Lean Manufacturing

Why We Need Lean Manufacturing?

- Stronger competitive environment
- Due to price erosion, all manufacturing industries face continuous pressure to reduce price and to remain competitiveness in the market.
- Need to lower the operational costs in order to sustain the profit margin.
- In an effort to become more profitable many companies are turning to lean manufacturing.

Old Way: Increase Profits by Price Increase

But, may lose customers!

The new way: Increase Profits by Waste Reduction (Cost Reduction)

Bigger Profit
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Waste Vs Profit Margin

Profit

Theoretical Costs

Waste

Price Erosion

Waste Vs Profit Margin

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Goals of Lean Manufacturing

Quality

Lowest Cost

Shortest Lead Time

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Key Objectives of Lean

- Waste Reduction
- Improve time-to-market
- Leading the market
- World class manufacturing processes
- Develop strategic relationship with key suppliers
- Develop strategic relationship with key customer
- Provide best in class product/process
- To sustain the gain (stay in the market)
- Higher productivity
- Increase the profit
Lean Manufacturing vs Traditional Manufacturing

- Build to order
- Economies of Speed
- Effective
- Pull (from customer)
- Small Lots
- Quick changeover
- Production Cells
- Right-sized machines
- Fast to respond
- Adaptive

- Make and sell
- Economies of Scale
- Efficient
- Push (to customer)
- Large Batches
- Changeover unimportant
- Functional Silos
- Big, Fast machines
- Slow to change
- Rigid, inflexible

History

- Lean manufacturing comes from the Toyota Production System.
- Practiced by Toyota for many years, the ultimate goal of the system is to produce quality products by cost reduction activities and a cultural focus on employee involvement through empowerment.

- Lean manufacturing uses concepts pioneered by Taiichi Ohno (Toyota) by instilling the discipline—
  - to reduce cost
  - to generate capital
  - to make money
  - to bring in more sales
  - to remain competitive in a growing global market.
- This "new" manufacturing culture is based on working in every facet of the value stream.
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Toyota Production System

• Production flow in the reverse direction
  – A later process would pull back on an earlier process to pick up only the right part, in the quantity needed, and exactly when needed
  – In an earlier process, the number of parts made would be only that number withdrawn by the next process downstream
  – Just In Time production
  – Required a communication system: Kanban System

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Toyota Production System

• Reduction in set up time – which was accomplished by Shingo, the creator of "Single Minute Exchange of Dies" SMED
• Autonomation ("Jidoka" in Japanese) – known as "automation with human touch"
  • Statistical Process Control (Edwards Deming and Joseph Juran as key advisors)
  • Elimination of waste
  • Cost Management
  • Worker as valuable assets essential to the overall success of the enterprise

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What is Lean?

• Lean production focuses on eliminating waste in processes (i.e. the waste of work in progress and finished good inventories)
• Lean production is not about eliminating people
• Lean production is about expanding capacity by reducing costs and shortening cycle times between order and ship date
• Lean is about understanding what is important to the customer
**Definition of Lean Manufacturing**

*Lean Manufacturing* is a manufacturing philosophy which shortens the time line the customer order and the shipment by eliminating waste.

**New Paradigm: Non-Blaming Culture**

- Management creates a culture where:
  - Problems are recognized as opportunities
  - Problems are exposed because of increased trust
  - People are not problems - they are problem solvers
- Emphasize on **finding solutions** instead of “who did it”

**LEAN**

*Lean* is about doing more with less:

- Less time
- Less inventory
- Less space
- Less people
- Less money.

*Lean* is about speed and getting it right the first time.
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Lean = Eliminating the Waste

Value added: typically ~5% of lead time

- Overproduction
- Excess inventory
- Defects
- Non-value added processing
- Waiting
- Undersituated people
- Excess motion
- Transportation

Typically 90-95% of Total Lead Time is Non-Value Added!

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What is Waste?

- VALUE: Any activity that changes the shape of a product to meet customer needs
- WASTE: Activities that consume time, resources and space, but does not change the form of the product OR “Anything that adds Cost to the product without adding Value”

Waste - “anything other than the minimum amount of equipment, materials, parts, space, and worker’s time, which are absolutely essential to add value to the product.”

- Fujio Cho, Toyota.

- A good test is “would my customer be willing to pay for this activity?”

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What is Waste?

Non-Value Added activities / items:

- Non-value added inventory
- Overproduction
- Waiting
- Defects
- Non-value added processing
- Transportation
- Excess motion
- Undersituated people
- Excess space
- Excess time
- Excess equipment
- Overhead costs
- Administrative waste

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Value Add - Customer oriented

- Value added is always determined from the customer's requirement.
  - Who is the customer?
  - Every process should be focused on adding value to the customer.
  - Anything that does not add value is waste.
  - Some non-valued added activity is necessary waste
    - Regulatory
    - Legal

Cheap

Quality products

Good Services

"I can get it just the way I want it."

"They always have the latest technology."

"I know they can produce & deliver it in two days."

"It looks cheaper."

Customers' Requirements

Type of Waste:

- Overproduction
  - Producing more than is needed before it is needed

- Excess Inventory
  - Maintaining excess inventory of raw materials, parts in process, or finished goods
Type of Waste:

- **Transportation**
  - Wasted effort to transport materials, parts, or finished goods into or out of storage

- **Motion**
  - Any wasted motion to pick up parts or stack parts
  - Also wasted walking

Type of Waste:

- **Over-processing**
  - Doing more work than is necessary

- **Correction**
  - Repair or Rework

- **Not fully utilize human resources**
  - Not using operators to their maximum ability

- **Loss Opportunities**

How to reduce cost through lean manufacturing?

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