It's Time to Look at Projects Differently

Strategies for Integrated Project Execution

EMERSON
Process Management

It's Time to Look at Projects Differenty

With increasing size, growing complexity, and shorter schedules, the challenges of executing a billion dollar project on budget and on time are becoming increasingly challenging. But the impact of failing to meet those challenges is increasing. The cost of overruns and lost revenue can exceed the cost of the project by tenfold. What is new, maybe even transformational, is the way Emerson Process Management is helping project executives meet those challenges and minimize project risk, with innovative services and technology.

First, it's the people. Emerson collaborates differently with its customers to develop a one team mentality. We are deliberate in the way we construct our project teams and how we build relationships with customers and other suppliers through early engagement and flexible contracts. Recently, a customer described an Emerson subject matter expert as "present and listening," factors he cited as critical for the project's success. "It felt like we were on the same team rather than on separate or even opposing sides," the customer said. That kind of one team mentality makes it possible to remove barriers and solve problems quickly. The customer went on to say, "Having a consistent presence meant that Emerson really understood what we wanted from the beginning and already had a vision for what would be needed at the end."

Next, it's the technology. Emerson hasn't just evolved our project services; we've transformed our methodology through the use of technology to drive project planning and execution, too. A rigid approach that relies on knowing all the answers up front is no longer a viable option. For example, to facilitate closer collaboration, we're leveraging virtualization platforms that make it easier for all parties involved to share information, test solutions and make decisions, regardless of where they are located globally. The efficiency and flexibility of proven technologies such as DeltaV's Electronic Marshalling and wireless networking have also dramatically altered the implementation of the project at hand and those in the future by minimizing the impact of late design changes.

Finally, it's reducing complexity. We've found ways to eliminate work and streamline start-ups. As one of our customers says, "you can't screw it up if you don't have to do it". Our human centered design, which is the cornerstone of our technology and project execution philosophy, eliminates unnecessary work, reduces the complexity, and embeds knowledge into our technology and services. A smooth and simpler implementation can have the biggest impact on achieving a successful project. We strive for no surprises as one customer shared, "Everyone expected some kind of minor issue that would hold up our start-up. But that just didn't happen."

Jim Nyquist

Group Vice President
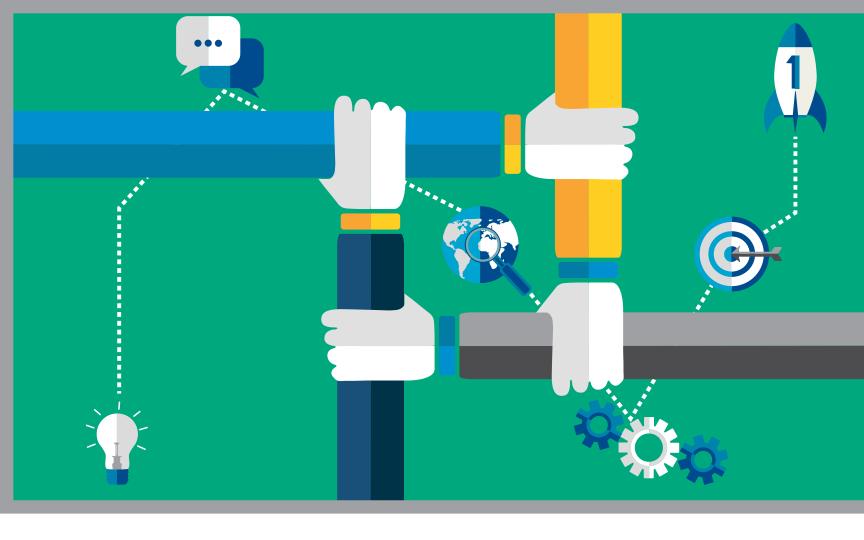Emerson Process Management

Table of Contents

Learn more at www.emersonprocess.com/projectcertainty

Simplify Project Execution

Easily accommodate late project changes with Electronic Marshalling

At some point in every design process, projects involve one of the industry's most burdensome tasks: engineering and managing I/O. This can include tasks such as changing a few I/O from one type to another due to modifications in the field, or in an extreme case, updating an I/O sub-system in a new section of the plant.

