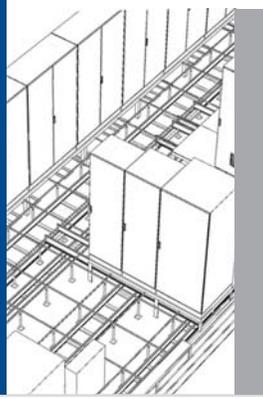


Front End Engineering Design Capabilities



Why EMERSON?



Aligning your project and business objectives while creating a solid, detailed project foundation begins with a Front End Engineering Design (FEED) study from Emerson Process Management.



Emerson blends industry expertise, process engineering and project management together with the proven PlantWeb® digital plant architecture to deliver the ROI you expect from your project.

Plan for success

Build your plan for success the smart way by partnering with the undisputed leader in process automation, Emerson Process Management.

Right from the start

Whether it's a large, complex greenfield project or just adding a few upgrades, Emerson delivers a multi-disciplinary approach with industry-standard FEED work processes, industry experts with decades of combined experience, and our deep commitment to operational excellence.

An Emerson FEED study provides the foundation for a controllable and profitable project by helping you:

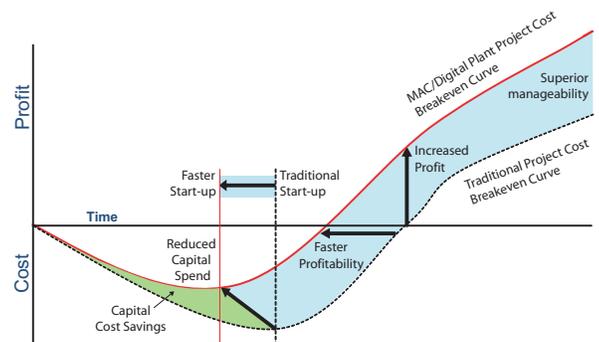
- Ensure that the design meets your project's time, budget, ROI and operating cost criteria
- Set scope boundaries by quantifying and justifying the investment required for a given benefit
- Encounter fewer changes with better change management

- Identify and plan for project risks early so that actions can be taken to minimize their impact
- Involve your key stakeholders to make certain your design meets your organization's overall needs
- Achieve faster implementation of technology

Emerson total value

Emerson's FEED capabilities are part of a total value proposition by which we combine applied expertise and our digital plant technology to create smart plant solutions with great benefits:

- Lower capital expenditure to reduce automation costs 20% - 30%
- Faster time to profitability
- Increased profitability
- Superior system manageability



Emerson's Total Solution Value Proposition Benefits

The one-stop technology

“One of the major reasons for the success was due to the excellent front-end engineering... The front-end package generated by Emerson and a small team from Solutia allowed us to develop plans and stick to them.”

Greg Kanteres - Solutia Project Manager

Multi-disciplinary expertise

Emerson provides a wide range of expertise to meet the demands of your project, including the very best engineers and designers in the process automation industry. Our smart field instrumentation technology leadership means you get skilled and experienced engineers to help you design efficient new facilities as well as analyze and improve your existing operations.



Project management

- Project managers with the training and experience to deliver consistent results
- Global best practices with an organized, structured approach
- Budgeting, schedule control and project team communications tools

Process automation engineering

- Main Automation Contractor (MAC) experience on small to very large projects
- DCS design, configuration, migration and connectivity to legacy systems
- Engineer control buildings, modular process skids and analyzer housings
- Design and implementation of embedded advanced control functionality

Instrumentation & electrical

- Smart field instrumentation installation, commissioning and start-up
- Supplemental electrical engineering related to automation projects
- Supplemental mechanical/structural engineering related to automation projects
- Supplemental design, construction, and commissioning of piping related to automation projects

Safety system engineering

- Certified FEED work processes for safety systems
- Process hazard analysis, risk & non-instrumented layers of protection (NLOP) assessments, SIL evaluations
- Certified specification, engineering, installation, and commissioning of safety instrumented systems

Power engineering

- Complete power system engineering from the utility source to the process equipment
- Design of emergency/backup power systems for critical equipment
- Arc flash hazard assessments to complement your facility's safe work practices

Process engineering

- Process knowledge and experience to meet performance and reliability objectives
- Process definition and analysis
- Process descriptions and flow diagrams
- P&ID development

and services experts

A process for SUCCESS



Emerson's structured FEED work process includes training project team members to ensure consistency and efficiency throughout the planning process and on into implementation.

