




The Supply
Chain Network

Technical Guidance Note for SMEs: Introduction to Lean Enterprise



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Introductory Content

- What is Lean Enterprise?
- 7 Wastes
- Just in Time (JIT)
- 5S
- Value Stream Mapping
- Single Minute Exchange of Dies
- Total Preventative Maintenance
- Six Sigma





What is Lean Enterprise?

Lean enterprise is a practice focused on value creation for the end customer with minimal waste and processes.

The term has historically been associated with lean manufacturing and Six Sigma (or Lean Six Sigma) due to lean principles being popularized by Toyota in the automobile manufacturing industry and subsequently the electronics and internet software industries.





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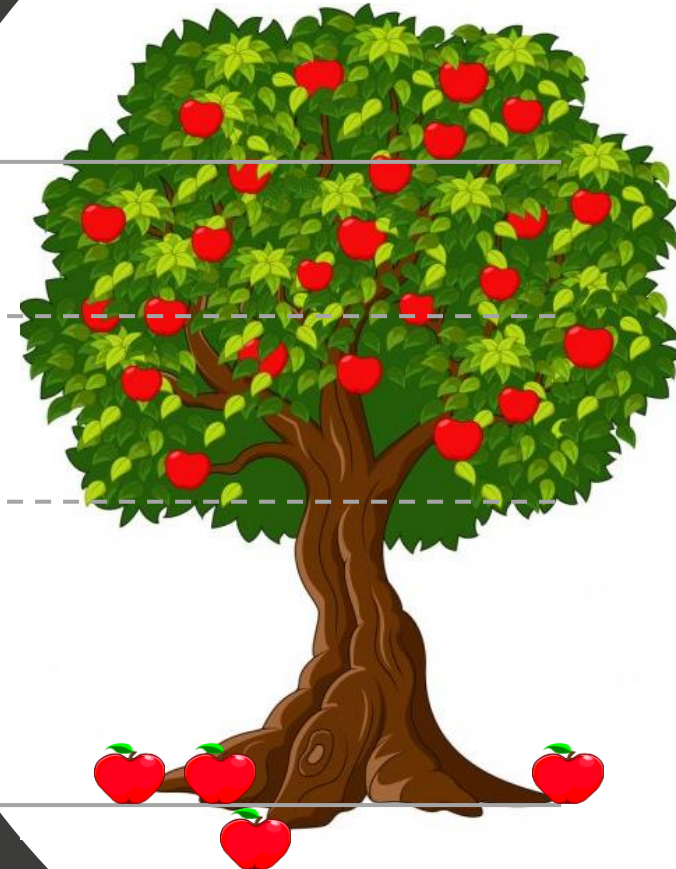
What is Lean Enterprise?

Sweet Fruit
Design for Manufacturability
LEAN DESIGN

Bulk of Fruit
Process Characterisation & Optimisation
SIX SIGMA

Low Hanging Fruit
Basic Tools
KAIZEN

Ground Fruit
Logic & Intuition
JUST DO IT!



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What is Lean Enterprise?

Principals

1. Specify value by product or service	Specify what does and does not create value from the customers perspective
2. Identify the value stream	Identify all the steps to design, order and produce products or service offering across the whole value stream
3. Make product or service flow	Make those actions that create value flow without interruption, detours, backflows, waiting or rework
4. At the pull of the customer	Only make what is pulled from the customer at the rate of their requirement
5. In pursuit of perfection	Strive for perfection by continually removing successive layers of waste as they are uncovered





Lean Tools

- 5S (Separating, Sorting, Sweeping, Standardise, Sustain)
- VSM (Value Stream Mapping)
- SMED (Single Minute Exchange of Dies)
- TPM (Total Preventative Maintenance)
- Six Sigma

Lean Approaches

- Standardised Work – for sustainability
- Kaizen – for continuous improvement
- Policy deployment – for coordination
- Team work – for empowerment & better solutions
- Kanban – to regulate Just-in-time





What is Lean Enterprise?

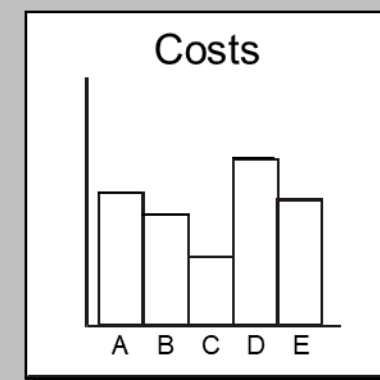
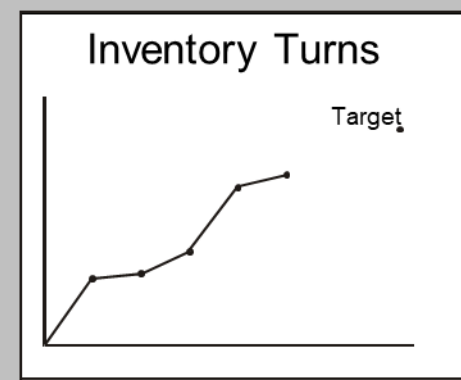
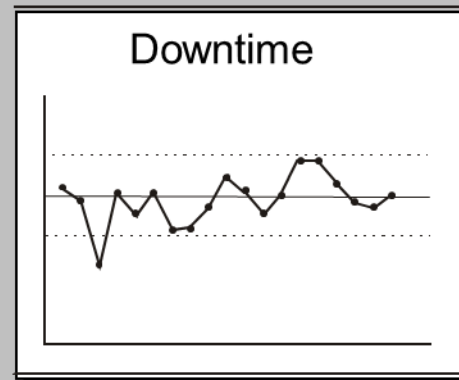
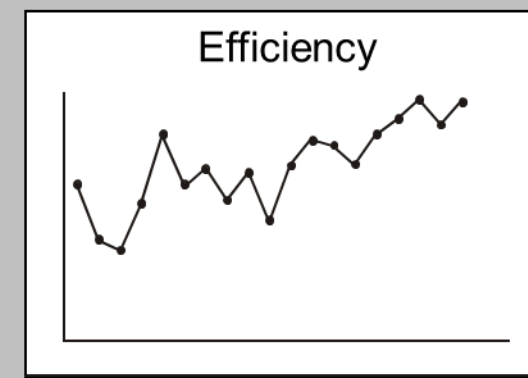
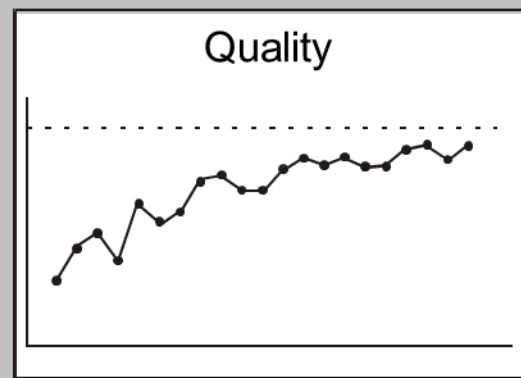
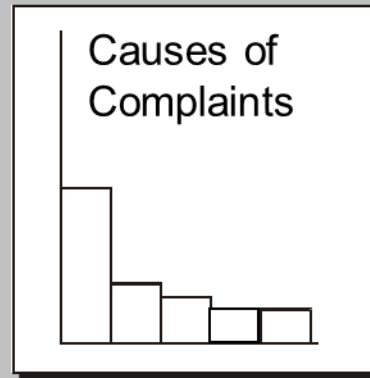
Old Model	New Model
<ul style="list-style-type: none">• Cost + Profit = Sales Price	<ul style="list-style-type: none">• Price – Cost = Profit
<ul style="list-style-type: none">• Price set by adding profit margin on top of cost• Few choices for customer• Value is customer perception	<ul style="list-style-type: none">• Ongoing cost reduction activities• More choices for customers• Increase profits• Possibly lower sales price





