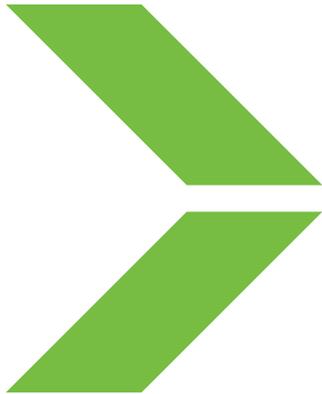




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Lean Manufacturing:

Part 1

What is Lean Manufacturing?

Lean manufacturing is a logical and structured approach to identifying and eliminating waste determined by the value created for the end user. In essence, lean manufacturing is maintaining value with less work.

To begin, we will breakdown the definition into parts and assess to understand what it really means. First, we will examine identifying and eliminating waste. Various resources have identified slightly different numbers and specific types of waste, but generally speaking, they all fall consistently within the following easy-to-remember acronym (DOWNTIME):

DEFECTS AND REWORK

These are easily identifiable wastes due to its tangibility; something people can see and feel. For example, defects and rework cause companies to spend unnecessary time correcting mistakes in paperwork or fixing physical problems with machines.

OVERPRODUCTION

This happens simply by producing more product than is needed by the consumer. It can also mean running too many reports, over-engineering by adding more to the process than necessary or having preventable order points.

WAITING OR IDLE TIME

This waste occurs from numerous sources. Typically, waiting waste is the time between tasks when no work is being performed. Other areas of wasted wait time may include waiting for a truck to be unloaded, searching for materials or poorly configured work centers.

NON-VALUE ADDED PROCEDURE

Anything that does not add value to the customer is considered to be a non-value added procedure. These are the items that a customer does not pay for, such as company reviews, inspections, production monitoring or anything else that is ultimately counterproductive.

TRANSPORTATION WASTE

Often, manufacturers are not only moving products, materials and other resources manually, but may also be moving them unnecessarily. This is considered transportation waste. Another factor in transportation waste is poor location of shipping and receiving peripherals.

INVENTORY WASTE

This waste can originate from both shortages and excesses. Having a shortage of a material can put a batch ticket on hold resulting in the expiration of the other materials for that batch. Having an excess of a material simply results in wasted resources. Inventory waste can also come from having a poor setup in retail locations and point of purchase displays.

MOTION WASTE

This waste varies from transportation waste in that motion is the movement within a specific work area versus the company as a whole. Often, motion waste comes from poor organization within a work area, resulting in poor processes and workflow from one area to the next.

EMPLOYEES UNDERUTILIZED

The value of a trained employee often goes unnoticed by a concerning amount of upper management, which leads to employees being underutilized. Both the company and the employee would benefit from being trained not only for their job, but also cross-trained in other areas. Additionally, applying an employee's skills and creativity where it best fits within the company is beneficial to all.

By eliminating waste, manufacturers can do more with less: less time, inventory, people, space, equipment, labor and money. To identify wastes in the work environment, manufacturers need to determine the components of the process that do not add value to the customer. By examining carefully each of the eight identified potential wastes, companies can begin the process of implementing lean manufacturing into their business.

Let's observe the practices of our subject chemical process company (GPC) when they accepted the challenge to implement lean practices. The lead team began by studying each of the eight areas of waste. The most readily identifiable was the amount of clutter in several areas, but predominantly in inventory control. There was a significant amount of excess material in storage stockpiled unnecessarily. Management recognized that eliminating the excess would make room for necessary production materials. Inventory control and reduction became primary goals for reducing waste and improving efficiency.

Continuous Improvement

Lean principles are not concepts companies can simply apply once and consider themselves done; they are ongoing. It requires a cycle of constant evaluation through each stage of the manufacturing process to find gaps between what is happening in the process and what should be happening based customer demands.

One of the challenges of implementing lean practices at GPC was helping the network of employees understand that each goal accomplished is a milestone and not the final result. Often in traditional working environments, once a target has been reached, employees relax and feel as though their work is complete. In our subject company, lean practices demand that GPC workers stay focused on continuous improvement and continue to maintain momentum by implementing further waste reduction tasks.

We have drawn attention to customer focus throughout this paper but now want to examine the final part of the lean manufacturing definition, “value created for the end user”. This is when considering the five basic principles of lean manufacturing become essential:

1. SPECIFYING VALUE

This is the most critical point of all the principles. For the sake of simplicity, we will only address the customer value as there are numerous values relating to identifying wastes. If a product has features that add cost but not value, the customer will not likely purchase the product. For example, if a customer requests 100 plain white t-shirts and the manufacturer fills the order, but also decides to add a fancy logo, the cost increases, but the shirt has not improved in overall quality. Thus creating waste, and ultimately, not meeting the customer’s demands.

2. IDENTIFY THE VALUE STREAM

The value stream is a set of required specific actions that bring a product through the critical business procedure, beginning with raw materials and ending with a finished product. The development process stream runs from the design concepts to addressing any challenges faced in engineering the product and finally to the production launch. The fulfillment process stream involves management of the product from order-taking to scheduling delivery of the finished product.

3. FLOW

The flow of a system is identifying each of the steps of production and arranging them in a continuous format. Eliminating waste and processes between steps will improve development and response times. This can be visualized in the process of baking a batch of cookies. When asked the steps taken to complete the task, the typical person may say something similar to, “gather all of the ingredients out of the cupboards, place them on the counter, and begin adding and mixing them as the recipe requires.” On the other hand, a lean description would resemble the following:

- Determine how long the process will take
- Locate the recipe and determine whether ingredients are on hand
- Create or clean a work surface for preparation
- Gather all the ingredients and position them for use on the work surface
- Gather the necessary tools for preparation

Following the steps of the lean process would save the baker a substantial amount of time because the necessary ingredients and tools were located in advance. The lean process also ensured a clean work surface in advance and ample time to do the job correctly.

