

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.)

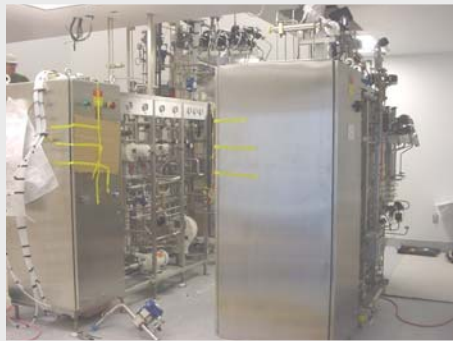
Protection during construction

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**

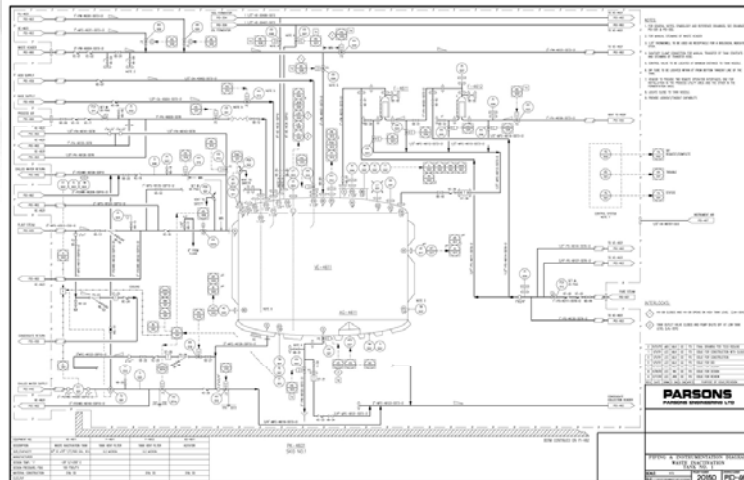
Technology Transfer – Understanding Clients needs or URS

- 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

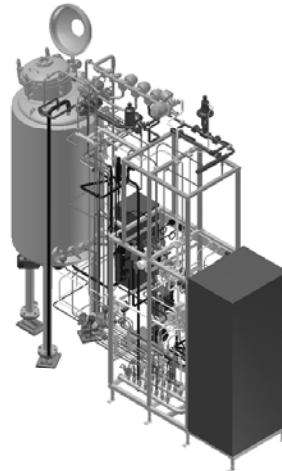


- Extremely important to have a well defined P&ID



Design Steps

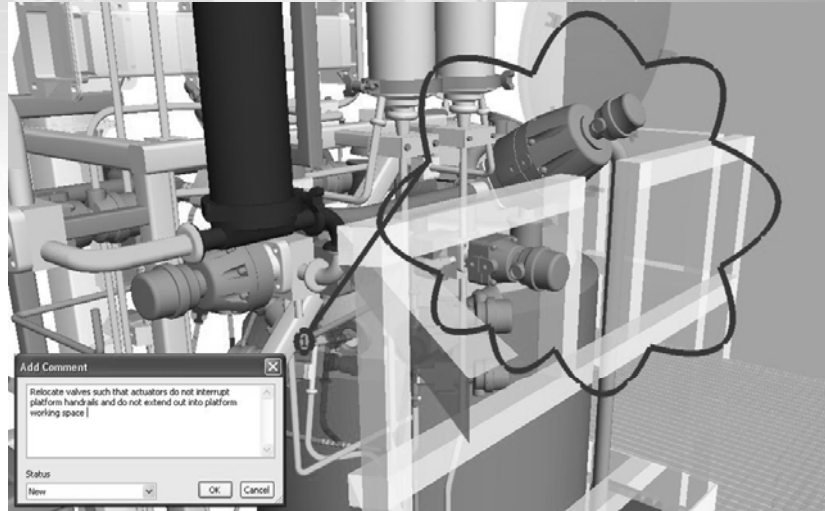
- Feasibility
- Conceptual
- Preliminary
- Detail
- CA
(construction administration)
- Start-up and Commissioning



- Keep an open mind about new innovations, equipment, components and technology. They are being improved upon continuously



Use Design tools to help alleviate field problems



Utilities

Know the utility requirements

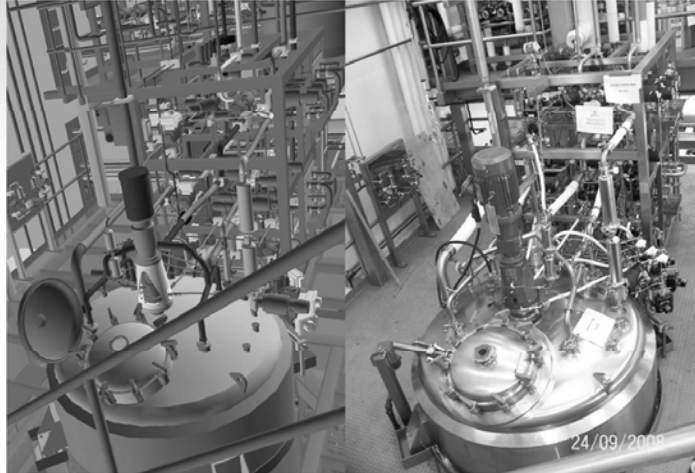
- Power
- Steam
- Water (USP, WFI)
- Gases
- Waste (drainage)



Design Tools

Proper use of design tools helps eliminates 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

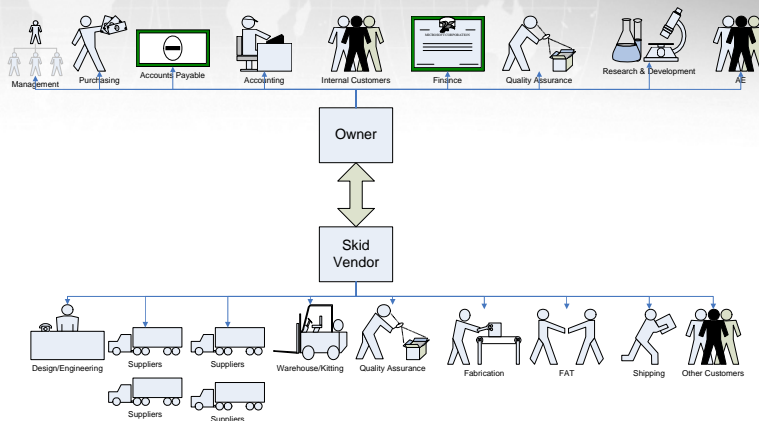
Owner and skid vendor are different

- 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

