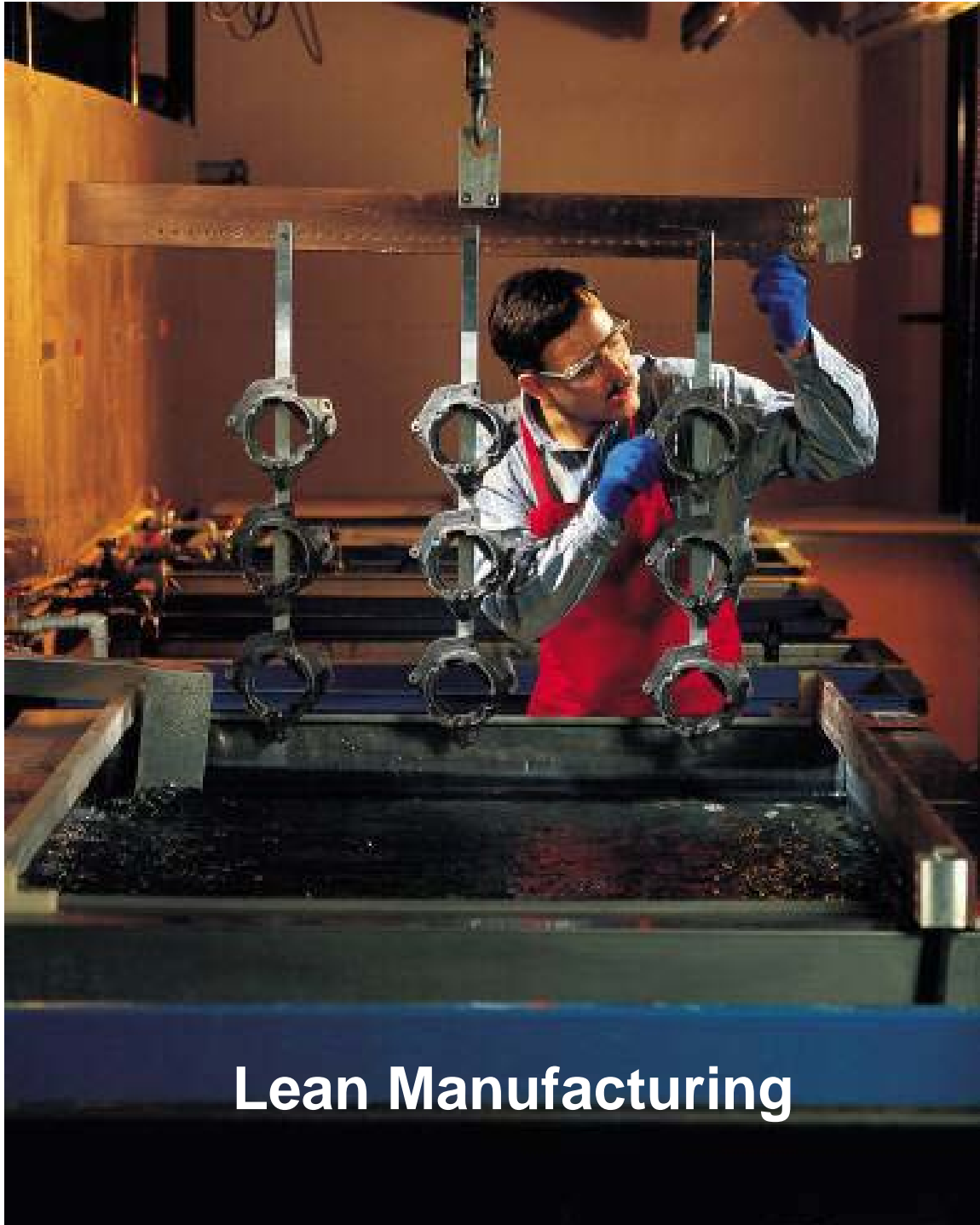


The 7 Wastes (Muda)



Lean Manufacturing

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Introduction

Waste elimination is one of the most effective ways to increase the profitability of any business. Processes either add value or waste to the production of a good or service. The seven wastes originated in Japan, where waste is known as “muda.” “The seven wastes” is a tool to further categorize “muda” and was originally developed by Toyota’s Chief Engineer Taiichi Ohno as the core of the Toyota Production System, also known as Lean Manufacturing. To eliminate waste, it is important to understand exactly what waste is and where it exists. While products significantly differ between factories, the typical wastes found in manufacturing environments are quite similar. For each waste, there is a strategy to reduce or eliminate its effect on a company, thereby improving overall performance and quality.



Waste No 1. Over Production

Simply put, overproduction is to manufacture an item before it is actually required. Overproduction is highly costly to a manufacturing plant because it prohibits the smooth flow of materials and actually degrades quality and productivity. The Toyota Production System is also referred to as “Just in Time” (JIT) because every item is made just as it is needed. Overproduction manufacturing is referred to as “Just in Case.” This creates excessive lead times, results in high storage costs, and makes it difficult to detect defects. The simple solution to overproduction is turning off the tap; this requires a lot of courage because the problems that overproduction is hiding will be revealed. The concept is to schedule and produce only what can be immediately sold/ shipped and improve machine changeover/set-up capability.

- To produce sooner, faster or in greater quantities than the absolute customer demand
- Manufacturing too much, too early or “Just in Case”
- Overproduction discourages a smooth flow of goods or services
- Takes the focus away from what the customer really wants
- Leads to excessive inventory

Caused by:

- MRP push rather than kanban pull
- Large batch sizes
- Looks better to be busy!
- Poor people utilisation
- Lack of customer focus

Why one of the 7 wastes?

