Changeover Reduction

Chemtura

FAST TRAC
FAST-TRAC
Change-over Reduction

Four categories of change-over time

- Foresight
- Attachment
- Setting Conditions
- Trial Runs & Adjustments
Four Categories of Changeover Time

**Foresight:**
- Planning and/or preparing for another step
- Pre-kitting and storage of tools, parts, materials

**Attachment:**
- Actual attachment of parts and/or tooling
- Tool use

**Setting Conditions:**
- Positioning parts/tooling
- Other machine settings

**Trial Runs & Adjustments:**
- Adjustments from “starting point”
- Trial runs – until running AT RATE
FAST-TRAC
Change-over Reduction
Improvement Methodology

Training & Awareness

Record & Recommend

Application

Continuous Improvement
Improvement Methodology

Training & Awareness:
- Cross-functional team of people
- Classroom as well as “hands-on”

Record & Recommend:
- AS A TEAM, observe & document existing changeover
- Break into steps, review areas of waste, brainstorm ideas

Application:
- Initially focus on low-cost or no-cost procedural changes
- Just do it! Document savings (time, distance, cost, etc.)

Continuous Improvement
- Investigate long-term solutions
- Never be satisfied with “good enough” – keep repeating the improvement methodology
<table>
<thead>
<tr>
<th>Step #</th>
<th>Time</th>
<th>Task</th>
<th>Int/Ext</th>
<th>Element / Task Description</th>
<th>Task Category</th>
<th>Problem Identified</th>
<th>Countermeasure &amp; Time Savings</th>
<th>Kaizen Action</th>
<th>Who</th>
<th>When</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0:40</td>
<td>Clean Bottom Tray</td>
<td>I</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
<td>Shingo</td>
<td>Yesterday</td>
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<tr>
<td>2</td>
<td>1:21</td>
<td>Vibrate Parts Down Stacker</td>
<td>I</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td>X</td>
<td>Shingo</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2:56</td>
<td>Press to Bottom &amp; Remove Clamps</td>
<td>I</td>
<td></td>
<td>S</td>
<td></td>
<td>Clamps are manual &quot;C&quot; type Modify to incorporate Dovetail</td>
<td>X</td>
<td>Clamps</td>
<td></td>
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<tr>
<td>4</td>
<td>4:36</td>
<td>Remove Stacker Bolts</td>
<td>I</td>
<td></td>
<td>T</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5:02</td>
<td>Adjust Stacker</td>
<td>I</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>6</td>
<td>6:21</td>
<td>Remove Top Stacker</td>
<td>I</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>7</td>
<td>7:08</td>
<td>Raise Ram</td>
<td>I</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>8</td>
<td>13:11</td>
<td>Remove Die</td>
<td>I</td>
<td></td>
<td>T</td>
<td></td>
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<td>X</td>
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<td>9</td>
<td>14:11</td>
<td>Measure Tool</td>
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<td>F</td>
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<td></td>
<td>X</td>
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<tr>
<td>10</td>
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<td>Clamp Tool</td>
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<td></td>
<td>A</td>
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<td>X</td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>19:00</td>
<td>Install Top Stacker</td>
<td>I</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td>X</td>
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<td>12</td>
<td>23:25</td>
<td>Install Bottom Stacker Rods</td>
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<td></td>
<td>T</td>
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<td>X</td>
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<tr>
<td>13</td>
<td>24:08</td>
<td>Set Scrap Box &amp; Set HT</td>
<td>I</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<td>31:31</td>
<td>Load Coil</td>
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<td></td>
<td>A</td>
<td></td>
<td></td>
<td>X</td>
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<td>15</td>
<td>34:23</td>
<td>Adjust for Material Thickness</td>
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<td>S</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>16</td>
<td>35:33</td>
<td>Adjust Material</td>
<td>I</td>
<td></td>
<td>T</td>
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<td></td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>17</td>
<td>39:26</td>
<td>Adjust / Clearance Check</td>
<td>I</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td>X</td>
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**Individual component times. 14:11 - 13:11 = 1:00**