What is Lean Enterprise?

Measures



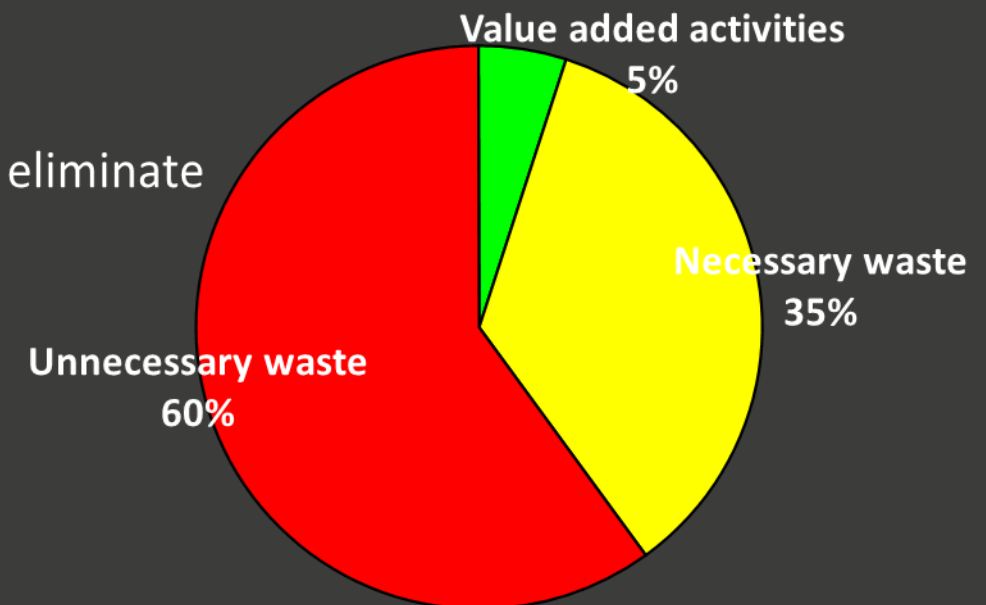


What is Lean Enterprise?

Value

- There are 2 types of activity in the value stream:
 - Those which **add value** to the customer
 - Those which **do not**
- The primary focus of a Lean Enterprise is to identify and eliminate **Waste** in our business

What we typically find:





What is Lean Enterprise?

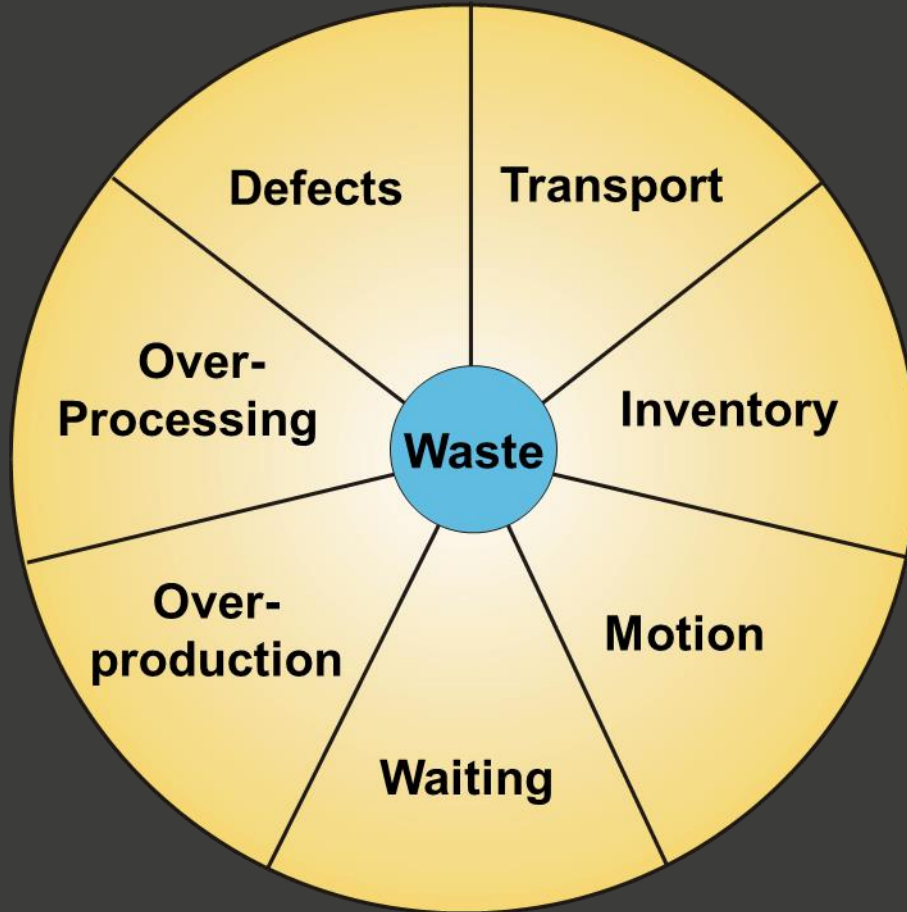
Value

- Is the work being performed changing the Form, Fit or Function of the part or product?
 - Bending, welding, assembling, tightening.....
- Is the work being performed for the first time on this part or product?
 - Are we reworking defective products.....?
- Is the customer willing to pay for the work being done?
 - Are there too many features, or too much performance.....?





What is Lean Enterprise?



7 Wastes

- If your customer could see all the things that go in your business, would they be prepared to pay for them?
- Because they do!





What is Lean Enterprise?