Because I/O hardware and software–bound by traditional marshalling–are so tightly integrated during design, development, testing, and commissioning, simple I/O changes can cause major project delays.

Many of these project headaches can be eliminated with a new way of providing I/O on demand that allows you to add I/O anywhere in the plant when and where you need it. When project scope increases, your design team has the flexibility in their control strategy design and implementation to incorporate the new project scope without affecting the project schedule.

Keep Projects on Schedule

Through an innovative technology–Electronic Marshalling with CHARMs–project design and implementation is simplified–reducing the number or hours needed to make I/O changes. Electronic Marshaling with CHARMs, part of Emerson's DeltaV™ Distributed Control System (DCS), enables you to land field cabling wherever you need it, regardless of signal type or control strategies. Each terminal block has a single channel characterization module, or CHARM, which allows any signal type of field wiring to be terminated in any location. Field wires are terminated on terminal strips, but the cross-wiring from the marshalling panel to I/O cards is not required. Each I/O channel is mapped to its appropriate controller automatically through the DeltaV system software.

Using Electronic Marshaling with CHARMs you will not need to land wires in a marshalling cabinet then wire each landed pair to an I/O channel on the right kind of card connected to the right controller. System engineering and documentation are therefore streamlined. In fact, you can build or order the required cabinets before the process design is complete. Each I/O channel can be re-characterized at any time by simply changing the associated CHARM, so you have flexibility now and in the future.

How Does Electronic Marshalling with CHARMs Change Project Execution?

Electronic Marshaling with CHARMs allows hardware and software to be fully independent of each other right up through automatic loop commissioning. Electronic Marshalling replaces traditional marshalling and compresses project engineering schedules for all types of projects, including greenfield plants, retrofits, and every-day changes. Electronic Marshaling with CHARMs brings project savings in many ways.

Simplify Automation System Design

Traditionally, a project engineer needed to know the required number and type of I/O points before designing hardware and building cabinets. Each type of I/O needed a certain type of I/O card. Each I/O card had to be tied to its respective controller. The inevitable late process-design changes revealed the system inflexibility and brought on expensive change-orders late in the project cycle or delayed overall project delivery.

But now–because adding and changing I/O types is greatly simplified with Electronic Marshaling with CHARMs technology–a project engineer can start hardware design and begin building cabinets earlier in the project with an approximate total I/O count and associated type. Each I/O channel is fully characterized by its respective CHARM plug-in which can be changed as needed without redesigning the hardware. Additional time is saved by using DeltaV system software, which automatically maps each I/O channel to its appropriate controller.

Automation is no longer a project bottleneck and is off the critical path.

Accommodate late
PROJECT
CHANGES

DeltaV Electronic Marshalling with CHARMs technology *allows late binding of process changes providing unparalleled adaptability and can help avoid costly, last minute change orders.*

FEED

Estimate I/O Count and Cabinet Count

System Design
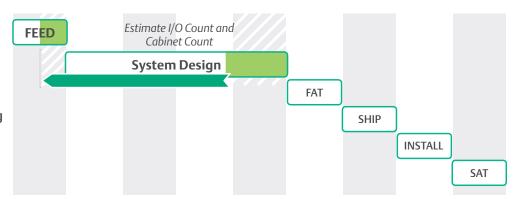
FAT

SHIP

INSTALL

SAT

Figure 1: DeltaV Electronic Marshalling allows late binding of process changes providing unparalleled adaptability and can help avoid costly last-minute change orders.

Reduce Installation and Commissioning Time

Hardware factory acceptance test (FAT) in the process industry has been about testing each I/O wire, each screw, and all of the cabinets. Electronic Marshalling with CHARMs technology removes all of the custom panel-building and cross-wiring, therefore the technology eliminates much of the FAT to reduce both FAT and commissioning time.

Although FAT cannot be completely eliminated (because it usually includes checks for completeness, contractual requirements, and functionality), the time required to perform the test can be significantly reduced by condensing the hardware portion of the test. That is exactly where the new Electronic Wiring with CHARMs technology helps. Because there are no physical wires–simply replaceable CHARMs– connecting field devices to the I/O subsystem, no screws and no physical wire logic must be tested. Emerson customer, Braskem in southeastern Brazil, estimated that the flexibility of the Electronic Marshalling solution meant they could design and install the new system in 50% less time as compared with conventional I/O approaches.

