



SupplyVelocity®

Using Value Stream Mapping to Reduce Overhead Labor

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Abstract

Lean Six Sigma is used to improve quality, increase productivity and reduce cycle time. However, most of the applications to increase productivity are dealing with direct labor. We have extensive experience using Lean Six Sigma to improve direct labor productivity in Distribution (order selectors), Hospitals (nurses), Financial Services Companies (application processors and accountants) and Factories (production employees). When demand decreases, as it did recently during the Great Recession of 2007 – 2009, direct labor can be reduced in proportion to demand. However, indirect labor (also called Overhead Labor) is often harder to reduce.

This paper will demonstrate how Value Stream Mapping can be used to identify areas of excess indirect / overhead labor within a company.

Background

This Plastics Manufacturing Company was caught in the Great Recession of 2007 – 2009. They were operating profitably through the mid 2000's. In 2008 their customers cut back orders dramatically. One large customer was an auto assembly plant that closed permanently.

They reduced direct labor in proportion to demand. But they still had unacceptably high indirect / overhead labor expenses. Instead of simply cutting these positions, they wanted to use Value Stream Mapping to identify where they could reduce costs. In addition to the short term cost reduction, they also viewed this as an opportunity to realign their indirect labor staff with their 24 hour a day production operations.

Value Stream Mapping

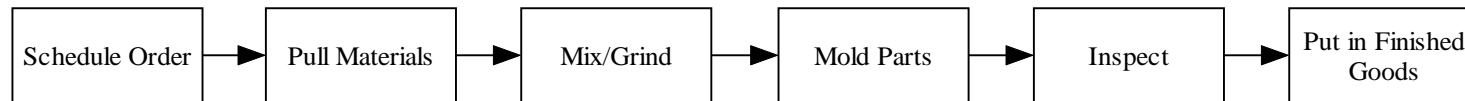
A Value Stream Map is a high level view of a process. This process can be an entire supply chain, the operations within a department or the steps to complete an order.

In addition to the high level view, a Value Stream Map seeks to quantify what the people and machines in the process are doing. Are they adding value to the product or service, are they waiting or are they doing non-value added tasks?

By gathering this data by time study we can see within the process how much of the time people and equipment are working and adding value for the customer, working but doing non value added tasks or waiting and doing nothing.



Plastics Manufacturing – Value Stream Major Steps



The scope of our Value Stream Mapping began at scheduling orders for production and finished when manufactured goods were put in inventory to be shipped to customers. Note, we did not include order-entry or shipping. We decided to keep this scope to the production operations of the company.

Within these steps we time studied:

- Material Handlers – Moved raw materials to the Mixing department, from Mixing to Molding and finished product to inventory
- Mixers – Prepared the plastic raw materials for molding
- Utility Workers – Did miscellaneous tasks as part of the order
- Lead Operator – Oversaw other Operators
- Operator – Checked quality of product coming off of the machine and packed product that was not robot-packed
- Set-Up Technician – Set up machine to make a new part, involving mold changes and pick & pack robotics
- Supervisor – Overall shift manager who also scheduled orders
- Inspector – Did first part inspection and set up inspection station for part changeover
- Machine utilization – The time the machine was producing parts versus its 24 hour per day, 7 day per week, 365 day per year availability

We time studied each of these roles as they touched an order. This was a high volume and high mix production company so there were numerous orders to time study. The variables in orders were part complexity and count. We performed enough time studies to account for this variation.



What Value Stream Mapping Showed Us

- Inspectors are only 50% utilized
- Utility Workers are very under-utilized and have no immediate link to an order
 - Giving them the ability to “float” around the plant
- Lead Operators are under utilized and also “float” around the plant
- 2nd and 3rd Shifts are understaffed with Supervisors, process expertise and prep (Mixing) employees
 - There were staffed to accommodate people’s desire to work on day shift versus the needs of production
- They are not working the molding machines very hard and have too many machines

For each of the roles above we calculated their utilization for a full day. This was done via the simple calculation below:

$$\text{People Utilization} = \frac{\text{Average Minutes per Order} \times \text{Average \# of Orders per Day}}{\text{Effective Time per Person}}$$

The results were shocking. We identified operations that were dramatically underutilized. Because these people weren’t directly linked to an order, they were allowed to “float” around the facility. Many times we saw them talking and disrupting direct people, sitting in an office or didn’t see them at all!

