Lean Manufacturing:
An overview of how it can help a business

Food, Fibre & Timber Industry Lean Manufacturing Overview

By

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Biography

Qualifications:
Tradesman Fitter Machinist
Professional Mechanical Engineer (1st Class Honours)
Project Engineer
Maintenance Engineer
Master Business Administration
Maintenance Manager

Engineering and Business Work History:
Nova Machinery – Manufacturer Press Brakes & Guillotines
Swan Brewery – Beverage
Riverton Engineering – Sheet Metal Fabrication
Coogee Chemicals – Mining & Agricultural Chemicals Manufacture
Lifetime Reliability Solutions – Lean, Asset Management, ISO 9001 Quality Consulting, and Competitive Manufacturing – Central Inst of Technology
• Three universal problems in business...

1. Wasted effort and wasted resources

2. Using wrong business processes for the purpose

3. Wide and out-of-control process variation

• Lean Manufacturing provides tools and solutions to address them.

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Need to Achieve Process Control and Capability

In control and capable

In control but not capable

Out of control

Figure 83: Progression of a Process to Capability
Wasted Effort and Resources

Waste when Mounting a Part on a Truck Chassis

1. Drop carton of components at assembly line [Start]
2. Walk 8 meters to pick-up components [10 sec]
3. Remove carton wrap to expose components [60 sec]
4. Reach into carton and grab components [20 sec]
5. Orient components so they can be picked up [60 sec]
6. Pick up bolts for component [15 sec]
7. Walk 8 meters to the chassis on the assembly line [10 sec]
8. Position components on the chassis [20 sec]
9. Walk to power tool [5 sec]
10. Reach for power tool [5 sec]
11. Walk and pull tool to component on the chassis [10 sec]
12. Bring power tool down to component [5 sec]
13. Place bolts in the component [20 sec]
14. Tighten bolts to the chassis with power tool [15 sec]
15. Place power tool on bench [10 sec]
16. Walk 8 meters to pick-up next components [265 sec]

“Would the Customer be less satisfied with the product if this step were left out?”

The 7 Wastes

1. **Overproduction**: Producing items for which there are no orders.
2. **Waiting Time**: Employees standing about. Inventory at stand-still.
3. **Unnecessary Transport**: Moving material unnecessarily or long distances.
4. **Over-processing**: Using more steps to produce a product than necessary.
5. **Excess Inventory**: Retaining unnecessary inventory between process steps.
6. **Unnecessary Movement**: Any wasted motion by man or machine.
7. **Defect**: Making incorrect product.

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Wrong Business Processes for the Job

How do you hit the bulls-eye every time?

Cross-hairs and 5 mm diameter circle

300 mm
Wide Process Outcome Variation

Distribution Curve of Variation in a Process

• Uncoil a paper clip and bend it as instructed by the Presenter. Carefully count the number of cycles until it breaks.

• Develop a distribution of the count of the number of cycles to failure.
The Basic Lean Concepts

• **Be customer focused**: Downstream. Customer’s want defines value. Be on-time, responsive, flexible, and fast.

• **Standardise and level workflows**: Mimic continuous one-piece flow, minimise WIP, use visible measures.

• **Manage capacity**: Increase process uptime, reduce set-up times, find ‘lost’ capacity.

• **Eliminate waste**: Identify non-value add activity, then modify, combine, eliminate those tasks.

• **JIT production and delivery**: Not too early - never late; always done right first time; equipment always works when needed.

To Be Lean = Eliminate Non-Value

- **Match lot sizes to customer demands**: Use kanbans; end WIP (no stock).

- **Use pull scheduling** instead of push scheduling. (Takt time)

- **Schedule to the rate-determining step** (the bottleneck) then debottleneck process.

- **Facilitate fast feedback**: Arrange sequential operations next to each other for fast feedback from ‘customer’ to ‘supplier’ operation if something in-process is wrong.

- **Value-stream map** to locate waste (non-value) and design it out.
Standardised Work Limits Variability

Standardised Work means...
‘developing the one best way’
Competitive Manufacturing Companies bring useful Lean Six Sigma practices into the business

**Lean**
- Used to improve Effectiveness: are we doing the right things!
  - 7 Wastes
  - The ‘Hidden Factory’
  - Lean Thinking/Practices
  - Lean Tools
    - Value Stream Mapping
    - 5S: Workplace Management
    - Kaizen

**Six Sigma**
- Used to improve Efficiency: are we doing things right!
  - $6\sigma$ accuracy
  - Sigma Levels
  - The Variation Problem
  - Six Sigma Tools
    - DMAIC Process
    - 7 QC Analysis Methods
    - Visual Management