project met the tight schedule and requirements.

*Reduce Complexity*

*Accommodate Change*

*Expert Partnering*



The team created a virtual space in which vendor and customer experts from six locations and five time zones could collaborate.



# Online Faster through Remote Collaboration

## Santos (Australia)

To build on its position as one of Australia's leading liquefied natural gas (LNG) suppliers, Santos needed its Scotia plant to triple production — no small feat. The timeframe and budget for the project demanded a team that could provide expertise quickly.

After evaluation of automation requirements, Santos decided to add several compressor packages, a dual-run metering skid, a power station, a water treatment plant, and more. In addition, Santos needed to update their Emerson DeltaV™ distributed control system (DCS).

The significance of the upgrades and changes combined with the schedule and budget held challenges, so any techniques to compress timeline and costs were welcome.

### MAC Solution Simplified Scheduling

Based on past successes, Santos selected Emerson to be the project main automation contractor (MAC). Emerson supplied the DeltaV integrated control and safety system (ICSS), and system-related hardware, software, licensing, and engineering services including the factory acceptance test (FAT). In addition, Santos asked Emerson to supply package interfaces, the control-system building, and a 250W solar system which supplied power to the remotely installed safety instrumented system (SIS) cabinet.

**Santos and Emerson jointly identified productivity and efficiency improvement opportunities within the project delivery schedule. As the project MAC, Emerson collaborated to efficiently deliver a complete and integrated solution.**



As the MAC, Emerson contained both capital and operating expenditures by reducing costs and bringing the system online faster. For example, by delivering the control-system building two weeks ahead of contractual delivery schedule, Emerson improved the construction schedule and reduced the costs of associated equipment.

### Virtual Collaboration and Testing Reduced Costs

Scotia's system architecture, controllers, instrument parameters, and more were set up on centralized servers for multiple worldwide connections to a single project database and configuration. The infrastructure that enabled this secure, collaborative project engineering environment was Emerson's remote virtual office (RVO).

With RVO, a wide variety of global experts contributed their engineering expertise while avoiding overseas travel to several supplier locations, thus costs were reduced without sacrificing expertise. FAT traditionally requires several days of travel for customers to view the testing and ensure correct operation at the factory. In this project, however, rather than perform a complete standard FAT at the Emerson site in Melbourne—far from the customer site—the team conducted a virtual FAT (vFAT) using RVO.

A Brisbane-based team member worked seamlessly and concurrently on testing the metering skid (in Singapore) without travel. And the Santos engineers in their Brisbane headquarters witnessed the vFAT via live video feed. Santos experienced significant savings by avoiding several days travel and living expenses.

By using effective project strategies and collaborative technologies, Emerson and Santos brought the Scotia project to a successful start-up.

Expert Partnering

Eliminate Cost



**2 WEEKS SAVINGS**

Emerson delivered the control-system building two weeks ahead of contractual delivery schedule.