4. CUSTOMER PULL

Customer pull is the exact opposite of customer push. Often, customer push methods create long response times in which companies try to convince customers that they want an item that has already been produced. Production scheduling is based on sales forecasts rather than actual requests.

Customer pull production, on the other hand, is dictated by specifically what the customer requests the manufacturer to make. This is known in the manufacturing industry as just in time (JIT) production.

5. PURSUE PERFECTION

Lastly, pursuing perfection demands perpetual review from beginning to end of the manufacturing process. The goal is to reach zero waste. In reality, perfection is never actually obtained. No matter the outcome of each review, there is always room for improvement in cost reduction, effort, time, space and/or mistakes.

To reexamine our subject company, GPC has embraced value stream mapping as a tool in identifying the above steps in their manufacturing processes. This is truly valuable for their current and future customers. By quantifying the value of the various steps in any process, the company has been able to 'lean out', or re-create their operating practices to deliver value, while eliminating the steps that add no value for their customer.

What Lean Manufacturing is Not

The primary focus of lean manufacturing is speed and inventory reduction, while continuing to deliver product quality that meets clearly defined customer specifications. When looking at the value to the customer, (both internal and external), manufacturers must be cautious when balancing the cost and time invested into a product. Quality demanded by the consumer is always a priority. Much like a three-legged stool, consisting of speed, cost and quality, each leg must be in proportion to the other legs or the stool becomes out of balance. Since the primary focus of lean manufacturing is to improve speed, this leg becomes the pivotal leg upon which the other two must balance. However, keep in mind, just because lean manufacturing focuses on speed, it does not mean quality is compromised. The very nature of lean manufacturing is to improve the quality of the product.

The Benefits of Lean Manufacturing

The benefits of lean manufacturing are vast and difficult to simplify. For the sake of practicality, listed below are five overriding benefits, with all additional benefits falling into one of the following categories:

1. MATERIAL HANDLING – Utilizing lean principles entails that materials move less often, to shorter distances and with simpler routes. These add up to a significant savings for the manufacturer due to fewer delays, less tracking efforts and less confusion. As a result, material handling becomes more efficient.

2. INVENTORY, SCHEDULING AND PRODUCTION CONTROL – With a customer demand flow to production, companies are able to reduce the amount of on-hand inventory. This decreases potential waste of both expired materials and floor space for storage and manufacturing. Fundamentally, excess inventory masks the issue. By reducing inventory levels, manufacturers uncover a wide array of process opportunities. Once these issues are corrected, they can improve their effectiveness and outrun their competitors. By reducing inventory levels, companies are able to increase inventory turns, meaning inventory will be in balance with current demands. In turn, this creates better supplier relationships, as manufacturers regularly re-order products needed for manufacturing. From a scheduling perspective, creating more batches in smaller lot sizes enhances the overall manufacturing flexibility. The less inventory a company has in its value stream, the less the lead time from customer order to delivery.

3. QUALITY – In traditional manufacturing, quality is jeopardized when a product has been labeled defective. When a product must move many times, often between several departments, it is very difficult to pinpoint where the defect occurred. With a single piece flow, the defect affects only one single part, thus eliminating long hours of isolating and investigating different components of the process to find the problem. Forming an effective problem-solving group across departments can become a challenge, as this responsibility is generally unwanted. With single piece flow, each team is focused on its responsibilities and is motivated to avoid future defects.

4. EMPLOYEE – As previously mentioned, each team is focused on its own goals and work results in a lean manufacturing environment. Problems are typically identified immediately, and team members receive instant feedback on their work. Team success builds employee morale. With team problem solving, the focus is directed to the processes, not the individuals. In addition to a morale boost, employees can also benefit from a safer work environment. Less inventory entails less clutter; fewer employees and machines leads to more light and space. A better layout of machines makes the physical labor for employees much less demanding.

5. CUSTOMER – Improved quality, paired with shorter and reliable response times, equals a recipe for satisfied customers. A pleased customer ultimately affects the bottom line for the manufacturer, as they become repeat customers.

The GPC team is discovering many of these benefits, and are continuing to explore opportunities for creating efficiencies. GPC management remains firm in their commitment to continue down the lean manufacturing path. The rewards, as will be explained in “Lean Manufacturing: Part 2,” are measurable and motivating.

Conclusion

No matter the field of manufacturing you are in, these basic lean manufacturing principles, applied and adhered to, serve to improve all aspects of a company's operations. If your company has not been utilizing lean manufacturing processes, it may be time to reconsider and look closer into the value of lean practices.

About GPC

GPC is a leading global supplier of paint solvents, test fuels and paint-system recycling technology for the automotive industry. Their customers include automotive manufacturers and suppliers, as well as chemical and pharmaceutical companies, in the United States, Canada, Mexico, Europe and South America.

The company has supplied custom-blended solvents, test fuels, calibration fluids and refined products to the automotive industry for over 70 years. Its products are used in Original Equipment Manufacturer (OEM) assembly, engine and component plants and throughout the industry's supply chain.

GPC manufactures paint-related products and cleaners for a wide variety of industrial uses, as well as calibration testing fuels for use in the automotive industry. Paint-related products include paint-line and booth cleaners, purge solvents and thinners.



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