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The Strategic Steps to Achieve the Lean Manufacturing Systems in Modern Operations Management

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Abstract

The basic principle of lean manufacturing it is important to see how it is implemented because theory without practice is sterile and practice without theory is futile. The process of going 'lean' starts with attitude level, not at the shop floor level. The paper elaborates strategic steps involved in Lean Manufacturing Systems.

Keywords: *Traditional Manufacturing, Lean Manufacturing, 3 Ms.*

1. Introduction

It is identified that the most important part required for implementation of Lean Manufacturing is the commitment from top management and championship mentality in the minds of our manufacturers. It is precisely for Indian industries that LM is an essential tool to respond quickly to customer, to work effectively and to reshape their business. First requirement is a clear vision in top management second would be the cultivation of the right attitude or work culture, which would perhaps be more important than superb products, good ideas or technical innovations. The third need for championship mentality and team work.

2. Strategic Steps to Implement Lean Manufacturing.

The following steps should be implemented to create the ideal lean manufacturing systems:

1. Design simple manufacturing system: Flow manufacturing is a time-based process that pulls material through a production system without any interruption. This is a fundamental 6principle of Lean Manufacturing. This process concept can be achieved by--rapidly flowing **material** from raw to finished good-systematically balancing **man** (operator) and **machine** (equipment) to customer requirement.

The goal of Flow Manufacturing is to provide the ultimate response and produce to customer requirement. The benefits of this goal include:-

1. Decreased Total Product Cycle Time.
2. Less inventory.
3. Increased productivity.
4. Increased capital equipment utilization.

2. **Realization for improvements**: The ultimate goal is a system that has a smooth flow of material while maximizing the value added (VA) activities of the operator. Usually there are many situations in System Design Process that require special consideration. A few of these situations include:

1. Manufacturing Process - is the equipment used to create, alter, assemble, measure or test the product with the objective of meeting a pre-determined product requirement. The equipment includes machines, fixtures, tools, gauges such as lathes, drills, grinders, test stands and so on.

2. Manufacturing System - is the combination of man and manufacturing process(es). These two are often linked together with material handling (manual or automated) to move the material or product from one manufacturing process to the next.

3. Value Added (VA) - is any activity performed to a product as it moves through the production process that the customer perceived as actually adding value to the product.

4. Non Value Added (NVA) - is all other activity associated with the production process that may or may not be necessary to be performed but it is nonetheless performed at present pending the emergence, awareness or availability of better methods.

3. **Continuously improve:** To be able to quickly respond to customer requirements and be a JIT manufacturer concurrently, one of the keys is to have the flexibility of equipment and have the ability to align it with product flexibility. Due to the uncertainty in customer requirement, it is important to examine manufacturing cost over a range of volumes.

Traditionally, there is a steep drop in manufacturing cost as the ideal volume requirement is approached and a steep rise as the volume is in excess of requirement. This system is generally characterized by:-

1. Investment committed upfront, usually very high.
2. More rigid and complex equipment, often not technologically modern, and
3. Larger capacity increments, high customer volume requirement for long period.

However, in Lean Manufacturing, the manufacturing cost does not have such a steep drop as volume requirement changes. This is because of the product flexibility and equipment flexibility that can be incorporated into the Lean Manufacturing System. This system is usually characterized by:-

1. Investment committed as needed.
2. More equipment flexibility.
3. More adaptable to uncertain markets (volume / product).
4. Smaller capacity increments, more product flexibility.

2.1 Technical changes.

1) The first step towards the lean production is to make such process of consistent and predictable production.
2) Standardize the process sequence for all this similar looking / type / category parts, which may have minor difference in size. This will help in shop layout for continuous material flow.
3) Make the fixture, holders, tolling, adaptable to all parts with zero or minimum setup change time.
4) Simple and autonomous machines.
5) Preventive maintenance of machine for zero breaks downs during production.

2.2 Additional Changes

1) Checking to be done to ensure safe future production.
2) Responsibility to be passed on downwards.
3) Use of statistical tools and thinking particularly cause and effect.
4) Satisfy customer expectations. Lean manufacturing works in association with Total Productive Maintenance (TPM). TPM aims at zero accidents, zero breakdowns and zero defects. TPM again is enhanced by the calculation of Overall Equipment Effectiveness.(OEE).

OEE = Availability * Performance Rate * Quality.

2.3 Advantages of Lean Manufacturing (LM).

1) Since LM involves the JIT inventory levels (raw material, WIP, finished goods) can be brought down to nearly nil, thus reducing cost.

2) LM uses simple multi task machinery where by product of different design can be produced on the same machine.

3) Transition between various designs takes only a few minutes. This enables increase in flexibility and better response to customer requirements.

4) It also reduces customer lead time, cost of production and wastage.

5) LM is an effective competitive tool, not in then least due to dramatic saving in productivity and cycle time to WIP inventory. LM helps to unleash the power of the work force, ultimately taking the organization to, a competitive position.

2.4 Different Avenues of Lean Manufacturing.

Lean Manufacturing System has potential for greater profit. The profitability depends on the utilization of its resources - the 3Ms viz

- Material moving rapidly from VA to VA operations
- Man working constantly by adding value to the product
- Machine running in a more productive manner according to customer requirement

Lean Manufacturing System can be adopted in new manufacturing system, existing manufacturing system requiring capitalization, equipment or product relocation.

2.5 The Obstacles on Pathway of Lean Manufacturing.

An organization that wants to implement lean manufacturing may face a few problems that require serious thought. Obstacles in transformation to lean enterprise:-

1) Top management lacks strategic understanding of lean.
2) Lack of specific skills or knowledge regarding lean enterprise.
3) Culture, ego, organizational inertia.
4) Management reluctance to empower employees.
5) Fear of change of loss of organizational power.
6) Internal system causing hurdles.
7) Old engineering concepts.
8) Inflexible accounting methods.

Manager to coach is difficult change and it is to be expected that there would be initial difficulties.

People would go through stages of refusal, anger, bargaining and finally accepting the change but stay firm against initial resistance and battle would be own.

3.0 A Tabular Comparison between Traditional Manufacturing and Lean Manufacturing.

Sr. No	Major Aspects	Traditional Manufacturing	Lean Manufacturing
1	Waste	Maximum	Minimum
2	Approach to efficiency	Individual Process	Overall System
3	Philosophy	Output Centered	Market Centered
4	Scheduling	Push	Pull
5	Production	Stock	JIT
6	Lead Time	Long	Short
7	Batch size	Long Batch & Queue	Small Continuous Flow
8	Inspection	Sampling	100% source
9	Shop floor layout	Activity based	Cellular Manufacturing
10	Empowerment	Low	High
11	Inventory turns	Low	High
12	Flexibility	Low	High

4. Conclusions

With increased from foreign competitors especially China all the businessman in India, need to rethink about these business on a war footing. With the adoption of LM the working space requirements have been reduced productivity, gains have been of order of 30-40% the inventories of raw material and components work in process and finished goods have came down. There, reducing the working capital needs and interest burden. The quality of total service has noticeably improved leading to "delighted customers, loyal customers".

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