

**CHAPTER 6**

# **PROCESS IMPROVEMENT**

**Expected Outcomes**

Able to identify several different approaches towards continuous process improvement  
Understand method applied to continuous improvement in quality aspect

# Chapter Outline

- **Process**
- **Types of Problems**
- **Improvement Strategies**
- **The Juran Trilogy**
- **Problem Solving Method**
  - **Kaizen**
  - **Reengineering**
  - **Six-Sigma**

# Introduction

Improvement is made by:

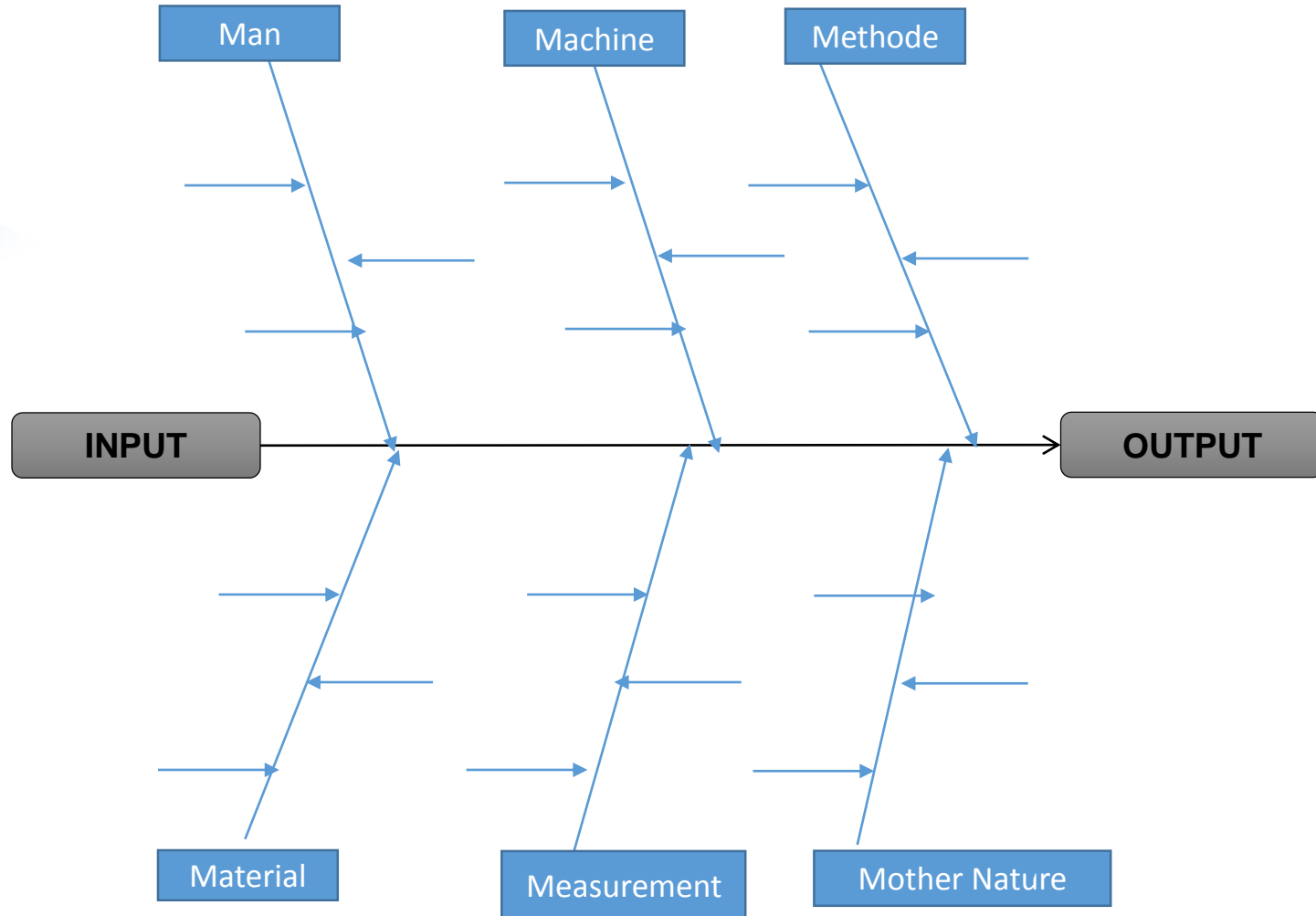
- Viewing all work as a process
- Making all processes effective, efficient and adaptable
- Anticipating changing customer needs
- Eliminating non value added process
- Using benchmarking to improve competitive advantage
- Innovating to achieve breakthroughs
- Incorporating lessons learned into future activities
- Using technical tools

