

innovations

IN PROCESS CONTROL

PROJECT CERTAINTY



*It's time to look at projects differently. Emerson's Project
Certainty approach provides a path to better performance.
Full story on page 4.*



Making a difference

Operator training simulator reduces plant start-up time

The implementation of an operator training simulator (OTS) has helped operators to gain the necessary skills to efficiently operate vacuum distillation and catalytic isodewaxing units of a new base lubricants plant in Cartagena, Spain.

The new Iberian Lube Base Oils Company (ILBOC) plant, a joint venture between Repsol and the Korean firm SK Lubricants, is the largest facility of its kind in Europe. During construction of the €250 million facility ILBOC identified a six month period between the plant design and commissioning stages, where it would be appropriate to provide DCS and safety instrumented system (SIS) training for operators. Implementing training at this juncture would help to improve the subsequent commissioning process, ensuring the plant was brought online according to the planification and in a safe and efficient manner.

To help achieve these goals Emerson provided ILBOC with both the OTS and supporting consultancy services. The OTS included a virtualised DeltaV™ system for process control and an integrated third party safety instrumentation system for process and emergency shutdowns.

The OTS provided a flexible architecture and integrated solution with all elements including the

process model, ICSS control database and SIS logic within the same environment. This minimised the complexity of the OTS design, thereby reducing project risk. During the four month onsite training programme, the simulation-based training allowed ILBOC operators to log hundreds of hours in a wide variety of situations. It also allowed them to widen their range of experience and instil confidence in handling many process situations.

Emerson's OTS provided ILBOC with a number of benefits including reduced operating costs, due to the ability to identify potential issues during initial start-up, shutdown and normal operations. Having well-trained operators reduced plant start-up and shutdown time and the production of off-specification product.

Energy consumption is a significant issue at process plants. The experience and understanding of the process gained through the training is enabling operators to identify potential problems such as loss of power failure, or cooling water, that would reduce the energy efficiency of the plant.

To read more about operator training simulators go to EmersonProcess.com/IM801

Welcome to innovations



It's a mind boggling statistic, but according to industry data, 65% of projects greater than \$1bn fail, meaning that companies exceed their budgets by more than 25% or miss their schedules by more than 50%.

In order to prevent investment capital from being wasted and shareholder value lost, we believe it is time to adopt a radical new

approach to project execution.

Emerson recently launched Project Certainty – a transformational approach to project execution, which will cut costs, reduce complexity and significantly improve the ability to accommodate changes throughout the lifecycle of the project. In practice this means that project performance will improve by eliminating unnecessary work and materials by automating the steps in the process and using standardised technologies.

This edition of Innovations in Process Control will dive into the various aspects of Project Certainty. It looks at how Emerson is providing game-changing technologies, such as electronic marshalling with CHARMS and dynamic simulation supporting operator training. It also highlights Emerson's use of secure Cloud engineering to decouple supplier dependencies and improve data and document management.

I am sure you will enjoy learning more about Project Certainty and how it will help you to reach Top Quartile performance on capital projects!

Find out how Emerson can help your company improve its project performance at EmersonProcess.com/ProjectCertainty or contact us today via EmersonProcess.com/Europe