Waste Types

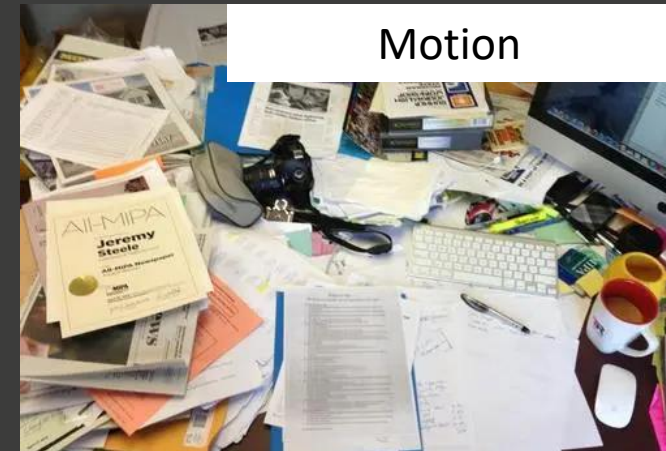
Waste	Description
1. Overproduction	Producing too much or too soon, resulting in poor flow of information or goods and excess inventory
2. Defects	Frequent errors in paperwork, product quality problems, or poor delivery performance
3. Inventory	Excessive storage and delay of information or goods, resulting in excessive cost and poor customer service
4. Over-processing	Going about work processes using the wrong set of tools, procedures or systems, often when a simpler approach may be more effective
5. Transportation	Excessive movement of people, information or goods resulting wasted time, effort and cost
6. Waiting	Long periods of inactivity for people, information or goods, resulting in poor flow and long lead times
7. Motion	Poor workplace organisation, resulting poor ergonomics, e.g. excessive bending stretching and frequently lost items





What is Lean Enterprise?

Waste Examples





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What is Lean Enterprise?



Waiting



Defects

Waste Examples



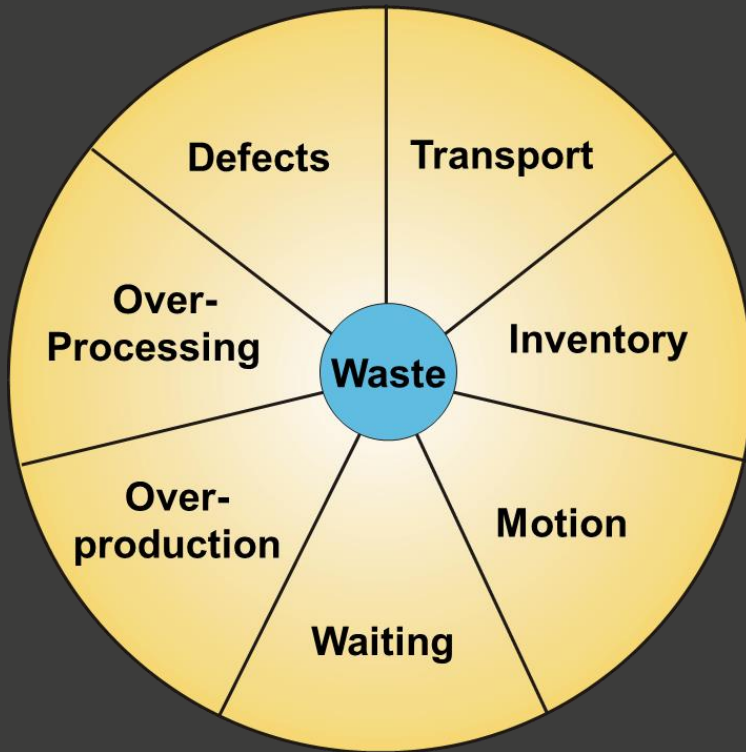
Over processing



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What is Lean Enterprise?



Exercise - recognising waste (10 mins)

- Write down 3 specific examples of waste that you know of in your process
- Define them in terms of the 7 wastes





Just-In-Time (JIT)

- Three key principles form the basis for Just-in-Time production:
 - Pull system for material delivery
 - Takt time (available work time/demand per day)
 - Continuous one-piece flow
- Also required are:
 - Use of Kanbans
 - Stable levelled production (produce product ABABAB not AAABBB)



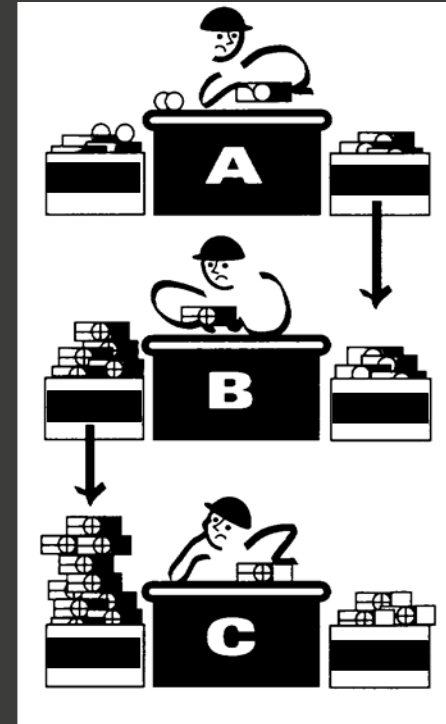


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Just-In-Time (JIT)

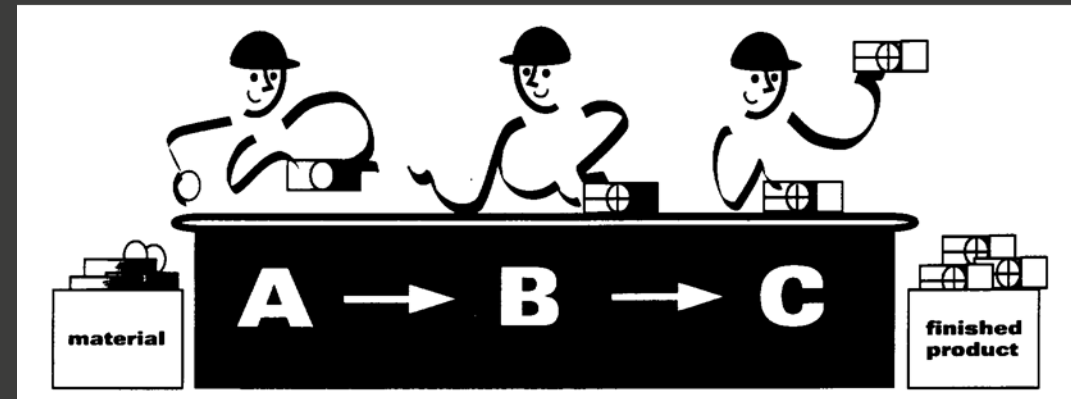
Traditional System

- When Process A completes its work, it hands the product off to Process B, where it is stored until needed.



