MODULAR (PACKAGED) UTILITY SYSTEMS

Faster – Better - Cheaper

Paul Hartmeister
Energy Sustainment Manager

DoE Better Buildings Summit
July 10, 2019
OPPORTUNITY-DRIVEN CHANGE AT GM

New programs required major utility upgrades at 3 plants:
• Process design significantly trailing building engineering
• New chiller and process tower water systems
  > 18000 tons of chiller + tower cooling
• All systems the same … but all different, 4500 -7500 t/site
• Varied capacities, heads, site interfaces, climates
• One GC, one A/E, but three PMs and site teams
  • Normal processes would drive 3 designs

Choices
• Do it the same way as always
• Do it a new way for a better outcome
• A few chose to pursue a new way …
  … (that takes a lot of push!)
• Packaged supplier approach chosen
WHAT IS A PACKAGED SYSTEM? JUST OFFSITE FAB?

Offsite Fabrication
• A/E designed - burden on A/E for shop details
• Fabricated to the A/E design - Owner still owns design issues
• Shop fabricated but …
  • Core stick built issues remain

Packaged Systems – More than offsite fabrication
• Owner-A/E specified for performance and content only
• Specialist system provider engineers to spec
  • Use packager’s experience base
  • Shortened schedule
  • Compacted layouts
• UL/ETL listed appliance
  • NOT real property
WHAT DOES THAT PROCESS LOOK LIKE?

**Proposal Model**
5 x 1500 T chillers
2 X 1500 T weld water systems
(3 future chillers also shown)

**Build Model**
5 x 1500 T chillers
2 X 1500 T weld systems
Compact – Easy to maintain
Basis for other sites
Expands to 12000 T w/no down time
Drawings done for future maximum
BUILD SEQUENCE - SYSTEM 1 OF 3

14 x 42' x 90k lbs.
maximum module size
7500 tons +

GENERAL MOTORS
ELAPSED FIELD TIME – 2 ½ WEEKS

Ordered October 2015
On site July 18, 2016
Start up (potential) September 1, 2016, (actual) March 2017

GENERAL MOTORS
ONE PLAN - THREE PLANTS

Fort Wayne Body/Paint (base build)

Arlington Body (w/future)

Flint Body (w/future)

Flint & Arlington are opposite 2/3s of FWA!
CHANGE IS HARD ... EXPECT PUSHBACK

Expect active and passive initial opposition from:
• Conventional A/E (reduced scope and control)
• General contractor (perceived risk from change)
• Teamed mechanical and electrical subcontractors (reduced scope)
• 3 out of 4 project managers (it’s different!)
• 4 out of 5 project engineers (hey, this is different)

Expect support from:
• 1 Construction group manager
• 1 Project manager

Why?
• Upsets traditional lines of supply
• Upsets traditional lines of control
• New (and frightening)

Beware of gravity
• Every traditionalist will pull back at every opening – never slip
• Prevent backsliding into detailed interference into the packager’s work
LESSONS LEARNED

Packaged utility supply can be faster IF you develop your supply base
• Shorten total project schedule by 6-10 months
• Reduce A/E time and hours dramatically
• Reduce typical field schedule from 18 months to 6-10 weeks

Packaged system supply can be cheaper
• Reduce A/E & owner staff time and hours by 80%
• Reduce field labor and duration by at least 80%
• Overall cost reduction of 20% readily achievable ($1200-1300/t installed)
• Future systems accumulate savings … keep the team together