

ECC ENGINEERING MANAGEMENT STRATEGY WORKSHOP

TEAM: A

ISSUE ADDRESSED: Issue 1 – The cost and time required to complete engineering often exceeds the estimate.

SITUATION:

Describe the issue in specific terms, using realistic project scenarios as appropriate.

Quality of FEED is good with a well- defined project basis and associated FEL deliverables. In spite of this, Production Engineering takes too long and costs too much.

COMPLICATION:

Identify the factors that make this issue difficult to resolve.

Interface Management

- Interfaces amongst multiple offices or multiple contractors have a greater impact than expected . . . too easy to be overly optimistic and underestimate the importance of this factor.
- Owner’s desire to meet all the “wishes” of everyone:

Change of Project Team Members – Both owner and contractor. Owner needs to take very seriously that changes in their team members do not drive late changes – important role of Owner PM and those above. Contractors needs to focus on the key positions and manage change to reduce changes

Home Office Staffing – Ramp up not staffed per plan.

Vendor Data – Late and does not support engineering schedule.

Planning / Scheduling – Pressure to deliver without all stakeholder participation.

RESOLUTION:

Develop ideas / approaches that both owners and contractors agree are practical and effective.

Interface Management

- Recognize as a risk that's always under-estimated
- Plan for the worst, expect the best
- Strong communication skills, don't manage the news (bring up issues on a timely basis)
- Owner's desire to meet all the "wishes" (change management) of everyone:
 - + Monthly "Steering Committee" with owner and contractor
 - + Project Objectives and Strategies well-defined / communicated
 - + Change criteria threshold well-defined / communicated / stewarded
 - + PM needs to be willing to say NO

Change of Project Team Members

- Penalty to Contractor for premature demob of named personnel in contract
- Are there complimentary skills between owner and contractor
- Team dynamics, one reason to force a change is to fix a problem

Home Office Staffing

- Are you relationship based or transactional based?
- Sense of urgency at the inception of production engineering
- Has a realistic engineering schedule been developed?
- Proactively steward schedule (recovery very difficult)

Vendor Data

- Frequently late
- Define early requirements (e.g. nozzle locations, weight, anchor bolt pattern, etc.)
- Proactively steward exception reports (Vendor late to contractor, contractor late to Vendor)

Planning / Scheduling

- Establish schedule expectations early
- Pressure to develop schedule prematurely
- Lacking skill set in Planning / Scheduling

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TEAM: D

ISSUE ADDRESSED:

#1: The Cost and Time required to complete engineering often exceeds the estimate.

SITUATION:

Due to Cost and Time in engineering/procurement creates a “rolling wave” effect on cost increases and time delays to construction.

Exceeding time is greater than exceeding the Cost. Project’s ability to maintain multiple phased handover of engineering deliverables is key.

Quality of development of initial plan: Using good data, quality of resources

Quality of ongoing updates and communication of changes to the plan

COMPLICATION:

Developing an Initial Plan

- 1) Contractor Construction Experience: Path of construction sequencing and scheduling
- 2) Vendor data and procurement deliverable dates
- 3) Owner delay in issuing of Engineering Contract with no change in project end date.
- 4) Owner delay due to incremental and timing of funding
- 5) Clear understanding of MoC between Owner and Contractor

Updating the plan

Developing a better Initial Plan

- 1) Modern Technology - when not used by the right resources
- 2) Holding Model reviews when project is not ready – Progress not accurately represented
- 3) Great Crew Change – Good Leaders to stop the steamroller
- 4) Managing Change

RESOLUTION:

Developing a better Initial Plan

- 1) Right personalities & resources
- 2) Needs to manage risk and cost/schedule probability to manage expectations
- 3) Owner needs to have an active market research
- 4) Better Statistical Data collection and use of that data for key areas
- 5) Proper Level of 3D Model, Tracking, and Progress measurement - Industry Standardization/Guideline
- 6) Schedule: Develop higher quality schedules “more logic”. Early involvement of Construction and Constructability Program

7) Integrated Schedule and Control Plan with Owner, Contractor, and Vendors

Updating the Plan

- 1) Better Communication - Don't let the teams know when time is up they have an additional 15 minutes. Could have developed a better plan
- 2) Need communicate to transfer Schedule Plan to the execution teams
- 3) Keep to the fundamentals and basics - 10% Technology – 90% Sociology

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TEAM: B

ISSUE ADDRESSED: #4 MOC Processes are Ineffective

SITUATION:

scope definition & alignment. When does it go from scope definition to a change? Should be set at FEL 2. Erosion of gate process – pressure for fast execution from owner.

