Using Lean to develop Partnerships between Students and Industry

Dr. Jim Keyes  College of Science, Technology, Engineering, Mathematics and Management
Inspiring Innovation. Learn more at www.uwstout.edu
UW Stout
Wisconsin’s Polytechnic University

Mission

University of Wisconsin-Stout is a career-focused, comprehensive polytechnic university where diverse students, faculty and staff integrate applied learning, scientific theory, humanistic understanding, creativity and research to solve real-world problems, grow the economy and serve a global society.

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UW Stout Facts

- Enrollment
  - 9,619 fall 2016
  - 87% Undergraduate
  - 13% Graduate

- Programs
  - 48 Undergraduate
  - 24 Graduate

- Employment of graduates
  - 97.4% 2016

- Degrees Awarded
  - 1,697 Undergraduate
  - 253 Graduate
College of Science, Technology, Engineering, Mathematics and Management

Departments
Biology  Business  Chemistry & Physics  Military Science
Mathematics, Statistics & Computer Science  Operations & Management

Undergraduate Programs
Apparel Design & Development  Applied Math and Computer Science
Applied Science  Business Administration
Computer Engineering  Construction
Engineering Technology  Environmental Science
Game Design & Development  Management
Manufacturing Engineering  Mechanical Engineering
Packaging  Plastics Engineering
Retail Merchandising & Mgmt.  Supply Chain Management
Sustainable Management

Graduate Programs
PSM Conservation Biology  MS Construction Management
PSM Industrial & Applied Math  MS Manufacturing Engineering
MS Operations & Supply Management  MS Risk Control
MS Sustainable Management  MS Training & Human Resource Development
Need for Lean Training

- Monster.com indicated 975 “lean” positions posted in October of 2006

- The same search recently indicated 2,253 “lean” positions available
Student Audience for Lean Training

• Business
• Supply Chain
• Management
• Technology
• Engineering
Using Lean to Partner with Industry

Industry is using lean
students are learning lean
Polytechnic approach is
application

Natural fit to work with industry to
help them improve while
advancing the learning of
UW Stout students

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Course Outline

Divided between the Classroom

Five weeks instruction, demonstrations and readings

Nine weeks of application based learning at Gemba working with clients

Observing
Developing
Implementing
Andersen Corporation

- Industry leader
- 11,000 employees
- 16 manufacturing facilities

Company Vision:
“Lead the window and door industry by providing products and services that are different and better as measured by our customers.”
Opened in May of 2000
212,000 square foot facility with
501 windows
Located on 40 acres in Stout Technology Park
2 shift operation
350 total employees at peak season: 300 Production/50 Support Staff
200 Series: Traditional Product

2016 Volume: 290,439 Units
Value-Priced Clad Wood Product
Entry-Level Residential (Production Builders)
Light Commercial (Senior Living)
Limited Size Grid & Offering Set

A-Series: Architectural Product

2016 Volume: 112,747 Units
Premium Composite Product
High-End Residential (Custom Home Builders)
Highest Performing Andersen Product
Virtually Unlimited Size Grid & Offering Set
All projects, including our Stout student projects, are aimed at realizing our True North!
Andersen & UW-Stout Partnerships

• Lean Enterprise Tours and Course Projects:
  – Time Observations/Line Balancing Studies
  – Supermarket Layout Studies
  – Lineside Kanban Studies
  – Rework, Creform, Test Wall Layout Projects
  – Quality Measurement Tool Calibration Update
  – Process Flow Studies
  – 5S Projects
  – Autonomous Maintenance/5S Check sheet Revamp
  – Flammable Cabinet Safety/Organization

• Internships – both Summer and throughout the academic year
• Lean Six Sigma Project
• Risk Control Group Tours
• Science Fest – STEM event
• Active employees utilizing AW for classroom studies/projects
ANDERSEN WINDOWS

Creform area

Project completed by:
Olga Mezentseva, Ryan Fellenz, Sam Ryan, Song Lor
Problem: the creform area, which is used for making improvements, lacks control and visuals, resulting in lost/misplaced materials, wasted time, etc.

Problem Solving Tools Utilized

7 Wastes

- Transportation
- Inventory – Excess inventory
- Motion – Too much movement leading to wasted time
- Waiting – Limited workspace
- Overproduction
- Overprocessing – No replenishment system
- Defects
Floor Layout

Before
- Creform Piping in the way of entrance
- Cluttered area where garbage and recycling bins
- Both miter saws and casters did not have any set location

After
- Moved creform piping near racking to create space for work in process and a larger entrance
- Identified specific locations for all machinery
- Moved work table closer to parts
## Results

<table>
<thead>
<tr>
<th></th>
<th>min was before</th>
<th>min was after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wasted time per week</td>
<td>335</td>
<td>157.5</td>
</tr>
<tr>
<td>Wasted time per year</td>
<td>17,420</td>
<td>8190</td>
</tr>
<tr>
<td><strong>Time saved per year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9,230</td>
<td>minutes</td>
</tr>
<tr>
<td></td>
<td>154</td>
<td>hour/year</td>
</tr>
<tr>
<td><strong>Dollars saved per year</strong></td>
<td>1,538</td>
<td>dollars per year</td>
</tr>
</tbody>
</table>
ANDERSEN WINDOWS
Stain Line Visual Indicators

Project completed by:
Camren Notermann, Jeremy Gabrielson, Aaron Moren, Tony Chiodi, Alex Sos
Problem: The stain line does not have a standardized, visually managed way of running which causes confusion from shift-to-shift, resulting in inefficiencies

- No visual management system for associates
  - No min/max for each line
- No way to expedite orders
- Schedule used was in alphabetical order
- Inefficient lane order
- Extremely small labels

- Visual aid for minimums & maximums of orders
- Larger labels for distinguishing different order types
- Priority lane for expedited orders
- Inbound lane numbered to maximize flow
- Optimized the organizational layout
Results

• Training documents electronically vaulted
  – Operators trained to use new method
• Associates in the area were involved in the decision making
  – Have more buy-in from employees
• Visual management system is used in other areas of the facility as well
  – Cross-training is easier
What’s in it for us?

