

EASTERN INTERNATIONAL  
UNIVERSITY  
School of Engineering



# ENGINEERING ECONOMY

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## Chapter 5. 5S



## Chapter 5. 5S

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### Outline:

1. Types of waste
2. Definition of 5S
3. Benefits of 5S
4. 5S Implementation

# Chapter 5. 5S

Types of waste:

## Seven Wastes



## What is your Customer Willing to Pay For?

Profit = (Selling price – Cost) x Quantity

- Reducing costs is a more effective method of increasing profits
- The need to cut costs and eliminate waste

$$\text{Marked Price (MP)} = \frac{\text{Cost Price (CP)}}{\text{Price}} \times (100\% + \text{Mark Up\%})$$



CP =  
\$1000

Mark Up  
= 80%



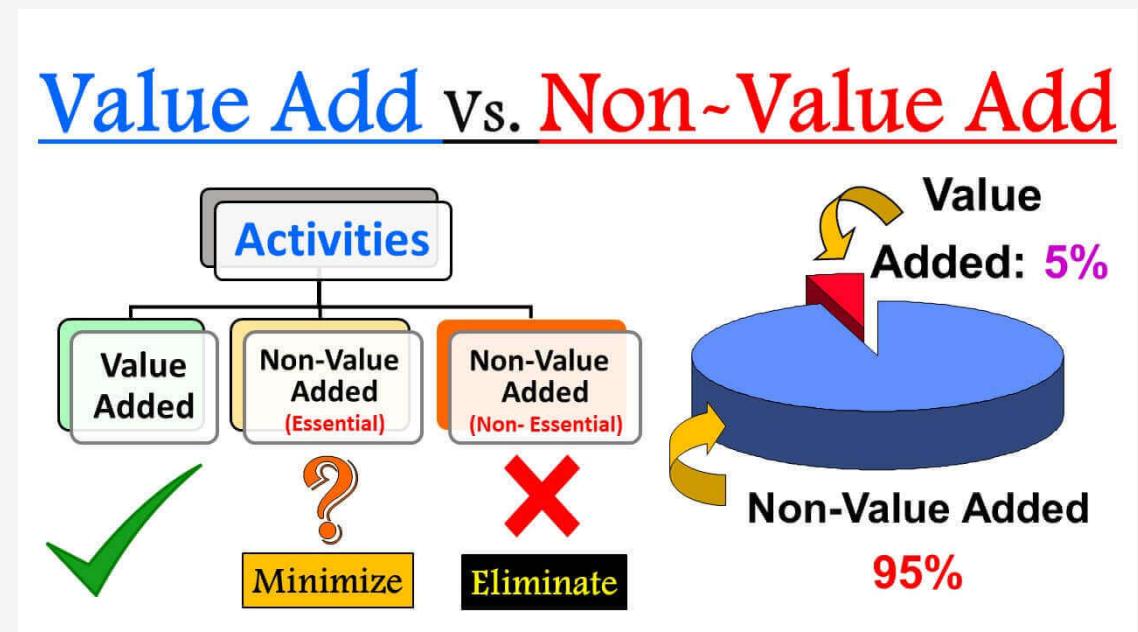
New TV  
\$1800 MP

$$\text{Cost Price (CP)} = \frac{\text{Marked Price (MP)}}{(100\% + \text{Mark Up\%)}}$$

# What is your Customer Willing to Pay For?

- Value Add work

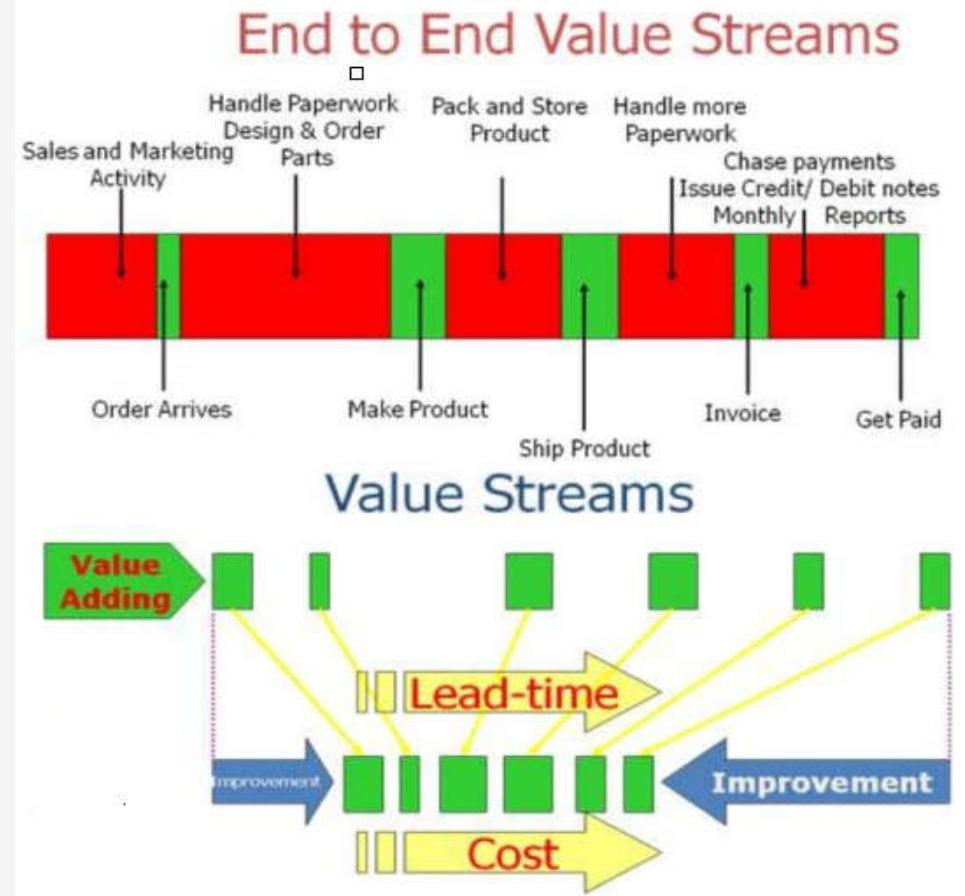
- Non Value Add work
  - Necessary
  - Unnecessary



## What is your Customer Willing to Pay For?

- NVA (red) and VA (green) activities always alternate in a production process

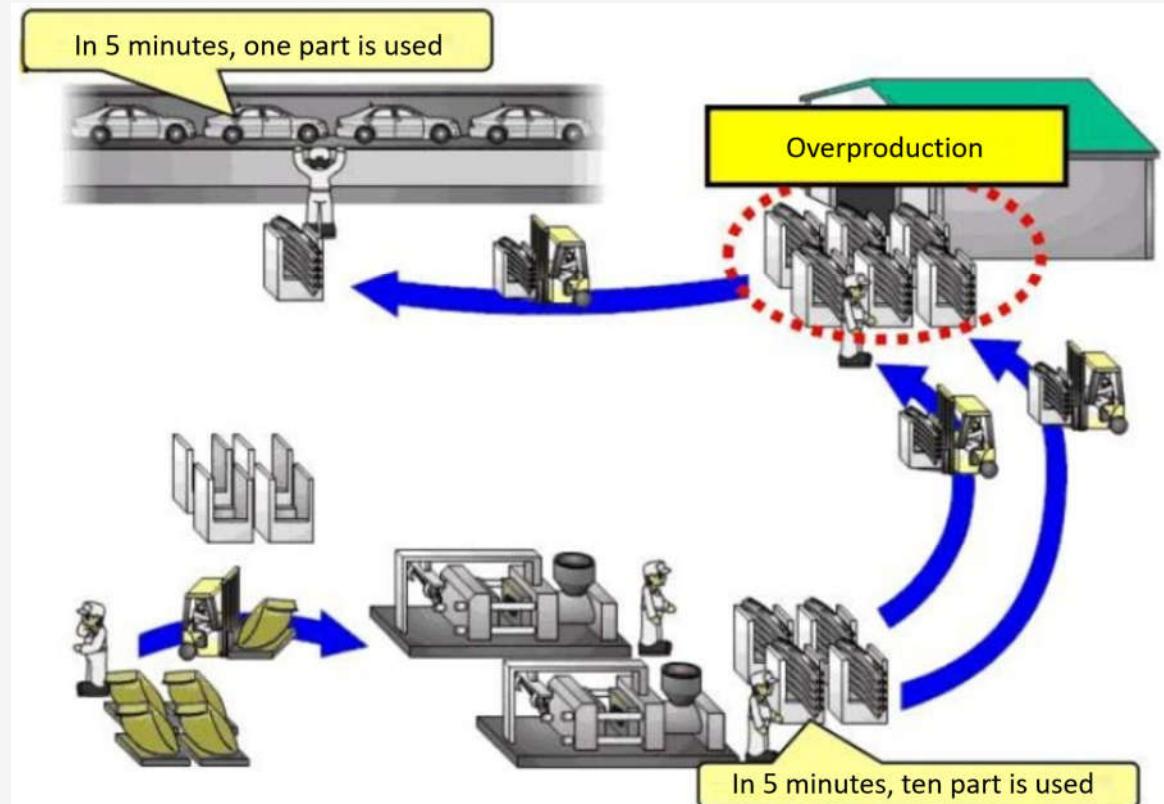
→ Objective: reduce NVA to the maximum level



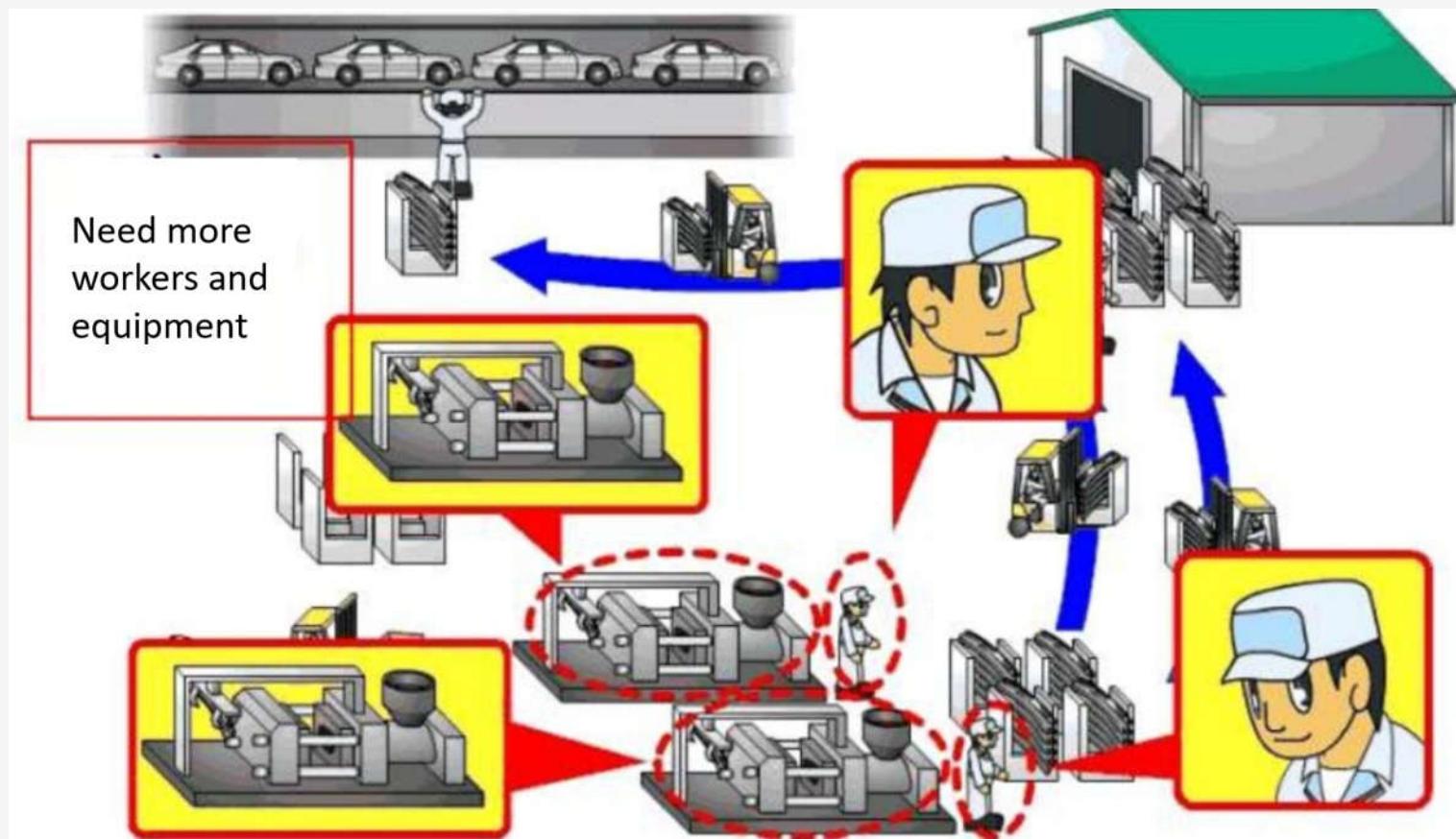
# Overproduction

Producing unnecessarily more or too early than required

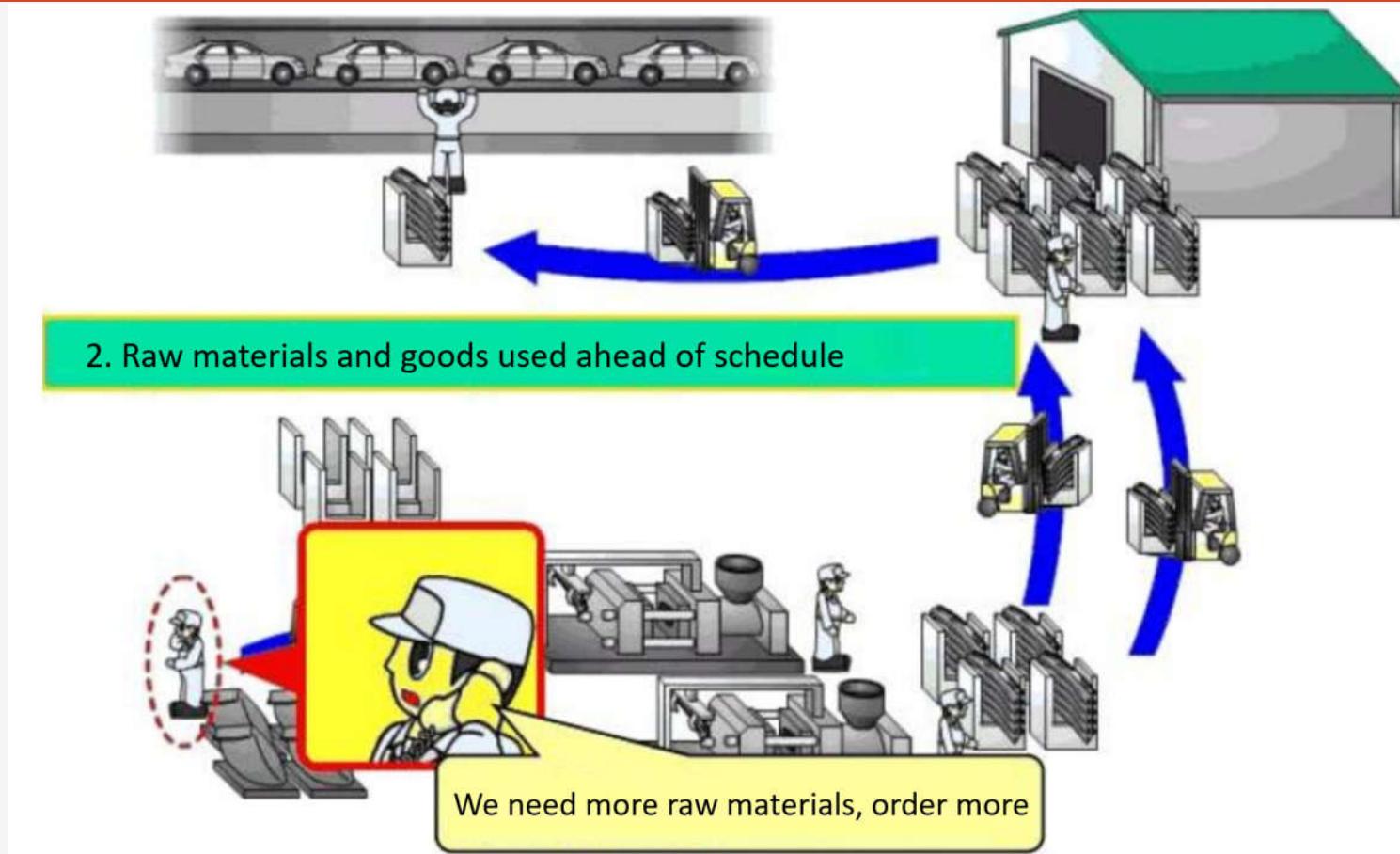
→ The worst type of wastage among the 7 types