Pull System

- Process B is responsible for getting parts and supplies from Process A *as they are needed*. There is no intermediate storage.
- Rate of production dictated by takt time





Just-In-Time (JIT)

A Kanban is a signboard or card used as a tool for visual control

- Serves as a work order
- Can describe what to produce, when, quantity, method and means of transportation
- Can move with the material

Simple



Detailed





What you see in Just-In-Time (JIT) factory

- An invisible line that seems to connect the customer to the production processes
- Greater flexibility to meet customer needs due to the short lead time
- Quick response to trouble on the line – because it is vital
- Production scheduling is very short term – because you are only making what you have orders for
- Forecasting the market is more accurate because you have better knowledge of the actual market needs





Just-In-Time (JIT) implementation

- You do not just cut inventory or space for inventory and assume you can now work to this new system



Water represents inventory level – the space between you and the underlying problems (the rocks)

As inventory is reduced the underlying problems rise to the surface

MACHINE





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5S

- SEPERATING
- SORTING
- SWEEPING
- STANDARDISING
- SUSTAINING



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5S - Sorting

- Throw away what we don't need





5S - Separating

- Arrange what we do need in a logical and efficient manner





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5S - Sweeping

- Everything we use, pick up or put back should be clean and fit for use



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5S - Standardising

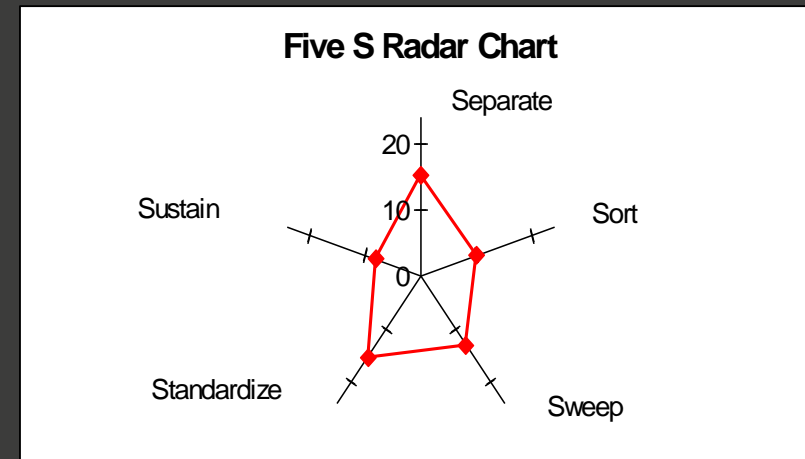
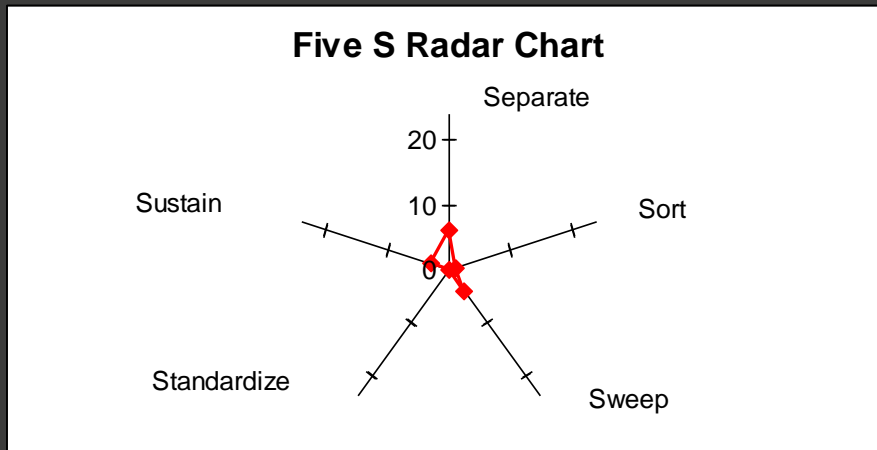
- The first 3S should be made systematic through work place design and visual control





5S - Sustaining

- The first 4S should be consistently reinforced and internalised into the culture





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Value Stream Mapping

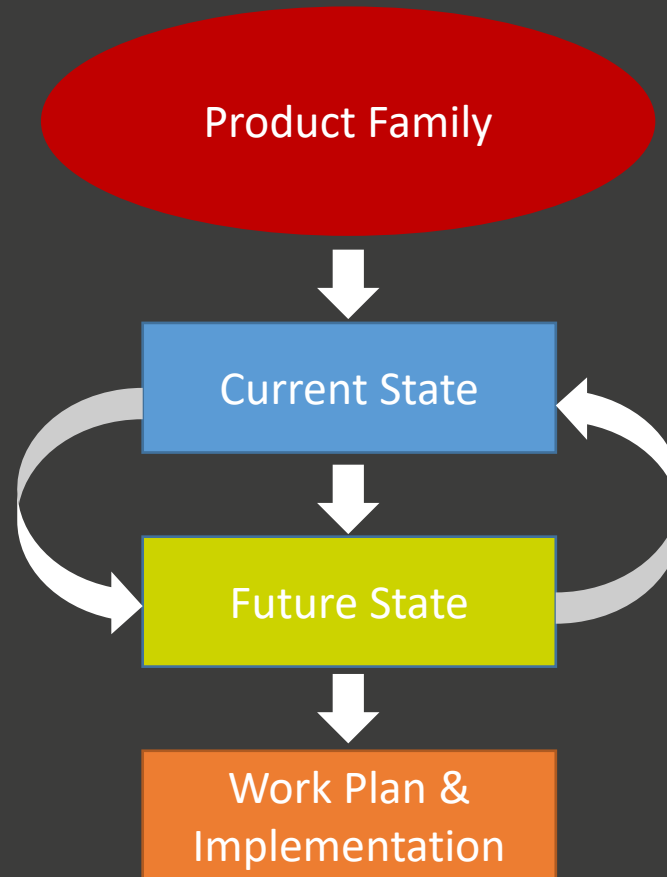
- Before & after states
- Material & information flow
- Framework for waste reduction



