

Project Certainty



No matter the project challenges, a well-formed plan with integrated expertise and technologies can deliver improved value, an on-time and on-budget start, and a comprehensive handover to operations.

In project after project around the globe, Emerson's Project Certainty solutions meet or exceed expectations and build a bridge to operational excellence.

Expert Partnering

Early and ongoing collaboration with experts develops a project vision that drives organizational consensus and a forward momentum to meet project goals.

Reduce Complexity

Adopt value-improvement programs and digitalization technologies that automate work processes and enable well-informed project contributors to work the same plan in parallel.

Accommodate Change

Adapt to project changes by integrating flexible technologies from the beginning. Absorb changes without negatively impacting the schedule.

Eliminate Cost

Innovative engineering practices eliminate costs associated with hardware design, the labor to install it, and the effort to maintain it.



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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 Partnership



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.



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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. 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 Santos' existing 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.



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Braskem Expansion Project Far Surpasses Expectations

Braskem (Brazil)

Responding to a surging PVC market, Braskem aimed to increase output by expanding its 20-year-old Maceió plant. To make the most of this investment, they decided to take advantage of a more efficient manufacturing process and more advanced automation technologies.

Because this was the Maceió team's first experience with the new manufacturing process and automation technologies, they also needed an experienced automation partner and a new approach to managing the work—one that would ensure they had the right skills and resources on hand to safely complete the project within their tight schedule.

Braskem chose Emerson as their main automation contractor (MAC), responsible for providing automation technologies and services for the entire project.

The MAC approach made managing the overall project much easier for Braskem. It simplified sourcing, avoided integration headaches, provided clear lines of communication and accountability, and enabled Braskem to take advantage of Emerson's automation and project management experience, tools, and resources.

Team Committed to a Safe, On-schedule Startup

Emerson provided the advanced automation capabilities Braskem sought, including integrated DeltaV™ process and safety systems,

“Emerson was with us every step of the way, supporting us on the most important task of starting up the plant in a short amount of time.”

- Marcus Aurélio Cabral Campêlo, Production Manager
Braskem PVC Alagoas

Electronic Marshalling, S88 batch software, FOUNDATION™ Fieldbus communications, and intelligent digital field devices.

Specialists from Emerson also managed automation-related tasks that included planning and engineering, delivery, installation, integration, configuration, commissioning, and startup support.

“Braskem and Emerson worked together, each doing more than their share to reach the same goal. Everyone was committed to a safe, on-schedule startup, and that's why it was successful,” said Roberto Serafim da Silva, operations technician at Braskem.

\$1M Saved before Startup. First Batch On-spec

Over the course of the project the Braskem and Emerson teams developed a close working relationship that enabled them to solve any problems as they arose. In fact, the project team exceeded expectations for project success.

- The team completed application software development in only seven months compared to Braskem's benchmark of 12 months, reducing costs by an estimated \$300,000.
- Factory acceptance testing of automation systems took four months less than is typical, saving almost \$700,000.
- Commissioning and startup were completed in record time, with only five months from first cabinet installation to first PVC production.
- The first batch of PVC was entirely on-spec, and after only 12 months of operation Braskem achieved record production levels.

By taking advantage of Emerson's technologies and main automation contractor services, the Braskem team exceeded project benchmarks and achieved record production levels.

Eliminate Cost

Expert Partnering

Reduce Complexity



\$1 MILLION SAVINGS

Completed three months earlier than anticipated with a completely on-spec first batch.



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Cracking the Complex Code

(Europe)

Fueling the Globe

A European refinery planned an expansion project to produce and improve the global availability of higher quality diesel fuels. To meet market demand, the refinery team wanted to accelerate the project schedule which would require high-quality project management and strong vendor stewardship.

Facing the team were many challenges to getting production right the first time. Resource limitations, cost controls, and managing change orders posed project risks. In the past, the customer's relationship with multiple vendors increased the complexity of tasks, led to ineffective order tracking, and required many field contractors to shepherd the vendors.

They needed innovation and a reliable expert partner.

Early Engagement and Risk Mitigation

In an early stage of the project, Emerson engaged with the client which resulted in several collaboration workshops addressing technology selection, sub-vendor selection, and the main instrument vendor (MIV) concept, which included all control valves and automated isolation valves. In consideration of the potential project challenges, the customer chose an MIV project strategy to promote efficiencies that help maintain the schedule. The MIV scope included engineering, the selection of valves and instrumentation, and project management. In addition, the customer asked Emerson to provide onsite lifecycle services.

A solid governance model assured that the client, EPC, and Emerson project teams stayed aligned and engaged.