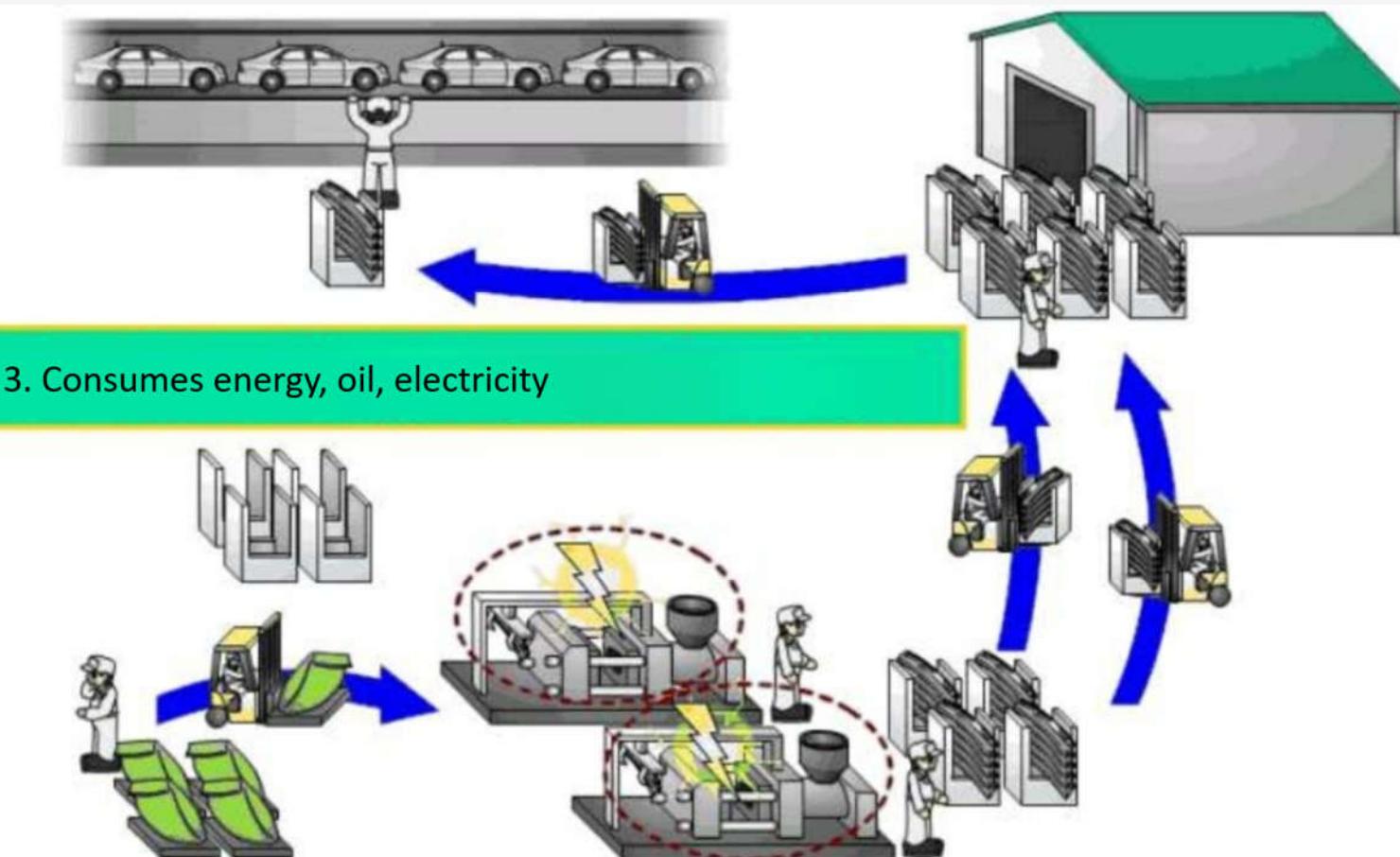
# Overproduction



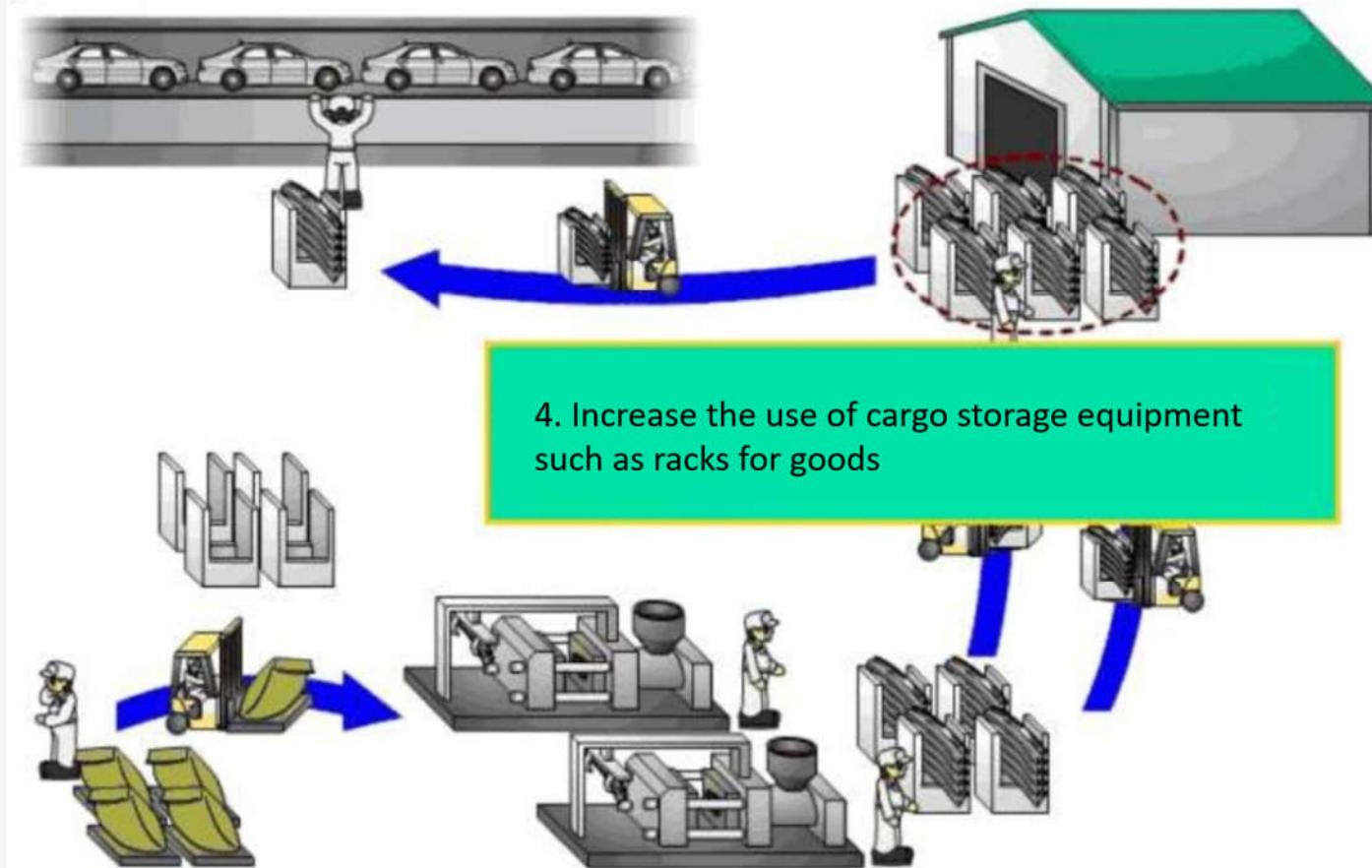
# Overproduction



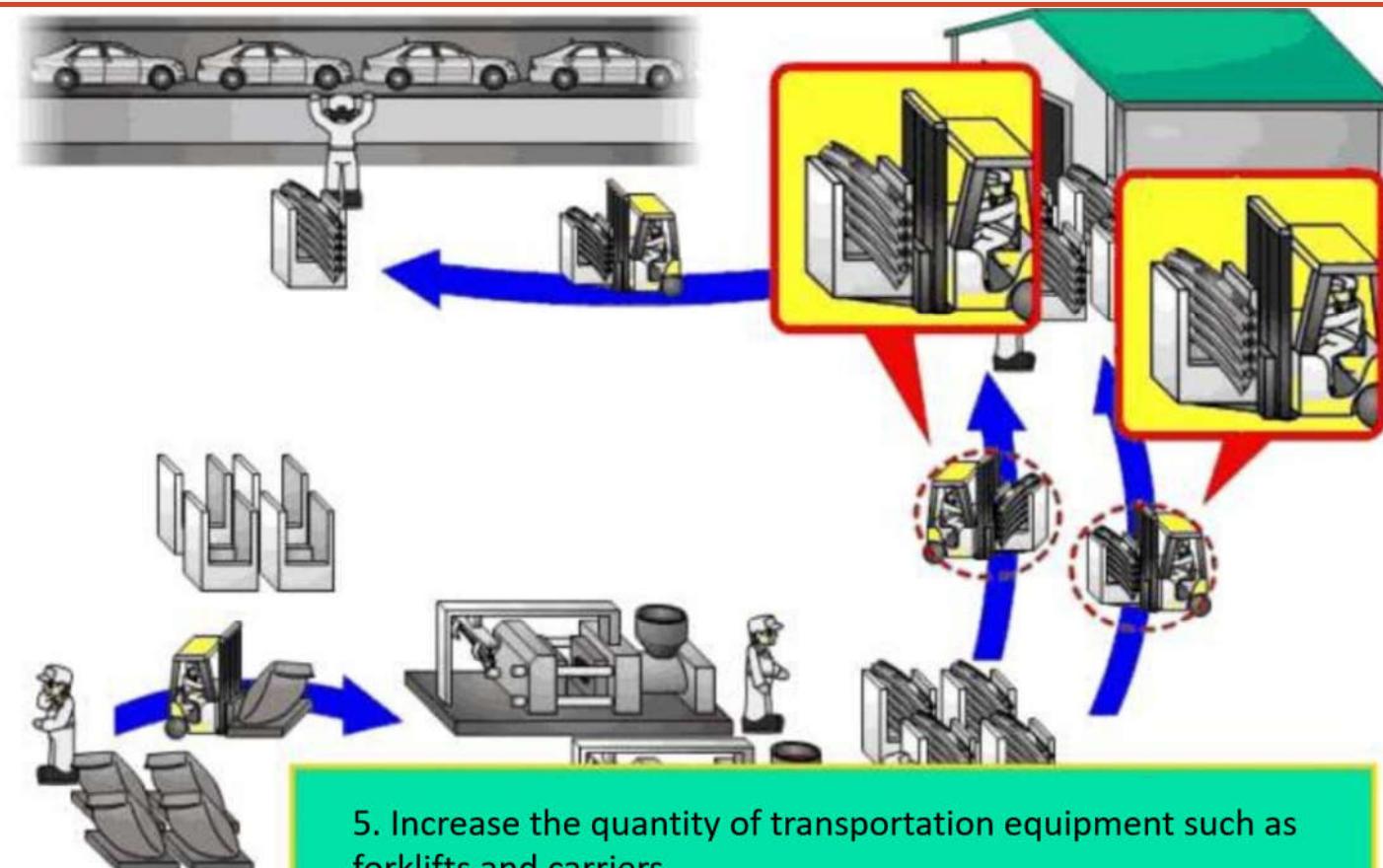
# Overproduction



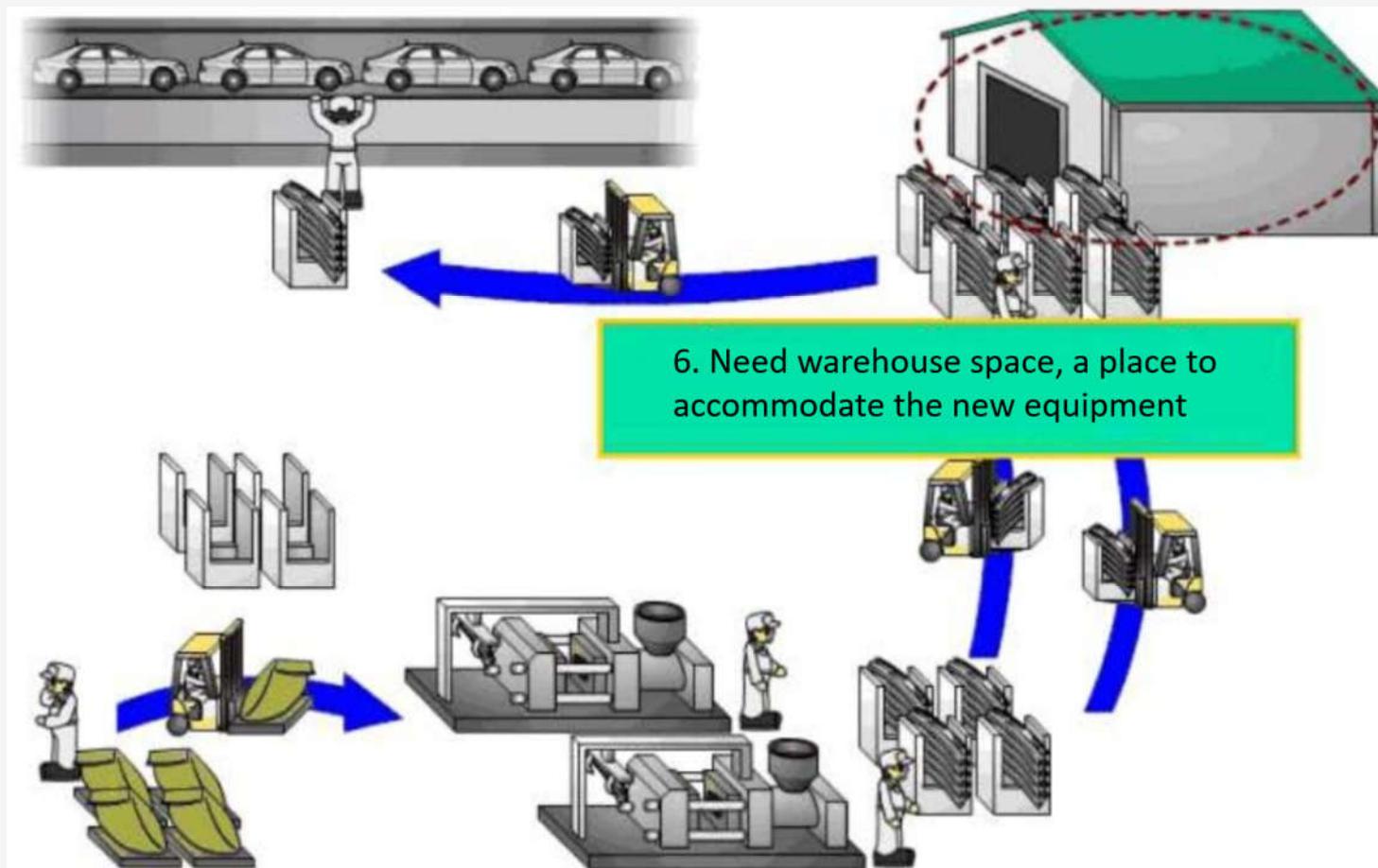
# Overproduction



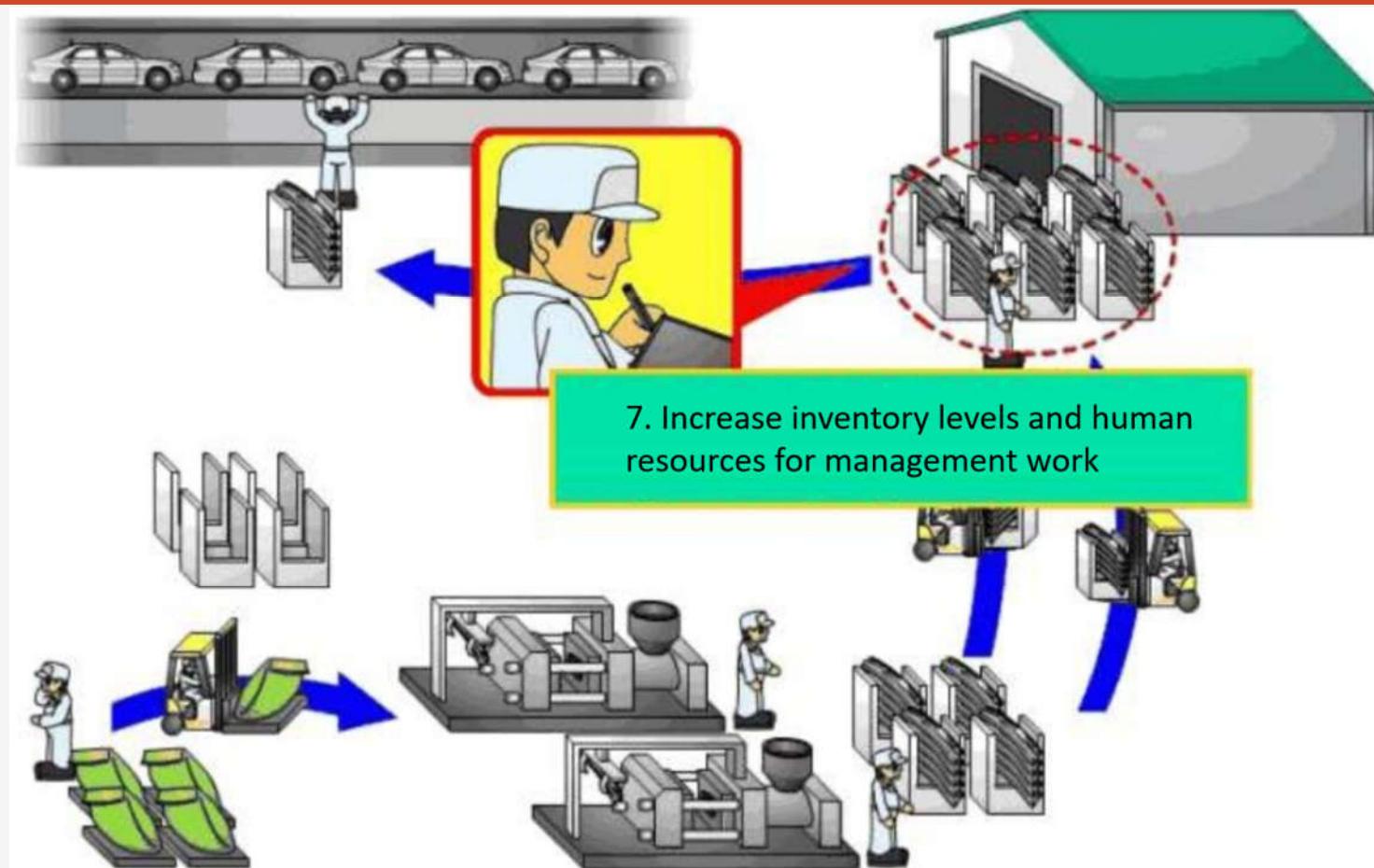