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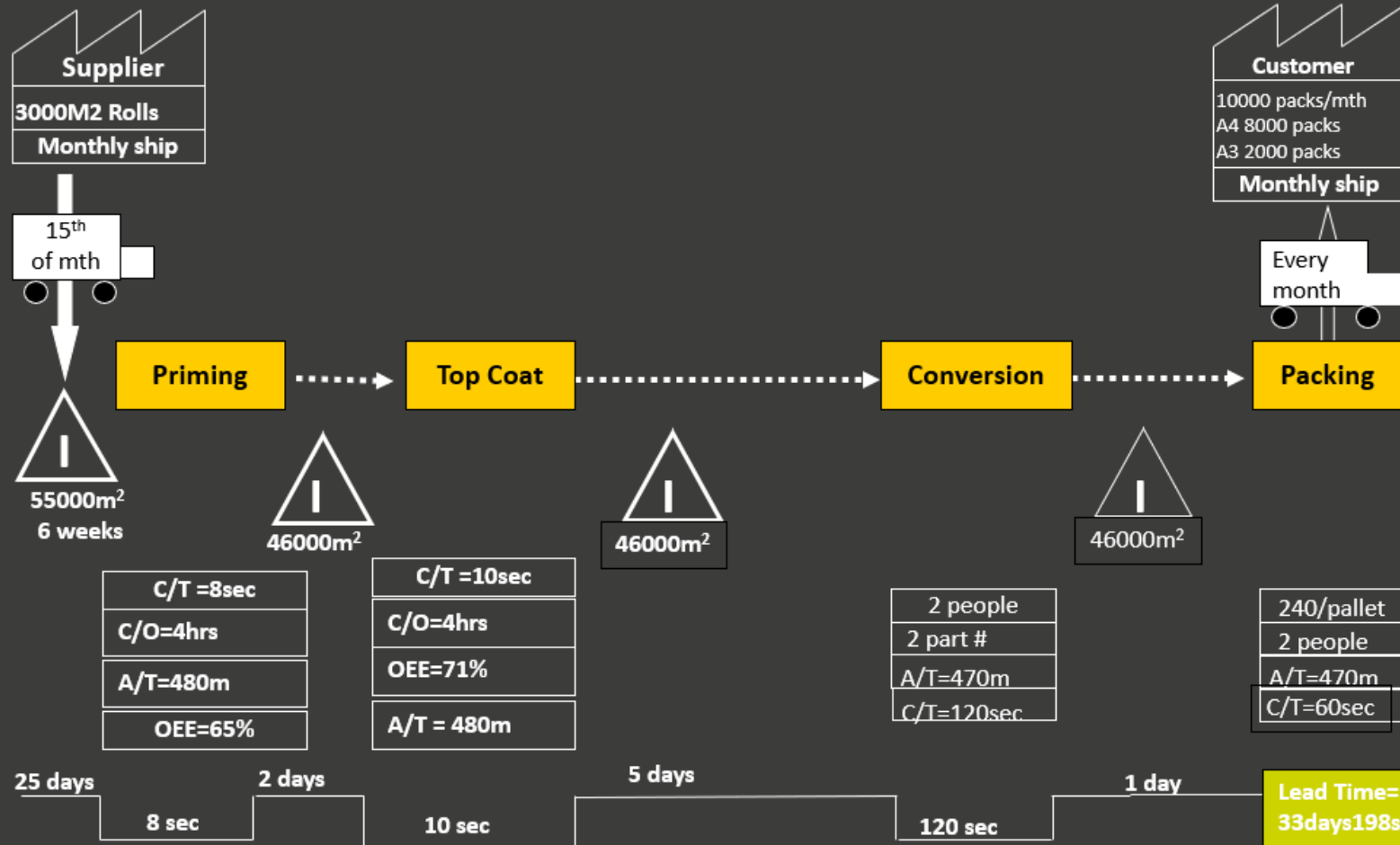


Value Stream Mapping (Before & after states)



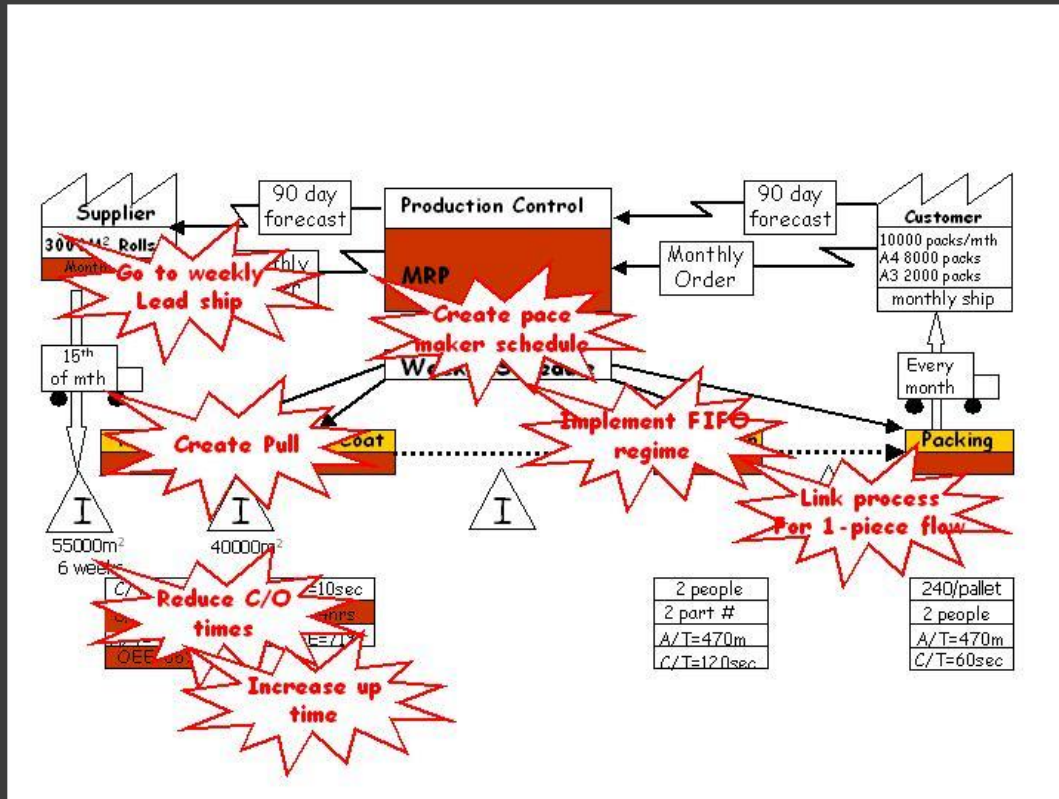


Value Stream Mapping (Material & information flow)





Value Stream Mapping (Framework for waste reduction)

