Member Communication Experience

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Modularization

Key Points

Modularization represents a fundamentally different approach to project delivery compared to the Ύ ƶǊŜ ǘǊŀŘƛǘƛƻƴŀƭ ΨǎǘƛŎƪ-built approach to facility design, procurement, and construction.

The principle modularization driver is often schedule.

Leveraged Execution and Procurement (LEAP)

Leveraged Execution and Procurement (LEAP) represents a fundamentally different approach to project delivery than the more traditʎƶyl·f άfʎyŜl·Ǌέ ǎΰʎŎʅ-built approach to facility design, procurement, and construction.

LEAP begins with construction-driven execution thinking. This means the focus is on how the project must be built in order to achieve the strategic business objectives the organization has defined for the program. Increasingly, the principle driver for a LEAP approach is schedule, recognizing the value of time to market or as a strategy to control high construction escalation rates or reduce risk exposure periods. Other drivers, however, are possible. These include transferring activities to lower cost locations or improving the quality of construction by relocating certain work from harsh environmental or poorly trained labor regimes.

Table 1 - LEAP Schedule Drivers
Value of time to market
Control or limit impacts of high construction escalation rates
Reduce risk exposure periods
Transfer work to lower cost locations

The Degree of Modularization and Preassembly Defined

In trying to define the degree of modularization or prefabrication desirable, it is important to keep sight of the strategic business objectives the program seeks to achieve as well as the program drivers that are applicable.

As a real world example, in discussing modularization as a strategy with an owner who had not previously employed it as a delivery strategy and who was unfamiliar with what was possible, a simple question was posed: άLŦ ØŜ Ŏƨdzfŕ Ŧfè è2dzℕ ØK2fŜ LJfI·yű ƛy˝ I·yŕ LJdzű ƛű I·ű űKŜ Ŧƛyl·f ăƛűŜ, Ø2dzfŕ è2dz ŎI·ℕŜKɛ

The magic of computer graphics aside, this is not a likely scenario, at least not yet. There are degrees of prefabrication and modularization possible, however,

Factors to be Considered in the Modularization Decision

As one goes through the process of evaluating what can be modularized and, more importantly, what [illegible] factors must be comprehensively considered. Broadly, the factors to consider in making the decision to modularize and to what degree include:

the various activities when compared to traditional construction approaches are highlighted. Modularization changes the sequence of all project activities.

Table 2 ç Lessons Learned in Modularization

Project Management	Fabrication Yard Management	Procurement/ Logistics	Engineering
Modularization decision should be made at concept selection	Address fab strategy during concept selection	Set up material management by module	Increases engineering effort by approximately 10-20 percent (support details, vibration analysis, emergency shutdown, electrical/controls systems
Modularize/prefab everything possible	Fab strategy should include how to select onboard module fabricator as early as possible	Must be clear on what goes to fab yard, what goes to site	Drives engineering and deliverables to an earlier schedule
Module breaks/turnover system boundaries on early FEED (front end engineering design) deliverables	Should address maximizing pre-commissioning/ commissioning in the fab yard	Which spares go to fab yard, which to site	Engineering must know the transportation details before the start of detail design (barges, transporters)
Interface management is critical	Material control in the ğ		

Stick-Built vs Modularization Cost/Schedule Comparisons

Modularization as part of a leveraged execution and procurement strategy offers great opportunities. Table 3 provides a summary cost comparison between modularization and stick built.

Table 3 ς Module Construction Cost/Schedule Comparison			
Comparative	Stick Built	Modularization	Comparison
Construction Execution Flexibility	Standard	Reduced	Construction execution methodology established early in project.
Work Sequencing	Standard	Increased	Module installation opens up multiple work fronts simultaneously.
Module Testing in Shop	N/A	Increased	Economies of scale for testing program. Shop environment increases productivity.
Effect of Late Changes and/or Rework on Cost/Schedule	Standard	Magnified Impact	Field construction duration reduced. Work completes faster so changes more likely to affect completed work.
Hourly Cost of Labor	Standard	Reduced	Shop labor typically less costly than field (rate plus expenses, plus temp living).
Productivity of Labor	Standard	Increased	Shop labor typically more productive than site.
Number of Field Welds	Standard		

Table 4 ς Modularization Risks
Availability of required facilities (module yard; preassembly)
Availability of transport (transport of construction materials to module yard; transport of modules to final project site)
New labor risks at module yard
New economic risks at module yard location
New political risks at module yard location
Module yard lead times
Reliance on special transport equipment (SPMT (self-propelled modular transporter); RORO, LOLO)
Labor relations at final construction site
Effectiveness and economics of management
Multi-currency regimes and need for hedging
Differential costs of labor and differential labor escalation rates
Modified exposure to tariffs and duties
Changed export and import control regimes
Potential embargoes
Political stability
Expanded cross-cultural challenges

Conclusion

Modularization today is key to meeting major capital program delivery. Increasingly, modularization has grown to be a valued component of large complex project execution strategy. Its utilization and acceptance across a wide range of industries and owners requires that owners and program managers more fully understand

Executive Insight, Location Factors in Large Complex Projects
Executive Insight, Procurement Management in Large Complex Programs
Executive Insight, Coupling in Large Complex Projects
Executive Insight, Strategic Program Management of Giga Projects
Executive Insight, Knowledge Management
Executive Insight, Stakeholder Engagement
Executive Insight, Addressing Emergent Risks
Executive Insight, White Space Risks
Executive Insights, Flows in Large Complex Projects

About the Author

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