# Overproduction



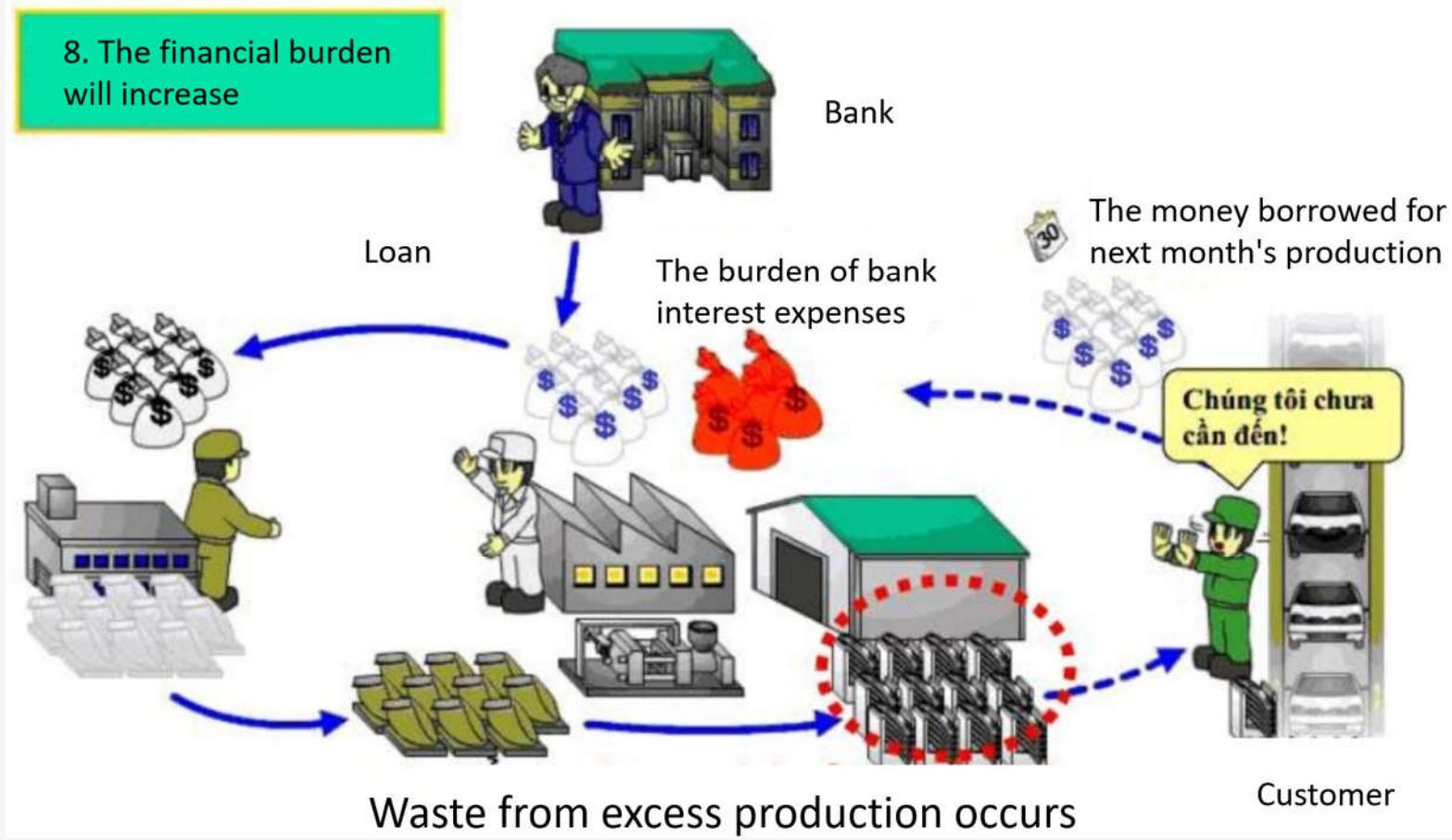
# Overproduction



# Overproduction

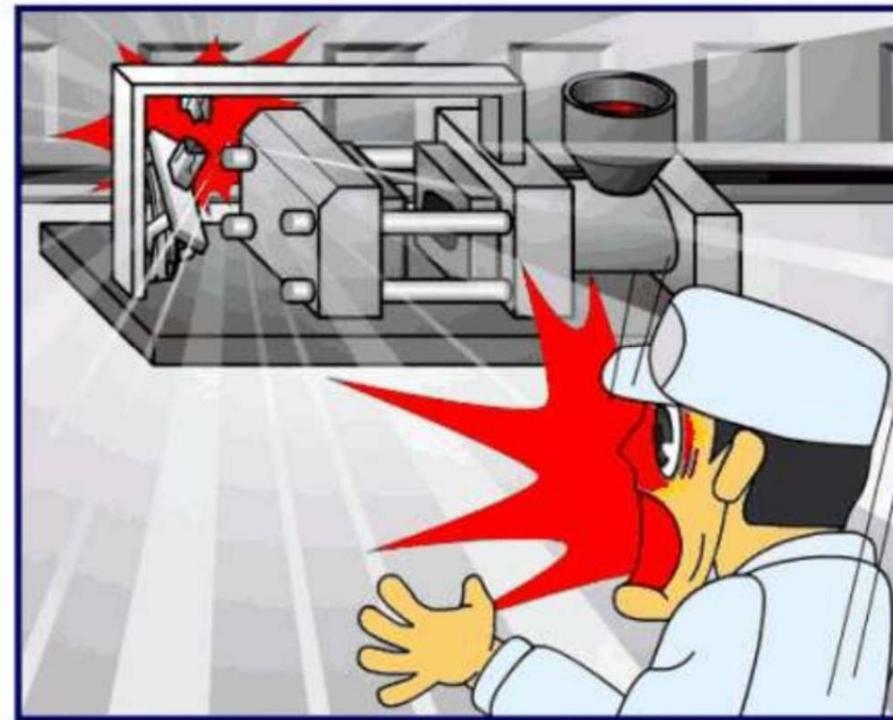


# Overproduction



# Overproduction

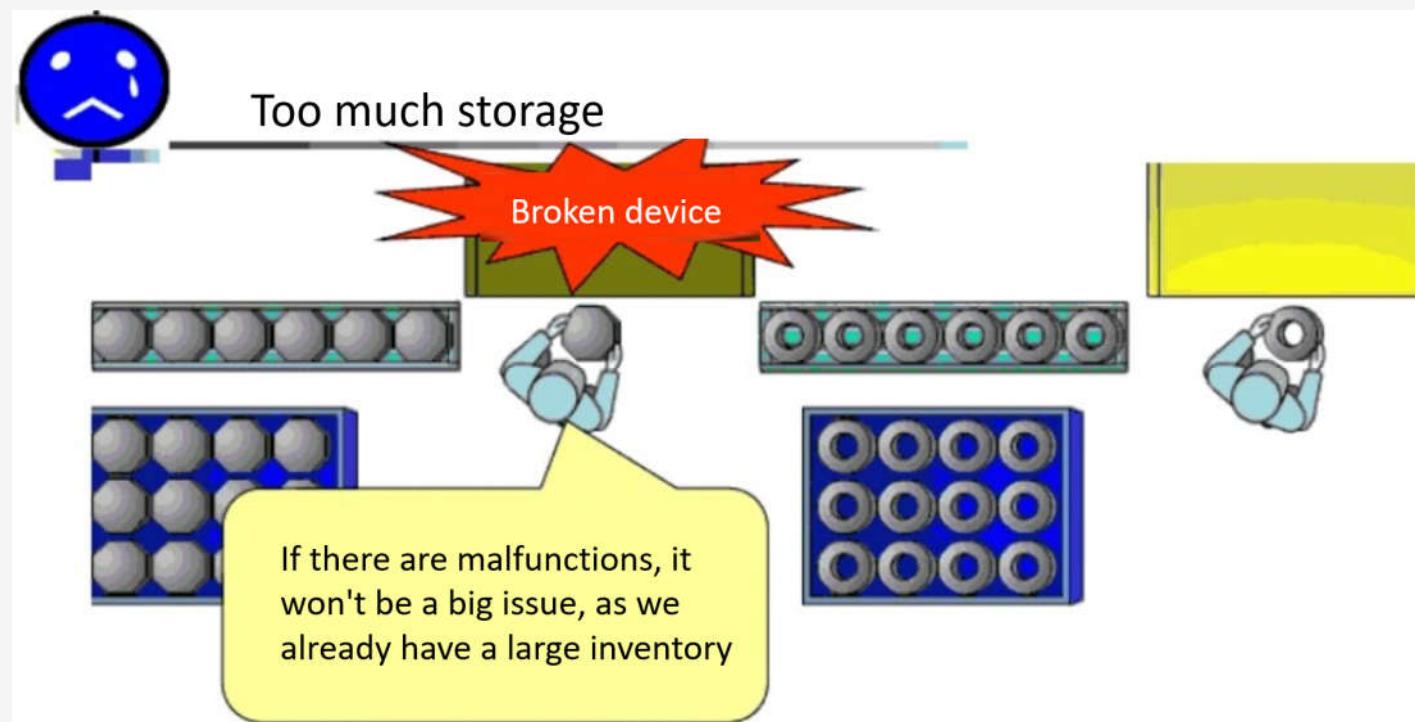
9. The foundation of improvement is being destroyed