Streamline Maintenance and Troubleshooting

The benefits of Electronic Marshaling with CHARMs technology don't stop when a project is completed. Because each I/O channel can be re-characterized at any time simply by changing its CHARM, flexibility is continued throughout system life. The technology also simplifies troubleshooting because communication is immediate and replacing a single CHARM is much easier than replacing an entire board, significantly reducing mean-time-to-repair.

When a CHARM or CHARM terminal block must be added or removed, no tools are needed. To add, simply snap the CHARM in place. When the CHARM is inserted into the DIN rail, the system automatically senses the CHARM with its I/O definitions. All the information is immediately included in the DeltaV configuration database. In addition, when a CHARM is inserted, each terminal block is "self-keyed" so the user cannot insert the wrong type of CHARM without removing and manually resetting its terminal block.

Simplify I/O and Streamline Project Execution

You can confidently move forward with the project in an environment where your design team electronically (rather than physically) assigns I/O to different controllers with no redesign of control strategies. And if the project scope increases, your design team will have more flexibility in control strategy design and implementation; they will incorporate the changes without negatively affecting project schedule.

Learn more about how Electronic Marshaling with CHARMs decouples engineering and installation from changes in the design. Consider your project without having to worry about far-reaching effects of late changes. Instead easily accommodate changes and reduce the hours required for design and implementation. ■

"It's so much easier to check. We're cutting out some of the normal problem areas. We can now turn around a large, semi-commercial unit in eight weeks, and now we're targeting six. This new technology will allow us to do that."

- Dr. Andre Joubert, Sasol Technology Manager of Control Systems and Instrumentation

Learn more at www.emersonprocess.com/projectcertainty

Increase Project Schedule Flexibility

*Find Money in Configure-To-Order (CTO)
Cabinets and Enclosures*

The unique characteristics and changing requirements of your process automation project might seem to require more expensive customized cabinets and enclosures. Traditionally, cabinets for complex processes have been custom designed and built based on preferential engineering. Then, of course, they have had to be functionally tested and could be deployed only after system design was finalized.

> *"The most important thing in cabinet design is uniformity. The more consistent design and specification, the more time it saves on all disciplines on a project."*
>
> *— Project Manager, Large International EPC*

Up to now, headaches around cabinets and enclosures have included significant redesign and rework and accompanying schedule and cost risks.
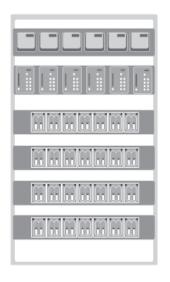
Delivery lead-time pressure — cabinets have to be specified and ordered in time to meet delivery requirements. Repercussions include pressure on the design team, later design changes, risk, and increased cost. After the design freeze date, making changes to cabinets is expensive in both time and money.
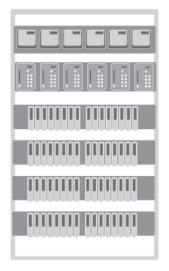
Project execution cost — more time and cost is required to design, document, and deliver customized cabinets and enclosures. They also require more effort to support and expand than standard cabinets.

Design flexibility — consider all the elements that can affect cabinet flexibility. If just one or two of these elements change, redesign could be required: I/O sizing, power supply, environmental demands, hazardous area classification, physical layout, statutory requirements, electrical codes, or physical layout.

Lack of expertise — finding a project partner with the qualified resources, experience, and expertise available for cabinet design and engineering can represent significant resource requirements.

By employing new engineering and project techniques, standard cabinets can be used in complex process automation projects.

Figure 2: Configure-To-Order cabinets provide an off-the-shelf solution for faster project execution and reduced installation costs.

What are Configure-To-Order Cabinets?

Configure-to-order cabinets provide a predesigned location that houses distributed control-hardware and related equipment. The cabinets meet Canadian Standards Association (CSA) and European Commission (CE) personal-safety requirements and arrive at your site ready for site installation and inspection. The cabinets are ready to be connected to the field I/0, and they seamlessly integrated into the overall hardware solution.