Roel Van Doren
President
Emerson Process Management Europe

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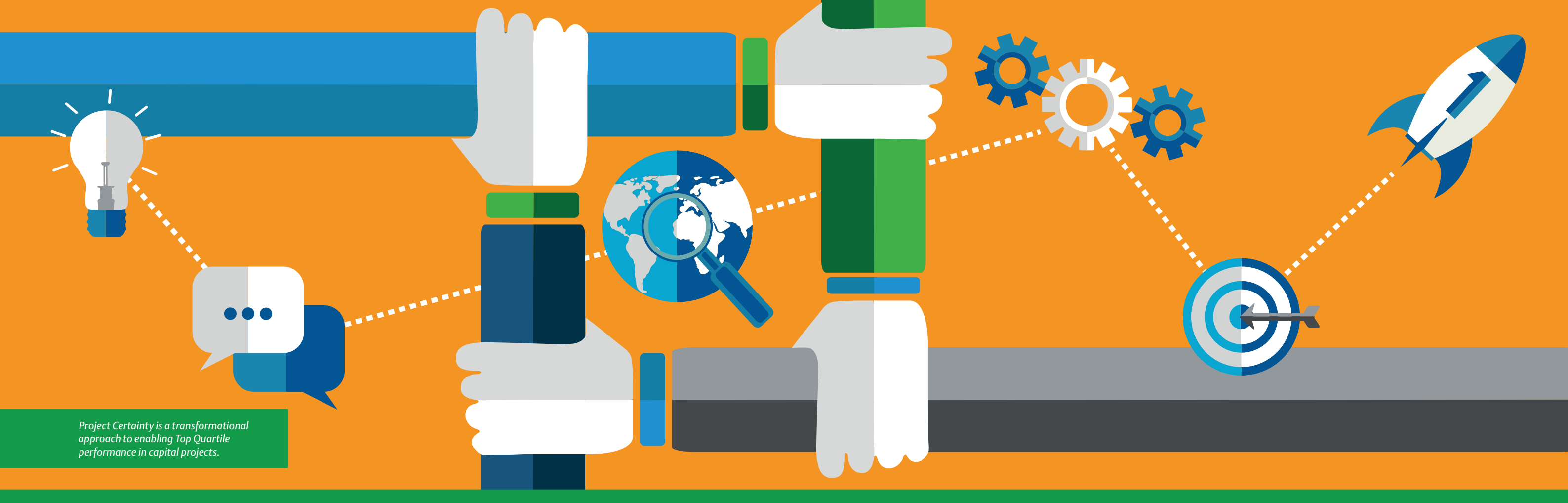
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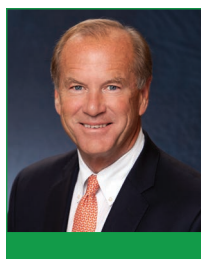
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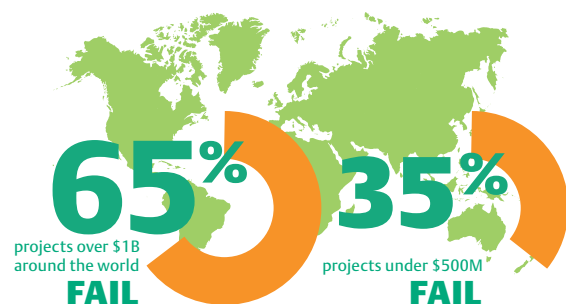
Project Certainty is a transformational approach to enabling Top Quartile performance in capital projects.

Increasing project certainty



Jim Nyquist, Group Vice President, Emerson Process Management, explains how Project Certainty – an innovative technology and engineering-based

approach to managing capital projects – will help reverse the current trend of increasing cost and time overruns.



Speed Kills, Klaver, Ali. 2012 Project Manager Magazine

With projects increasing in size and growing in complexity, set against a background of ever shorter schedules, executing billion dollar projects on budget and on time is becoming increasingly challenging. We believe it is time to adopt a radical new approach to project execution.

Due to project excesses, billions of dollars are lost annually throughout the process industries. According to industry data, over 65% of projects greater than \$1 billion fail, with companies exceeding their budgets by more than 25% or missing schedules by more than 50%. This consistently poor project performance means that investment capital is wasted, company performance is compromised and shareholder value is lost.

But why is this happening? Over the past few years the original budget and schedule for capital projects have increased. Yet, whilst budgets are increasing, the actual expenditures are growing even faster – meaning larger and larger overruns. It seems the larger the project, the greater the probability of exceeding the plan.

So what is causing these variances? Two issues are clear: increased complexity and outdated methods. These challenges create real problems for integrated project execution, requiring a solution that defies traditional

thinking and provides dependable execution, industry expertise, and bottom line results.

To address these challenges Emerson has introduced Project Certainty – an innovative technology and engineering-based approach for improved capital efficiency and more reliable project schedules. Emerson's Project Certainty approach provides a path to better performance by eliminating cost, reducing complexity, and accommodating late changes.

Emerson's Project Certainty begins with early engagement during engineering and design studies to define project goals and high impact strategies to meet these goals. Despite traditionally accounting for approximately 4% of a project investment, automation is revealing unique and repeatable ways to eliminate cost, reduce complexity and accommodate late-stage project changes, beyond the automation discipline.

For example, cost can be eliminated by using electronic marshalling that reduces rack room requirements by 70-80%, wireless instrumentation will eliminate 90% of the cost of wired instruments and an optimised spares programme will cut capital costs.



