97th Annual AGC Convention
March 9-11, 2016
Grand Hyatt San Antonio | San Antonio, TX

Linbeck’s Lean Journey

Education Sessions Sponsored By
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AGC of America
Quality People. Quality Projects.
agcleanforum.org

96th Annual AGC Convention: Lean Construction for Executives
Speaker: Bill Seed, Walt Disney Imagineering
Wednesday, March 18, 2:30pm – 4:00pm

Are you looking to complete projects faster and at lower costs? Lean Construction is driven to minimize costs and maximize value on each project completed, challenging all stakeholders to...
agcleanforum.org/resources/

AGC Lean news

59th Annual AGC Convention: Lean Construction for Executives
Speaker: Bill Seed, Walt Disney Imagineering
Wednesday, March 18, 2:30pm – 4:00pm
Webinar: The Role of Communication in Supporting the Development of a Lean Culture
18th Annual Lean Construction Institute Congress - October 7-10, 2014 - San Francisco, CA
Lean Construction 101 Course Re-released!
Webinar: Lean Problem Solving to Improve Contractors' Operations
August 5, 2014 | 2:00PM - 3:00PM ET

Resources

- Seeing Value – Application of Lean Thinking to Construction
- Lean Construction from a Specialty Contractors’ Perspective
- Lean Workstructuring – Perspectives from Miron and Bolds
- Three Lean Tools to Help Your Company Become More Competitive
- Lean Construction in Practice Through 'Real World' Applications
agcleanforum.org/education/
Why Lean?

The Problem: Variation  The Goal: Reliability

- Work waiting on people
- People waiting on work
Linbeck’s Lean Journey

1997
Linbeck was a charter member of the Lean Construction Institute.

1999-2003
Developed company-wide, integrated value streams in support of TeamBuild.

2004
Last Planner used company-wide and established as dash board measurement.

2006
Hired first dedicated internal lean coach to institutionalize lean training as part of the Linbeck Academy.

2008
Linbeck was founding member of LCI Houston CoP.

2009
Adopted Hoshin planning model for Linbeck annual business planning.

2012
Company-wide adoption of “Lean Boards” as part of a Construction Big Room.

2013
Leo Linbeck III wins is awarded the 2013 LCI Pioneer Award which recognizes individuals who have moved the design and construction industry forward in embracing and implementing Lean tools and techniques.

2014
Company wide War On Waste (WOW) which centers on publication and dissemination of short videos.

2015
Lean Leadership becomes an integral certification and is earned through demonstrated mastery known as “The Five Tests”.

After Lean, brick shear attaching to concrete beam/liner
Early Efforts: Value Mapping / Value Streams

Construction Scheduling Value Stream

1. Pre-Project Information
   - Determine Information Availability
   - Develop Project Schedule

2. Design Scheduling
   - Develop Design Schedule
   - Review Design Drawings
   - Schedule Design

3. Construction Scheduling
   - Develop Construction Schedule
   - Review Construction Drawings
   - Schedule Construction

4. Project Management
   - Assign Project Managers
   - Schedule Tasks
   - Allocate Resources

5. Project Oversight
   - Monitor Project
   - Track Progress
   - Report Status

6. Project Completion
   - Complete Project
   - Finalize Documents
   - Close Out Project
Early Efforts: Last Planner™
## 97th Annual AGC Convention

**Flowchart:**
- Master Schedule
- Pull Phase Schedule
- Six-Week Lookahead
- Weekly Workplan
- Percent Planned Complete

### Chart 1: Project Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task A</td>
<td>01/01/2023</td>
<td>01/15/2023</td>
</tr>
<tr>
<td>Task B</td>
<td>01/16/2023</td>
<td>01/31/2023</td>
</tr>
<tr>
<td>Task C</td>
<td>02/01/2023</td>
<td>02/15/2023</td>
</tr>
</tbody>
</table>

### Chart 2: Constraints Analysis Form

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Probability</th>
<th>Impact</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>High</td>
<td>Critical</td>
<td>Develop alternative resources</td>
</tr>
<tr>
<td>Schedule</td>
<td>Medium</td>
<td>Low</td>
<td>Identify delays and re-schedule tasks</td>
</tr>
<tr>
<td>Quality</td>
<td>Low</td>
<td>Medium</td>
<td>Inspect and rework as needed</td>
</tr>
</tbody>
</table>

---

*Note: The charts illustrate project management processes and constraints analysis for a construction project.*
### Linbeck