Equipment malfunctions are increasing

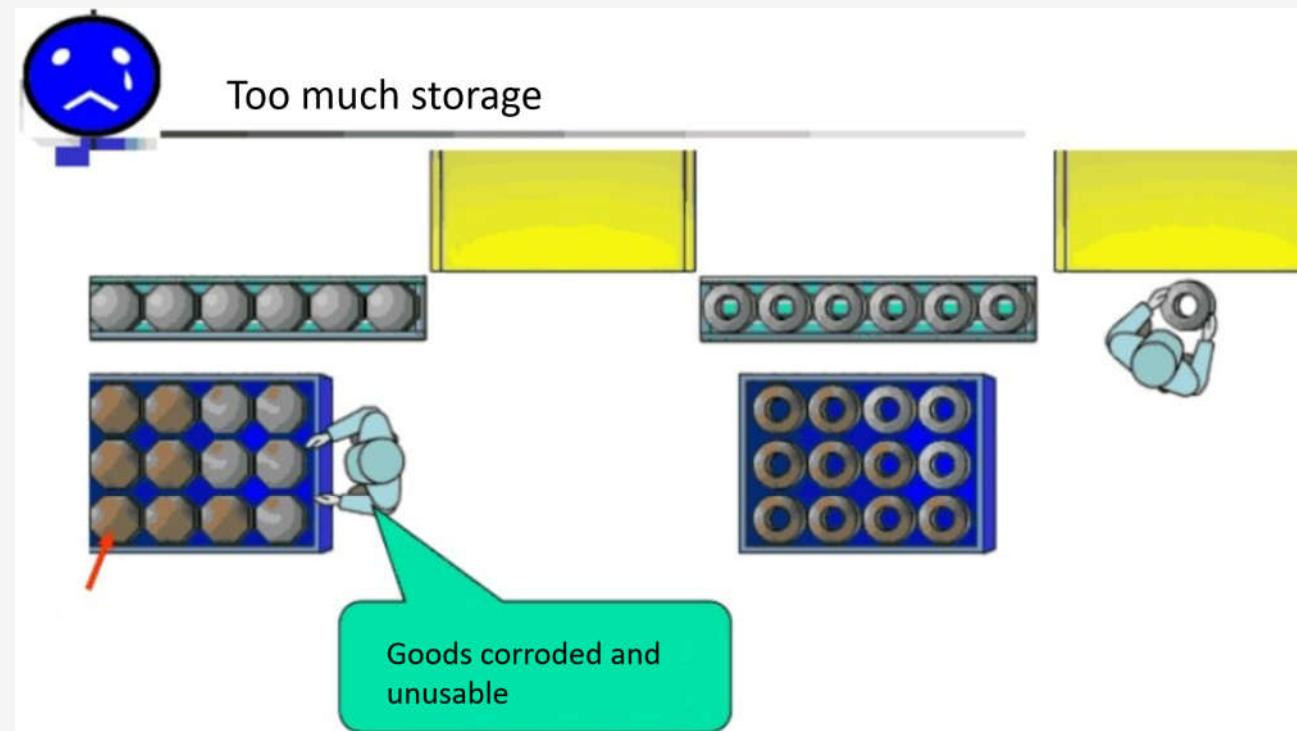
# Inventory

Excess reserves of raw materials, intermediate goods, and finished products

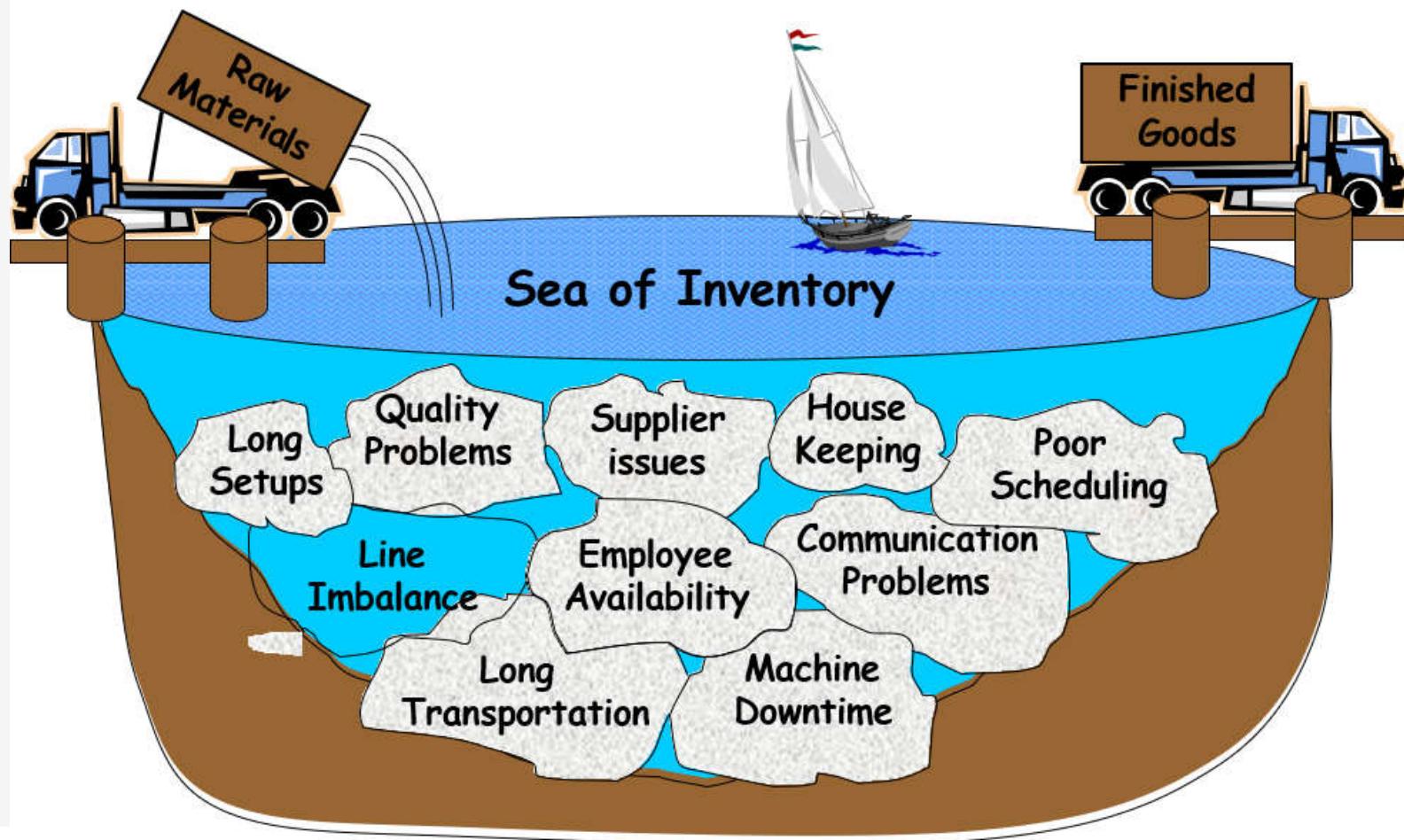


# Inventory

Financial costs, storage expenses, and defect rates increase



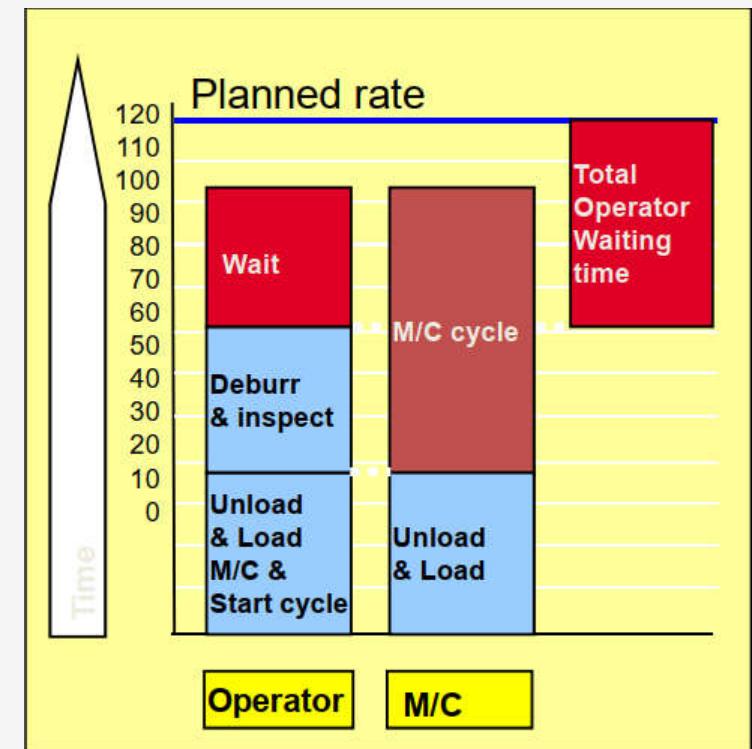
# Inventory



# Waiting

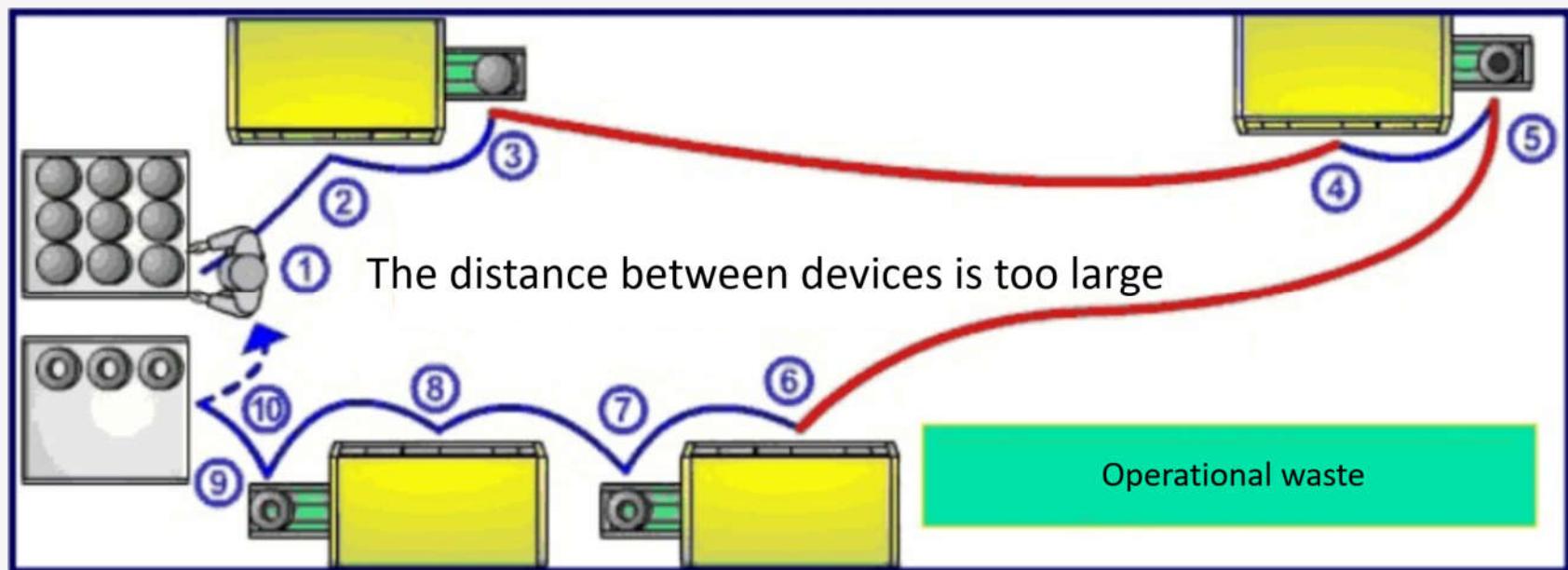
Downtime is the period when workers/machinery are idle due to congestion, the idle time between processing cycles..., and times that do not generate any product.

→ Increased labor and energy consumption costs for machinery



*Waiting time results from failure to synchronise activities*

# Operating

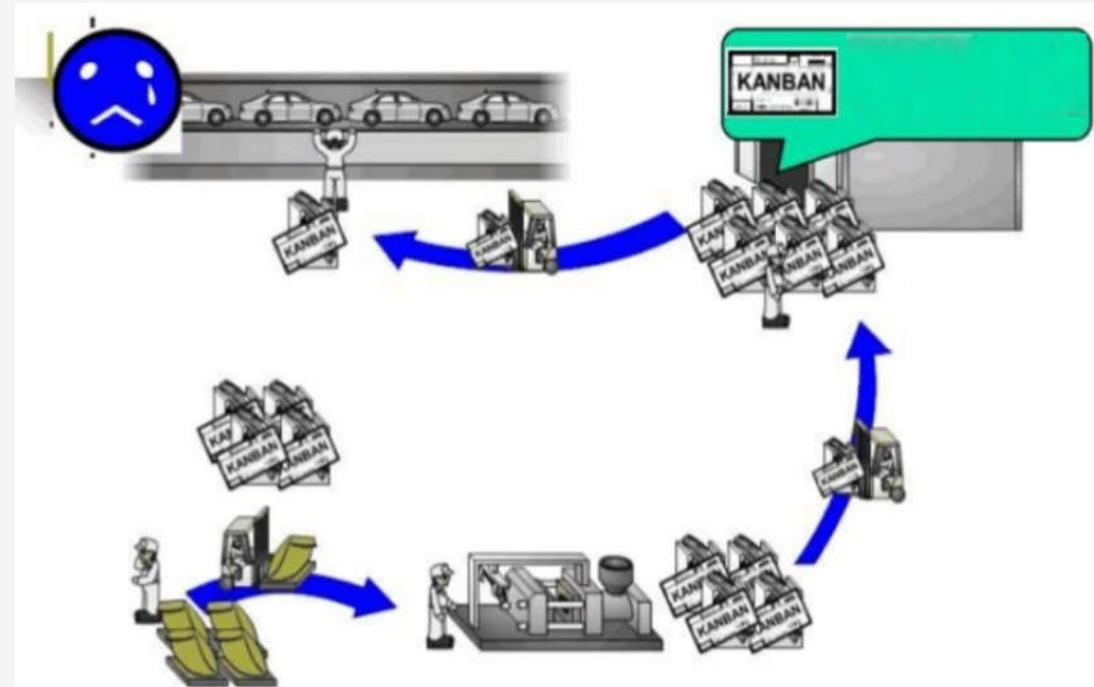


- Unreasonable workplace arrangement
- The operating instructions are poorly designed

