

Lean Manufacturing

- **Removal of waste**
- **Improving the flow of work**

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There are two general approaches to Lean Manufacturing:

1- **Removal of "wastages"**. In simple terms, "wastages" can be explained as the expenditure of resources (employee time, production machine time, inventory) on products other than the end customer product value, i.e. wasting resources that will be of no value to the customers. "Lean," is a production practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful, and thus a target for elimination. Working from the perspective of the customer who consumes a product or service, "value" is defined as any action or process that the customer would be willing to pay for.

2- **Process flow**. The second approach to Lean Manufacturing is a focus on improving the "flow" or smoothness of work, thereby steadily eliminating "unevenness" through the system. The implementation of smooth flow exposes quality problems that already existed, and thus waste reduction naturally happens as a consequence. The advantage claimed for this approach is that it naturally takes a system-wide perspective (removing waste and improving smoothness of processes), whereas a waste focus sometimes wrongly assumes this perspective.

Lean manufacturing is a variation on the theme of [efficiency](#) based on optimizing flow. It is a present-day instance of the recurring theme in human history toward increasing efficiency, decreasing waste, and using observed methods to decide what matters rather than uncritically accepting pre-existing ideas.

Essentially, Lean is centered on *preserving value with less work and less cost*, and applies to all aspects of a manufacturing organization, i.e. use of employees time, inventory on hand, finished goods in stock, purchasing methods, job processes, production machine reliability, etc. The responsibility of assuring a Lean operator

not only with employees at all levels of an organization (from Executive Management Entry Level), but also with the tools, processes, methodologies and automation applications in place. For many, Lean is the set of "tools" that assist in the identification and steady elimination of waste.

"Keep in mind that Lean applies to the entire organization. Although individual components or building blocks of Lean may be tactical and narrowly focused, we only achieve maximum effectiveness by using them together and applying them cross-functionally through the system."

Jerry Kilpatrick, MEP Utah, *Lean Principles*

As waste is eliminated quality improves while production time and cost are reduced. quote Benjamin Franklin in [Poor Richard's Almanac](#): "He that idly loses 5 schilling worth of time, loses 5 schillings, and might as prudently throw 5 schillings into the air. He added that avoiding unnecessary costs could be more profitable than increasing sales: "A penny saved is two pence clear. Save and have."

Lean implementation is therefore focused on getting the right things to the right place at the right time in the right quantity to achieve perfect work flow, while minimizing waste and being flexible and able to change.

Enter "best practices". [Frederick Winslow Taylor](#), the father of [scientific management](#) introduced what are now called standardization and best practice deployment. In [Principles of Scientific Management](#), (1911), Taylor said: "And whenever a workman proposes an improvement, it should be the policy of the management to make a careful analysis of the new method, and if necessary conduct a series of experiments to determine accurately the relative merit of the new suggestion and of the old standard. And whenever the new method is found to be markedly superior to the old, it should be adopted as the standard for the whole establishment."

Benefits of Implementing Lean

In his article titled "Lean Principles, Jerry Kilpatrick, MEP Utah, suggests the benefits of implementing Lean can be broken down into three broad categories; Operational, Administrative, and Strategic improvements. Some of Lean's benefits are summarized

below.

Operational Improvements

The NIST Manufacturing Extension Partnership recently surveyed forty of their clients who had implemented Lean Manufacturing. Typical improvements were reported as follows:

- Lead Time (Cycle Time) reduced by 90%
- Productivity increased by 50%
- Work-In-Process Inventory reduced by 80%
- Quality improved by 80%
- Space Utilization reduced by 75%

Administrative Improvements