Limited communication to contractor. Inexperienced PMs and Controls do not forecast ripple effect of change. Costs due to large team waiting on decisions.

Owner not informed in a timely manner of changes that affect cost. This is driving increasing costs of Controls systems to predict variances.

Owners less clear on upfront scope. Used to do front end work themselves and give finished plan to contractor. Front end loading now more the responsibility of the contractor.

Business pressure to achieve financial expectations quickly.

COMPLICATION:

Owner preference versus spec. Late input/review from owner stakeholder subject matter “experts” that change basic design due to owner preference.

No common understanding of phase gate deliverables between owners and contractors.

Many Project managers tend to avoid confrontation and be overly optimistic

RESOLUTION:

Approval of management of change process as a part of the contract

Use of risk register to identify risks related to project changes throughout life of project

Use Management of change on business objectives

Ability to force late changes to be delayed to future projects

Management of personnel change during life of project. On-boarding process.

ECC ENGINEERING MANAGEMENT STRATEGY WORKSHOP

TEAM: Table C

ISSUE ADDRESSED: #1: The cost and time required to complete engineering often exceeds the estimate

SITUATION:

The time and effort to complete engineering work, with the starting point of the Appropriation Estimate and ending with handover of the Facility for Major Capital Projects (\$100MM and above), frequently greatly exceed the cost and time for these activities included in the Estimate.

The impacts of this situation impact far exceed just the increased cost/time for the engineering effort, but are amplified in procurement, fabrication and construction.

COMPLICATIONS:

The great crew change: incoming engineering resources for both Owner and Contractor teams lack the practical experience to understand what good engineering definition and appropriate engineering cost and schedule look like.

Different market segments contract Engineering work differently. For example, a typical upstream/offshore project contracts separately for Engineering, Procurement, Fabrication and Installation whereas a downstream chemicals/refinery project contracts for E, P and C in a single contract. This puts schedule integration and alignment responsibility more on the Owner.

Compressed schedules are increasingly being demanded by owners, based on faster time-to-market or capital efficiency, the risks for which are not often fully understood or acknowledged by either the owner or contractor.

Understanding of risk and risk ranges is based on history, which often is not reflective of today's reality.

Large growth of action items from safety studies (HAZOPs, human factors studies, etc.), each of which are taking increasingly longer to resolve.

Current practices to know (from data) when your engineering budget/schedule are under threat often only start telling you something useful at 50% complete. Most early warning indicators rely on observations of experienced project folks, rather than hard data.

RESOLUTION:

Some best practices from Contractors' perspective:

1. Engage all execution contractors in an up-front workshop to understand the feasibility of the proposed schedule and to use the collective wisdom of the execution contractors to refine

plans. Results in greater alignment between Owners and Contractors and better understanding in schedule drivers and project values/tradeoffs.

2. Owners need to get current market information from contractors and suppliers in order to develop realistic project schedules.
3. Contractors similarly need to use current and realistic market conditions (equipment lead times, fab yard productivities, etc.) to develop their schedules which in some cases form the basis for the overall project's schedule.

Invest significant time in having frequent, high-quality risk discussions, inclusive both owner and contractors. Active engagement in discussing risk throughout the life of the project is very helpful to driving early identification and mitigation of large cost/schedule deviations. Conduct these at both project-team and executive (steering team) levels.

Ensure common and early understanding and alignment on project drivers—not just between owners and contractors, but also across the different owner stakeholder groups (e.g. business, operations, maintenance, etc.).

Purposefully develop the skills needed to manage engineering (administration, budgeting, scheduling and discipline coordination). These are often NOT built through traditional discipline engineering roles.

Need to have broader industry conversation about what “realistic” cost/schedule really means and how it's achieved. The more tangible and broadly supported in industry “realistic” benchmarks are, the more likely they can be effectively used and accepted by decision makers.