

# INTRODUCTION



- ▶ Rick Stumph
- ▶ Graduated with a Degree in Construction Management from Central Washington University
- ▶ 20 years of experience in mostly Industrial Construction (Capital, Turnarounds and Maintenance)
- ▶ Currently a Vice President at InServ

# LESSONS LEARNED FROM MODULE CONSTRUCTION

Goal:

Share stories of My Experience with Module Construction.

Discuss Lessons I have learned

Help inspire deeper thought into planning a project with module construction.




# WHAT IS MODULAR CONSTRUCTION



- ▶ Modular construction is an off-site building method where a structure is built in separate sections, or "modules," in a factory before being transported to the site for final assembly.



# THE ADVANTAGES OF A MODULE

- ▶ Construction in a controlled environment(Safety, Quality, Productivity)
  - ▶ Minimize Field Labor
  - ▶ Improve Project Schedules
  - ▶ Cost Savings
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# LESSON LEARNED #1

## 50% MOD/ 50% FIELD INSTALL

- ▶ Sulfur Recovery Unit
  - ▶ Modules fabricated in Southwest Washinton
  - ▶ Installed in Northwest Washington




# SRU LESSONS LEARNED

- ▶ Material and equipment Deliveries to Fabrication shop.
- ▶ Over the road shipping sizes
- ▶ Project Schedule
- ▶ Maintainability/housekeeping



# LESSON LEARNED #2


## 25% MOD / 75% FIELD INSTALL

- ▶ Modular Hydrogen Reformer
    - ▶ Modules Fabricated out of State
    - ▶ Designed for the base of the module to be cast into the concrete
    - ▶ Mostly Pipe rack modules with smaller equipment installed.
    - ▶ Larger equipment to be installed separately.
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# HYDROGEN REFORMER LESSONS LEARNED PAGE 1

- ▶ Very congested for field install
  - ▶ Interconnecting pipe was to be welded in the field.
  - ▶ Access to these welds was limited causing a lot of damage to the insulation and sensitive components.
- ▶ Maintainability
  - ▶ Casting into the slab was very good for house keeping
  - ▶ Access to maintain equipment and overhead room suffered

# HYDROGEN REFORMER LESSONS LEARNED PAGE 2


- ▶ Adherence to standard plant specifications
    - ▶ Need buy in from final on site acceptance authority
    - ▶ Have fabrication facility inspection planned into the process.
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# HEATER MODULE 90% MODULAR / 10% FIELD

- ▶ New Coker Heater
  - ▶ Heater fabricated overseas in Thailand
  - ▶ Shipped to the US
  - ▶ Offloaded and Transported to the Facility
  - ▶ Heater was modularized and the balance of plant was traditional field construction



# HEATER MODULE LESSONS LEARNED PAGE 1

- ▶ Bigger the better
    - ▶ Large Mods = Less Field Labor
    - ▶ If you are going to build them larger than legal loads you may as well maximize size
  - ▶ Good communication with fabricator
    - ▶ Compliance with Site Standards = Less rework
    - ▶ Fabrication facility visits
    - ▶ Schedule for delivery
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# HEATER MODULE LESSONS LEARNED PAGE 2


- ▶ Constructability
    - ▶ Include the contractors field installation supervision
    - ▶ Pre fit accessories (Ladders and Platforms, module connections,
    - ▶ Photos
    - ▶ Templates
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# FOOD AND BEVERAGE MODULAR PIPE RACKS




- ▶ New food processing facility in AZ
  - ▶ Indoor facility
  - ▶ All stainless-steel structures to food and beverage standards
  - ▶ Limited locations to bring materials into the building
  - ▶ Tight working conditions (head room)
  - ▶ Fast track construction engineering to construction

# FOOD AND BEVERAGE MODULAR PIPE RACKS LESSONS LEARNED

- ▶ EPC Contractor supplied steel. No time for constructability reviews with contractor.
  - ▶ Modules would not fit down the road or through the doors to the building. The modules ended up being fabricated on site in the building and erected in place.
  - ▶ The work was estimated as modular but was not executed as modules because of time constraints.
  - ▶ Slab sloping not accounted for in modules.
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# WHY ARE WE CHOOSING MODULAR CONSTRUCTION

- ▶ What is the goal you are trying to achieve when considering a modular project.
    - ▶ Saving Money
    - ▶ Saving Time (Is this a fast-track project or is there time for planning)
    - ▶ Reducing field exposure
    - ▶ Quality
    - ▶ Lack of labor resources at the construction site
    - ▶ Repetition
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# DON'T TAKE THE PLANNING LIGHTLY

- ▶ To maximize savings, you cannot overlook the need for planning
  - ▶ Long lead items / Supply Chain
  - ▶ Engineering Resources
  - ▶ Transportation restrictions (not just DOT but building codes)
  - ▶ Seasonal timing for field install
  - ▶ Thorough review of maintainability
  - ▶ Constructability (Fab shop visits, construction tolerance, assembly techniques and sequence)
  - ▶ Selecting Contractors with experience in modular construction and Fabrication.
    - ▶ Multi Discipline capabilities
    - ▶ Strong project controls and scheduling capabilities
    - ▶ Experienced Craft and supervision

# Q&A / DISCUSSION