- Costs money
- Consumes resource ahead of plan
- Creates inventory
- Hides inventory/defect problems
- Space utilisation

Waste No 2. Inventory

Work in Progress (WIP) is a direct result of *overproduction* and *waiting*. Excess inventory tends to hide problems on the plant floor, which must be identified and resolved in order to improve operating performance. Excess inventory increases lead times, consumes productive floor space, delays the identification of problems, and inhibits communication. By achieving a seamless flow between work centres, many manufacturers have been able to improve customer service and slash inventories and their associated costs.

Any raw material, work in progress (WIP) or finished goods which are not having value added to them

Caused by:

- Production schedule not level
- Inaccurate forecasting
- Excessive downtime/set up
- Push instead of pull
- Large batching
- Unreliable suppliers

Why one of the 7 Wastes?

- Adds cost
- Extra storage space required
- Extra resource to manage
- Hides shortages & defects
- Can become damaged
- Shelf life expires



Waste No 3. Motion

This waste is related to ergonomics and is seen in all instances of bending, stretching, walking, lifting, and reaching. These are also health and safety issues, which in today's litigious society are becoming more of a problem for organizations. Jobs with excessive motion should be analysed and redesigned for improvement with the involvement of plant personnel.

- Adds cost
- Motion is the movement of “man”
- Waste motion occurs when individuals move more than is necessary for the process to be completed

Caused by:

- No standard operating procedure
- Poor housekeeping
- Badly designed cell
- Inadequate training

Why one of the 7 Wastes?

- It interrupts production flow
- Increases production time
- Can cause injury



Waste No 4. Waiting

Whenever goods are not moving or being processed, the waste of waiting occurs. Typically more than 99% of a product's life in traditional batch-and-queue manufacture will be spent waiting to be processed. Much of a product's lead time is tied up in waiting for the next operation; this is usually because material flow is poor, production runs are too long, and distances between work centres are too great. Goldratt (Theory of Constraints) has stated many times that one hour lost in a bottleneck process is one hour lost to the entire factory's output, which can never be recovered. Linking processes together so that one feeds directly into the next can dramatically reduce waiting.

People or parts that wait for a work cycle to be completed

- Where are the bottlenecks?
- What are the major causes of lost machine availability?
- What are we doing to improve machine availability?
- Do people wait on machinery?

Caused by:

- Shortages & unreliable supply chain
- Lack of multi-skilling/flexibility
- Downtime/Breakdown
- Ineffective production planning
- Quality, design, engineering Issues
- 'Black art' processes

Why one of the 7 Wastes?

- Stop/start production
- Poor workflow continuity
- Causes bottlenecks
- Long lead times
- Failed delivery dates



Waste No 5. Transportation

Transporting product between processes is a cost incursion which adds no value to the product. Excessive movement and handling cause damage and are an opportunity for quality to deteriorate. Material handlers must be used to transport the materials, resulting in another organizational cost that adds no customer value. Transportation can be difficult to reduce due to the perceived costs of moving equipment and processes closer together. Furthermore, it is often hard to determine which processes should be next to each other. Mapping product flows can make this easier to visualize.

Unnecessary movement of parts between processes

- Complex material flow paths
- Poor close coupling
- Wasted floor space
- Unnecessary material handling
- Potential damage to products

Caused by:

- Badly designed process/cell
- Poor value stream flow
- Complex material flows
- Sharing of equipment

Why one of the 7 Wastes?

- Increases production time
- It consumes resource & floorspace
- Poor communication
- Increases work in progress
- Potential damage to products



Waste No 6. Over Processing

Often termed as “using a sledgehammer to crack a nut,” many organizations use expensive high precision equipment where simpler tools would be sufficient. This often results in poor plant layout because preceding or subsequent operations are located far apart. In addition they encourage high asset utilization (over-production with minimal changeovers) in order to recover the high cost of this equipment. Toyota is famous for their use of low-cost automation, combined with immaculately maintained, often older machines. Investing in smaller, more flexible equipment where possible; creating manufacturing cells; and combining steps will greatly reduce the waste of inappropriate processing.

Processing beyond the standard required by the customer

By improving processing efficiency we ultimately use less resource to achieve the same customer satisfaction

Caused by:

- Out of date standards
- Attitude - ‘Always done it like this’
- Not understanding the process
- Lack of innovation & improvement
- Lack of standard operation procedures

Why one of the 7 Wastes?

- It consumes resource
- It increases production time
- It’s work above and beyond specification
- Can reduce life of component



Waste No 7. Defects – Not right first time

Having a direct impact to the bottom line, quality defects resulting in rework or scrap are a tremendous cost to organizations. Associated costs include quarantining inventory, re-inspecting, rescheduling, and capacity loss. In many organizations the total cost of defects is often a significant percentage of total manufacturing cost. Through employee involvement and Continuous Process Improvement (CPI), there is a huge opportunity to reduce defects at many facilities.

A defect is a component which the customer would deem unacceptable to pass the quality standard

- Defects reduce or discourage customer satisfaction
- Defects have to be rectified
- Rectification costs money with regard to time effort and materials
- Defects in the field will lose customers
- Right first time is the key

Caused by:

- Out of control/Incapable processes
- Lack of skill, training & on the job support
- Inaccurate design & engineering
- Machine inaccuracy
- Black art processes

Why one of the 7 Wastes?

- Adds costs
- It interrupts the scheduled • It consumes resources
- It creates paper work
- Reduces customer confidence

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