

Introduction

Lean Manufacturing is a systematic approach to identifying and eliminating waste through continuous improvement. Lean is about doing more with less: Less time, inventory, space, people, and money. Lean is about speed and getting it right the first time.

Lean production is aimed at the elimination of waste in every area of production including customer relations, product design, supplier networks and factory management.

Its goal is to incorporate less human effort, less inventory, less time to develop products, and less space to become highly responsive to customer demand while producing top quality products in the most efficient and economical manner possible.

Lean is a mind-set, or way of thinking, with a commitment to achieve a totally waste-free operation that's focused on our customer's success.

The Principles of Lean Manufacturing

As with most other production philosophies and management practices, lean principles cannot be universally applied. However, because they are fundamentally customer value driven, they are suitable for many manufacturing environments. There are five basic principles of lean manufacturing:

Understanding Customer Value

Value must be externally focused. Only what your customers perceive as value is important.

Value Stream Analysis

Once you understand the value that you deliver to your customers, you need to analyze all the steps in your business processes to determine which ones actually add value. If an action does not add value, you should consider changing it or removing it from the process.

Flow

Instead of moving the product from one work center to the next in large batches, production should flow continuously from raw materials to finished goods in dedicated production cells.

Pull

Rather than building goods to stock, customer demand pulls finished goods through the system. Work is not performed unless the part is required downstream.

Perfection

As you eliminate waste from your processes and flow product continuously according to the demands of your customers, you will realize that there is no end to reducing time, cost, space, mistakes, and effort.

These five lean principles work together and are fundamental to the elimination of waste.

The Benefits of Lean

Whether you are looking to cut costs, gain a competitive advantage, or remain viable in the face of competition that has gone lean, there are many reasons to adopt lean manufacturing techniques in your company.

Lean benefits include reduced work-in-process, increased inventory turns, increased capacity, cycle-time reduction, and improved customer satisfaction. According to a recent survey of 100 companies that had adopted lean manufacturing, typical improvements included

Operational Improvements

- A 90% reduction in lead time (cycle time)
- A 50% increase in productivity
- An 80% reduction in work-in-process inventory
- An 80% improvement in quality
- A 75% reduction in space utilization

Administrative Improvements

- Reduction in order processing errors
- Streamlining of customer service functions so that customers are no longer placed on hold
- Reduction of paperwork in office areas
- Reduced staffing demands, allowing the same number of office staff to handle larger numbers of orders
- Documentation and streamlining of processing steps, enabling noncritical functions to be outsourced and allowing the company to focus its efforts on customers' needs
- Reduction in turnover and the resulting costs of attrition
- Implementation of job standards and pre-employment profiling, ensuring the hiring of only above-average performers (imagine the benefit to the organization if everyone performs as well as the top 20%)

Strategic Improvements

Reduced lead time, reduced costs, and improved quality provide opportunities for new marketing campaigns, allowing your company to gain market share from competitors that are slower, have higher costs, or have poorer quality.

Methods to Implement Lean

While most of these lean methods are interrelated and can occur concurrently, their implementation is often sequenced in the order they are presented below. Most organizations begin by implementing lean techniques in a particular production area or at a “pilot” facility, and then expand use of the methods over time.

There are numerous methods and tools that organizations use to implement lean production systems.

- Cellular Manufacturing
- Total Quality
- Rapid Set-up
- Kanban
- Value Stream Mapping
- Process mapping
- Work Balancing / Level Production
- 5S
- Autonomation
- Mistake-Proofing
- Jidoka
- Elimination of waste
- TPM
- One Piece Flow
- Continuous Flow
- Standardise work
- Visual Management
- Takt Time
- Point of Usage
- Kaizen
- Supplier Development

Lean Manufacturing at SPEL

Although lean principles can be implemented manually, the integrated lean manufacturing IT solution can make any lean initiative even more successful. IT applications complement lean manufacturing with improved data visibility, speeding information flow for problem resolution, design changes, quality issues, and changing customer demand.

Lean initiatives focussed in three main functional areas:

- Performance management
- Planning and execution
- Waste reduction

Performance Management

The system is designed to assess our current level in lean implementation by examining our current practices relative to several benchmarks. In doing so, we can put together an

orderly step-by-step implementation plan and easily measure our progress at any time during the implementation. It helps to integrate people and processes—and ultimately generate a sustainable competitive advantage.

Planning and Execution

With lean manufacturing, finished goods are not built to stock. Instead, customer demand pulls them through the system. Work is not performed unless a part is required downstream. Lean systems provide flexibility in production so that any product can be produced in any combination. Customers know they can get what they want when they want it; therefore, demand becomes much more stable. SPEL provides a complete range of options for a pull system depending on the requirements. But we may not want or be able to implement lean manufacturing throughout the business. For certain parts of the business or for some products, we may need to run an order-based flow. Therefore, we need a system that allows mixing rate and order-based production. SPEL supports planning and execution with functionality for demand levelling, STAR integrated inventory and Pull manufacturing.

Waste Reduction

Waste is commonly defined as *non-value-added activity*. Lean practitioners identify eight types of waste:

❖ Over Production

- Making more than is required by the next process
- Making earlier than is required by the next process
- Making faster than is required by the next process

❖ Inventory - Causes of excess Inventory

- Protects the company from inefficiencies and unexpected problems.
- Product complexity
- Unlevelled scheduling
- Poor Market forecast
- Unbalanced workload
- Unreliable shipments by suppliers
- Misunderstood communications
- Inventory of excess parts from assembly
- Poor Forecasting of Recovery Rates

❖ Defects - Causes of Defects

- Weak process control
- Poor quality
- Unbalanced inventory level
- Deficient planned maintenance
- Inadequate education/training/work instructions
- Product design
- Customer needs not understood

❖ Over Processing - Causes of Processing Waste

- Product changes without process changes
- Just-in-case logic
- True customer requirements undefined
- Over processing to accommodate downtime
- Lack of communications
- Redundant approvals

❖ **Transportation - Causes of Transportation Waste**

- Poor plant layout
- Poor understanding of the process flow for production
- Large batch sizes, long lead times, and large storage areas

❖ **Waiting - Causes of Waiting Waste**

- Unbalanced work load
- Unplanned maintenance
- Long process set-up times
- Misuses of automation
- Upstream quality problems
- Un-levelled scheduling
- No Structured Routings
- Repairs not based upon material condition
- Inspection/rework/repair

❖ **Motion - Any movement of people or machines that does not add value to the product or service. Causes of Motion Waste**

- Poor people/machine effectiveness
- Inconsistent work methods
- Unfavourable facility or cell layout
- Poor workplace organization and housekeeping
- Extra busy movements while waiting
- Expediting

❖ **Underutilized People - Causes of people waste**

- Old guard thinking, politics, the business culture
- Poor hiring practices
- Low or no investment in training
- Low pay, high turnover strategy
- Early Vs. Late Repair Decisions