- Lay the ground work for larger projects
- Build up coaching capabilities
- Develop potential and current leaders
- Cultivate lasting impressions and relationships

Frame Fab Time Study:
**Goal** – capture cycle times in the ACA frame fab
**Coach** – Brian Atchison
**Team members:** Greg, Abdullahi, Lucas, Tyler, Ryan, Nick

Hot Melt Time Study:
**Goal** – capture cycle times on hot melt clean up throughout the value stream
**Coach** – Dave Otto
**Team members:** Marvin, Kraig, Jenny, Jordan, Matthew

Stout interns, Bradly and Kaitlin, enjoying an ice cream celebration at Andersen

Stout intern, Jacob, presenting his project to Operations VP’s

Current Stout student, Greg, and Stout Alumni, Colin, in 6 Sigma White Belt training

Recent Stout graduate, Megan, presenting work done in the Team Lead Development Program
UW-Stout Alumni & Current Students Employed in Menomonie Plant

- Engineering – 60%
- Leadership – 50%
- Quality – 40%
- Supply Chain – 20%
- Operations: Supervisors & Leads – 5%
Path Forward to Business Transformation

IBM Rochester Lean Sigma Initiative

Lean Kaizen Event
Tote Storage Area (Before)
Tote Storage Area (After)
Current Pick List & Route
First Pick List

Sorted by Part Number

422 36 ft.
C252 9 ft.
C303 2 ft.
842 84 ft.
C302 84 ft.
633B 65 ft.
723 36 ft.
751 20 ft.
441 56 ft.
614B 52 ft.
C271 53 ft.
TOTAL 687 ft.
Revised Pick List & Route
First Pick List

Sorted by Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>441</td>
<td>27 ft.</td>
</tr>
<tr>
<td>422</td>
<td>14 ft.</td>
</tr>
<tr>
<td>C252</td>
<td>9 ft.</td>
</tr>
<tr>
<td>C271</td>
<td>2 ft.</td>
</tr>
<tr>
<td>C302</td>
<td>2 ft.</td>
</tr>
<tr>
<td>C303</td>
<td>2 ft.</td>
</tr>
<tr>
<td>614B</td>
<td>48 ft.</td>
</tr>
<tr>
<td>633B</td>
<td>16 ft.</td>
</tr>
<tr>
<td>751</td>
<td>34 ft.</td>
</tr>
<tr>
<td>723</td>
<td>20 ft.</td>
</tr>
<tr>
<td>842</td>
<td>39 ft.</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>213 ft.</strong></td>
</tr>
</tbody>
</table>
Motion Reduction
Pick List (# 11860 - turbine)

• Current Motion
  • Total Distance Traveled = 687 ft.

• Revised Motion
  • Total Distance Traveled = 213 ft.

Percent Reduction = 70%
UW Stout Paper Inventory Reduction
Operations and Management Department
Business Department
Starting Condition
## Paper Inventory

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Amount</th>
<th>$ AMOUNT</th>
<th>DAYS ON HAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>762 Reams</td>
<td>$2,657.81</td>
<td>347</td>
</tr>
<tr>
<td>Riso Master Rolls</td>
<td>100 Rolls @ $54.40/roll</td>
<td>$5,440.00</td>
<td>642</td>
</tr>
</tbody>
</table>

Excess Inventory of office supplies of nominal value
- Paper Clips
- Markers, Pens, and Pencils
- Envelopes
Outcomes

• Reduce paper inventory by 96%

• Saved $2570.56 in inventory costs

• Converted Room 279 from a storage area to a classroom
Katelyn Lokrantz, Yao Jin, Darren Lee, Michael Swarmer
Set in Order

• **Methodology:**
  - Arrange needed items so that they are easy to use.
  - Label items so that anyone can find them or put them away.

• **Application:**
  - We taped several areas to store over-products and coffins.
  - Over-products and coffins separately stored based on the pallet or coffin specification
Waiting and Over-processing

• Old
  - 1 stack = 2 stacks off semi
  - 140 Ft (49.64 miles per year)
  - Have to travel across busy pathway

• New
  - 1 stack = 1 stack off semi
  - 60 Ft (21.27 miles per year)
  - Stacks located directly behind semi
  - Quicker unloading time

• Difference
  - 28.37 miles per year
  - Long fork forklift
Transportation & Motion

- **Old Pick Travel Route**
  - Used Two Forklift
  - 883 Total Ft (1933.7 miles per year)
  - 3 min 50 sec pick time (2-3 item order)

- **New Pick Travel Route**
  - Uses one Forklift
  - 653 Total Ft (1852.15 miles per year)
  - 1 min 50 sec pick time (2-3 item order)

- **Difference**
  - 230 Less Ft
  - **81.55 miles per year**

- **Impacts**
  - Long fork forklift
  - Less Gas
  - Less Motion
  - One less forklift needed
  - 2 min difference
  - Less than half the time
  - Less Labor costs
  - Safer turn when coming from other side of warehouse
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Questions / Comments