Proven technology and processes

Emerson's proven FEED work process is built upon the recommended best practices of authorities such as Construction Industry Institute (CII), Project Management Institute (PMI), and Independent Project Analysis (IPA) methodologies. Our project management program is consistent with these guidelines for project implementation.

You get a single point of accountability for the instrument and automation system project, and our PlantWeb expertise ensures that your project is technically sound, safe, timely, and that it derives the most benefit from today's digital technologies.

FEED planning

One of the first steps to executing a successful project is to have good communication to identify not only the project objectives, but also the business objectives.

Emerson assists with the development of the FEED team to ensure all key stakeholders contribute to and align themselves with the project objectives. Constraints for timing and budget are also reviewed and aligned during identification of the project premise and scope.

Data gathering

For a project in an existing facility, data can be collected in the field using Emerson data management software on Personal Digital Assistants (PDA). This software helps to expedite checkout and accurately benchmark the existing equipment and installation. This method of verification typically takes half the time of traditional methods.

All documentation is verified to minimize risk of unforeseen events or existing conditions related to the project.



Emerson FEED Work Process

"For the validation project, the front-end work performed by Emerson was quite important as we needed to have accurate cost estimates. It is the ultimate goal of every project."

John Wilson - Dow AgroSciences Project Manager

Basis for design

From detailed design, construction, commissioning, to the completion of each successful startup, our years of experience help you attain the best solution to meet all appropriate standards and codes. Together, we can evaluate project alternatives are evaluated to meet process and business objectives, while reducing cost and tightening schedules.

Communication and alignment throughout the project are important to ensure the design and deliverables match your project expectations. Emerson can include third parties such as installation contractors to ensure that the design encompasses the complete scope. This minimizes field change orders later in the project.

FEED estimate

The FEED process typically narrows the cost and benefit estimate down to +/- 10%, and identifies the risks and issues that support this estimate.

The estimate includes:

- Detailed functional scope of the engineering and design
- Detailed project execution plan
- Detailed procurement plan

Final document

The final FEED document is the definitive technical and business project summary including all FEED deliverable documents to be used by your organization and your project team. These documents include:

Scope definition including engineering & design

The defined scope of a project is based on aligning your needs with a plan that includes the engineering & design work.

Typical deliverables include:

- Master Project Schedule
- Budget plan
- Alternative analysis report
- Functional design specifications
- Engineering drawings approved for design

- Required bill of materials
- Required resource allocation plan

Execution/procurement planning

The Project Execution plan addresses project resources, migration plans, and required purchases. Contingency funds can be significantly reduced due to increased accuracy of the budget estimate.

Economic justification

The FEED definition often includes the required economic justification in both investment requirements and the expected process and business-related returns. An ROI calculation can be determined as part of a FEED study to ensure that the project clears the required financial hurdles.

*Structured processes,
proven methods*

The benefits of SUCCESS



To meet your business objectives, Emerson focuses on delivering quantifiable business results consistently, from one project to the next.

Lower costs

Completion of a FEED study results in a well-defined scope for the rest of the project, which in turn results in a more accurate estimate, lower contingency, and typically lower overall project costs.

The effort and upfront cost of the FEED delivers major benefits, as this is work that would otherwise be done in the first 10-25% of detailed engineering. The resulting “blue print” is further refined during the detailed design phase of the project.

Faster implementation

Studies (see opposite page) show that projects with a thorough FEED study are more likely to be completed on time.

Early identification of potential problem areas and/or necessary changes allow for early resolution, resulting in less impact to the project.

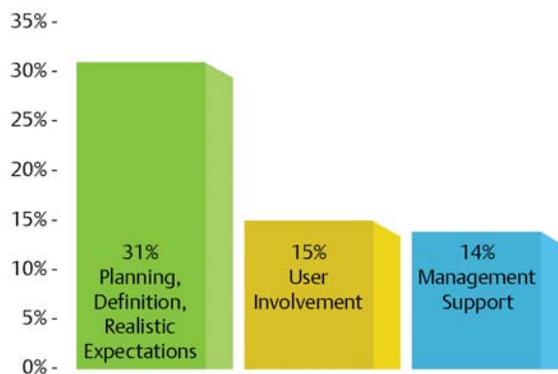
The schedule is defined and the project planned from start to finish including resource requirements and hardware procurement.