# Transport

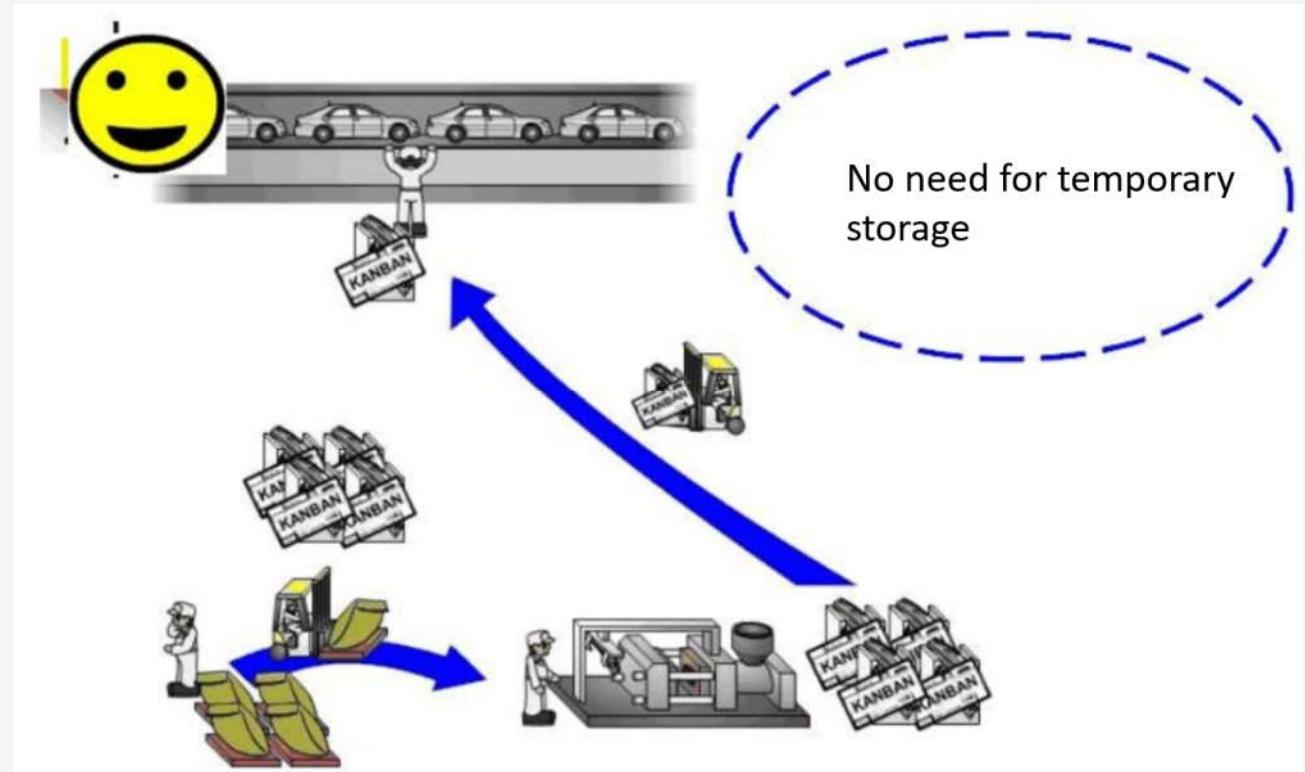
- The movement of materials does not create additional value.
- For example: Transportation between production stages

→ Prolonging the production cycle, using labor and space inefficiently, causing stagnation



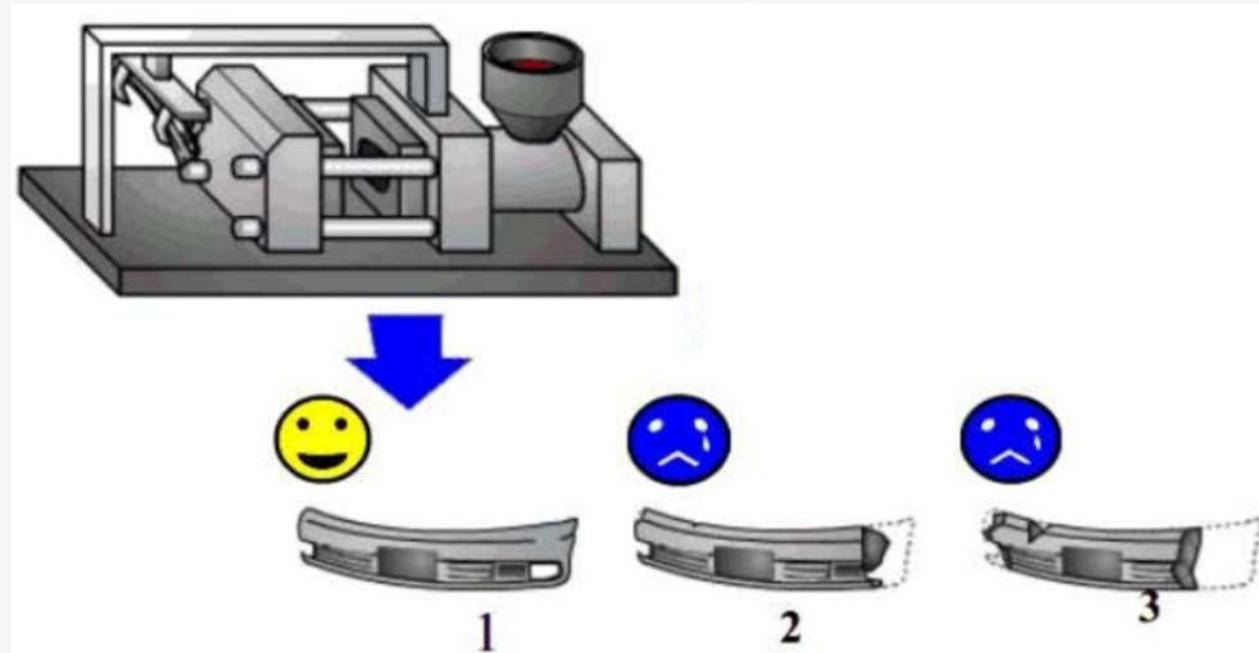
# Transport

- The output of one stage should be immediately utilized by the next stage



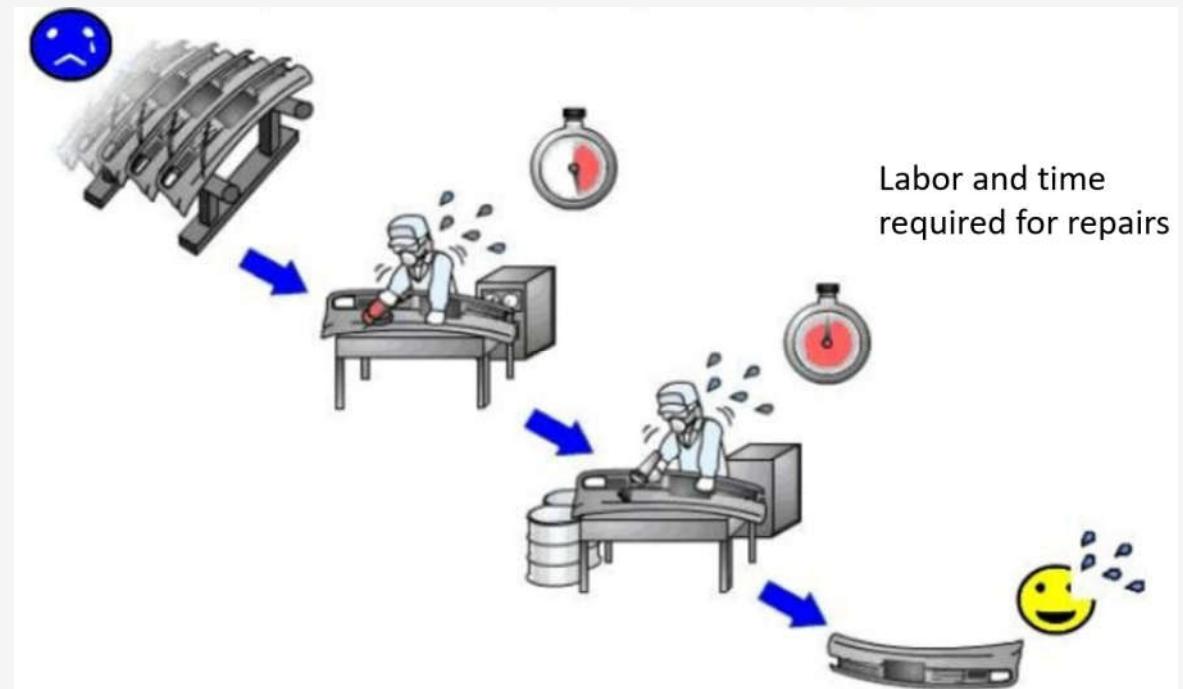
# Defects

Including physical defects that increase production costs, errors in paperwork and product information, late delivery, incorrect production specifications, waste of raw materials and waste products



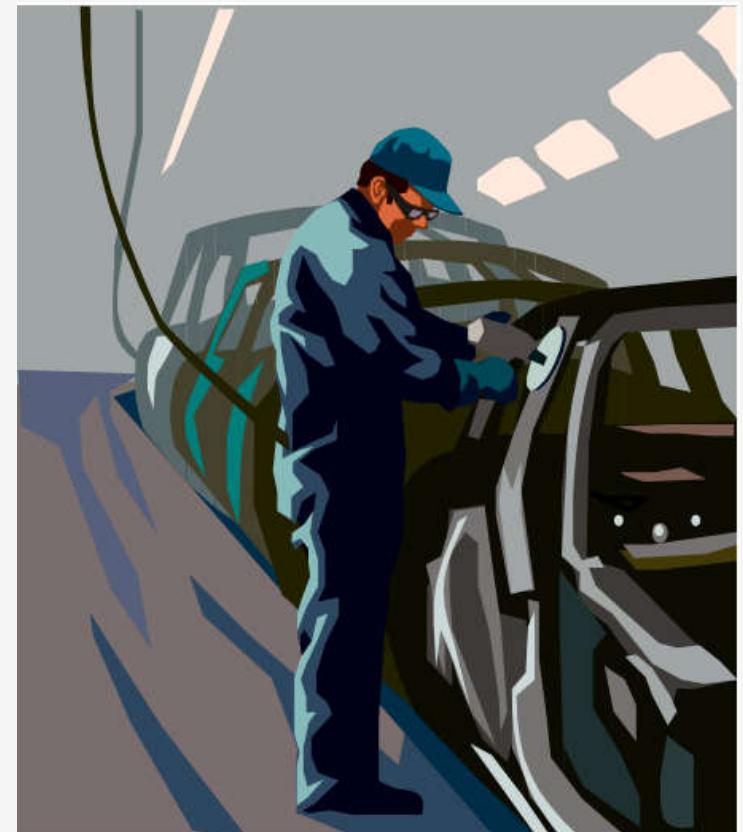
# Defects

With the same amount of time, labor/machinery costs, defective production will result in waste, leading to unrecovered processing costs and dissatisfied customers unwilling to pay for the product



## Over-Processing

- Over processing is putting more into the product than is valued by the customer,
  - ❖ Painting of unseen areas
  - ❖ Unnecessarily tight tolerances
  - ❖ Cleaning and polishing beyond the level required
- The goal is to do only the level of processing to match that which is useful and necessary



*Clear, standardised instructions  
avoid over-processing*

## People

- Not tapping into, and following up on the ideas and thoughts of the employees
- Underutilisation of human potential



## What is 5s?

- 5S is a philosophy and a way of organizing and managing the workspace and work flow with the intent to improve efficiency by eliminating waste, improving flow and reducing process unreasonableness.

**It is for improvement of  
working environment**

## What is 5s?

- 5S activities are to create good working environment through reduction of "Muri", "Mura", and "Muda"
- It help to have a basis of strong management of workplace
- What is "Muri", "Mura", and "Muda"?
  - ❖ Muri : overburden, unreasonableness or absurdity
  - ❖ Mura : unevenness or inconsistency, primarily with physical matter and the human spiritual condition
  - ❖ Muda : activity which is wasteful or doesn't add value

# 5S in Japanese/English/Swahili

*5S is literally five abbreviations of Japanese terms with 5 initials of S.*

	<i>Japanese</i>	<i>English</i>	<i>Ki-Swahili</i>
S-1	<b>Seiri</b>	<b>Sort</b>	<b>Sasambua</b>
S-2	<b>Seiton</b>	<b>Set</b>	<b>Seti</b>
S-3	<b>Seiso</b>	<b>Shine</b>	<b>Safisha</b>
S-4	<b>Seiketsu</b>	<b>Standardize</b>	<b>Sanifisha</b>
S-5	<b>Sitsuke</b>	<b>Sustain</b>	<b>Shikilia</b>

## Benefits of 5S

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- Saves time wasted searching for tools, etc.
- Reduces amount of time walking around
- Increases safety by eliminating tripping hazards
- Frees up floor space
- Makes your workplace more pleasant
- Less stress
- Increases morale!

# What 5S can do?

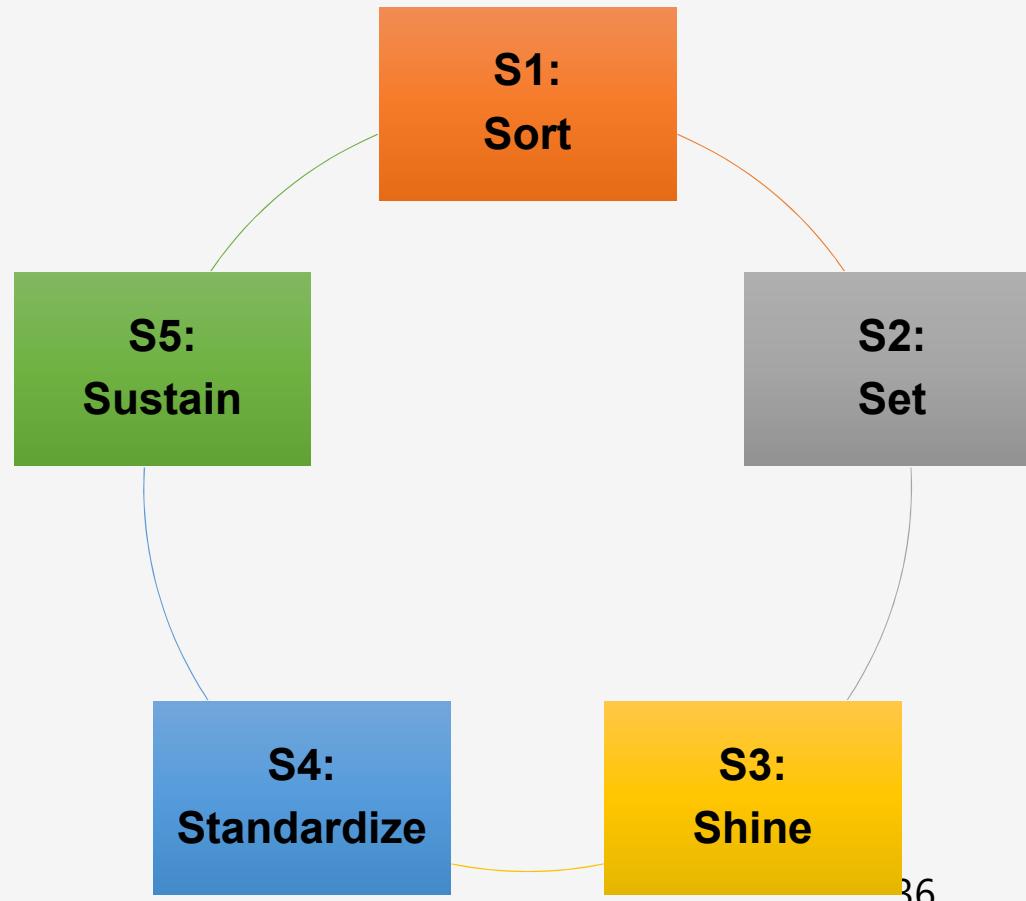
**Team work improvement through  
everyone's participation**