For the machines, the results were equally shocking. This company clearly was not “working the assets”. Operating Equipment Efficiency (OEE) is a simple measure that can be benchmarked across any company and industry. It is the sell-able output from a machine divided by the theoretical output on a 24 hours per day, 7 days per week, 365 days per year basis.

OEE doesn’t care that a company may not want to work weekends or 3rd shift. This measure also doesn’t care if you don’t have enough demand to keep machinery busy. It only looks at how much of the available capacity we are using to make sales.

On this basis, this company had too much machinery. Note, that much of this data is pre-recession demand. Only 3 – 4 machines were operating at a high OEE utilization. Most machines were used less than 50% of their availability. About five machines, which produced less complex parts, were operating at about 30%. This data created a very difficult action item to evaluate selling some of the machines and outsourcing some customer orders to companies that specialized in less complex parts.



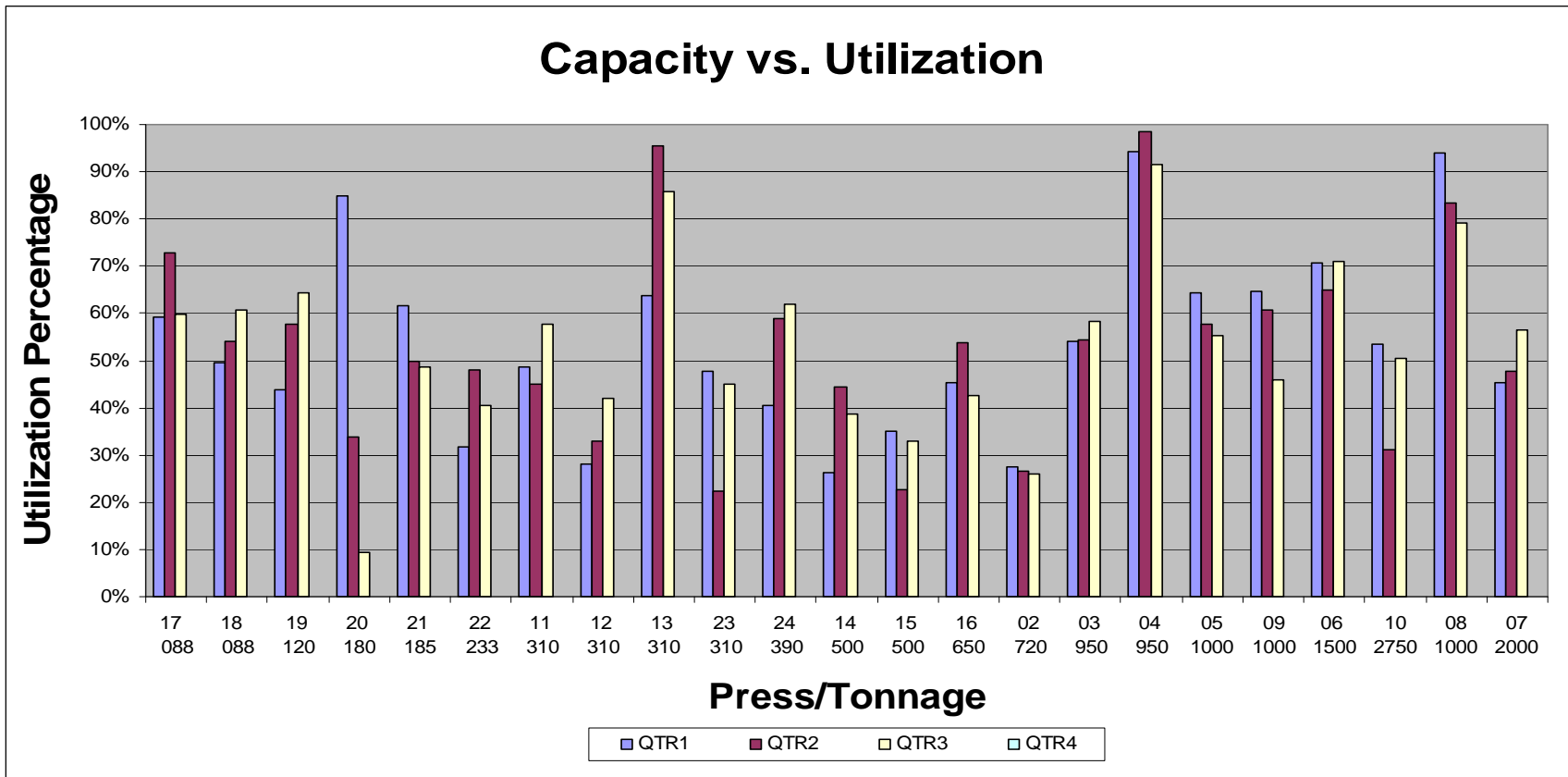
Staffing Rebalancing

| | Current | | | Proposed | | | Change |
|------------------|---------|------|-----|----------|-----|-----|--------|
| | 1st | 2nd | 3rd | 1st | 2nd | 3rd | |
| Shift Supervisor | 0 | 0 | 0 | 1 | 1 | 1 | |
| Process Experts | 2 | 2 | 0 | 1 | 1 | 1 | |
| Set-Up | 2 | 1 | 1 | 2 | 1 | 1 | |
| Other | | | 2 | | | | |
| Sub-Total | 4 | 3 | 3 | 4 | 3 | 3 | 0 |
| Grinder/Mixer | 2 | 0.5 | | 1 | 1 | 1 | |
| Matl. Handler | 1 | 1 | 1 | 1 | 1 | 1 | |
| Lead Operator | 1 | 1 | 1 | 0 | 0 | 0 | |
| Floor Workers | 1 | 1 | 1 | 0 | 0 | 0 | |
| Direct | 16 | 16 | 16 | 17 | 17 | 17 | |
| Sub-Total | 21 | 19.5 | 19 | 19 | 19 | 19 | -2.5 |
| Lead Inspector | 1 | 0 | 0 | 1 | 0 | 0 | |
| Inspectors | 2 | 2 | 2 | 1 | 1 | 1 | |