Collaborating with the project's engineering, procurement, and construction (EPC) supplier, Emerson contributed to the EPC's instrumented datasheets by automating the managed process for data exchange related to the control valves scope. This facilitated collaboration with the EPC and enabled Emerson to contribute to the EPC's instrument datasheets. Emerson also kept track of all activities by providing a lead project manager as the single point of contact for all major groups of instruments, including third parties. This ensured Emerson had effective stewardship over all their extended MIV responsibilities. A solid governance model assured that the client, EPC, and Emerson project teams stayed aligned and engaged. Issues, risks, and hurdles were flagged in an early stage and addressed by the steering committee.

Time Savers

The MIV approach reduced the instrument and procurement schedule by combining instrumentation requirements into one package and removing requirements for competitive bidding. In addition, the approach enabled resources to focus on the technical selections instead of on bid evaluations. These and more MIV strategies eliminated unnecessary meetings and extra administrative tasks. Overall, the MIV methods helped save three to four months on the project schedule.

Expert Partnering

Accommodate Change

Reduce Complexity

Eliminate Cost

 **3-4 MONTHS SAVED**

Overall, the MIV methods helped save three to four months on the project schedule.



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Finding Success in Savings

Small Crew, Big Goals

Establishing a new mine with a small crew and only a four-month schedule is a difficult task under the best of circumstances. When that mine is in a harsh, remote desert area, the roadblocks to success begin to multiply even more quickly. For one small mining company, such an accomplishment wasn't just a desire, but an absolute necessity.

The organization needed to see a full, fast return on its investment in a new mine to deliver necessary revenue to support other essential projects. In addition, the climate and extreme distance from nearby cities meant that the project would need to be completed using a small crew at the site while leveraging engineering teams spread across the globe. Had the project team followed a traditional workflow, the global nature of the project and limited workforce could have quickly caused costs to spiral out of control.

The company needed to find a solution to reduce engineering time, speed commissioning, and allow for late-stage project changes that would result from the accelerated timeline, and it needed to do this while reducing instrumentation and installation costs.

Driving Success on a Tight Budget

Because the mine site was remote, engineering needed to be completed in another world area to remain cost-effective. This meant there would be occasional late-stage changes as crews ran into

Electronic Marshalling helped the project team overcome late engineering changes, while Smart Commissioning helped keep commissioning off the critical path, ultimately delivering project success well within the four-month timeline.

unanticipated logistics problems completing installation on-site. The company overcame this roadblock by selecting Emerson's DeltaV™ distributed control system (DCS) and its Electronic Marshalling with CHARMs.

There were many scheduling challenges due to engineering in multiple world areas, and the I/O layout was not received until the night before factory acceptance testing (FAT). Electronic Marshalling allowed the team to populate all the field junction boxes with CHARMs without any delays or extra costs to the FAT, which allowed the system to be tested, packaged, and loaded onto a ship on schedule. Once on site, the implementation team was able to make last-minute changes simply by adding new CHARM I/O points as required without changing cable organization, which would add costs and delays.

Selecting Emerson's Smart Commissioning technology also saved the organization money in commissioning. The team needed to commission instrumentation quickly, but only had one person who could be assigned to the task. Using AMS Device Manager, coupled with the integrated Loop Check feature in the DeltaV system, one technician could complete all device commissioning from the control room within the allocated time.

Turning Planning into Savings

The results of the company's modern approach to engineering exceeded expectations. The implementation team saved 40% over traditional home-run I/O, and 50% over traditional I/O with junction boxes. Moreover, the team's innovative approach reduced cable length by nearly 70% over the original plans, resulting in as much as \$300,000 in savings. The team ultimately met its four-month schedule while simultaneously reducing installation costs by almost 60%, helping the organization stay competitive and drive success of future projects.

Eliminate Cost

Accommodate Change

Reduce Complexity

40%

SAVINGS OVER TRADITIONAL I/O

Electronic Marshalling with CHARMs saved the team 40% - 50% over traditional workflows. Reduced cable length saved an additional \$300,000.


EMERSON

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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 I/O. 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 Emerson's 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.



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Winning New Business with Fewer Iterations

Eastman (USA)

Always ready to meet the challenges of innovation, Eastman Chemical Company wanted to position themselves to win new business while building on their successful track record. To leverage innovation and create a competitive market advantage, Eastman is investing selectively with targeted return on invested capital. Eastman's plan includes managing and reducing costs so that margin growth goes to the bottom line.

"For this new project, we adjusted our plans so we could squeeze every bit of value from project management to get even stronger returns," says Steve Hansen, instrumentation expert at Eastman. "By choosing the Emerson's Project Management Organization (PMO) again as our collaborator for automation, we planned to reduce engineering iterations and ultimately improve the schedule."

