Modularization in Total Systems Integration

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Agenda

Overview
  • Understanding Conventional vs. Modular Unitizing & Pre-Assembly
  • Reference Projects

Review of Values and Benefits
  • Schedule
  • Costs
  • ROI/Cash Flow
  • Investment Approach
  • Project Management & Design
  • Fabrication and Manufacture
  • Construction
  • Commissioning & Start-up

Summary Analysis
Conventional vs. Unitizing & Pre-Assembly

Conventional Construction:
- Floor supported wide flange structural mezzanine, local shop fabricated and piece by piece assembled at site. Pipe welded piece by piece at site, painted at site, pipe cleaning at site. All testing at site. Electrical components (tray, disconnects, sensors, etc.) installed piece by piece at site. Conveyance and other equipment assembled piece by piece at site. Many shipments - loose parts.

Unitizing & Pre-Assembly Approach:
- Unique structural design that is 60% of standard structural weight that provides envelope for pipe and electrical headers. Assembled in shop environment to ensure quality, painting and fit-up. Large pieces installs quickly.
Unitizing & Pre-Assembly Construction
Roeslein Highlights

- Experienced in modularization involving design, detailed engineering, fabrication, “Unitizing & Preassembly”, testing, installation, start-up & commissioning.

- System integrator of choice to the largest global can manufacturers including Ball, Can Pack, Crown and Rexam.

- Successfully completed more than 70 major projects including line additions, plant expansions & Greenfield facilities in more than 35 countries with cumulative production capacity of 45 billion.

- Awarded U.S. Trade & Development Agency grant/project in Africa.

- State of Illinois and Missouri Exporter of the Year recognition.
Schedule

• Overall Schedule – Unitizing & Pre-Assembly built while building is under construction – Decouples the Process From the Building Process

• Installation Schedule 16 weeks verses 12 weeks

• FCO – Commissioning 6 to 8 days verses 4 weeks

• Higher start-up efficiencies – More Product – Reduces Project Risks
Cost

- U&P Mezzanine Installed Comparable to Installed Conventional Built System
- Piping and Electrical Installed Relatively Same Cost
- Lower Amount of Construction Man Hours and Supervision at Site
- U&P Requires Higher Shipping Costs (Conventional Requires Shipping Conveyance, Piping, Equipment)
- Lower Cost At Site Due To Less Lost Items, Fit Up Issues, Change Orders, Delay Costs, etc.
- Lower On-Site Housing/ Other Expenses
ROI – Cash Flow

• Faster Recovery Of Capital – Thus Shorten Schedule Improves ROI (Return On Investment)

• Example – In a $50 million capital project near completion of installation typically would involve $40 million capital outlay. Conventional verses Unitized & Pre-assembly difference of 4 weeks is 1 month interest on $40 million – at 6% annual – one month interest is 0.5% of 40 million = $200,000.
ROI – Cash Flow

- Additional product produced with higher start-up curve -
- Overall Project Implementation Matches All Equipment and Service - Thus Project Implementation Aligns With Cash Flow
- More Organized And Quicker Installation And Start-up Assures Equipment Retainers Paid Same Time And Thus Cash Flow Matches Project Start-up.
Value of Engineering

- Feasibility
  - Phase 1: Preliminary Engineering
- Ability to Influence Cost
  - Phase 2: Detailed Engineering, Building Design
  - Phase 3: Equipment Procurement, Prefabrication, Building Construction
- Project Expenditure
  - Phase 4: Installation, FCO, Commissioning, Start-Up

Start | Time | Complete
---|---|---
High | High | Low
Low | Low | High
Value of Engineering

- Phase 1: Preliminary Engineering
- Phase 2: Detailed Engineering, Building Design
- Phase 3: Equipment Procurement, Prefabrication, Building Construction
- Phase 4: Installation, FCO, Commissioning, Start-Up

Graph shows the relationship between Ability to Influence Cost, Feasibility, Project Expenditure, Start, Time, and Complete.
Project Management & Design

- Better Cost and Scope Control
- Better Schedule Management
- Higher OEM & Vendor Coordination
- Quality Assurance Built into Design
- Early Decisions Are Required/Forced Into Layout, Scope and Process.
- Discipline Coordination Assures Higher quality Design
- Better Project Documentation
- Lower Design, Manufacture & Installation Risks
Fabrication & Modularization

- Higher Quality Due to Shop Controlled Fabrication
- U&P Focus on all of the Non-Equipment Pieces of the Puzzle
- Fit Up and Alterations can be Handle in More Efficient Higher Quality Manner – at Lower Cost.
- Fabricate, Unitize, Modularize, Preassemble & Test Complete Systems Prior to Installation.
Construction & Commissioning

- Roeslein Self-Performed Installation Of Modular Systems Assures Best Cost and Risk control on Project
- Shorter More Organized Schedule
- Less Change Orders At Site
- Less Loss Item or Damaged Items
- Lower Amount of Supervision
- Lower Amount of Construction Hours
- Better Safety Due to Smaller Work Force
- Better Cost Risk if Project is Delayed
- Higher Amount of Product in 1st 6 Months
- Lower Amount of OEM Support
- More Efficient Use of Plant Personnel
Summary - Benefits of Unitizing & Preassembly

Safety & Productivity
• Enhanced overall project safety allows for more productive work environment.
• Less site congestion (lifts, equipment, personnel).
• Minimize stacking of trades from the field to a controlled shop.

Schedule
• Substantial reduction in on-site installation schedule & manpower.
• Decouples process installation from building construction and major equipment erection.
• Mitigate weather interruptions and shortage of local skilled labor resources.
• Speed to Market.

Cost
• Minimize change orders and contract growth.
• Controlled shop fabrication reduces field labor.
• Faster recovery of committed capital.
Refinery
C5C6 Splitter project

47 Modules & Off Module Piping
22’x58’x18’
$16MM

2015
Refinery Fuel Gas Skids

2 Modules
12’x19’x12’
$500,000

2015
Refinery
Kerosene Merox Unit
4 Modules & Off Module Piping
Various Dimensions
$2.6MM
2014
Refinery Merox Test Skid
12’x20’x12’
$250,000
2014
Power – Clean Energy
Post Carbon Capture System

7 modules
14’x34.5’x14’
$3.7MM

2013
Sulfuric Acid Plant
SO2 Recovery System

9 Modules
Various Dimensions
$4.7MM

2013