Our second imperative is to reduce complexity. Projects are complicated enough and we all need to find ways to simplify. There is great scope here, for instance using secure Cloud engineering to decouple supplier dependencies and improve data and document management. The Cloud could also be used to streamline and simplify traditional project approaches, such as FATs.

The third imperative is having the ability to better accommodate changes. The most fundamental values technology can add to a project are speed and flexibility, thus avoiding plant start-up delays by being better able to accommodate design changes during the project. Control system auto-discovery and assignment of field devices, extensive use of wireless devices and networks, and streamlined auto-commissioning can eliminate 80% of engineering and technician hours required to commission field instruments.

All these things are possible through Project Certainty, a transformational approach to Top Quartile performance on capital projects. It defies traditional thinking and provides dependable execution, industry expertise and bottom line results.

For more information on how Emerson's Project Certainty could help deliver your project on time, within budget and with minimum risk, visit EmersonProcess.com/ProjectCertainty



Using Emerson as your MAC will ensure your project is completed on budget and on time.

Adopting Main Automation Contractor services earlier



Emerson's Main Automation Contractor (MAC) service reduces project risk, lowers project costs and reduces schedule, and provides superior plant manageability.

John Nita, Vice President Projects and Services, explains how using Emerson as your MAC will ensure your project is completed on budget and on time.

Process projects are becoming larger and more complex and this is increasing the risk of failure to meet budgetary and schedule requirements. Traditional project delivery systems have struggled to keep pace with today's capital projects and this has prompted the need for new systems that improve capital efficiency and reduce the risk of overrunning project schedules.

Although automation systems typically only account for about 4% of the total cost of a capital project, they interface with every part of the process, making the automation system a critical component of a successful project. All too often the selection of automation suppliers is not considered early enough in the project, which has a detrimental effect on the success of the project. However, this is changing with major end users moving towards choosing their automation supplier as early as possible. By doing so, customers are moving away from the traditional EPC (Engineer, Procure, Construction) model and moving towards a 'PEpC' approach which is based on concepts developed and research performed by the Construction Industry Institute (CII).

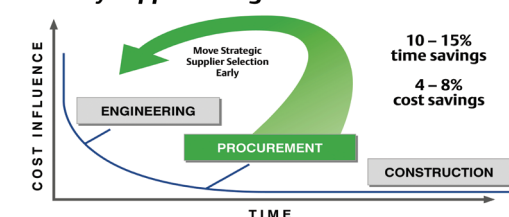
PEpC uses key-supplier expertise in all phases of the project lifecycle by developing an advanced procurement strategy and by reaching commercial and contractual agreements with suppliers of strategic procurement items and/or systems prior to principal project engineering activities.

The PEpC model includes four phases: Procure critical and strategic items first (including the automation technology), Engineer (by contractor partnered with the automation supplier), procure commodity items and finally Construct. Using this process early in the project facilitates better strategic decision making and has proven to produce time and cost savings of 10-15% and 4-8% respectively, when compared with traditional project processes.

Emerson's Main Automation Contractor (MAC) service replaces the traditional EPC model with the PEpC project delivery system for major project contracting. Early engineering and design work identifies opportunities for automation technology to reduce complexity, create project cost savings and reduce schedule and cost risks. As the project moves into the execution phase, Emerson is well-positioned to implement the design, accommodate late changes and reduce on-site work – all of which speed execution without compromising quality, safety or reliability, helping to deliver a consistent project on time and on budget.

As your project MAC, Emerson identifies and manages the risks associated with sourcing Emerson and third-party technology and solutions throughout the design, implementation, installation, testing, commissioning, start-up, and the lifecycle of your facility. Emerson is

Early supplier integration delivers value



Influence over project cost is greatest at the beginning. Early strategic supplier integration is essential to success.

responsible for all automation and will work with your EPC and can co-locate engineers with plant personnel, EPCs, and suppliers to integrate processes, coordinate communications, and establish standards, rules and conventions.

Involving the Main Automation Contractor early enables better definition of the automation system's size, hence eliminating un-forecasted changes, scope additions and resource requirements. In addition to getting a better scope definition, elimination of design inconsistencies and better selection of equipment, you will also be able to align your strategic suppliers with the project objectives and metrics, maintain consistent performance amongst your suppliers and simplify the data management and documentation throughout integrated systems.