How Does Configure-to-Order Cabinets Change Project Execution?

By choosing Emerson configure-to-order cabinets and enclosures, you open your project up to greater efficiency:
- Access a wide range of customizable solutions
- Reduce schedule time and risk
- Reduce financial risk

Flexible cabinet design is possible because of Emerson's DeltaV™ Distributed Control System. Electronic Marshalling with CHARM technology (rather than hard-wired marshalling) eliminates the need for any internal cross wiring and I/0 rationalization, and a single cabinet or enclosure design can serve a wide variety of I/O signals, conditioned individually by a DeltaV CHARM. Electronic Marshalling eliminates traditional I/O design tasks and allows field wiring to start long before control strategies are finalized. The results include faster project execution and reduced installation costs.

Access a Wide Range of Customizable Solutions

Although CTO cabinets are an off-the-shelf solution, they offer customizable options. Select an enclosure from over 40 base models, and then choose from predefined options to meet 80% of your project's functional requirements. These options will be configured by Emerson to meet your specific project needs.

Reduce Schedule Time and Risk

Schedule time and risk issues are minimized because the flexibility of Electronic Marshalling with CHARMs technology enables you to delay the design freeze. Pre-configured cabinets arrive at your site ready for you to set the I/O characteristics–and because late changes are easily accommodated, you can redefine those characteristics easily later with minimal re-engineering and no rewiring as the project develops.

Each pre-engineered cabinet and enclosure undergoes a full in-house inspection and test, significantly reducing cabinet design engineering and ensuring the cabinet is fully operational before shipping to your site. Choosing CTO cabinets and accompanying technologies, you will even minimize factory acceptance test. Emerson provides virtual factory acceptance test (vFAT) that decouples software and hardware delivery to maximize schedule flexibility and reduce FAT time.

Reduce Financial Risk

Configure-to-order field enclosures and cabinets provide more predictable cost by using proven designs–improving quality and consistency while reducing unexpected rework. With standardization also come reduced maintenance and support costs. And with Emerson's worldwide network of cabinet assembly facilities, you have a single point of responsibility for hardware deliverables.

Emerson's configure-to-order cabinets suit most installation needs. Emerson will design, engineer, build, and deliver to meet your specific requirements. Remove cabinets from the critical path and obtain better schedule certainty and lower risks.
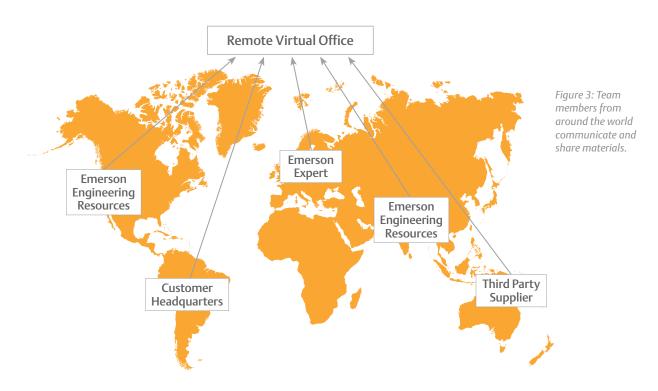
Increase Project Schedule Flexibility

Implementing a successful automation project is about delivering consistent quality with speed and efficiency to meet operations' needs. Emerson's pre-engineered Configure-to-Order cabinet and field enclosure solutions suit most installation needs. For your other cabinet and field enclosure needs, Emerson will design, engineer, build, and deliver to meet your specific requirements. ■

Learn more at www.emersonprocess.com/projectcertainty

Streamline Project Resources

*Engage Expertise Regardless of Location
with a Distributed Engineering Solution*

Without a doubt, your process automation team does not work in a single room, at the same time, or even at the same location. It can be difficult to share files and communicate immediately as progress happens, and there may be parts of your automation project that are out of your team's area of expertise. Project missteps and miscommunications happen, and they cause delays and lost profits.