## Identify Abnormalities

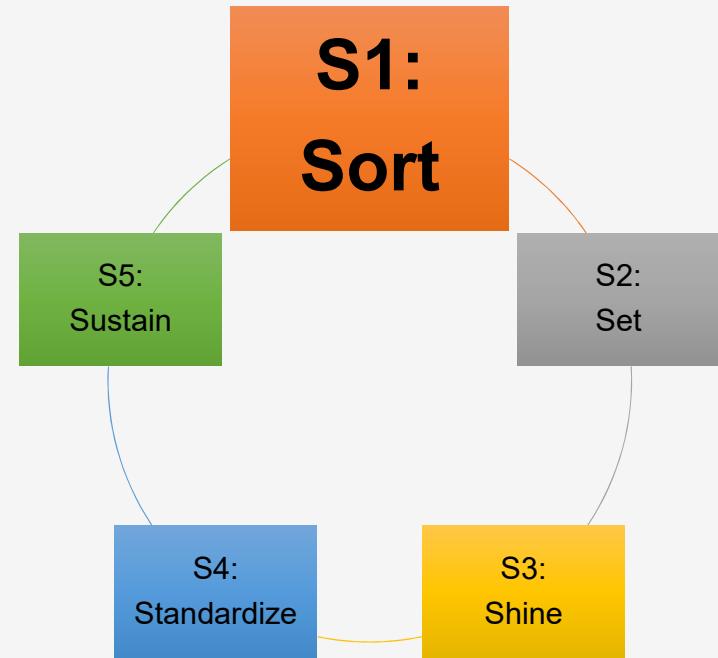


# 5S: Sort-Set-Shine-Standardize-Sustain



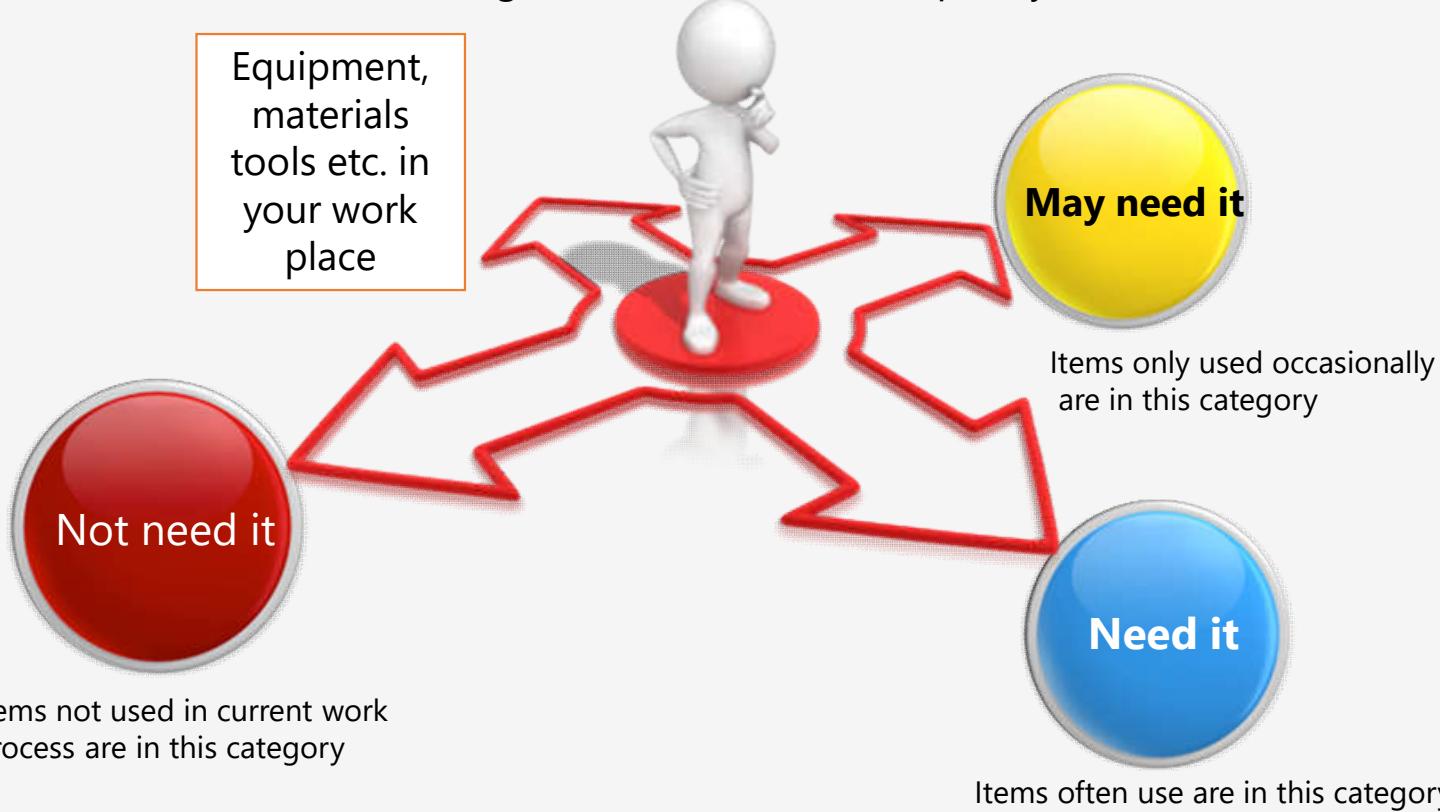
## S1: Sort

- Focuses on eliminating unnecessary items from the workplace
- Categorize equipment, furniture, tool in your working place into the following 3 categories
  1. Necessary
  2. Unnecessary
  3. May not necessary
- This step will also help with the “just in case” attitude



## S1: Sorting activities

Equipment, material, tools files, furniture etc. can be categorized based on the frequency of use!



## Examples of “Sorting”

- Place “Red tag” for categorization of items to identify unnecessary items
- Move unnecessary items( broken tools, obsolete jigs and fixtures, scrap and excess raw material etc.) to central stored area
- Free up valuable floor space (Space utilization)
- Finding abnormality of equipment and tools (Out of order, missing parts etc.)

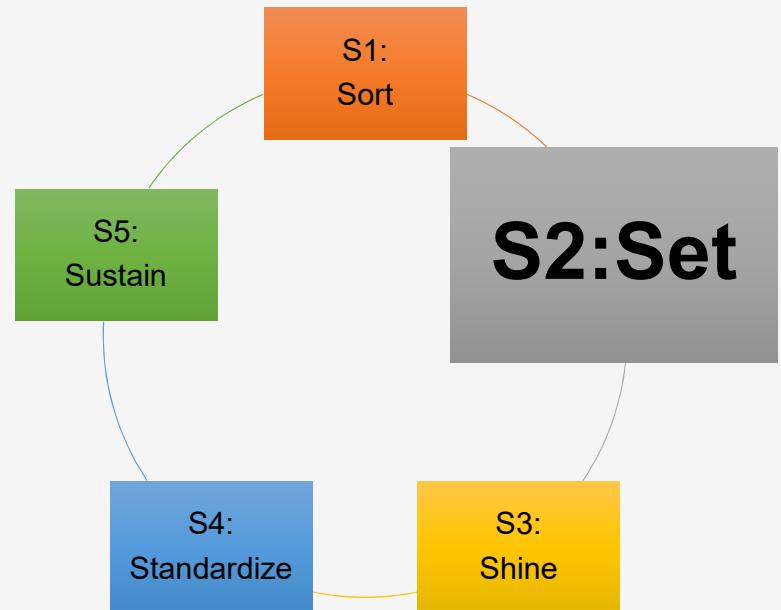


6 1:55 PM



## S2: Set

- “Set” is based on finding efficient and effective storage of necessary items
- Apply “Can see, Can take out, and Can return” philosophy
- This will save time and energy to look for something



## S2: Setting activities

Think not only "beatification.  
Need to consider workflow and  
arrange items



Have consensus among co-workers on where and how to organize necessary items



Use 5S tools for proper Organization of items such as

- Labeling
- Color coding
- Numbering
- Zoning etc.

Arrange them properly based on "Can see, Can take-out, Can return" Philosophy

## Example of “Setting” activities

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- Labeling , numbering, zoning for clear identification of storage areas to keep necessary items
- Set necessary items matching with workflow to minimize unnecessary movement and transportation time

**BASELINE  
PHOTOGRAPHS  
AUGUST  
2008**

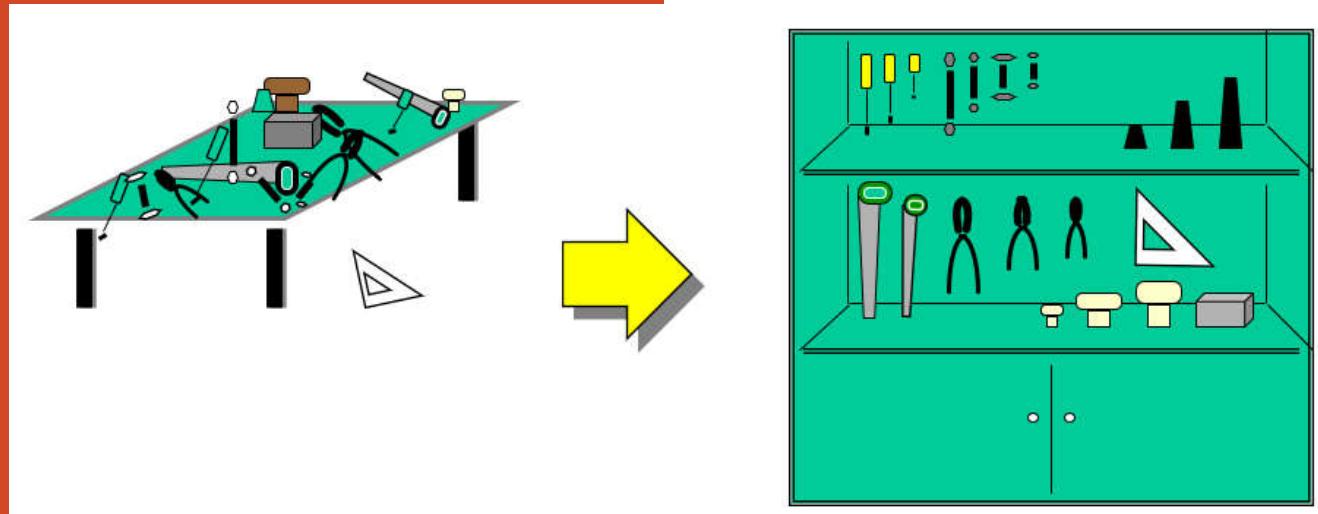
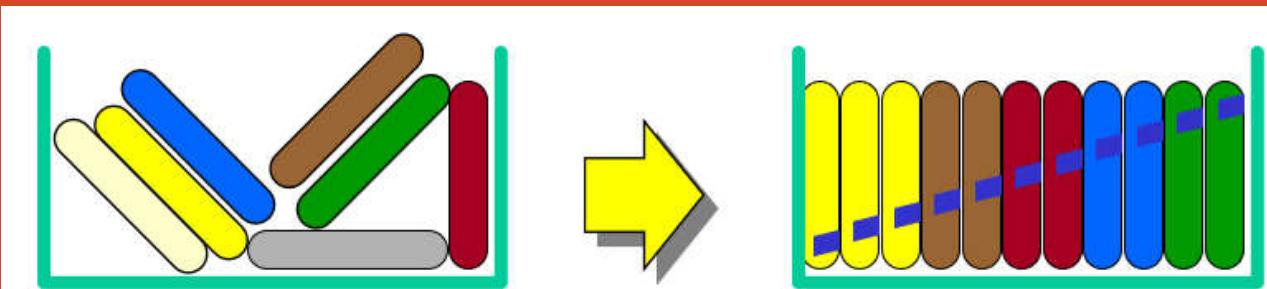
**ADMINISTRATION**