Using Emerson as your Main Automation Contractor will avoid project cost overruns, eliminate schedule slippage and reduce project inconsistencies. **Find out more about Emerson's MAC service at [EmersonProcess.com/IM802](https://www.emerson.com/en-us/industry/process-management/im802)**

Securing the return on your investment



Many projects do not pay enough attention to on going operations, but this can be a costly mistake. Chris Hamlin, Director Global Industry Consulting, explains how

Emerson's Operational Excellence framework, part of the Project Certainty approach, can boost return on investment by ensuring Top Quartile operating performance.

Discussions about project performance usually focus on investment, specifically on time, cost and risk. But there is another dimension that all too often takes second place, if indeed it is considered at all; securing the return on that investment.

It is universally acknowledged that projects pay insufficient attention to on going operations, but most people would accept that the operating returns from the asset are economically more important than the up-front cost. So why does this behaviour persist and why don't we learn from our collective experience?

The operations of Top Quartile performers rely on a unique combination of advanced technologies, complex processes and capable people. But unique combinations of advanced technologies and complex processes are the last things project managers want to hear – they can only move time, cost and risk in the wrong direction. Project teams design and build the simplest possible plant that can meet the performance objectives of the project (defined in terms of throughput, yield and efficiency). Discretionary technologies that enable high-level performance and continuous improvement inevitably get excluded in the later stages of most projects.

Consequently most plants go through a 3-5 year period of 'just good enough operation' after start-up. During this time the new operating teams start to define and

implement the practices and enabling technologies that will eventually get them to Top Quartile performance. This performance gap is horribly expensive from a return on investment and cash flow perspective. Wouldn't it be great if we could accelerate the realisation of Top Quartile performance without significantly adding to the time, cost or risk of the base project?



The idea that control infrastructure acts as the 'central nervous system' of a production facility has almost become a cliché, but it remains a great metaphor. Consider some Top Quartile operator characteristics. We are finally seeing the long promised realisation of predictive and preventative maintenance. Leading performers proactively monitor the condition of their assets, compare performance against rigorous and empirical models and take action before anything breaks or production is impacted. The whole process industry is moving from the traditional model of reactive, periodic planning to continuous monitoring and refinement of production plans. Specification of the right system architecture, measurements and controls delivers fundamental competitive advantage, providing ultimate flexibility to respond and grow.

Emerson can help new plants realise Top Quartile performance from day one of operation.



Emerson's Operational Excellence framework provides a model of all the factors that impact on overall effectiveness. We use it in the early stages of project design to make sure that the automation infrastructure that is delivered can actually deliver the level of operational performance necessary to meet or exceed the anticipated return on investment. Furthermore, by identifying programmes that will deliver a step-change in economics, capture demand, or address foundational issues that hold the enterprise to ransom, it enables the transition from 'good enough' to 'Top Quartile' to start on day one of operation. Emerson has also developed a group of Operational

Excellence specialists who are skilled, experienced and qualified consultants and are supporting and guiding many of our clients through this process.

In this issue of Innovations we focus on getting the foundations right, delivering the plant on time and to cost, and ensuring that it is ready to rapidly accelerate from good enough to Top Quartile operating performance, thereby delivering true project certainty.

Read more about Operational Excellence at EmersonProcess.com/IM803



RVO ensures that Emerson global project teams can execute projects effectively.

Distributed project engineering



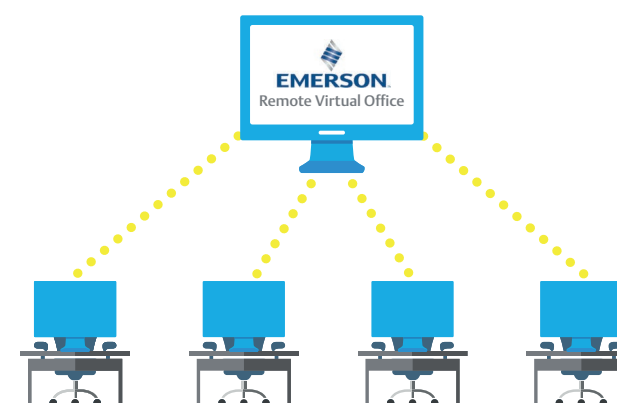
The vast number of people involved in today's large-scale automation projects and their wide geographical spread can create a logistical nightmare, explains Michel Da Silva, Director Engineering and Strategic Services Europe at Emerson. But Emerson's Remote Virtual Office (RVO) solution enables distributed project teams to collaborate with ease and to execute projects successfully.