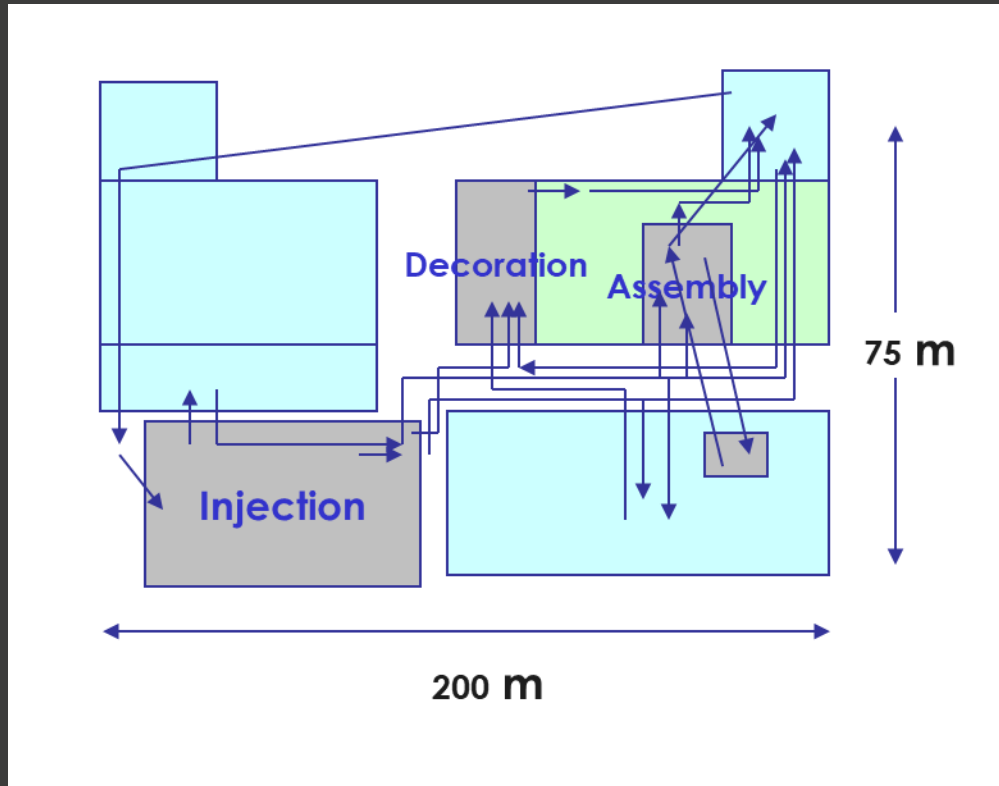


Date : Champion : Value Stream manager :		Annual VSM Plan		Executive Sign Off.....												
Plant Level Objective	Value Stream Loop	Objective	Measurable Goal	1	2	3	4	5	6	7	8	9	10	11	12	Review & Date
Improve Profitability of 6VF11 and 4VF11 product range	1. Pacemaker	• 1 piece flow Final config & Pack • U-shape cell assembly • Create pacemaker schedule • Implement FIFO at formation • Reduce C/O time on COS	• Reduce to 4 • WIP < 20 • H'nka Y/N • FIFO contrl • C/O < 10min	→	→	→	→	→	→	→	→	→	→	→	→	
	2. Casting & Pasting supermarket	• Reduce C/O time on Caster • Reduce C/O time on Paster • Increase uptime on Caster	• C/O < 10min • C/O < 10min • OEE > 85%	→	→	→	→	→	→	→	→	→	→	→	→	
	3. Supplier	• Pull lead stacks for increased inventory turns	• Turns > 52	→	→	→	→	→	→	→	→	→	→	→	→	

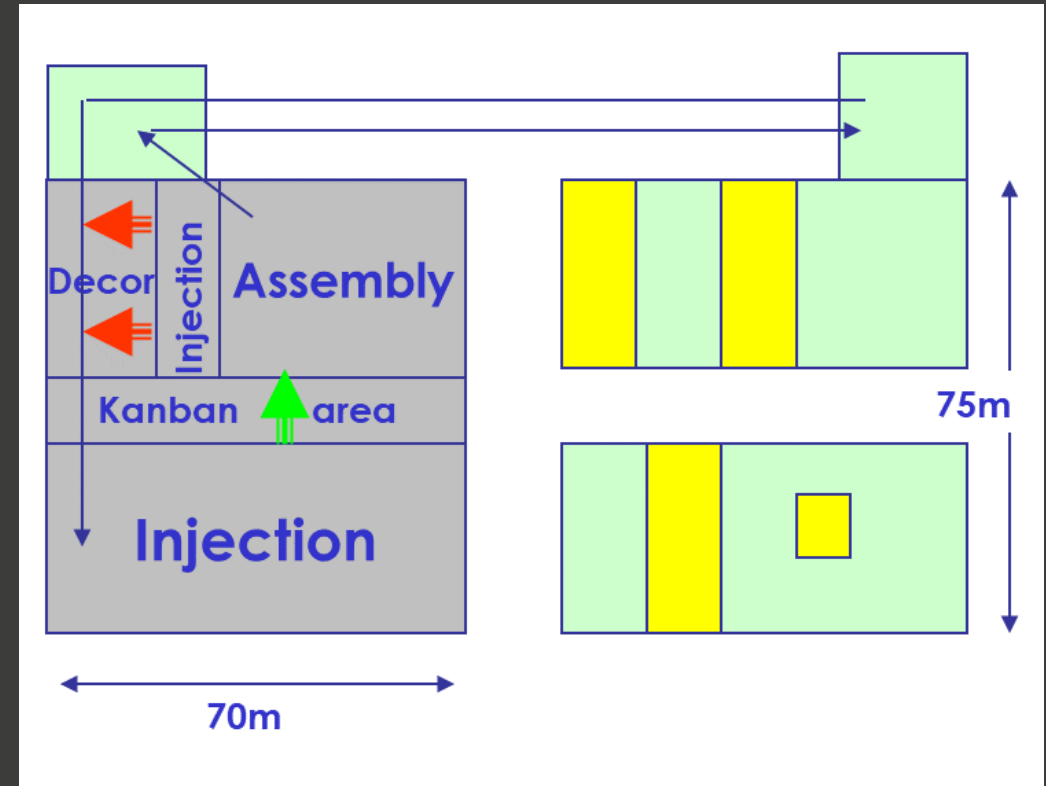




Value Stream Mapping (Framework for waste reduction)



