



## Maximizing Value, Minimizing Cost - How Lean Manufacturing Improves Production Efficiency

Lean manufacturing is a concept that has been embraced by production facilities around the world to improve production efficiencies and therefore reduce customer costs. Many of the lean manufacturing processes look at how manufacturing operations are performed and determine how they can be optimized. As lean manufacturing can lead to reduced production costs and improved quality, many large and small manufacturing facilities have embraced the concept.

### What is Lean Manufacturing?

At its simplest, lean manufacturing is a way of thinking and developing manufacturing processes to minimize inefficiencies in production and waste in resources. The four goals of lean manufacturing are:

1. Improve Product and Process Quality
2. Minimize Waste
3. Reduce Production and Process Time
4. Reduce Costs

By improving quality, fewer defective products are produced, minimizing waste, and therefore reducing costs. By reducing production times, labor and facility costs per part are reduced.

Large manufacturers, such as Toyota's automobile manufacturing facilities, as well as smaller manufacturers, such as refrigeration equipment manufacturer Hussmann Corporation, rely on lean manufacturing to improve their quality and reduce costs.

### Pioneers of Lean Manufacturing

The premises of personal and production efficiency have been practiced for centuries. Henry Ford was one of the first to apply these principles to manufacturing lines. However, the true forerunner to lean manufacturing was the Toyota Production System (TPS), pioneered by Taiichi Ohno, Shigeo Shingo and Eiji Toyoda. TPS, also known as "just-in-time production", was conceived after a trip to America to view the Ford assembly lines. The Japanese were not impressed with the inefficiencies of the Ford lines, particularly the uneven workloads, large amount of stored inventories, and large amounts of rework that were often required. However, after visiting a local supermarket, and learning how the supermarket maintains its inventory by only replacing items that are purchased, the Toyota team adapted this concept to automobile manufacturing and their relationships with suppliers.

The term "lean manufacturing" was first used by John Krafcik in the 1988 article, "Triumph of the Lean Production System," in the Sloan Management Review. Krafcik had been employed in a California Toyota production facility prior to attending graduate school at MIT, and based his thesis on the processes implemented at that plant.



Lean manufacturing is often most closely associated with automobile manufacturing. However, just about every large volume production facility in every industry uses lean manufacturing concepts, and even smaller volume production facilities implement many lean manufacturing processes to help reduce production costs.

### Lean Manufacturing Tools

A variety of tools and evaluation processes have been developed to help organizations identify areas of inefficiencies and improve their manufacturing processes. Some of these tools include:

Six Sigma - Six Sigma is a business management strategy that uses quality management philosophy and statistical analysis to identify and remove the sources of production defects. The name “six sigma” refers to a very high quality percentage, based on the standard deviation, or sigma, of the process. Six Sigma was developed by Motorola in the early 1980s.

Value Stream Mapping - This process focuses on defining and optimizing how materials and information flow through a manufacturing process.

5S - 5S is a set of five Japanese words and concepts that translate into: Sorting, Straighten, Sweeping, Standardizing, and Sustaining. The goal of 5S is to create a workplace that contains only the tools that are needed, that are organized in the most efficient way, and continuously review and revise work processes to increase efficiency.

Kanban - Kanban is a signaling system to determine when materials, components, or products are needed at the next stage in the manufacturing or delivery process. Kanban evolved from a physical card system that identified containers of products. Today, Kanban is implemented electronically, often as part of enterprise resource planning (ERP) platforms.

Poka-Yoke - Poka-Yoke is a Japanese term that translates as “mistake proofing”. This process examines processes to predict where potential errors could occur, or building in mechanisms that will prevent errors in machine or operator functions.

### Benefits of Lean Manufacturing to Today's Companies

One of the premises of lean manufacturing is continuous improvement. This means that companies continue to examine their processes and strive for improvements in efficiency. By refusing to stagnate, companies continue to innovate and move forward while providing improved value and reduced costs for their customers.

Over the last few years, the concepts of lean manufacturing have been embraced by environmental and conservation proponents, because of the goal of minimizing waste. Facilities are now examining how their business impacts the environment, and are finding in many cases that reducing waste actually benefits the environment. Reduction in water usage and electric power not only save the company money, but reduce the impact on public resources.