Automation projects are getting larger and ever more complex, with shorter cycle times. The specifics of each individual project may be unique, but they all face common concerns about keeping within budget and completing on time. Modern working practices demand involvement by multiple owners, engineering contractors, and suppliers from different parts of the world. This can create headaches when it comes to planning, communication, and collaboration.

Available project resources are not always local, nor are they in a common location, which makes it difficult to share files and to communicate progress updates. Travel time can cause project delays and travel expenses hit hard the pockets of those involved. If only you could reduce or even eliminate the need for travel among those working on such schemes. This would help to compress project schedules and reduce expenses. How can you cut out travel and keep access to expertise and resources whenever you need them, regardless of where in the world they happened to be?

Emerson has developed Remote Virtual Office (RVO) as a cost-efficient, rapidly-deployed, and secure distributed engineering solution. RVO allows worldwide project team members including the client, Emerson personnel, contractors and suppliers to communicate and contribute remotely in a virtual engineering and testing environment, without overwriting each other's work. That means less travel, fewer expenses, and more time saved.

This virtual environment involves multiple RVO engineering centres working with server farms around the world that provide intelligent redundancy and virtual engineering systems. A major benefit is that project team members can configure an automation system and build the project without any physical project hardware.



Members of each organisation involved, whether next door or on the other side of the world, can access files, discussions, updates, tools and applications, and contribute their specific knowledge to the on going project. This provides many benefits to owners, including being able to remotely review prototypes to ensure compliance with specifications and to engage operations personnel early in remote factory acceptance tests. The distributed environment also makes it easier to deploy standards, processes and tools.

Using RVO, Emerson ensures application of the right skills for each project. Any of Emerson's 6,800 project and service professionals across the world can be engaged to share best practices and processes, ensuring that Emerson global project teams can execute projects effectively. By eliminating physical hardware dependency, virtualisation allows faster project start-up, and since the RVO engineering infrastructure is available on demand, configuration and prototyping can start on day one of a project.

Go to EmersonProcess.com/IM804 to learn more and download the Remote Virtual Office flyer.



Process simulation models are designed to reflect actual plant process dynamics.

Dynamic simulation supports successful start-ups



Construction is finished. Now will the plant start up on time and run to specification? Ronnie Bains, Dynamic Simulation & Process Optimisation

Business Manager at Emerson, describes how dynamic simulation supports control system development, testing, operator training and commissioning to reduce risk and ensure successful start-ups.

The sooner operators can bring a plant safely up to full production, the quicker the return on their investment. Reduced engineering, commissioning and start-up periods directly affect when an asset can reach full capacity. Making reductions to project schedules whilst extending the level of design integrity, innovation and design quality, presents a difficult challenge. As part of its Project Certainty approach, Emerson is helping companies achieve this, using dynamic simulation to support automation systems development, testing, commissioning and operator training, which all contribute towards a successful start-up.

For process industry applications, dynamic simulation solutions usually comprise of an integrated control and safety system (ICSS) communicating with a model of the process facility. Process simulation models are designed, developed and integrated to reflect actual plant process dynamics and to provide realistic feedback for the ICSS. The configuration of the ICSS, including relevant databases and graphics, are taken from the actual production system being installed.

The HMI and control logic will be a replica of what the operator would see in the real control room, where a copy of the production system is used for development. This creates an environment where an experienced operator would not be able to tell the difference between the real production plant and the simulated plant.

Dynamic simulation can also be used to perform a number of vital tasks during the lifecycle of a greenfield or brownfield project. For example, it can be used to verify both commissioning and operating procedures. This allows many issues, which would otherwise only be highlighted whilst commissioning was taking place, to be identified and addressed beforehand. This results in a much smoother, more efficient and faster commissioning period, termed 'virtual commissioning'. Dynamic simulation can also be used to test any control system design changes made before they are implemented on the actual production plant, to troubleshoot problems that may arise with the installed automation system and to evaluate alternative operating procedures.

In terms of training, it is imperative that the workforce has as much knowledge as possible of a plant's processes before start-up, so that from day one they can be confident of handling any situation in the control room. However experienced they may be, each new plant is different and there could be many new processes and procedures to be learned and equipment or software to be trained on. To provide this level of detailed preparation, Emerson offers operator training simulators (OTS), which are

computer-based training systems that use a dynamic simulation of an industrial process to create a learning environment tailored to a plant's specific needs. This allows operators to understand all the processes involved in the plant's operation and prepares them to effectively handle any potential incidents, once production begins for real.