Value does not flow

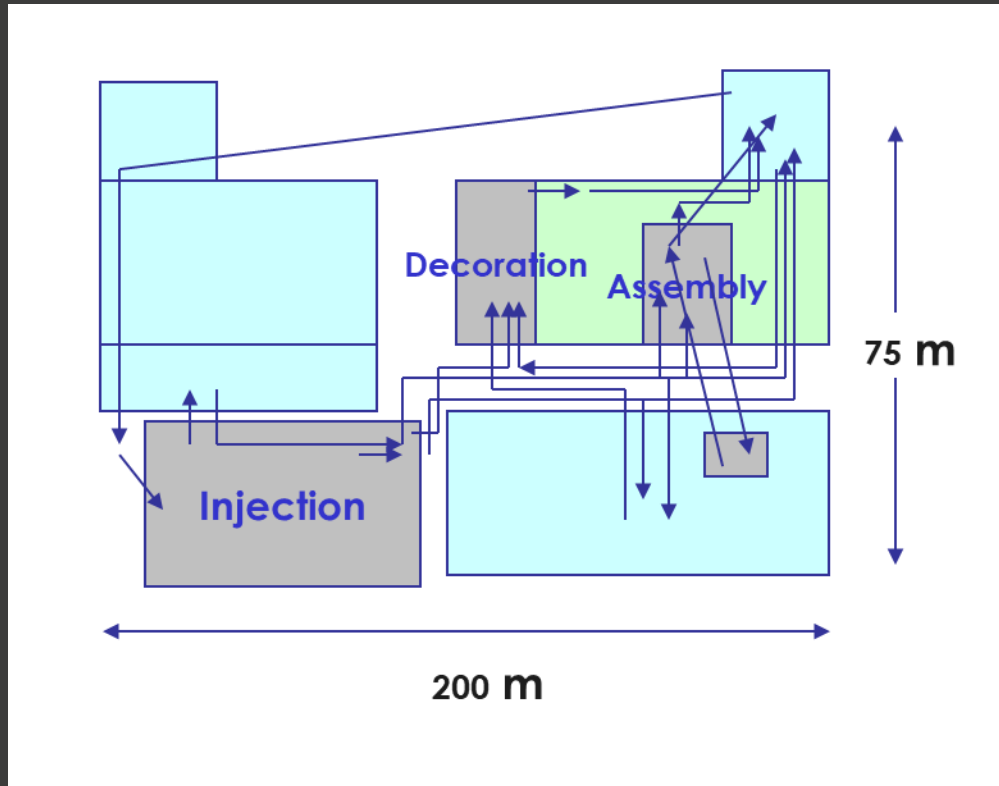


Improvement

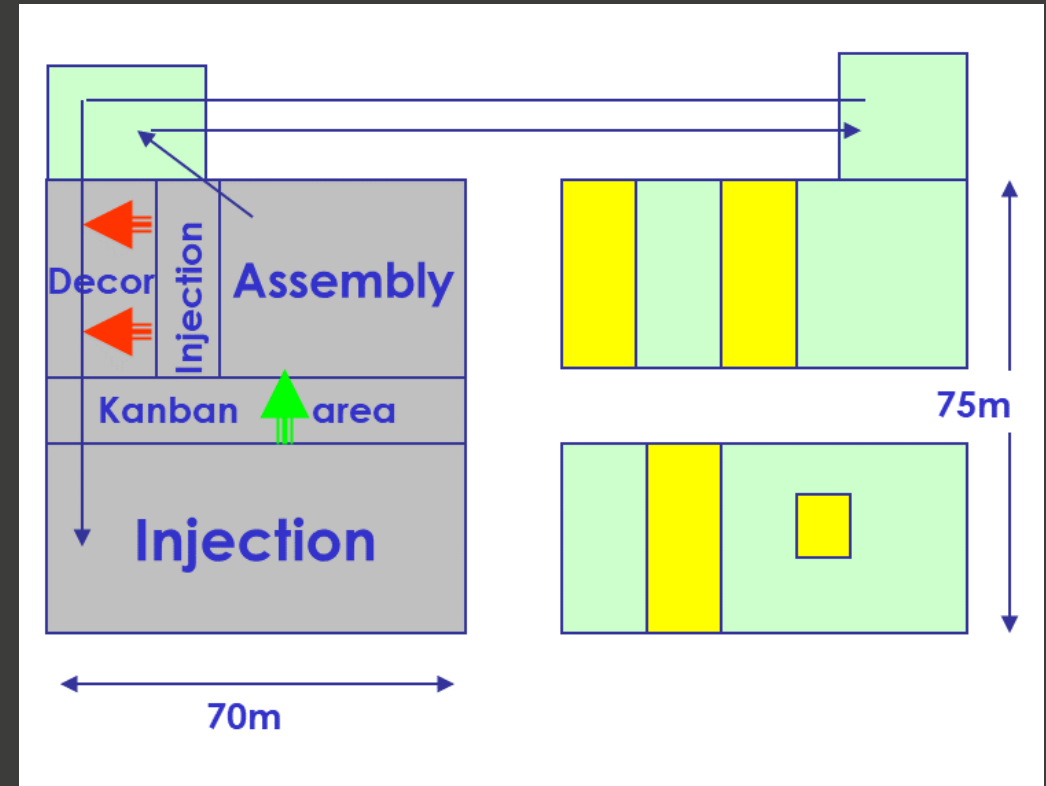




Value Stream Mapping (Framework for waste reduction)



Value does not flow



Improvement





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SMED

- SINGLE
- MINUTE
- EXCHANGE OF
- DIES

Value does not flow

Improvement



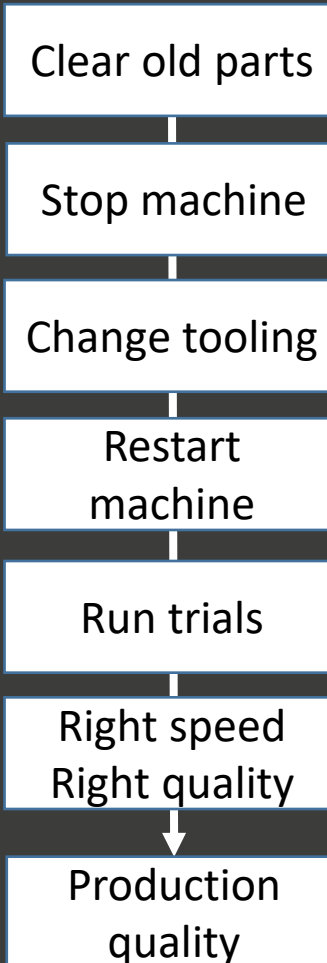
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SMED

