CONQUERING THE SUMMIT
ASPIRING TO FLAWLESS PROJECT DELIVERY

45TH E CC CONFERENCE
2013

engineering and construction contracting association
This is NOT where you want to find your valve handle...
Project Engineering – Safety Moment

...especially when it came from HERE!
Project Engineering – Safety Moment

...from this high!

- Scott Brandenburg – BASF – Owner
- Bob Reymond – Burns & McDonnell – Engineer
- Willie Lefever – Performance Contractors – Constructor
- Matt Wilson – Mitsubishi Polysilicon - Moderator
Scott Brandenburg
Vice President Engineering and Maintenance
BASF Corporation
Scott’s Background

- 25+ years experience
- Engineering and Maintenance
- US and Europe
- Executed projects with 8 different Engineering companies
- Contracts: LSTK, EPC, EP, E, Reimbursable
- 4 Joint Ventures
- Types: Environmental driven, Emergency rebuild, New Technologies, Turnarounds, Grassroots Ethylene Complex
What contributes to an “Unsuccessful Project”? And how I lived through it.

- Too much turnover on Project Team (Owner, Engineer, Constructor). Loss of knowledge setbacks occur.
- Too much cut and paste engineering delays attention to design issues until HAZOP unearths them.
- Size of job- if not staffed properly causes delays and quality issues especially if Contractor over-focuses on cost.
- Late deliverables by Owner or Engineer impact Construction contractor, causes misalignment.
- Large project=large risk, without good Project Engineering can lead to short sighted decision making.
Unsuccessful Projects (continued)

- Lack of understanding between Contractor and Owner regarding HAZOP and Pre-startup Safety review by EPC contract

- Contractor uses “blackbox” approach for package units

- Contract revisions and incentives not used early enough to address potential delays and responsibilities late in the project

- Operations/Maintenance input ignored

- Turnover packages/responsibilities between Construction and Commissioning and Operations is not well defined.
Bob Reymond
Vice President, Projects
Burns & McDonnell
Bob Reymond
Vice President, Projects
Burns & McDonnell
Bob’s Background

- 25+ Years Experience
- 17 Yr Engineering Firms / 3 Yr Owner
- Mostly EPC / Some engineering only
- International and Domestic
- Power, Nuclear, Petrochemical, Foods
- Most projects $100MM - $500MM
- Largest project $2 Billion
Engineering a “Successful Project”

• Owner project objectives well defined
• Alignment of goals
• Good scope definition; discipline
• Safety & Constructability considered early
• Disciplined planning process
• Realistic schedule expectations
• Design effort correlates to project size & complexity
Engineering into Crisis

- Significant external change
- Vendor information
- Engineer staffing
- Project Schedule
Engineering Quality vs. Schedule

- Unacceptable Compression
- Acceptable Schedule
- Inefficient Schedule

- Rework
- Change
- Inefficiency

Schedule Length
Willie’s Background

• 35 years experience
• Primarily US construction, (1) international
• 10+ EPC or EPCM projects
• Contracts: LSTK, CPFF
• Power, Refining, Petrochemical, Upstream
• Types: Grassroots, Expansion, Environmental, Retrofit
• Technology led- vendor/contractor partnering
Willie’s Project Example(s)

“Successful Project”

- Lump Sum EPC - $50+MM
- Proven process technology (reference plant basis)
- Clear project objectives
- Contract strategy alignment
- Defined Project Risk - all parties
- Clear roles and responsibilities (all contracting parties)
Willie’s Project Example(s)

“Not So Good” Project

• Lump Sum EPC - $50+MM

• Technology and Schedule driven project

• Inexperienced technology provider in EPC project lead role

• EPC Contractor prime : construction subcontractor relationship

• Incomplete scope definition

• Segregated EP and C schedule
Willie’s Project Example(s)

“Successful Project”

- Cost savings
- Ahead of schedule
- Client achieved business objectives

“Not So Good” Project

- Front end engineering & procurement delays
- Scope creep/quantity growth
- Construction schedule compression/excess costs
Questions?

• Fill out an index card
• Text – 251-377-4495
Cost of Project Engineering and Impacts on Project?