The practical experience gained from an OTS includes operating process systems in various situations, such as start-up and shutdown, normal operations at different throughputs, recovery from malfunctions and upsets, emergency shutdowns as well as being equipped to deal with the management of abnormal situations. By logging hundreds of hours in simulated scenarios such as these, operators widen their experience, boost their confidence and are able to operate the facility more optimally.

The benefits of this level of preparation are widespread. Thorough testing of the control configuration and smooth start-up due to virtual commissioning, as well as upskilling of a workforce through OTS training, leads to increased plant performance. This means greater profits, plus increased plant-wide safety and energy efficiency.

Read more about Dynamic Simulation at EmersonProcess.com/IM805

Innovative technologies



Configure-to-order cabinets accelerate project execution schedules

When designing system cabinets and field enclosures for complex automation projects, you typically face long lead times. Much design effort is required up front and yet there is considerable likelihood of process changes that can adversely impact the schedule. Traditionally designers have had two choices of system cabinets and field enclosures, each with its particular drawbacks. A standard off-the-shelf option is simpler but may not meet all the project's needs, while a custom-designed solution is more costly, as it requires major design effort and additional time.

As part of the Project Certainty approach, Emerson has introduced another option in the form of configure-to-order (CTO) cabinets. CTO cabinets provide a predesigned enclosure that houses distributed control system hardware and related equipment. The cabinets arrive at project sites ready to be connected to the field I/O and they can be seamlessly integrated into the overall hardware solution. Because the designs are pre-engineered and proven, the need for extra acceptance testing or on-site testing is either reduced or eliminated, saving vital time.

With CTO, Emerson makes life easier for customers during both design and installation. CTO is fundamentally an off-the-shelf solution that offers a wide range of customisable options. Customers can choose from a range of over 40 base enclosure models covering different I/O quantities, power distribution needs, environmental requirements (safe area or hazardous area) and certifications and then select further configurable options to meet their project's specific needs.

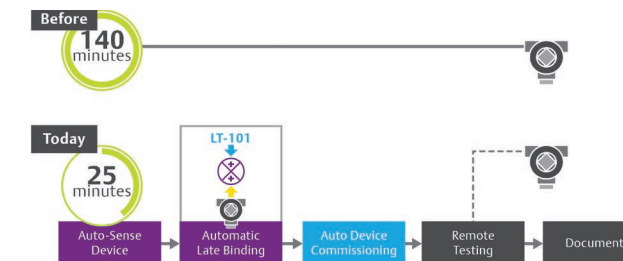
Flexible cabinet design is made possible through use of Emerson's DeltaV distributed control system electronic marshalling with CHARacterisation Module (CHARM) technology. Unlike hard-wired marshalling, electronic marshalling eliminates many traditional I/O design tasks and allows field wiring to start long before control strategies are finalised. This flexibility allows designers to meet project needs efficiently while reducing schedule and financial risk. Customers who have used CTO cabinets accelerated their project execution schedules and reduced installation costs.

To get the CTO datasheet go to EmersonProcess.com/IM806

Smart Commissioning

Successful project execution relies on project teams being able to meet tight project timelines without being hampered by late design changes. To help achieve this Emerson has introduced Smart Commissioning, a technology-enabled process that drastically reduces automation commissioning time and effort. Smart Commissioning helps automation projects meet strict and shifting deadlines by reducing trips to the field, eliminating tasks, and accommodating late project changes. Smart Commissioning builds on advances made possible by the combination of the DeltaV distributed control system, Electronic Marshalling with CHARMs and AMS Device Manager software to remove automation from the critical path of projects.

With the release of version 13 software for the DeltaV system and AMS Suite, Smart Commissioning brings ease to automation project implementation. From the initial device connections to final system testing, users save money as they shave weeks off the project schedule by reducing time spent on automation commissioning activities.



Smart Commissioning reduces commissioning hours by 82% today

Upon arrival at a project site, pre-tagged smart devices can be connected immediately to any channel in a nearby junction box - no need to wait for wiring designs to be complete. Smart Commissioning also eliminates potential errors by automatically finding and identifying all smart devices, then binding them to the configuration. To further accelerate implementation, the device configuration is pushed to all devices based on pre-configured templates. Testing is easily and safely done from the control room by using digital communication, requiring no personnel in the field for confirmation.

