

# Lean Manufacturing

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Lean manufacturing is a production methodology focused on eliminating unnecessary waste while also maximizing productivity. In lean manufacturing, unnecessary waste is identified as any action or step in the entire production process that does not add value to the product or service. Benefits of this methodology include shorter lead times, lower operating costs and increased quality of the product or service offering.

Throughout the years, various companies and leaders have developed differing implementation strategies for lean manufacturing. However, each of these strategies are based on 5 Core Principles: value, map value stream, create flow, establish pull system and pursue perfection.

1. **Value:** As in every industry, the customer determines the value of a product and how much they are willing to pay for it. It is the manufacturers job to identify value points and develop a process that eliminates waste while also maximizing value, which in turn maximizes profit.
2. **Map Value Stream:** When mapping a value stream, it is important to look at the entire lifecycle of the product, from raw materials coming in the door to disposal of the product after being used by the customer. Every stage of the production process should be examined to identify wastes that can be eliminated (i.e., material, time, processes).
3. **Create Flow:** Lead times are important to customers, especially in manufacturing. This principle focuses on removing any barriers that create interruptions during the production process. Creating flow ensures production and delivery meet lead time deadlines.
4. **Establish Pull System:** In a pull system, work on a product is not started until there is demand for that product. This can be tough to implement in manufacturing, as many manufacturers utilize a push system to determine inventories in advance to meet sales or production forecasts. This goes against the goal of lean manufacturing, as push systems can lead to additional warehousing costs and disrupted production schedules. Pull systems eliminate these wastes but require flexibility, communication and efficient processes to work properly.
5. **Pursue Perfection:** Lean manufacturing requires continuous improvement throughout all levels of an organization. With the advancement of technology and machinery in manufacturing, new improvements are constantly emerging, both on the production floor and in the front office. Continuous improvement should be a strong component of a company's culture if they wish to create a collective responsibility for improvement and value creation.

Following these 5 principles of lean manufacturing are critical for a company to successfully implement this production methodology.

Lean manufacturing focuses on eliminating waste to reduce cost and production time. Waste can be classified into 8 different categories, listed below:



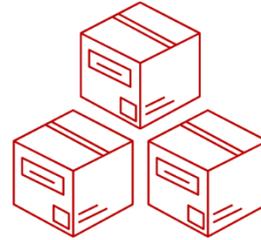
### Unused Talent

Underutilizing skills, knowledge or talent



### Inventory

Building or storing excess raw materials, WIP or finished goods



### Over Producing

Manufacturing product before it is required



### Waiting

Processing delays, downtime, bottlenecks, out-of-stock parts



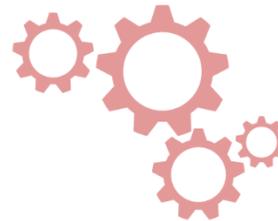
### Transportation

Excessive moving of raw materials or inventory



### Defects

Reprocessing, inspections or correcting work



### Over Processing

Adding extra value when it is not required to satisfy the customer



### Motion

Human motion that is unnecessary or ergonomically incorrect

There are two methods to address waste when implementing lean manufacturing. One is to simply identify and eliminate any waste throughout the production process, which results improved production time and lower costs. The other method is to focus on improving workflows rather than waste. This is often referred to as the “Toyota Way” as it was made popular by the auto-manufacturing giant.

Both methods work toward the same goal, but the Toyota Way naturally eliminates waste rather than focusing solely on identifying and eliminating it. Although different in the approach, both methods share several principles, including automation, continuous improvement, flexibility, pull processing and more.

Finally, it is important to remember that Lean Manufacturing is an ongoing journey. The pursuit of perfection never stops and many companies take years or decades to master its principles.