#### ACH Child & Family Services Phase 1B - Part 1

<table>
<thead>
<tr>
<th>No.</th>
<th>TASKS</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GUARD ENTRANCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Work forms</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demo and dispose concrete/binder</td>
<td>X, X</td>
<td></td>
<td>Electrical Sheers</td>
</tr>
<tr>
<td></td>
<td>Grade and install forms</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pour gutters</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-instate rebar</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-instate rebar</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCHES:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Substantial approval forms and steel</td>
<td>X, X, X, X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Form columns</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Install steel</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-instate rebar with reinstate rebar forms &amp; BLDG</td>
<td>X</td>
<td>X</td>
<td>Location of fence</td>
</tr>
<tr>
<td></td>
<td>Worksite backfill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rebar Drive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light poles</td>
<td></td>
<td></td>
<td>156 clearance and 150 mm clear utility relocation</td>
</tr>
</tbody>
</table>

**NOTE:** This table represents a portion of the work plan for the ACH Child & Family Services Phase 1B - Part 1. The table includes tasks, their status for weeks 1 and 2, and any relevant constraints.
<table>
<thead>
<tr>
<th>Item #</th>
<th>Priority</th>
<th>Task</th>
<th>By When</th>
<th>Anticipated % Complete</th>
<th>Constraints</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Prepare Kick-Off Meeting Notes</td>
<td>6/22/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>Prepare Board Meeting Notes</td>
<td>6/23/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Schedule CME/Hayward Baker Administration Foundation Meeting</td>
<td>6/23/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>Send all Subcontracts for 1976</td>
<td>6/23/10</td>
<td>50%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>Obtain 1976 Permit</td>
<td>6/25/10</td>
<td>50%</td>
<td>Negotiations with HHS and WADCO</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>Resolve Asphalt Road Issue</td>
<td>6/25/10</td>
<td>50%</td>
<td>Waiting Urban Forestry approval</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>Setup Subcontractor Welcome Meetings</td>
<td>6/25/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>B</td>
<td>Schedule HVAC Report Under Chapel</td>
<td>6/25/10</td>
<td>50%</td>
<td>Negotiate terms with Commercial Insurance</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td>Order Copy Machine</td>
<td>6/25/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>Order Materials for Gibson Tool Amphibian Stage</td>
<td>6/25/10</td>
<td>100%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>Follow up with Michael about 1976 Owner Contract</td>
<td>6/25/10</td>
<td>75%</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>Upload Submittal Log In Endrive</td>
<td>6/25/10</td>
<td>50%</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Problem: Inconsistent Adoption @ Jobsites

- Management of paperwork is tedious
- Lean packets become outdated shortly after the meeting
- Meetings are too long
- Not enough emphasis on root causes for work not completed
- System is not visual
- Communication with Subcontractors difficult
Our Goal: Better Commitments

- Better Communication with/between trade partners
- Visual/Up to Date: Schedule, Constraints, Material Deliveries, Inspections, Action Items
- Improved accountability between Linbeck and trade partners
- Less paperwork/Less man-hours for meeting preparation
- Shorter Meeting Durations
Our Response: Management by Site/Visual Controls
Lean Boards @ Jobsites
Lean Boards @ Jobsites
War On Waste (WOW) Videos
Grass Roots & Organic Growth

Lean Leaders: The Five Tests

- 1-WOW Video Per Quarter
- Master Lean Boards and make one improvement
- Teach 1 AGC Lean Unit
- Teach 1 Supply Chain Workshop
- Present on Lean at University, LCI Community of Practice, or conference
Learn
Education & Training
Lean Construction
• 4,669 attendees since inception
• 1,711 total attendees in 2015
• 13 Linbeck instructors added in 2015
• 7 passed the CM Lean beta exam
Why Lean?

• Lean focuses on maximizing the whole NOT on maximizing individual performance
• Maximize Value + Reduce Waste
• Improve processes to be more competitive
• Provides consistency throughout company
Why Lean?

• Toyota’s Goal

“Give customers what they want, deliver it instantly, with no waste.”

Toyota Plant – San Antonio, TX
Why Lean?

• It brings solutions!
2005
Test pilot LPS at Apollo RiverPoint
Lean Expectations set at Executive Level
Train the Trainer
Grass roots implementation
Sundt Lean Committee

2006
Lean Seminars
Sundt Academies
PMs, Superintendents, Engineers, Precon

2007
LPS included in ‘Instructions to Bidders’
LPS incorporated into Subcontracts
Operational & Corporate Value Stream Mapping

2008
Buy in at the Executive Level

- Driven by the CEO

- Key people sent to LCI Congress for 1st hand view of Lean – What are we getting into?