Identified and minimized project risk

With project staff alignment, business drivers and constraints defined, the project risk is identified and minimized. Business management can proceed with full disclosure of opportunities to mitigate risk and/or project alternatives.

Greater user involvement and management support

Studies also show that early planning, project definition and goal setting are major factors in gaining user involvement and management support. These factors greatly increase the opportunity for a successful process automation project.

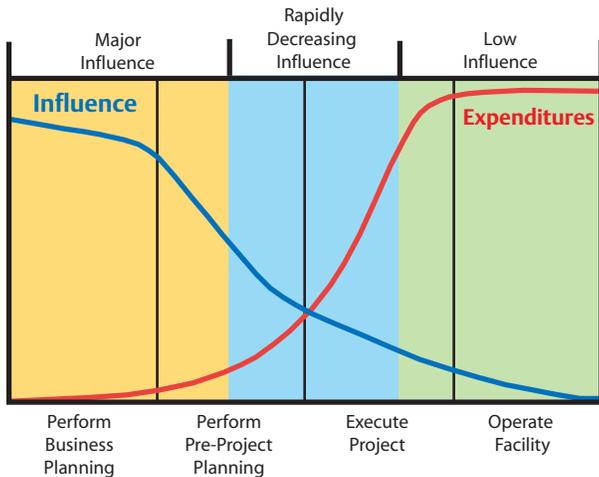


Ref. - Control Magazine Survey - Feb. 2000

Lower costs, and incre

“The FEED is important to attain the level of detail, clarity and deliverables necessary to set the boundaries for the project...Emerson’s thorough FEED was a significant factor in the project(s) being completed within budget and on schedule.”

William Pouncey - Pfizer Project Manager



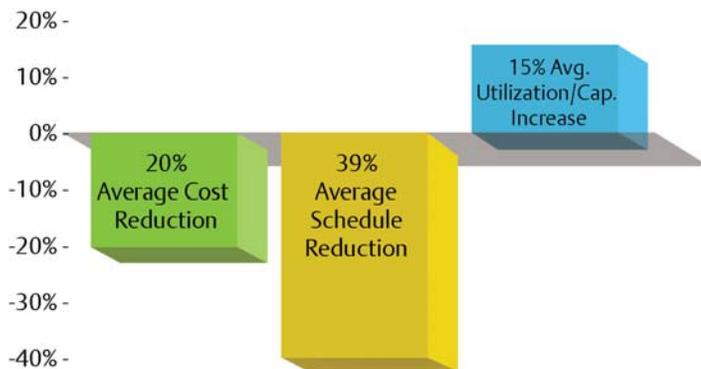
Earlier is better

Changes in scope are best made at a time when they have the least financial impact to the project. It is more difficult to improve project costs later in the project lifecycle when project execution and operation of the facility are already in place.

Cost/schedule down, utilization/capacity up

According to a Construction Industry Institute study of 53 large projects, the group of projects that spent the most effort on pre-project planning (another term used for FEED study) averaged:

- 20% lower costs
- 39% schedule reduction
- 15% utilization/capacity increase compared to the group that spent the least effort on pre-project planning.



Pre-Project Planning impact on the Success of 53 projects
Re: Construction Industry Institute Study SD105

increase profits and capacity



Committed through every phase

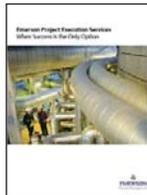
As part of pre-project planning, Front End Engineering Design work is early design work done after conceptual business planning and prior to detailed design. - Emerson can provide a turnkey solution that includes FEED, equipment selection, commissioning services, and implementation and operational capabilities.

Emerson's capabilities and experience are especially valuable when time is at a premium. When the stakes are high, our experienced project management, engineering, and single point of accountability for the entire instrumentation and automation system make a crucial difference.

From full Main Automation Contractor (MAC) scope, to Main Instrument Vendor (MIV), to supply of the automation system and configuration services, Emerson can help. Contact your local Emerson sales office or representative today.

Emerson Process Management
email: industry.solutions@emersonprocess.com
www.EmersonProcess.com/solutions

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Project Services— When success is the only option, call upon Emerson experts. Visit: www.EmersonProcess.com/solutions/projectservices

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