Our project is:

• Process Industry
• $200M
• Green field
• Technology provided and not cutting edge
• 5 Full Time owner’s engineers for PM and support
• Project is EPC
• Permits done by owner
Cost of Project Engineering?

How much for Project Engineering?

- PE reduces costs.
- Last cost item to look at.
- Who cares?
- Somebody cares.
How much for Project Engineering?

Answer:

• Front end? 1-2%

• Detailed design? 8 – 12%

• Construction Management? 6 – 8%

• Start up assistance? 1-2%

• Documentation and Clean up? Included above.
Project Engineering
Over / Under

• How does it happen?
• What are the consequences?
  ➢ Cost
  ➢ Schedule
  ➢ Quality
• How do you get it just right?
The Experts Say:

CAUSES

• Underestimation.
• Lack of definition.
• Engineering costs become significant.
• Schedule delays, costs increase, ripples through entire project.

SOLUTIONS

• Plan to get it right.
• Experience in all the right places.
• Get construction involved early.
• Fill out an index card
• Text – 251-377-4495
How does project engineering minimize the impact of an ever evolving design?

How do you know when to kill the engineer, finish construction and start up?

Is this the sole responsibility of the Owner?
Famous Sayings

- Discipline, discipline, discipline.
- Learn when to FREEZE! Live with it.
- Engineers abhor a vacuum. An engineer will fill the schedule.
- Rods up, pencils down.
- Accountability: Project manager, owner. Hold engineers accountable to schedule.
- Could be EPC contractor depending on contracts.
Project Controls

• Definition of Project Controls – Part of the project team dedicated to making sure we do what we’re supposed to do.

• Why is this needed?

• Is it a good thing?

• How to determine if it is worth the cost?

• Keys to execution
We all agree!

- Absolutely necessary.
- Can’t manage project by “feel”?
- Cost should be minimal.
- Focuses on forecasts, not the past.
- Early warning system.
- Develop the correct project metrics and monitor religiously.
Questions?

• Fill out an index card

• Text – 251-377-4495
Project Engineering is the key component to a successful project. How do we make sure each participant understands and accepts the appropriate risk?

When is the appropriate time to have clear understanding? Why can’t we get it done at the beginning?

How can we stay out of court?

Ultimately – Is the owner responsible?

RISK is not just a Board Game.
Risky Business

- Clear and concise and proven contract language.
- Address risk and problems immediately, DO NOT WAIT!
- Agree on Project Risk Matrix.
- He who controls risk should take responsibility.
- Anna Karenina Project Model

- Owner should allocate risk contractually.
- Some risks only the Owner can have.
- Owner has to live with it.
One trend among owners is to have third party oversight of the Engineer and/or Constructor.

- Why is this needed?
- Is it a good thing?
- How to determine if it is worth the cost?
- Keys to execution
Survey says!

- Inexperienced Owner
- Limited resources available.
- Roles defined and communicated
- Danger of competing agendas
- Adds cost and redundancy
- Owner has to evaluate his/her Project toolbox
How can Project Engineering influence:

- Construction?
- Operations?
Safety Pays:

- Design for construction techniques and risk
- Constructability reviews
- Include construction and operations in all safety reviews
- Detailed planning on sequence of construction
- Project Engineering need to insure mindset
Third Party Technology Providers

- How do you integrate a third party technology provider into the project team?
  - Owner?
  - Engineer?
  - Constructor?
- How do you handle the risk?
Get it straight up front

- Contractual synergy – all parties
- Assigning risk adds cost
- Define responsibilities and deliverables
- Performance guarantees
Communications

What is the biggest hindrance to communications:

• Owner to Engineer?
• Engineer to Constructor?
• Owner to Constructor?

Then how to improve?
Get Personal:

- Owner be full time present.
- Talk, don’t email.
- Get goals aligned and check often.
- Meet face to face.
- Then talk some more.
What is the Future? Is the Future Now?

Project engineering becomes more critical?

• Craft labor shortage/ skill deterioration?
• Professional labor shortage?
• Modularization in all its forms
Matt says:

- Blatant advertisement – Go to the forums on this stuff.
- Send in evaluations