**Running total time on stop watch**

**Total set-up time**

**# of Steps Moved to External:______**

**Time Moved to External:______**

**Steps Reduced:______**

**Time Reduced:______**

**Steps Eliminated:______**

**Time Eliminated:______**
Changeover Reduction – Spaghetti Diagrams

BEFORE

AFTER
Changeover Reduction – Spaghetti Diagrams

BEFORE

AFTER
Changeover Reduction – Spaghetti Diagrams

BEFORE

AFTER
Improvement Example #1

**Problem:** Lock collars on infeed screw required use of allen wrench to remove lock collars, nuts used to secure plate to base – task time was roughly 5 minutes

**Solution:** Lock collars were not needed, so were removed from shaft – screw was secured with quick-connecting slots and knobs to tighten – task time reduced to less than one minute, no tools required
**Improvement Example #2**

**Problem:** Operator had to locate pins into holes and use wing nuts to secure machine guard – additional wing nuts required to make settings for different bottle types. Bottles were occasionally ejected out of the top of the machine.

**Solution:** Using cardboard and duct tape, a mock-up design of a new guard was made – will easily drop into place and can be easily adjusted to different bottle sizes without the use of tools – also covers top of machine to prevent bottles from being ejected.

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- **2 Pins w/ wing nuts on each side**
- **2 wing nuts for bottle type settings**
- **Entire guard designed to move up/down without use of tools**
- **New guard has a “top”**
Improvement Example #3

**Problem:** Due to the existing design of this capper’s changeparts, the timing chain under the capper had to be changed when changing from large to small bottles (or vice versa) – task time was at least 30 minutes

**Solution:** By working directly with the changeparts manufacturer, were able to design new changeparts to accept any bottle type without changing the timing – task completely eliminated!
## Improvement Example #4

| **Problem:** During a changeover, the operator had to completely remove two stationary guards on the side of this filler in order to set it to the proper height | **Solution:** The stationary guards were replaced with hinged pieces of Lexan, allowing for quicker, easier and safer access to the inside of the filler |

![Image of the filler with guards]

![Image of the filler with hinged pieces of Lexan]

![Image of the operator removing the guards and placing the hinged pieces of Lexan]
Improvement Example #5

**Problem:** A wrench was required to adjust dozens of points (pulleys, belts, guides, etc.) inside this bottle upsetter.

**Solution:** Quick-turn handles were installed at each point that required adjustment – eliminated the need to use tools, made changeover quicker and easier on the operator.
### Improvement Example #6

**Problem:** A wrench was required to remove bottle guides on a filler (different guides are required for each bottle size/type)

**Solution:** Bolts were replaced with quick-turn handles – eliminated the need to use tools, made changeover quicker and easier on the operator
**Problem:** To change the width of bottle conveyor side rails (to accommodate different bottle sizes), a wrench was used, and bolts had to be completely removed to make changes.

**Solution:** Instead of separate holes for each bottle size, a slot was made and quick handles installed – eliminated the need for tools and allowed for any bottle size, without removing bolt (paint marks added to indicate proper position for different bottle sizes).
**Improvement Example #8**

<table>
<thead>
<tr>
<th><strong>Problem:</strong> Paint marks were used to line up conveyor rails – still had to do some adjustment (not an exact setting)</th>
<th><strong>Solution:</strong> Instead of using slotted metal brackets, a rod (with a quick handle) was used – lock collars were installed on the rod at smallest and largest bottle settings</th>
</tr>
</thead>
</table>

![Problem Image](image1.png)  ![Solution Image](image2.png)
**Problem:** Height of the bottle orientor was set using the height of a bottle as a gauge (only 2 bottle sizes) – orientor could be moved up and down the full length of the supports, but only needed to be moved less than 1” – lots of room for error!

**Solution:** Plastic blocks were installed as positive stops at each of the two required settings (one for each bottle size) – completely removed guesswork and adjustment that was typically involved with setting the orientor height – much faster, simpler operation.
**Problem:** Cross-shaped plastic knobs were used to attach individual valves. Some knobs were missing and required a wrench to turn.

**Solution:** All knobs were replaced with quick-release handles (more durable, easier for the operator to loosen so that valves could be moved).