What if you could access project resources and expertise regardless of where they exist in the world? What if technology could enable you to compress project schedules, optimize costs, and maximize capital efficiency? What if you could ensure software engineering started as soon as possible, independent of procuring project hardware?

Remote Virtual Office

Emerson Expert

Emerson Engineering Resources

Emerson Engineering Resources

Customer Headquarters

Third Party Supplier

Figure 3: Team members from around the world communicate and share materials.

"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."

— François Davin Instrumentation, Electrical and Automation Manager– Engineering Service Sanofi

Stay On Track in a Distributed Engineering Environment

Changes in global work styles–remote workers, long-distance expertise, and worldwide team building–have enabled technology to smooth interactions in cooperative team development projects. Using new virtualization technology, a distributed engineering solution can reduce risk for your next process automation project. A distributed engineering environment provides:

- A secure environment for distributed, global engineering enables project team members worldwide–including your internal team, Main Automation Contractor (MAC) personnel, EPCs, and third-party suppliers–to contribute without overwriting work.
- Access to expertise and resources independent of location leverages centralized virtualization technology so that configuration can begin before hardware has been defined.
- Elimination of travel time and expense brings results from more effective remote offsite prototyping and testing.

How Does Distributed Engineering Impact Project Execution?

Process automation projects are ripe for remote-project advances. Emerson has developed Remote Virtual Office, a distributed engineering technology that empowers you with the resources to complete your project regardless of location. Remote Virtual Office allows your team members–whether across the world or next door–to have access to updates, tools, and applications. With assigned privileges, team members can view project files and contribute knowledge to the ongoing and changing project. And the right teams have access to Emerson knowledge and expertise.

Tap into Expertise and Resources Independent of Location

Over the years, cost-efficient, rapidly deployed, and professionally supported project engineering environments have grown. Working in the Remote Virtual Office environment, you have access to global service capabilities such as design, engineering, third-party testing, and customer Factory Acceptance Tests (FAT) independent of location–and for efficiency sake all use a common infrastructure for hundreds of parallel projects.

And you don't have to do it alone–gain access to over 6,800 project and service professionals distributed globally. Emerson's Project Management Office (PMO) provides global management of Remote Virtual Office (RVO) knowledge to share best practices and processes.

Employ Centralized Virtualization Technology

Unique virtualization technology is at the center of Remote Virtual Office–enabling project teams, clients, and suppliers to collaborate independent of location in a virtual engineering and testing environment. The architecture encompasses several engineering centers working with server farms around the world to provide intelligent redundancy and virtual engineering systems.

Specified project resources can use the system to configure your automation system and build your project in a virtual environment without requiring physical project hardware. Save time and money because no local inventory is required. The results include a project that meets your exact specifications with faster project startup accomplished, in part, by eliminating physical hardware dependency.

Prototype and Test Remotely, Offsite

Because the Remote Virtual Office engineering infrastructure is available on demand, configuration and prototyping can on start on day one of a project. At the team's fingertips are design flexibility and collaboration capabilities to securely collaborate without travel expense. The environment allows the team to develop designs, participate in design reviews, and even conduct important testing, such as FAT or integration tests, with I/O subsystems or DCS controllers built into skids. Applications are developed on your equipment or can be provided with Emerson in-house inventory. And given the proper privileges, each member in each organization–including suppliers and third parties–can gain access to files and discussions. The joint access and open communication reduce errors and rework, reduce design duration to shorten project schedules, and provide flexibility to manage key changes throughout the design process.

Streamline Project Resources

Gain access and secure the resources and expertise required to define project requirements, plan to mitigate risk, and execute project plans successfully. Emerson's investment in a Remote Virtual Office infrastructure for global distributed engineering and associated support organization is a commitment to reduce your overall project risk and minimize any disruption impact to a project's schedule. ∎

As a trusted advisor to some of the world's most successful companies, Emerson has collaborated in bringing the most complex projects to successful implementation. We look forward to collaborating with you, too.

Learn more at www.emersonprocess.com/projectcertainty

Emerson Process Management

1100 W. Louis Henna Blvd., Building One
Round Rock, TX 78681-7430

EMERSON™
Process Management

EMERSON. CONSIDER IT SOLVED.