

The 7 Wastes: Hidden Costs That Erode Manufacturing Performance

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Dr.Abdu Shaalan
Industrial Automation programme leader

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Introduction - Presenter

Dr. Abdu Shaalan

Dr. Abdu Shaalan is a PhD holder in the fields of Industrial Automation and Advanced Maintenance practices from the University of Sunderland.

He is a research enthusiast and has held multiple research projects over the years, including a research fellowship with the nursing school, several KTP projects with local manufacturers, and was recently awarded a Teaching Fellowship in AI in Education.

Abdu's research focus is on Industrial Automation and Advanced Maintenance practices in the advances of Industry 4.0 technologies.

Teaching-wise, Abdu held multiple programme lead positions ranging from Undergraduate and Postgraduate levels.

Abdu values the link between teaching, research, and industry through research-led education that bridges the gap between academia and industry, ensuring graduates are ready for industry upon graduation.

Currently a programme leader for Undergraduate and Postgraduate Industrial Automation programmes at ECT, he ensures students are supported and provided with high value education that competes with world class education.



Agenda

- Activities classification
- The 7 deadly wastes



Value Added

An action that add an actual value to a product

Three main aspects must exist to call a process a 'Value added process'

- 1- Customers are willing to pay for it
- 2- Physical change takes place on the product
- 3- Successful application from the first time

Essential Non-value added

The type of work that does not add value but must be done to meet customers needs.

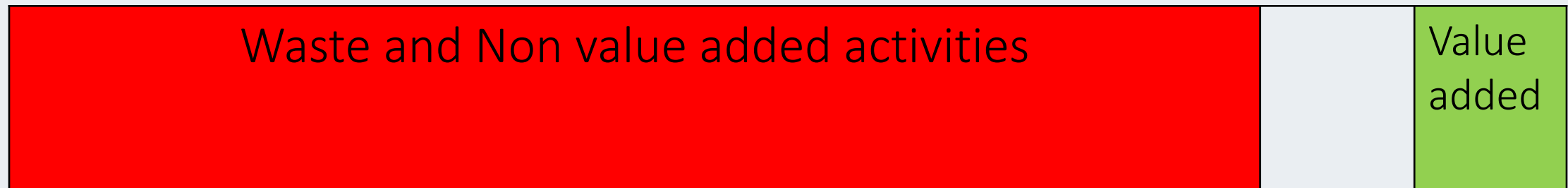
Waste

Does not any value and customers are NOT willing to pay for it.

Total lead time through value stream



Traditional improvement focus (VA focus)



Waste elimination focus



7 Wastes of Lean



Inventory



Waiting



Defects



Overproduction



Motion



Transportation



Over-processing



The Waste of defects

Work quality that is less than customers expectations or request

Examples of defects

Rework

Scrap

Missing parts

Wrong parts

Incomplete documents

As it is often hard to measure the waste of defects, its impact could be measured using various indicators including;

- warranty cost

- Rework cost

- Field service repair

- Lost customers

It is estimated that each time a defect passed to the following process, it costs 10 times to fix.

Causes of defects

Lack of in-process checks.

Low quality materials from suppliers.

Inadequate training and poor or no work instructions

Tools to battle defects

Stop the line principles.

