Skidded Process Equipment – Installation, Startup and Commissioning

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Installation Challenges

Dimensions:
- Footprint, Height
- Maintenance access
- Movement into building
- Movement through building

Weight limitations
Shipping Damage

Timing:
- Skids often placed early during construction – contingency planning
Installation Challenges (cont.)

Protection during construction

Interconnecting Piping:
• Interfaces – line up/sloping
• Walkdown before installing drywalls

Business interruption:
• Temporary egress
• Cleanroom: Tenting
• Utility tie-ins

Startup Challenges

Safety:
• The first time you turn it on
• Plan & contain danger
• Is everything wired?
• Protect your testing equipment
• Do you have spare rupture discs?
Startup Challenges

Vendor Support:
• Plan + use support wisely
• Leverage knowledge
• Turnover and Punchlist

SME: Startup and initial tuning

Commissioning

Test plan:
• Mechanical
• Utility Verification
• Control System Hardware / Calibration
• Software Testing
• Coverage Testing
• Spare Parts
• TOP Completion
Superskids
Design Support and Commissioning on site:
• Fast changes
• FAT → IQ/parts of OQ
• Wet Testing / startup
• TOP review / completion

ASTM-E2500: Speed & Focus
SME Leads the effort
Risk assessments:
• Focus on the critical attributes
• Take risk and budget for contingencies
Verification:
• Leverage FAT → partner with vendor
• Supplement with Client testing
TOP’s:
• Review during FAT
• Electronic
Contact Info

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“Talking Shop”
Round Table Discussion on Skid Based Process Equipment

Design & Engineering:
Ray Foley - Parsons

Technology Transfer – Understanding Clients needs or URS

• URS (user requirement specification) is a key element in skid design but is quite often not available
• A detailed technology transfer is necessary
• Make sure both engineer and the client understand what the parameters are.
• Basis of Design
• Size constraints
• Accessibility
• Cleaning requirements (CIP)
• Steaming requirements (SIP)
• Automation
• Location – Clean room, Grey Space, Utility Room, Outside
Engineering Documentation

- Process Flow Diagram (PFD)
- Specifications
- Piping and Instrument Diagram (P&ID)
- 3D Model
- Equipment Arrangement
- Piping GA

- Extremely important to have a well defined P&ID

Design Steps

- Feasibility
- Conceptual
- Preliminary
- Detail
- CA (construction administration)
- Start-up and Commissioning

- Keep an open mind about new innovations, equipment, components and technology. They are being improved upon continuously
Use a Control drawing when specify equipment

Spatial Requirements

- Installation
- Operability
- Maintenance
- Cleanable
- Insulation
Use Design tools to help alleviate field problems

Utilities

Know the utility requirements

- Power
- Steam
- Water (USP, WFI)
- Gases
- Waste (drainage)
Design Tools

Proper use of design tools helps eliminate surprises in the field.

Lets the operator know how they will be able to access their equipment.
ISPE Talking Shop
Skid Based Process Equipment
Part 2: Equipment Buy Out, Contracts, Etc.

Date: 21 April 2011

RJ MacLean
Project Engineering, Biogen Idec

Agenda, Part 2

• Introduction, a view from each side of fence
• Owner vs. Skid Vendor
• Buy out of the equipment
• Terms and conditions
• Fabrication & Factory visits/FATs
• Wrap up
Introduction
Owner and skid vendor are different

• Vastly different, but complimentary skill sets
• Operate in different competitive environments
• Owner: primarily internally focused
• Skid Vendor: primarily externally focused
• Project time horizons are not the same

Both sides must recognize the strengths and weaknesses of the other.

These are very different firms!
Owner vs. Skid Vendor

Owner’s Priorities:
1. Cost Certainty
2. Schedule Certainty
3. Quality
4. Efficient Delivery

Skid Vendor Priorities:
1. Understand scope
2. Manage demand
3. Owner: stay out of the way
4. Minimal changes

Owner vs. Skid Vendor
• Understand what each other need to succeed
• Trust is critical
• Once broken, it will be a long project
Owner vs. Skid Vendor
Owners Remember This:
1. The skid biz is not easy
2. If it were so easy then do it yourself
3. Don’t play “where’s waldo” with specs
   • If something is important, highlight it
   • Avoid a late spec dump
4. Unwritten specs
   • The OEM can not read your mind
5. Stay out of the OEM workflow
   • Docs: Don’t ask for what you don’t need
   • Tags: Don’t change them!

Owner vs. Skid Vendor
Skid Vendors Remember This:
1. Life on the inside is complex
2. Don’t be high maintenance
   • Figure out ways to save the owner time
   • Time is the owner’s enemy, don’t waste it
3. The “project” has barely begun when the skid arrives at the owner’s dock
4. The owner wants to “forget about you”
   • The owner does not have enough time/internal resources—be efficient with comms
   • Be reliable, meet your schedule commitments
   • Own the schedule: DRIVE THE OWNER
Buy Out—Owner Initial Considerations
1. Trust
   • Leverage relationships
2. Keep vendor base small but active
   • Why re-train if you don’t have to?
   • Reuse existing contracts
3. Local is best
   • Time, not cost is key
4. Don’t send out an RFP to a firm that you don’t intend to use

Buy Out—Vendor Initial Considerations
1. Trust
   • Leverage relationships
2. Recognize that the owner must operate and quote in a competitive environment
3. Don’t promise what can’t be done
4. If you can’t work with a firm don’t bid
5. If something doesn’t sound right in the RFP, it likely is not. Get it clarified.
T’s & C’s
1. The contract template should be part of the RFP
   • Vendor: This is your time to comment and edit. Not later.

2. Define milestone payments
   • What is a 30% review
   • What is an “approved general arrangement”?
   • Owner: Promptly pay.
   • Vendor: Don’t be stupid with invoices

T’s & C’s (cont.)
3. Change orders
   • How will a change be executed if a contract is in place?
   • Owner: Recognize the OEM cost structure
   • Vendor: Owner needs prompt cost certainty
   • Both: The C/O process is the most likely place to break trust.

4. Penalties and Incentives
   • Owner: Use with caution
   • Vendor: Insist on incentives if owner insists on penalties
Fabrication and FATs
1. Owner: Consider multiple in process inspections
   • Avoid surprises
   • 3rd party—tell the vendor in advance
2. Both: Who is responsible for the FAT doc?
3. Both: How to staff the FAT?
4. Spray ball testing should be done at vessel vendor, not the OEM shop
5. Owner: Short FAT protocols are best
   • Less is more. Get in and get out.
   • What can be leveraged down the road in C&V?
6. Don’t waste time simulating DCS operations without a DCS
   • Local I/O and loop checks go a long way
7. Get wet

Wrap Up
1. Understand each other’s priorities
2. Build and maintain trust
3. Both: Look for return business
4. Time is the enemy for the owner
5. Scope control and understanding of scope is key for the vendor