Fewer Iterations

Reducing engineering iterations reduces modifications to the overall system, coding, and project execution. It also naturally reduces engineering hours, which has a financial impact throughout the project.

Eastman and Emerson found ways to use personnel more efficiently to improve the bottom line. With focused attention on using expert resources effectively, the project team dedicated specialists and generalists to their areas of expertise. In doing so, PMO specialists' time was more focused on higher-level issues.

"We saw the change as bringing fresh eyes, ears, and enthusiasm. By more effectively using Eastman and Emerson PMO resources, we knew we could improve efficiency."

- Ed Hicks, Engineering Manager at Eastman

Improve the Schedule

The team reviewed the traditional and actual timelines of previous projects and found unexpected costs when technologies were not considered early enough. Savings were found when Eastman collaborated early on with the primary providers and vendors.

PMO engagement was important in the streamlined project schedule. Barriers between Eastman and Emerson's PMO were removed or reduced at each project stage. In addition, more time was spent upfront in planning and with the PMO reviewing requirements and technologies.

The resulting shorter project timeline significantly impacted the financial targets, not only in the lower cost of the project but in the ability to begin reaching the market earlier with products.

Business Results on Target

Monthly and total savings of engineering, procurement, and construction (EPC) and client instrumentation hours started earlier than in the previous project, increased faster, and resulted in larger savings overall. In fact, Eastman saved approximately 5% in EPC and client instrumentation hours. Eastman believes they can continue improving and hit 25% on future projects.

Ed Hicks, Eastman Engineering Manager, sums up, "Analysis showed that the strong business results came in part thanks to more frequent and effective communication up front early in the project. And with early buy in from all stakeholders —Emerson, PMO, EPC, and Eastman — hours were saved all around."

Expert Partnering

Eliminate Cost



**5%
SAVED**

Eastman saved approximately 5% in EPC and client instrumentation hours.



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Overcoming Global Complexity



When Getting There is Half the Battle

To meet the power generation needs of an emerging economy, one oil and gas organization needed to recover feedstock in a remote, inhospitable location. The organization discovered a field encompassing more than 100 wells and flow lines and decided to build on-site flow stations to separate impurities from the crude. But due to the difficulty of getting people to the site, three quarters of the stations would be unmanned.

Because of the uniqueness of the proposed flow stations, the necessary engineers could not be found locally. Engineering would have to be performed in another country and local talent would be used to build the stations. The flow stations would be difficult to construct, and safety and logistics issues meant that trips to the site would need to be minimized.

The project team needed to complete a complex and far-reaching project on time and on budget while simultaneously minimizing on-site commissioning hours—no easy task.

Reducing Complexity on a Global Scale

To reduce the complexity of this unique, world-spanning capital project, the owner chose Emerson as a main automation contractor (MAC). Emerson had established a project management toolkit for this organization through previous projects, utilizing Project Certainty methodologies for standardization to assure quality and consistency across multiple projects.

A pre-established toolkit of Emerson methodologies allowed the team to cut down on time and complexity, ensuring that any changes were fast and painless.

The toolkit provided documentation from prior projects that could be reused for a large portion of this project. Having this resource significantly reduced task complexity and completion time. Project changes were made fast and painless by referencing these documents, preventing extension of project timeline and budget. Emerson engineers quickly developed the fire and gas detection system, advanced control strategies to simplify operations, and information technology policies that aligned with documented specifications.

The project team challenged Emerson to keep the project on schedule. Emerson acted as a single point of contact, helping the customer select which world area would be responsible for guidelines and deliverables and ensuring that the design standards were upheld consistently. Control systems, safety instrumented systems, and blast-proof buildings were engineered on three continents to leverage global expertise and to assure quality. Integration was completed before shipment to site. Software and hardware testing were completed during the factory acceptance test (FAT) to accelerate commissioning. After delivery to the site, the team accomplished system power on—a process that typically takes up to two weeks—in just three days.

Decrease Complexity; Increase Results

The rewards for executing a complex, large-scale capital project are great, but these projects do not come without significant risk. Choosing Emerson as a MAC and taking advantage of a project toolkit helped this oil and gas organization to reduce the overall complexity of its project, allowing the project team to focus on engineering a best-in-class flow station solution that operates in line with company best practices. When project complexity began to spiral out of control, looking outside of their organization for expert assistance helped the company successfully deliver much-needed energy resources.

Expert Partnering

Reduce Complexity

Eliminate Cost

 **11 DAYS
SAVED**

Global collaboration allowed the project team to power on systems in only three days—a process that typically requires two weeks.



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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) cloud engineering services.

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.



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