**PROCESS**

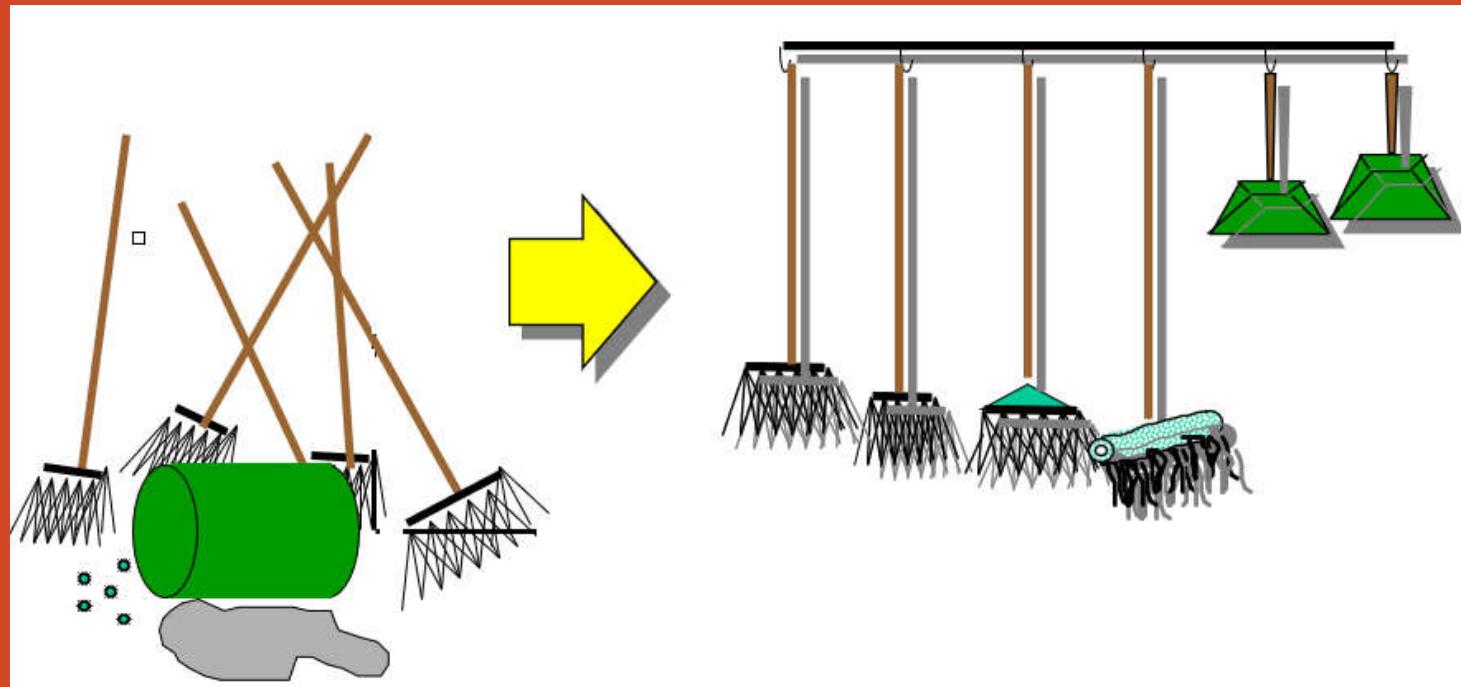
**SEPTEMBER  
2008**



*Take pictures BEFORE and AFTER cleaning and organizing*



*Take pictures BEFORE and AFTER cleaning and organizing*

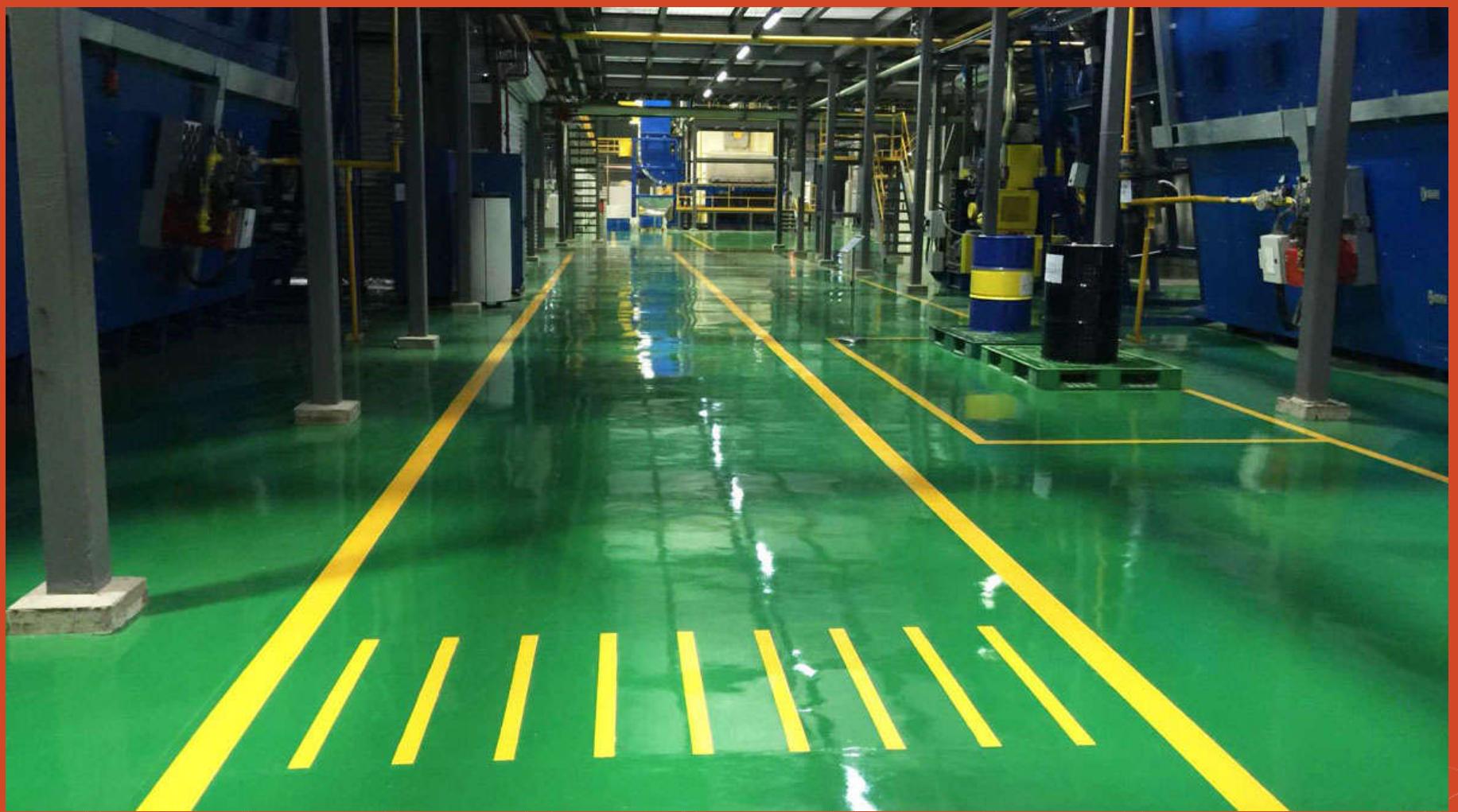


*How does the marking technique help you?*



*How does the marking technique help you?*



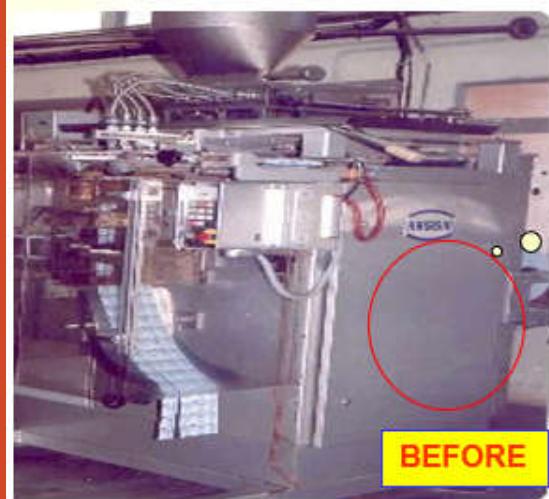


# Drawing Floor Lines for Rearranging

Basic Rules:

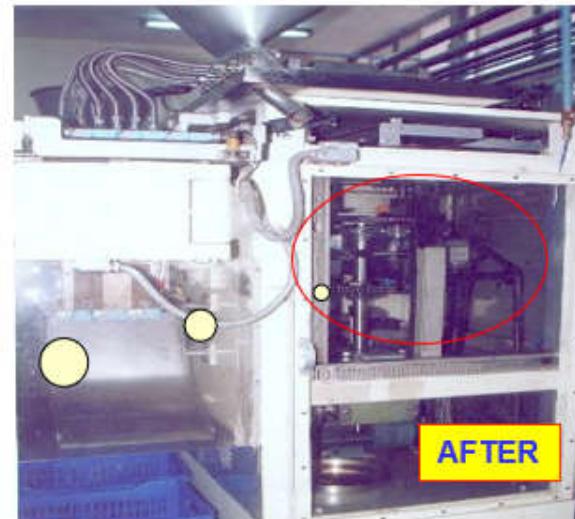
- Never walk on yellow lines or step over them !
- Dividing Lines are lifelines !

<u>Type</u>	<u>Color</u>	<u>Width</u>	<u>Notes</u>
Dividing Lines	Yellow	10 cm	Solid Line
Exits/Entrances	Yellow	10 cm	Dot Lines
Doors/Openings	Yellow	10 cm	Dot Lines
Traffic Flow Lines	Yellow	10 cm	Arrows
Tiger Pattern	 A graphic showing a horizontal band with diagonal black and white stripes, representing a tiger pattern.	10 cm	Strippers



Opaque  
SS Guard

Transparent  
Acrylic  
Guard

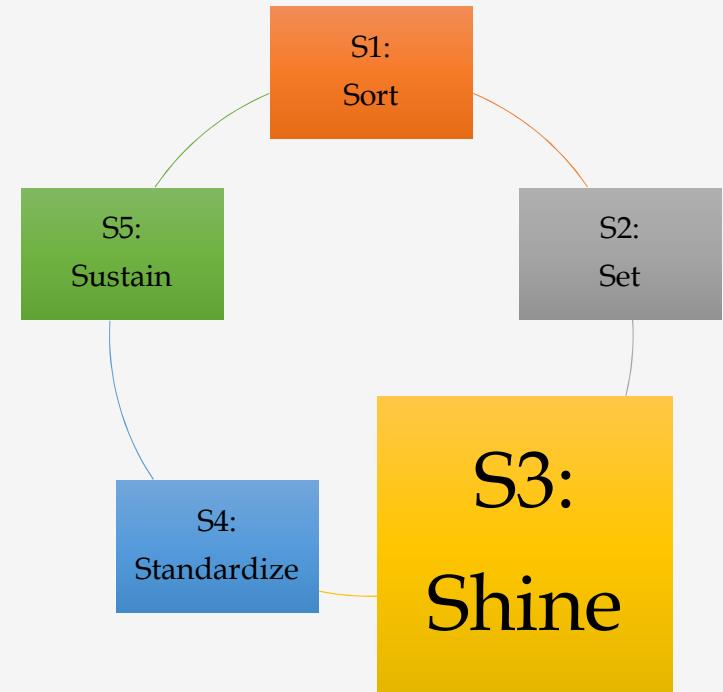


DIFFICULT  
TO  
INSPECT



## S3: Shine

- Cleaning up one's workplace daily so that there is no dust on floors, machines or equipment.
- It will create ownership and build pride in the workers

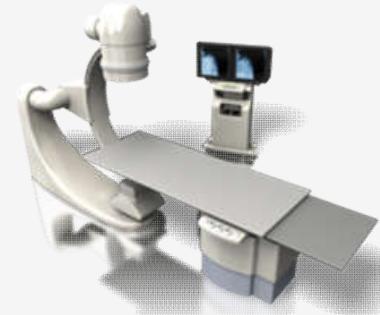


## S3: Shining activities

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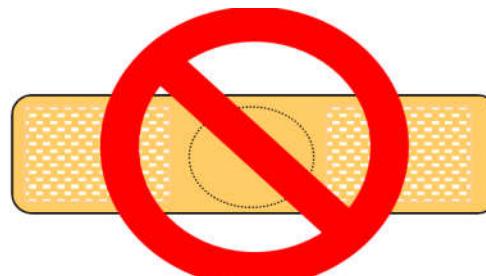


- Clean floor, windows and walls.
- Clean and Maintain office automation machines, medical equipment and tools, office furniture
- Develop and follow regular cleaning and Maintenance schedule



## Example of “Shining” activities

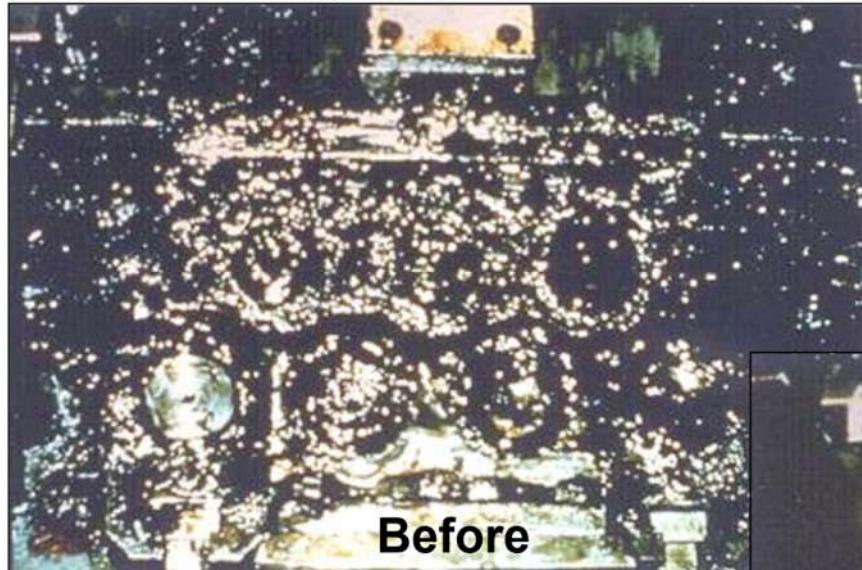
- Daily sweeping and mopping of floor, bathroom, corridor etc.
- Regular cleaning and maintenance of equipment and tools
- Periodical check for changes in equipment and the service area such as: leaks, vibration, misalignment, breakage etc.
- IPC activities such as hand hygiene, waste segregation are also part of shine



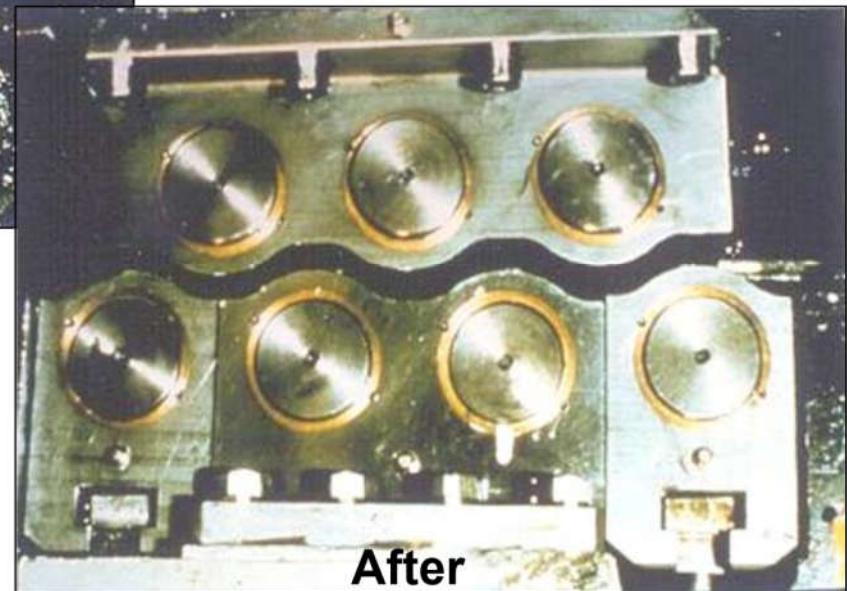
No Band Aids !



**What's wrong with this machine?**



..... Now we can find out!





**Before**



**After**

# 5S Supplies or Tools provided line side



Supply storage board



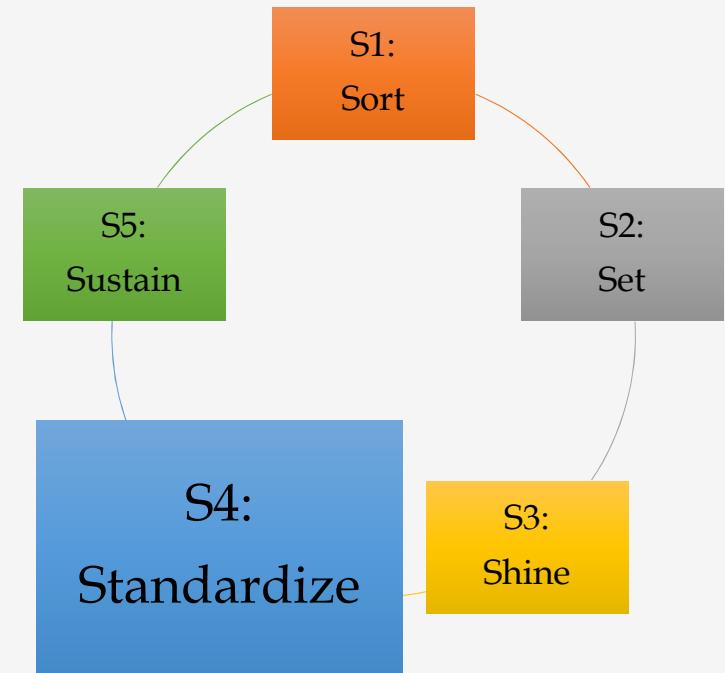
Cleaning kit and check sheet



Designated location for cleaning supplies.

