Lean Operations In Environments
Oji Intertech, Inc. – Company Profile

Location: North Manchester, Indiana
Incorporated: 1980
Manufacturing SQ. FT. – 80,000
Employees: 94
Shifts: 3
Started Lean Journey in 2009
Extruder Value Stream

- Commercial Bags
- Detergent Box
- Steel & Paper Wrap
- Ice Cream Tub
- Poly Coated Crepe
- Paper Wrap
Laminating process that applies a LDPE poly coating on 20 different grades of raw paper material.

The master converted rolls are slit down to a narrower size to meet the customer requirements. Over a 1000 different part numbers.
• No Production system can be continuously responsive to gyrating orders without suffering from mura (unevenness in productivity and quality) and muri (overburden of machines, managers, and production associates) And mura and muri together create muda (Waste)

- Heijunka: Leveling Production by Daniel T Jones
Heijunka (Level Production)

• Heijunka is defined as “The distribution of production volume and mix evenly over time”
  - Lean Production Simplified, Pascal Dennis

• Provides a system that creates stability and can be systematically adjusted to expose opportunities for Continuous Improvement.
Lean Journey

• Started with a production system that was “Make-to-Order” with a small stocking program based on Finished Goods

• Moved to a triangle Kanban system “Make-to-Stock” (3 week cycle time)
  ✓ Began a pull system “Replenishment Pull”
  ❑ Still in batch production (waiting on long trigger times)
  ❑ Inventory was based on Finished Goods instead of WIP

• Consolidated items to create a more efficient production process
  ✓ Stratified by: Chip, caliper, potential slit width, and general format
    * Consolidated items to the point of customization *

• Implemented a Single card Kanban system (2 week cycle time)
  ✓ Able to build an inventory pull market to cushion customer fluctuations
  ✓ Based inventory on prior three months of sales

“Inventory beyond what you need to smoothly run the process is waste”

- Taiichi Ohno
Lean Journey (continued)

• Required a Mixed Pull system - “sequential & replenishment pull”
  - Had to accommodate for Purchase Orders (Sequential) “Make-to-Order”
  - At the mercy of raw stock and suppliers (Lead Times)

• Reduced production cycle down to one week
  ✓ Fixed time, and unfixed quantity production
  ✓ More flexibility to adjust the schedule or make changes with minimal disruption of the production system

1. Triangle Batch Cycle
2. Two Week Cycle
3. One Week Cycle

Over 2 weeks to run the 1st yellow unit

1.5 weeks to run the 1st yellow unit

Less than 1 week to run the 1st yellow unit
Customer Order Pattern

- High mix – low volume items
  - Over 1,000 different items in this value stream
- Gyrating orders with large variation in demand / pull

OJI Customer Example:
Avg. volume per/month – 6.9
Min- 5.8, Max – 8.3
Step 1

Point of Customization

1. Laminated roll stock before being slit down into a smaller width for Finished Goods. (WIP)
   a. Grades of material (20 different grades)
   b. Width Size for our WIP (25 different width sizes)
### Step 2: Kanban Calculation Sheet

<table>
<thead>
<tr>
<th>Kanban ID #</th>
<th>Stock/PO Date Updated</th>
<th>Item Description</th>
<th>Size</th>
<th>Finish</th>
<th>Kanban total amount of rolls needed</th>
<th>Total Lineal Footage for last 3 Months</th>
<th>Bi-Weekly Average @ 1.10</th>
<th>Standard Time</th>
<th>Run Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S 1-Jan</td>
<td>1a 72 M</td>
<td>12</td>
<td></td>
<td></td>
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<td>68000</td>
<td>200.00</td>
<td>8.3</td>
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<tr>
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<td>2a 72 M</td>
<td>3</td>
<td></td>
<td></td>
<td>141,570</td>
<td>25740</td>
<td>28314</td>
<td>200.00</td>
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<tr>
<td>3</td>
<td>S 7-Nov</td>
<td>1b 72 M</td>
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<td></td>
<td></td>
<td>80,000</td>
<td>14545.455</td>
<td>16000</td>
<td>200.00</td>
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<tr>
<td>4</td>
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<td>2b 72 M</td>
<td>5</td>
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<td>40000</td>
<td>250</td>
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<tr>
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<td>1c 72 M</td>
<td>7</td>
<td></td>
<td></td>
<td>200,000</td>
<td>36363.636</td>
<td>40000</td>
<td>200</td>
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<tr>
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<tr>
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<td>4c 61 M</td>
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<td>35,720</td>
<td>6494.5455</td>
<td>7144</td>
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</tr>
</tbody>
</table>

**USED HISTORICAL SALES NUMBERS PER CUSTOMER TO DETERMINE KANBAN RUN LEVELS**

**UNUSED HISTORICAL RUN SPEEDS TO DETERMINE PRODUCTION TIME NEEDED**

**UNFIXED QUANTITY**

**FIXED TIME**
Determine Efficient Run Sequence

• Run Matte and Gloss finish

• 24 separate width changes for the Matte finish (72” - 32”)

• 16 separate width changes for the Gloss finish (72” - 44”)
Kanban Sequencing Board
BEFORE

- Lead Time was 3-4 weeks due to raw material
- No or limited raw material stores.
- Stored very little WIP

- Stored a large amount of finished Goods product to anticipate customer orders.
- High amount of obsolescence due to inaccurate forecasting. Trying to forecast over 1000 different finished goods part numbers
- Inventory was very inaccurate

AFTER

- Lead Time is one week or less
- Raw material stores are set up on a kanban system to support the different grades and WIP widths
- Set kanbans up to the point of customization for WIP product (20 different grades and 25 different widths)
- Increased sales by 40% and have maintained the same inventory value
- Inventory turns have increased by 5 turns
- Noticeable increase in quality
Continuous Improvement (Next Steps)

“Challenge the system”

- Shorten changeovers
- Reduce set-up times
- Limit waste in information flow
- Reduce inventory
  1. Remove any safety stock
  2. Reduction in Kanban cards
- Shorten cycle times
- Produce “at” the pacemaker
Questions

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