- Provided resources for success

- Hired 3rd party Lean consultant
Test Pilot Projects
Apollo RiverPoint & Butler WWTP

- Pilot projects selected for implementing LPS™
- Used 3rd party consultant
- Pilot project team trained on LPS™
Train. Train. Train…

- Lean Seminars
  - Subcontractors/Sundt
  - Owners/Architects/Sundt Preconstruction

- Train the Trainer

- Sundt Academies
  - PM, PS, PE, Preconstruction
  - Self-perform groups

- Attended Lean Conferences
  - Lean & Infrastructure - UCLA Berkeley
  - Lean UK Congress – Manchester, England
  - Lean Congress – San Francisco & Mumbai, India
  - Lean Design Congress - Chicago
  - Benchmark Session with Vision Alliance - Helsinki, Finland

And when your done…train some more
Incorporated Lean in Subcontracts

✓ Instructions to Bidders
✓ Subcontract language section 8.3

8.3 Lean Construction. Contractor will employ lean construction principles on this Project.

8.3.1 Use of the Last Planner System™.

1. The Last Planner System™ (“LPS”) is a lean production-based project planning and management system developed by the Lean Construction Institute.

2. Subcontractor shall actively participate in the implementation and use of lean construction principles and Last Planner System on this Project. At a minimum, Subcontractor shall (a) attend LPS scheduling meetings in addition to normal weekly subcontractor coordination meetings, (b) regularly submit Weekly Work Plans, and (c) attend and participate in pull planning sessions as required by Contractor.
Establish Kaizen Committee

Sundt Way/Best Practices
Ideas@sundt.com

Companywide Training Consultant
Mastering Change & Achieving Results

Change Management Model
The Kaizen Process

1st Kaizen Director
1 year full time rotating position

2009
Company Presentations
Introduce Kaizen Process
Focus on high impact ideas

2010
Introduce A3 Form

2011

2012
Submitting Ideas

- Collecting ideas from employees companywide & posting in a central location
- Ideas reviewed by Committee
- Communicating decisions
Training on Mastering Change & Achieving Results

✓ Hired 3rd party change consultant
✓ Develop Sundt’s Change Management Model
✓ Develop process to evaluate ideas
✓ Encouraged the use of lean tools (A3, Value Stream Mapping)
Dedicated Director

- Dedicated resource to lead the charge
- Growth opportunity as a rotating position

- More ideas being implemented
- Opportunity to pursue high impact ideas
LPS mandatory for all Sundt projects
Kaizen Director position extended 2 year tour
Introduce 2 Second Lean

'Continuous Improvement' movement is created

2013

2014 Lean Summit
Corporate Director of CI permanent full time position

2014

CI Strategic Plan is implemented
AGC Lean Training Sessions
CI Leaders are identified

2015
2 Second Lean

- Small incremental improvements
- Empowering employees - making improvements within their scope of influence
- 5 S’s being utilized at the enterprise and project levels
- Books presented to all Admin employees
- Presented at orientation
Develop a Strategic Plan

Continuous Improvement (Lean and Kaizen) Strategic Plan

C: Current State
- No current CI baseline metrics
- Revenue per Employee-Owner (Admin) > 40th percentile
- Revenue per Employee-Owner (Craft) > 50th percentile
- Operating income per Employee-Owner (Admin) = Per Success Scorecard

D: Bridging Strategies
1. Develop skilled continuous improvement leaders
2. Develop Sundt’s continuous improvement toolbox
3. Nurture a culture of continuous improvement

A: Ideal Future
- Sundt’s CI culture inspires better performance every day.
- Sundt is the industry leader in productivity.

B: Measures (by 2020...)
1. On the internal customer survey:
   - At least 75% of respondents report understanding tools and methods of CI
   - At least 75% of respondents report feeling empowered to make improvements to their own work or that of their team
   - At least 85% of respondents feel CI group is accessible
   - At least 75% of respondents report CI implementations positively impact their work
2. Each continuous improvement leader acquires AGC’s Lean Management credential
3. Measurements for process improvement (appropriate measures for each process)
4. Shared metric: Revenue per Employee-Owner for Craft and Admin (each) in the 75th percentile or higher (Price/Waterhouse/Cooper)
5. Operating Income per Employee-Owner (Admin) for each business unit (TBD)
Identified employees companywide that were passionate about improvement

Develop lean knowledge & skills; taking that experience & putting it to use

29 employees participated in initial training

17 employees eligible to take exam
2016 and beyond

17 CI Leaders earned AGC’s Certificate of Management Lean Construction CM-Lean

2nd group of CI Leaders start AGC Lean training

CI Leaders start improvement projects
Crossing Divisional Lines

Applying Lean to horizontal construction!

www.agcleanforum.org < resources < Papers and presentations
Keep calm, lean is a long term journey.

Don’t give up…it’s a continuous journey!
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Thank You
Zurich