The ability to change from one product to the next in less than 10 minutes

Zero changeover an ultimate goal



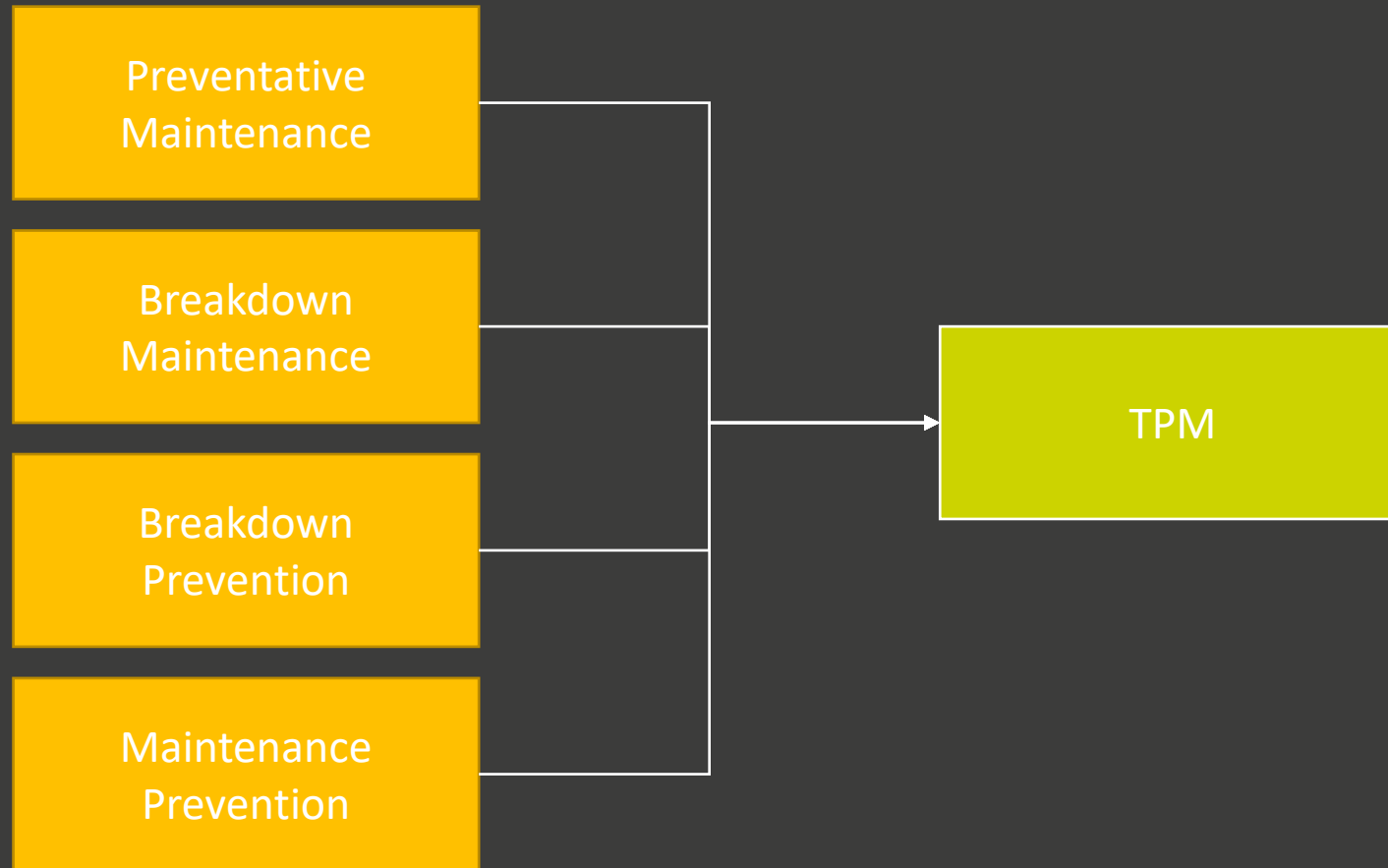
Scope

- Preparation
- Tool Out
- Tool In
- Ramp up
- Evaluation





TPM (Total Preventative Maintenance)





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TPM (Preventative Maintenance)

- Operators are responsible for:
 - Basic maintenance functions
 - Cleaning, lubricating, tightening, filters, changeovers etc
 - Detecting and reporting abnormalities
 - Maintaining standards



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TPM (Breakdown Maintenance)

- Technicians are responsible for:
 - Timely repair of breakdowns, including:
 - Total or partial loss of performance, minor stoppages etc
 - Fault analysis and root cause problem solving
 - Encouraging operator involvement





TPM (Breakdown Prevention)

- Technicians are responsible for:
 - Predictive maintenance activity
 - Oil ferrography, bear wear analysis, vibration analysis etc
 - Fault analysis and root cause problem solving of breakdowns
 - Updating preventative maintenance scheduling
 - Operator training





TPM (Maintenance Prevention)

- Operators and Technicians are responsible for:
 - Maintaining 5S excellence
 - Separating, sorting, sweeping, standardising, sustaining
 - Controlling or eliminating sources of maintenance
 - Oil leaks, scrap recovery devices
 - Driving “Quick Change”, SMED activity

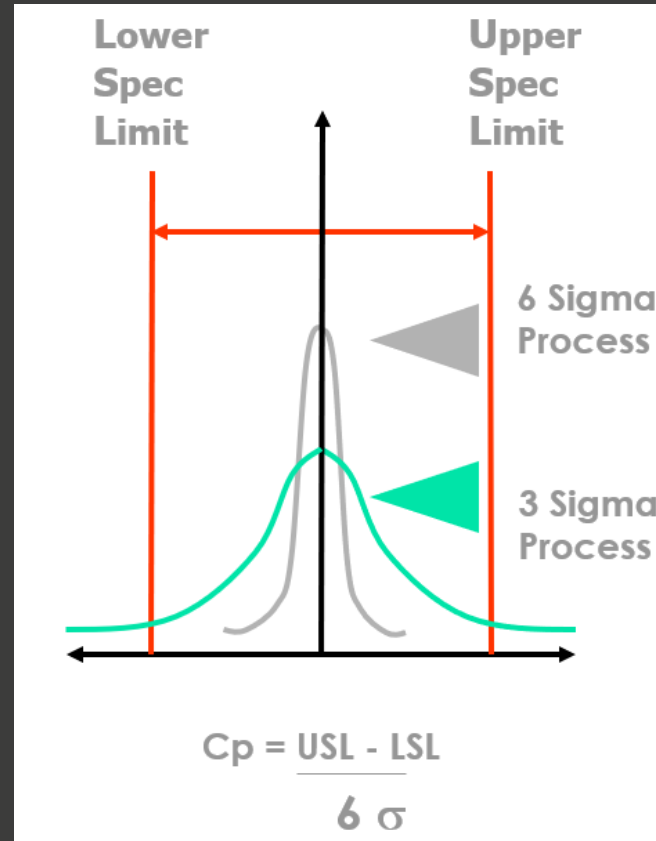




Six Sigma

Six Sigma is a set of techniques and tools for process improvement.

- Define
- Measure
- Analyse
- Improve
- Control



Tool Box

- Control plans
- Design of experiments
- Process control
- Statistical analysis
- Capability studies
- FMEA
- Measurement systems
- Process mapping
- Cause & effect