Using E-stops or Overline stop cables

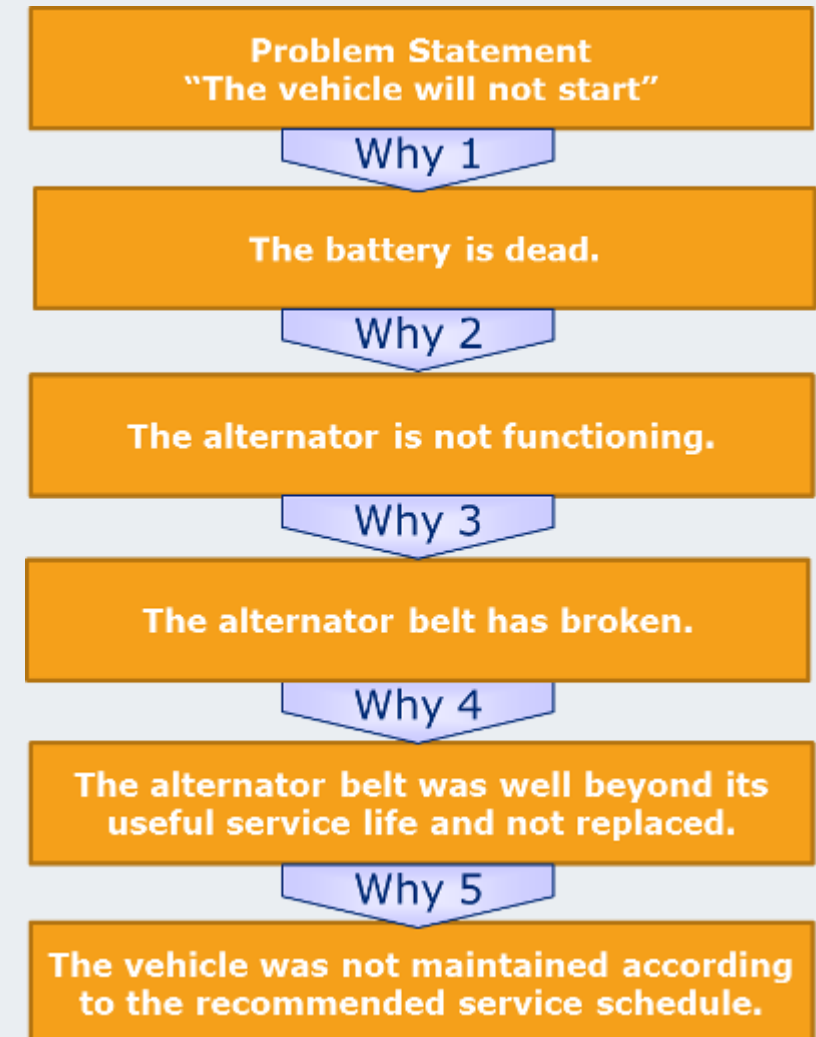
Pokayoke (Mistake proof)

Make it impossible to produce a defect.

Each part has a certain way of installation
and certain shape for example.

5-Y analysis

Asking Y multiple times in a effort to identify the
root cause of a problem



Is 99% good enough?

One billion prescriptions written in the UK every year.
About a million faulty prescription every year??

14.4 billion letter handled by the royal mail in 17-18.
over 14 million lost letters every year??



Waste of inventory

Any work or material in hand that is not needed to meet customers demands now.

Examples of inventory waste

- 1- Excess raw material
- 2- Work in process (WIP)
- 3- Finished goods
- 4- Supplies
- 5- Spare parts

Inventory is directly related to cash flow.



Cost of inventory



Holding cost



Obsolescence



Price erosion



Opportunity cost

Causes of inventory waste

Making extra parts to cover defects and scrap.

Employees rewarded based on their output capacity regardless of customers demand.

Unlevelled production schedule.

Wrong forecast.

Waste of processing (over processing)

Occurs when a product is designed in such a way that consumes more resources such as space, energy, or people than is truly required.



Examples of Over processing

Machines are slower or faster than needed.

Equipment that uses more energy than needed.

Drilling instead of punching.

Extra critical checks when it is unnecessary.

Cleaning the same space more than once or with higher frequency than needed.

Cost of Ove processing

Extra materials used.

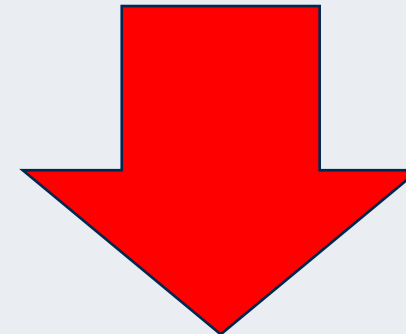
Excess space used.

Cost of Energy.

Extra time spent on the extra process.

Reducing over-processing increases productivity

Reduce over
processing



Increase
productivity



The waste of waiting

Idle time created due Late materials, machines, inspection or information.

Often replaced by over production or busy work which could cause more harm than good.

Usually happen due to poor planning

Costs of waiting



Loss capacity.



Loss operating cost.



overtime costs.



Loss of flexibility to meet costumers demands.



Cost of overproduction.

The waste of motion

Any movement of people that doesn't add value to the product creates the waste of motion.

By closely studying motion and the time it takes to do a task, it is often possible to improve manual operation time by 30%-50%.

Reducing the waste of motion contributes to the reduction of the change of time.



Examples of waste of motion



Walking



Reaching for tools or supplies



Searching for items



Lifting parts and materials



Choosing between parts



Arranging

Causes of waste of motion



Poorly designed process.



Lack of standard workplace.

Poor work area layout and design.