| Sub-Total | 3 | 2 | 2 | 2 | 1 | 1 | -3 |
| Total | 28 | 24.5 | 24 | 25 | 23 | 23 | -5.5 |

This chart shows how indirect positions were either eliminated or rebalanced on 2nd and 3rd shifts based on the utilization data.



Operating Equipment Efficiency – Machine Utilization



Machine # 13, 04 and 08, which operate at high OEE utilization

Machine 22, 12, 23, 14, 15 and 02 operate at very low OEE utilization



Results

- Eliminated Lead Operators
- Eliminated Floor Workers
- Reduced Inspectors
- Improved shift performance

As seen on the chart on Page 5, they were able to eliminate 5.5 overhead labor positions. Most of these positions were people who had very low utilization and “floated” around the facility because they were not directly linked to an order. Lead Operators were moved back to being Operators. Floor Worker jobs were eliminated, with this work being done by Operators.

There was great debate about eliminating Inspectors, and the affect it would have on quality. However, in the end they realized that quality is not “inspected-in”; it happens at production and is the responsibility of Operators.

This cost reduction helped them survive the recession, but in addition they found improved shift performance by moving highly skilled people to 2nd and 3rd shift, which was lacking support. This further reduced downtime costs and improved on time delivery of product to the customer.

The result of this project was difficult on employees. We were moving people from 1st shift to 2nd and 3rd, which is a difficult transition. In other places we permanently eliminated positions at the company, forcing these people to go back to being Operators.

However, the ownership did not just do a mass layoff. They invested to cut costs where it would not impact the Customer, but would actually improve off-shift performance.