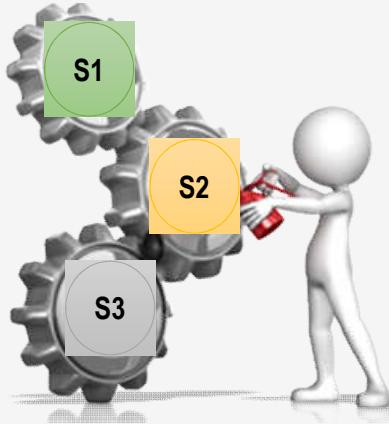
## S4: Standardize

- Maintain an environment where S1 to S3 are implemented in the same manner throughout the organization
- Give opportunities to employees to take active part in the development of these standards.



## S4: Standardizing activities

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Develop mechanism to standardize  
S1-S3 implementation for continuation

Standardization will leads equalization of activities  
= "Production leveling and smoothing"



Standardization is useful for;

- Easy implementation of S1 to S3 activities
- Equalization process output
- Everyone's participation

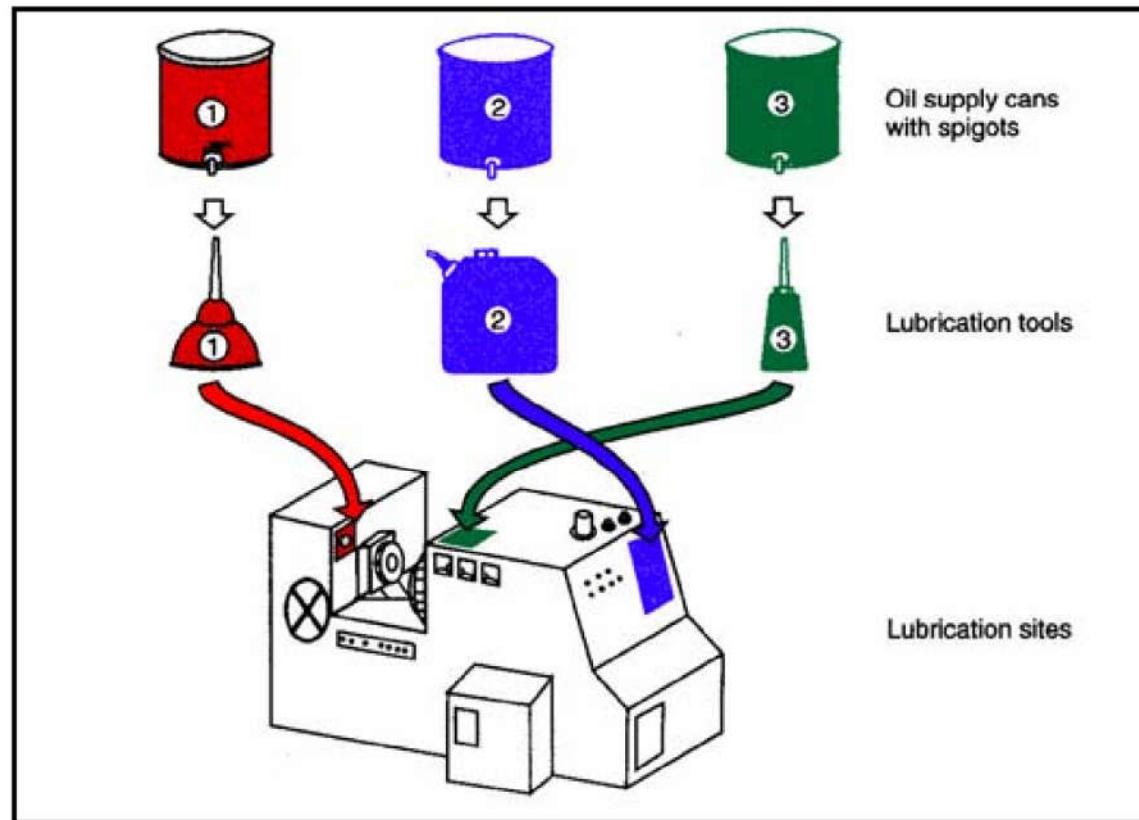
## Example of “Standardize” activities

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- Work instructions, Standard Operating Procedures (SOPs)
- Checklist development and regular usage for SOPs
- Mechanism and format development for ordering supplies, reporting etc
- Color coding for waste segregation
- Standardized common symbols

# Standardize Example

## 5S Map & Color Coding



## Standardize

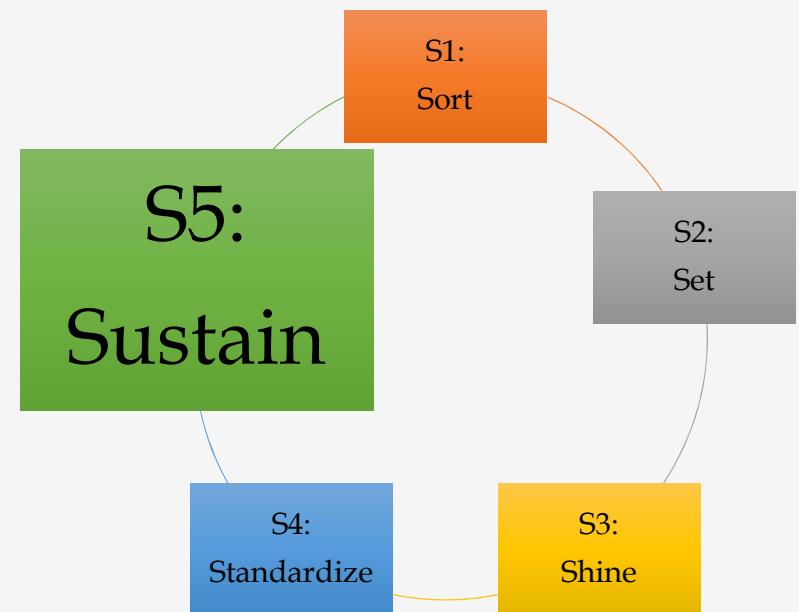
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Various plumbing going in and coming out of machinery.

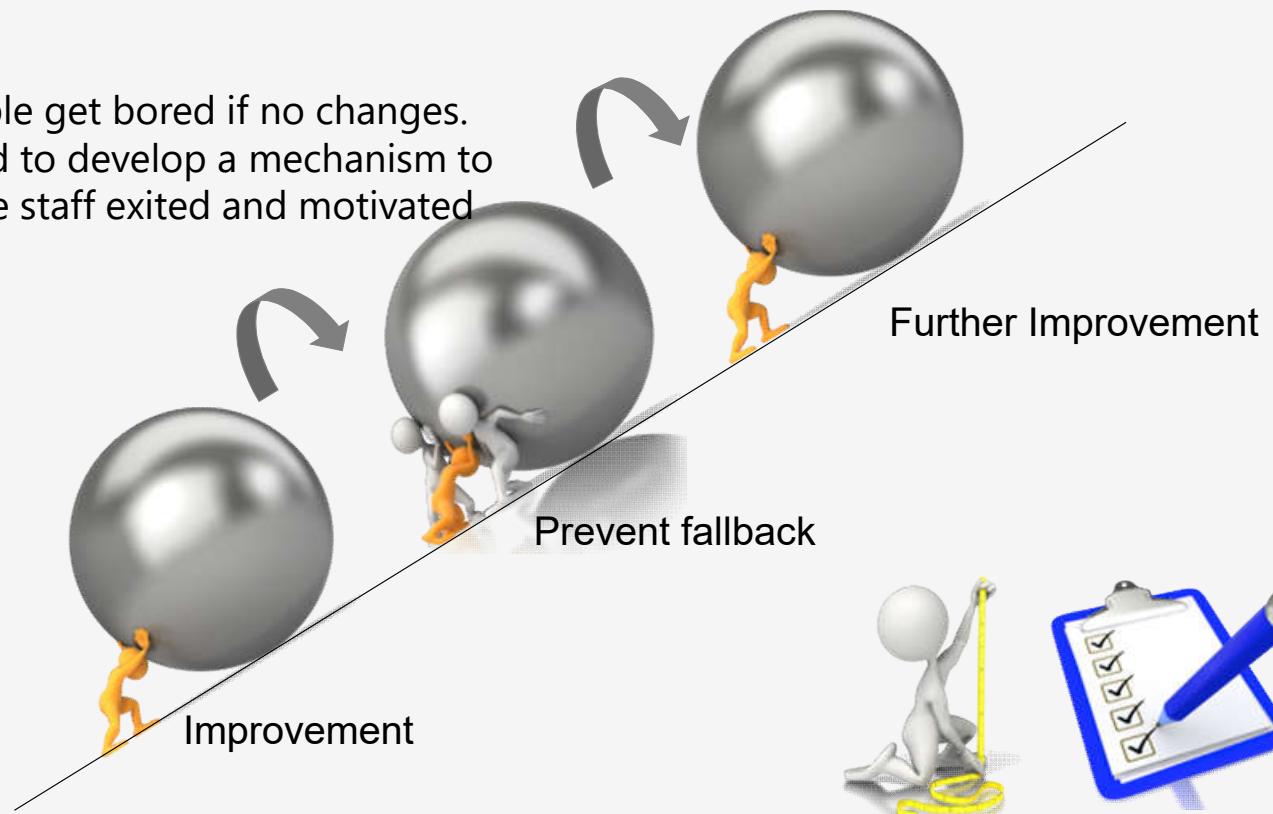
## S5 : Sustain

- Maintain S1-S4 through discipline, commitment and empowerment
- It focuses on defining a new mindset and a standard in workplace



## S5: Sustainability activities

People get bored if no changes.  
Need to develop a mechanism to  
make staff exited and motivated



Measure improvement with proper  
periodical monitoring

## Example of “Sustain” activities

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- Regular progress reporting
- Refresher training
- Periodical evaluation of 5S activities with proper advices for continuation and further improvements
- Appreciation, recognition and awarding on good 5S activities
- Reminder using 5S corner, new letters, good practice sheet etc.

## *Visual Control System (VCS)*



*5S images*

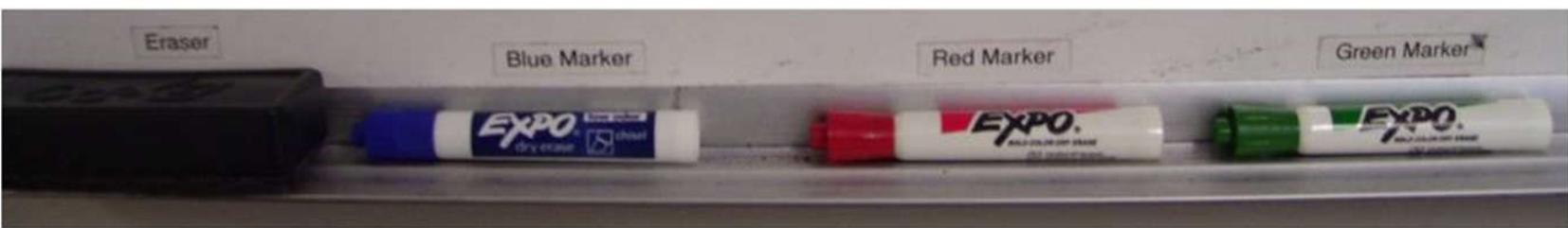
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# *5S images*



# 5S images



## *5S images*

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# 5S images



## 5S images



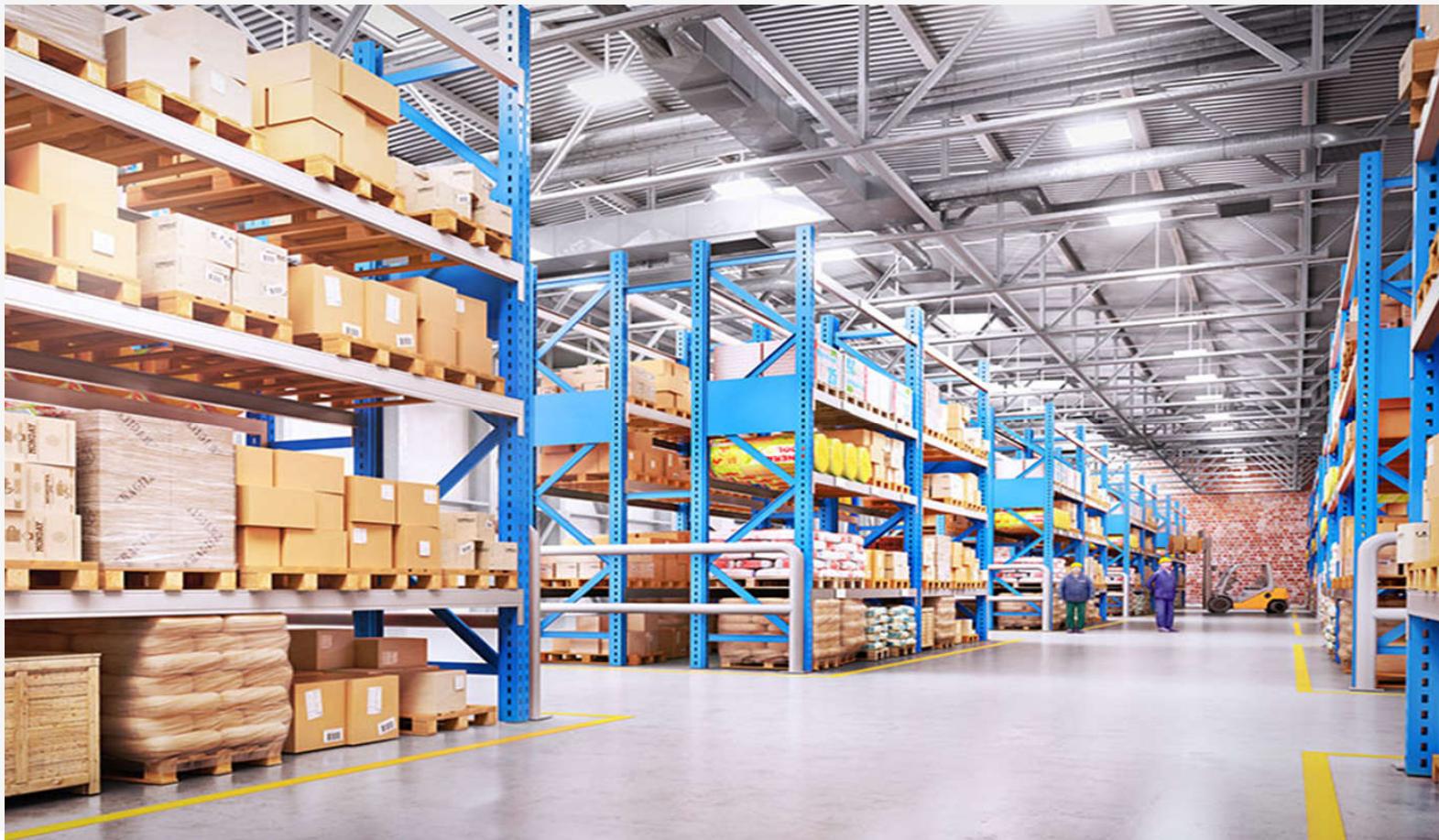
**Before implementing 5S**



**After implementing 5S**

## *5S images*

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# *5S images*



# *5S images*

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Thank  
you!