AGC LEAN COURSES

Unit 1 - Variation in Production Systems
Unit 2 - Pull in Production
Unit 3 - Lean Workstructuring
Unit 4 - The Last Planner® System
Unit 5 - Lean Supply Chain and Assembly
Unit 6 - Lean Design and Pre-construction
Unit 6 - Lean Design and Pre-construction
Unit 7 - Problem-solving Principles and Tools
### Lean Theory & Tools

#### Wastes
- Transportation
- Inventory
- Motion
- Waiting
- Overproduction
- Overprocessing
- Defects
- Underutilized Talent

#### Buffers
- **Inventory Buffer**
  - Maintain excess material/stockpile
- **Capacity Buffer**
  - Build in reserve capacity in a crew or operation, creates room to absorb excess demand.
- **Schedule, or Plan, Buffer**
  - Workable backlog

#### Batch-and-queue (PUSH)
- Each production stage creates or completes more than one piece of an item.

#### Continuous-flow (PULL)
- A unit undergoes each stage of the production sequentially, no batching, AKA single-piece flow, just in time, justified for time.

#### The Five Big Ideas
1. Collaborate, really collaborate
2. Increase relatedness
3. Projects are a network of commitments
4. Optimize the project not the pieces
5. Tightly couple action with learning

#### Variation
- **SPECIAL CAUSE** - external sources
  - Noticeable deviations from the process mean and is an unusual occurrence
  - Weather & environmental conditions
  - Unexpected staff shortage
  - Broken equipment
  - Delivery delay
  - Design errors

- **COMMON CAUSE** - internal sources
  - Inherently random source of variation that is a property of the process
  - Motivation level
  - Safety procedures
  - Experience
  - Varied practices
  - Productivity

#### Little's Law
- Work in Progress (WIP) = Throughput (TH) x Cycle Time (CT)
- Inventory = Throughput (TH) x Flow Time

#### Supermarket = logistics center = decoupling point

#### Last Planner System (LPS)

<table>
<thead>
<tr>
<th>SHOULD</th>
<th>CAN</th>
<th>WILL</th>
<th>DID</th>
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</thead>
<tbody>
<tr>
<td><strong>Master Scheduling Milestones</strong></td>
<td><strong>Make-Ready Planning</strong></td>
<td><strong>Weekly Work Planning</strong></td>
<td><strong>Daily Huddles</strong></td>
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<tr>
<td><strong>Phase Scheduling</strong></td>
<td><strong>Lookahead &amp; Launch</strong></td>
<td><strong>Schedules, MRP</strong></td>
<td><strong>Measure PPC</strong></td>
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<td><strong>Specify handoff</strong></td>
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<tr>
<td>Validation process</td>
<td>6-week lookahead, constraint analysis</td>
<td>weekly work plan</td>
<td>act on reasons for failure to keep promises</td>
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</tbody>
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#### Commitments
- Preparation for next request
- Clarification & negotiation
- Declare Satisfaction
- Commit & Timing
- Performance

#### TAKT
- Amount of time required at production station before material is moved to next station

#### CYCLE
- Time to complete one finished unit of a process from start to finish

#### THROUGHPUT
- Amount of completed output from the process in a given amount of time

#### Target Value Design
- Collaborative, design to a set budget

#### Integrated Project Delivery
- Collaborative, include stakeholders early in planning process

#### Performance Measures
- **PPC** = Completed Weekly Assignments / Total Weekly Promised Assignments

#### Variation
- Undesirable deviation from the process mean, BAD.

#### Variability
- Adaptability, GOOD.
WASTES

T
TRANSPORTATION
Moving items or information

I
INVENTORY
Items or information that customer has not received

M
MOTION
Excessive movement within workspace

W
WAITING
Waiting for information or items to arrive

O
OVERPROCESSING
Doing more work than necessary

O
OVERPRODUCTION
Doing work before it is needed

D
DEFECTS
Mistakes and errors that need to be reworked

S
SKILLS
Not using workers to fullest of abilities
1. Sort

2. Set in Order

5S’s

3. Shine

4. Standardize

5. Sustain
Introduction to the Last Planner System

Productivity using Last Planner™

Measure productivity: Percent Plan Complete (PPC)

- Below Budget (Making $)
- At Budget
- Over Budget (Losing $)

- PPC = ~50%

Start Last Planner™ (PPC) is increasing

PPC = 65%

PPC = 86%
LPS Summary

Master Scheduling
Milestones
Lays out all milestones.

Phase Scheduling
Specify handoff
Establishes handoffs between milestones.

6-week Look-ahead/Make-ready Planning
Rolling look ahead & launch
Takes handoffs, expands them and makes constraints visible.

Weekly Work Planning
Measure PPC, act on reasons for failure to keep promises
Details the work to be done.

Daily Huddles
Confirming your weekly plan and adjusting as required
Confirms that daily commitments will be done.
Pull Planning
## Pull Planning

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Duration</th>
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<tbody>
<tr>
<td>What I will deliver</td>
<td></td>
</tr>
<tr>
<td>What I need from others</td>
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</table>
### Six-week Look-ahead/Make-ready Planning

<table>
<thead>
<tr>
<th>wk1</th>
<th>wk2</th>
<th>wk3</th>
<th>wk4</th>
<th>wk5</th>
<th>wk6</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
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*Post-it-note representing one day duration assignment*  
*Post-it-note detail (varies by company)*

- **Act ID**: Assignment  
- **Crew size**:  
- **Company**

*Wall/White Board/White Paper*
Daily Huddles
LEAN EXAMPLES

PIC OF AP YARD
LEAN EXAMPLES

PIC OF AP YARD
QUESTIONS