Read more about Smart Commissioning at EmersonProcess.com/IM807

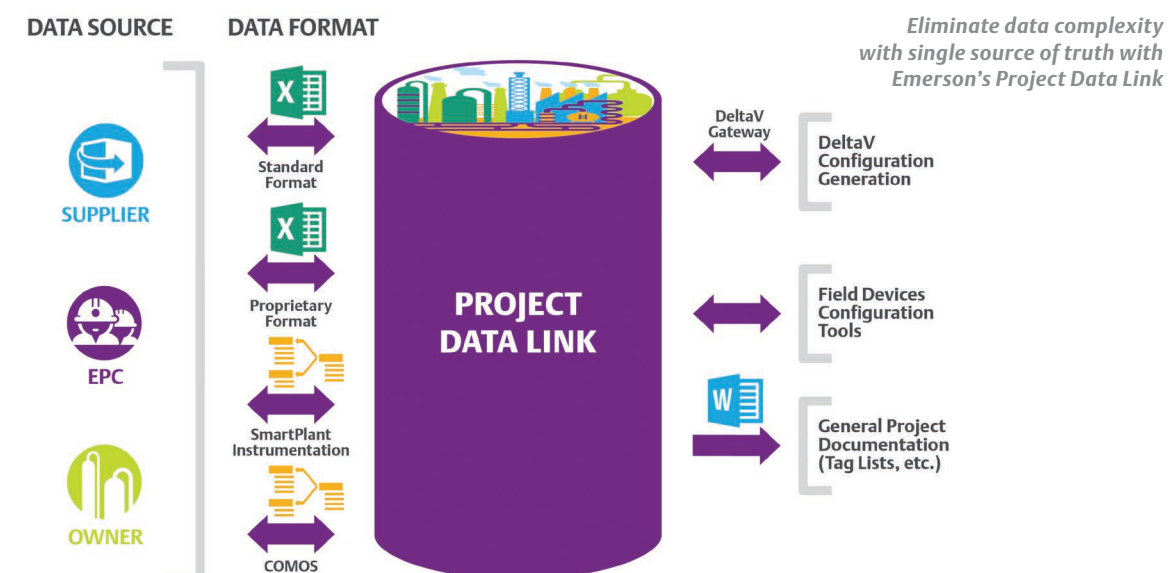
Engineering environment streamlines specification processing

The challenge of reducing the complexity of projects and keeping them off the critical path has led Emerson to develop Project Data Link, a new project engineering environment designed to accommodate late changes and improve engineering efficiency.

Project Data Link efficiently translates project information from multiple sources into project deliverables. It mitigates project risk by normalising specifications into a single data source with traceability and an integrated change-management system. It gives all stakeholders access to project information, including specifications related to field devices and the distributed control system.

The data link is always up to date, so when a change is initiated, Project Data Link automatically reconciles it against what is in the system, identifies what needs to be changed, sends updates to the DeltaV distributed control system and provides an audit trail of what has changed. This saves time and eliminates errors during the critical late stages of the project.

Read about Emerson's Global Centre of Project Excellence at EmersonProcess.com/IM808



Further information

Emerson Process Management is always looking for new and innovative ways to connect with customers. These include local country websites, the award winning Emerson Process Experts blog and social media.

Web

www.EmersonProcess.com

Community

The Emerson Global Users Exchange is a unique opportunity to exchange ideas, best practices and proven solutions with leaders in the process industry.

www.EmersonExchange.org

Emerson Exchange 365 is the global peer-to-peer on-line Emerson Users Exchange Community with a built-in translation facility.

EmersonExchange365.com

Blogs

Emerson Process Experts

Connecting with the people behind the technologies and expertise. Website equipped with automatic translation.

www.EmersonProcessexperts.com

DeltaV News

DeltaV – Emerson's distributed control system.

news.easydeltav.com

Modelling and Control

The dynamic world of process control.

Website equipped with automatic translation.

www.modelingandcontrol.com

Analytic Expert

Discussing the application of liquid and gas analysers.

www.analyticexpert.com

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The banner features a photograph of three professionals (two men and one woman) in business attire standing in front of a large, curved screen displaying technical diagrams. The text is overlaid on the right side of the image.

**New Reality.
New Opportunity.**

**EMERSON
GLOBAL
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**Emerson Global Users Exchange
12-14 April 2016 Brussels**

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innovations

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