

Lean

Lean Defined

The determination of value is paramount to lean. Value is an item or feature for which a customer is willing to pay. Any other aspects of the manufacturing process are waste. Lean manufacturing is a tool to focus resources and energies on producing the value-added features while identifying and eliminating the non-value added activities.



Lean Applied

The goal of a lean organization is to deliver the exact product in the exact quantity with the exact quality that the customer needs exactly when they need it. One of the stumbling blocks to lean is understanding the concept of waste identification and elimination. In any manufacturing environment everyone works to minimize waste. However, lean redefines waste.

Traditionally waste has been viewed as an object. It is very easy to envision a barrel of scrap and identify it as waste. Rather than referring to waste as physical material, lean manufacturing defines the term as the relationship of the resource to the end customer. In short, if the end customer will not pay you for it, it is waste.

In addition to delivery, manufacturing to customer demand includes the correct level of quality and features. In a lean environment, implementation of a pull system forces just-in-time deliveries. One of the hallmarks of companies that are truly lean is a focus on continuous improvement. Although project-based changes are typical, a lean environment lends itself to constant change. Quickly identifying and removing waste from the value stream achieves immediate benefits.

Additional lean tools for reducing waste:

- Continuous Flow – The concept of continuous flow is central to Lean manufacturing because it seeks to eliminate the stagnation of work in and between processes that lead to motion, transportation, and inventory waste. Several benefits to using a continuous flow process are:
 - Facilitates communications and flexibility through close proximity of the workers
 - Shortens lead time due to simplified production flow
 - Eliminates the buildup of defects
 - Improves your ability to use multifunctional workers efficiently
 - Eases identification of specific problem location
 - Assists in the introduction of Standardized work concepts
- Kanban – Kanban is a technique for producing parts to meet customer demand. Historically, most manufacturers have operated using a Push System, building products into inventory without firm customer orders. Kanban is a Japanese word which translates as “card” or literally a “visible record” or sign. It is a method for maintaining an orderly flow of material into a work cell. Kanban cards are a part of Visual Management and provide a physical signal as to when a particular component within a production cell needs replenishment. Kanban cards are used to indicate material order points:
 - How much material is needed
 - Where the material is ordered from
 - The specific location where the material should be delivered

- Value Stream Mapping – A Value Stream Map is a diagram depicting the process steps associated with turning a customer need into a delivered product or service. The Value Stream Map indicates how much value each of the steps adds to the product. If an activity step creates a form, feature, or function of value to the customer, it is called *value-added*; if it does not, it is referred to as *non-value added*.

Value Stream Mapping provides a clear understanding of the current process by:

- Provides a visual reference for multiple process levels
- Highlights waste and its ultimate sources
- Brings hidden decision points into focus

A Value Stream Map is initially created using a pencil and paper outline of the process to understand the flow of materials and information needed to produce the product or service. The map should visually present the flow of a product from the customer back to the supplier. It ultimately documents the current state as well as the future state vision.

- Quick Changeover – Quick Changeover is often referred to as Setup Reduction and Single Minute Exchange of Dies (SMED). It is the technique of reducing the amount of time to change a process from running one specific type of product to another. The main purpose for reducing changeover time is not for increasing production capacity, but rather to increase production flexibility. Quick changeovers facilitate the ability to produce smaller batch sizes.
- Visual Management – Visual Management is a process which provides a simple, visual signal to an immediate and readily apparent understanding of a condition or situation. Visual controls enable someone to walk into a work area and have a general knowledge of what is happening with regards to that work process. Visual Controls should be efficient, self-regulating and manage by the work staff. Through the use of visual signals one should be able to gauge the following:
 - Production schedules
 - Backlog
 - Workflow issues
 - Inventory levels

- Resource utilization
- Quality
- Visual controls should include:
 - Kanban cards
 - Andon lights
 - Color coded tools
 - Product flow work lines
 - Clearly delineated work stations

- 5S – 5S is one of the easiest Lean tools to implement, providing a systematic methodology for organizing and standardizing each station in the workplace. The components include:
 - Sort – Separate and eliminate any unnecessary items from the work area
 - Straighten – Arrange necessary items in order for easy access
 - Sanitize – Clean everything, equipment and workplace. Use cleaning as a method of inspection
 - Standardize – Create standards for the first 3S's and make them obvious through visual techniques
 - Sustain – Sustain the gains through self-discipline and training and spread throughout the organization

5S crosses over functional boundaries, can yield immediate return on investment, and is applicable to every function within an organization. Because of its ease of implementation and the strong visual results, 5S is often one of the first CPI tools applied in the Lean implementation process.

- TAKT Time – TAKT time is the time required to produce a single component or an entire product based on customer demand. It matches the pace of production to the pace of sales. TAKT time is the measure used to allocate work efficiently. Line balancing seeks to adjust station workloads so that each operator emulates TAKT time, thereby reaching a pace of production that is in sync with customer demand.

$$\text{TAKT Time} = \frac{\text{Total available production time}}{\text{Total production requirements}}$$

- Mistake Proofing (poka-yoke) – The Control phase of the DMAIC process utilizes a tool called mistake proofing. The Japanese term is known as poka-yoke. Mistake proofing creates a monitoring, gauging, and feedback system to instantly detect and control trends. Mistake proofing is applicable to any process; however, the term is mainly used in the manufacturing process. This key concept was widely used by Henry Ford in Model T production as early as 1908.

Mistake proofing systems prevent errors and defects from passing through the process. Front-line operators are empowered to stop a machine or entire production line if a problem arises. Mistake-proof devices, such as gauges or measurement tools, ensure that the defects are caught and corrected before defective products are produced.

Lean at Thomas Group

Lean is about getting the right things, in the right quantity, to the right place, at the right time, while altogether minimizing waste through a flexibility and openness to change. More importantly, these concepts should be understood, appreciated, and embraced by the actual employees who build the products, therefore owning the processes. The cultural aspect of Lean is just as paramount as the tools and methodologies.

By identifying the customer and how they define value, lean manufacturing allows companies and individuals to focus resources on adding value. Manufacturing to customer demand, driving out waste and continuously improving, satisfies customers, employees and shareholders alike.

When implementing and following a lean path you should realize direct cost savings by driving out waste. Other areas of improvement include:

- Employee morale and productivity
- Customer satisfaction due to reduced defects and improved delivery
- Faster time to market

Lean manufacturing is customer focused. Since the success of your business as a whole is due in large part on satisfying customer demands, lean allows your manufacturing activities to become more closely aligned with other company goals and activities. 