Module Assembly Best Practice
Lower your total installed cost

COAA Best Practices Conference XXIII
May 13, 2015
Today’s Agenda

- 12:45 - 1:30 Overview of Module Assembly Best Practice work to date
- 1:30 - 1:50 Break into working groups, discuss topics
- 1:50 - 2:05 Table presenters provide feedback to larger group
- 2:05 - 2:15 Summary & Path Forward
- 2:15 Wrap-up
Introduction

- **Vision:** To make optimum use of the already strong Alberta fabrication capabilities to deliver globally competitive modules.
- **Goal:** Establish and implement an industry accepted Modular Best Practice to improve Total Installed cost, Scheduling, Quality, Transportation and Safety.
Introduction

- **Committee Chairs**
  - Greg Prinsen, Williams Energy
  - Gary Trigg, PCL Industrial Management Inc.

- **Committee Members**
  - Dr. Simaan Abourizk, UofA
  - Patricia Armitage, Govt of Alberta
  - Martin Clutterbuck, Devon Energy
  - Jason Collins, Collins Industries
  - Kevin Guile, Supreme Modular
  - Gavin Kerr, Mammoet
  - Ken McAlpine, Suncor Major Projects
  - Rae-Ann McMullen, PCL Industrial Management
  - Michael Powell, Enterprise Edmonton
  - Darren Starchuk, Enerflex
  - Brian Skeoch, Bemac Construction Corp
  - Ross Turner, Fluor Canada Ltd.
  - Karen Ulmer, PCL Industrial Constructors Inc.
Module Assembly Elements

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Module Assembly Best Practices Sub-Committee is developing a “Principled base Framework” with the intent that it:

- provides guidance for proper planning and execution
- is adaptable and non-prescriptive
- is scalable to fit the needs of various project sizes
- allows contracting flexibility
- recognizes that organizations within the contracting supply chain have their own specific strengths, weaknesses and risk profiles
- put ownership at the front end with the decision maker, early involvement in planning
Principles vs Best Practices - what’s the difference?

▸ Principle:
“*A fundamental truth; a comprehensive law or doctrine, from which others are derived, or on which other are founded; a governing law of conduct*” - Definitions.net

▸ Best Practice:
“*Commercial or professional procedures that are accepted or prescribed as being correct or most effective.*” - Oxford Dictionary
Principles vs Best Practices - Modularization

- **Principle (industry applicable):**
  
  5.3 All required materials delivered to fabricator prior to start of fabrication

- **Best Practice (project specific):**
  
  **Example:**
  
  - Materials arriving from local suppliers are required to arrive a minimum of 7 days prior to the start of fabrication.
  
  - Materials arriving from international suppliers are required to arrive a minimum of 30 days prior to the start of fabrication.
Focus on 1-2-3 Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Work Packaging
Principles & Practices

1) Design
2) Procurement
3) Contracting
4) **Work packaging**
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Work Packaging
Principles & Practices

4.0 Work Packaging

4.1 Deliverables from buyer to modular supplier

4.2 Work package elements

4.3 No changes

4.4 Scope repetition if possible

4.5 Recommended scope review
Focus on Fabrication Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Fabrication Principles & Practices

5.0 Fabrication

5.1 Complete IFC drawings required

5.2 Engage fabricator at earliest stage of engineering design

5.3 All required materials delivered to fabricator prior to start of fabrication

5.4 Fabrication to include all required components to avoid design at modular fabrication level (i.e., support for misc piping, electrical, etc.)

5.5 Maximize pre-assembly for modular erection efficiency
Focus on Module Assembly Principles & Practices

1) Design
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6) Module assembly
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10) Completion
Focus on Module Assembly
Principles & Practices

6.0 Module Assembly

6.1 MIWP requirements are agreed by stakeholders in advance of module assembly

6.2 Issued for construction design model, drawing and cut sheets are available to module contractor

6.3 Design is complete before assembly commences

6.4 Module assembly materials are shipped with one module per load

6.5 Module assembly contractor is engaged as a stakeholder in the engineering, procurement and construction schedule - integrated project schedule

6.6 Module contractor utilizes work face planning and lean manufacturing principles

6.7 Materials are shipped on time

6.8 QC/QA requirements are defined up front by stakeholders

6.9 Module yard infrastructure supports project goals
Focus on Lifting & Shipping Preparation Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Lifting & Shipping Preparation
Principles & Practices

7.0 Lifting & Shipping Preparation

7.1 Lifting

- Standardize the lift points & bay spacing
- Minimize the number of lift points
- Modules with unequal lift lug elevations
- Lift lugs cannot fit shackles
Focus on Lifting & Shipping Preparation Principles & Practices

7.0 Lifting & Shipping Preparation

7.1 Shipping Preparation

- Width & height control
- Weight certainty & control
- Shipping season/construction schedule
- Lashing & tie-downs
Focus on Transportation & Receiving Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
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8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Transportation & Receiving Principles & Practices

8.0 Transport and Receiving

8.1 Transport

- Integrated transport beam
- Build on shipping beams
- Self-load/offload versus hoisting
- Leave temp steel as permanent
Focus on Transportation & Receiving (Offload) Principles & Practices

8.0 Transport and Receiving

8.2 Receiving

- Straight to hook (just-in-time)
- On-site laydown area
- Straight to piles
Focus on Module Installation Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
5) Fabrication
6) Module assembly
7) Lifting & shipping preparation
8) Transportation & receiving (offload)
9) Module installation
10) Completion
Focus on Module Installation
Principles & Practices

9.0 Module Installation

9.1 Reduce work at heights
9.2 Early involvement of module installer
9.3 Bolted construction of interconnects
9.4 Preassemble at site
9.5 Include construction supports
9.6 Plan for site conditions
Focus on Completion Principles & Practices

1) Design
2) Procurement
3) Contracting
4) Work packaging
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6) Module assembly
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10) Completion
Summary

- **Goal**: Establish and implement an industry accepted Modular Best Practice to improve Total Installed cost, Scheduling, Quality, Transportation and Safety.

- Provided **brief overview** of modular best practice work to date

- **Prescriptive**: needs to be tailored to your project

- **Modular best practice**: part of project execution plan

- **Great committee**: broad cross section representing all aspects of industry
Table Discussion: looking for feedback

- How will the principle based framework accomplish COAAs vision of twice as safe and twice as productive by 2020?

- Will this document benefit your business? If so, how or how not?

- Are the 10 best practice areas representative of the requirements for a module assembly best practice? Are there any areas missing?
Next Steps

- Draft document available on COAA website in June 2015
- Document completion
- Continued improvement
- Encourage industry feedback and additions
- Framework for your business

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