Disorganisation

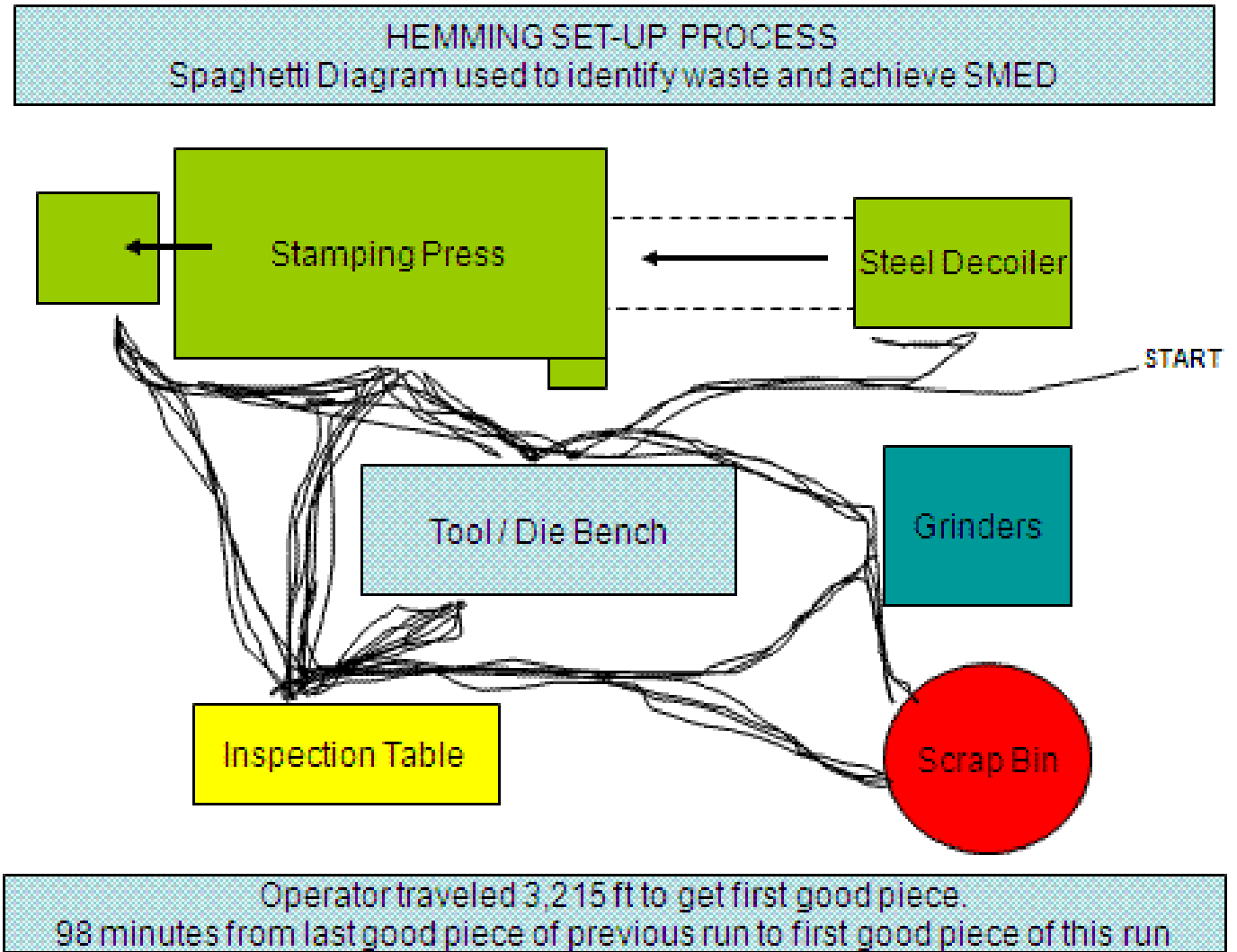


"Could say motion waste is the mother of all productivity waste"

Tools to reduce waste of motion

5S

Work flow analysis (spaghetti diagram)



The waste of transportation

Movement of materials that adds NO value to the product.

Movement of materials using forklifts, carts, or conveyor belts.



Examples of the waste of transportation



Moving finished goods to storage



Moving work in process to next step



Moving between areas



Moving parts between the line



Waking paperwork around the office



Moving items to quality assurance

Causes of waste of transportation



Outdated plant layout



Large batch size (over-production)



Inventory



Transfer of materials

Waste of overproduction (mother of all waste)



Occurs when a manufacturer make more product more than what customers needs right now.

It often leads to other forms of waste on way or another.

It increases the waste of inventory

Increases the waiting time to reach materials

Examples of over production

Making extra parts

Thank you!

Upcoming Courses

Engineering College of Technology (ECT) <i>UK-Recognised Qualifications</i>	Start Date
Bachelor of Engineering (Honours) in Industrial Automation	September 2026, February 2027
Bachelor of Engineering (Honours) in Electrical Engineering	September 2026, February 2027
Master of Science (Power System Analysis and Renewable Integration)	October 2026, February 2027
Master of Science (Industrial Automation and Instrumentation Control)	October 2026, February 2027

Q&A

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