# Process

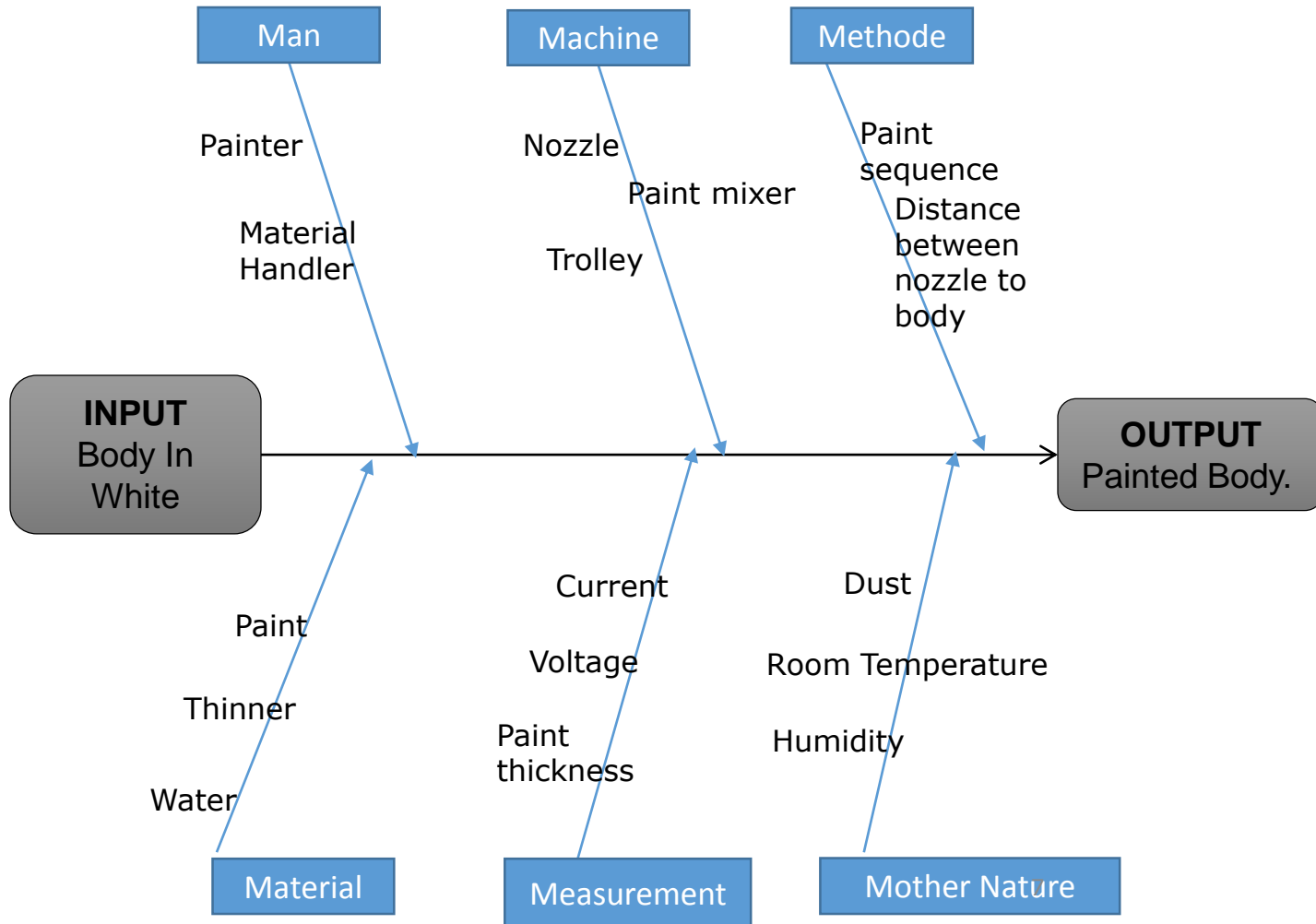
Is the interaction of some combination of **6M**; people (**Man**), **Materials**, equipments (**Machines**), **Method**, **Measurement** and the environment (**Mother Nature**) to produce an outcome such as a product, service or an input to another process.

# Process

## Input / Output Process Model



# Process



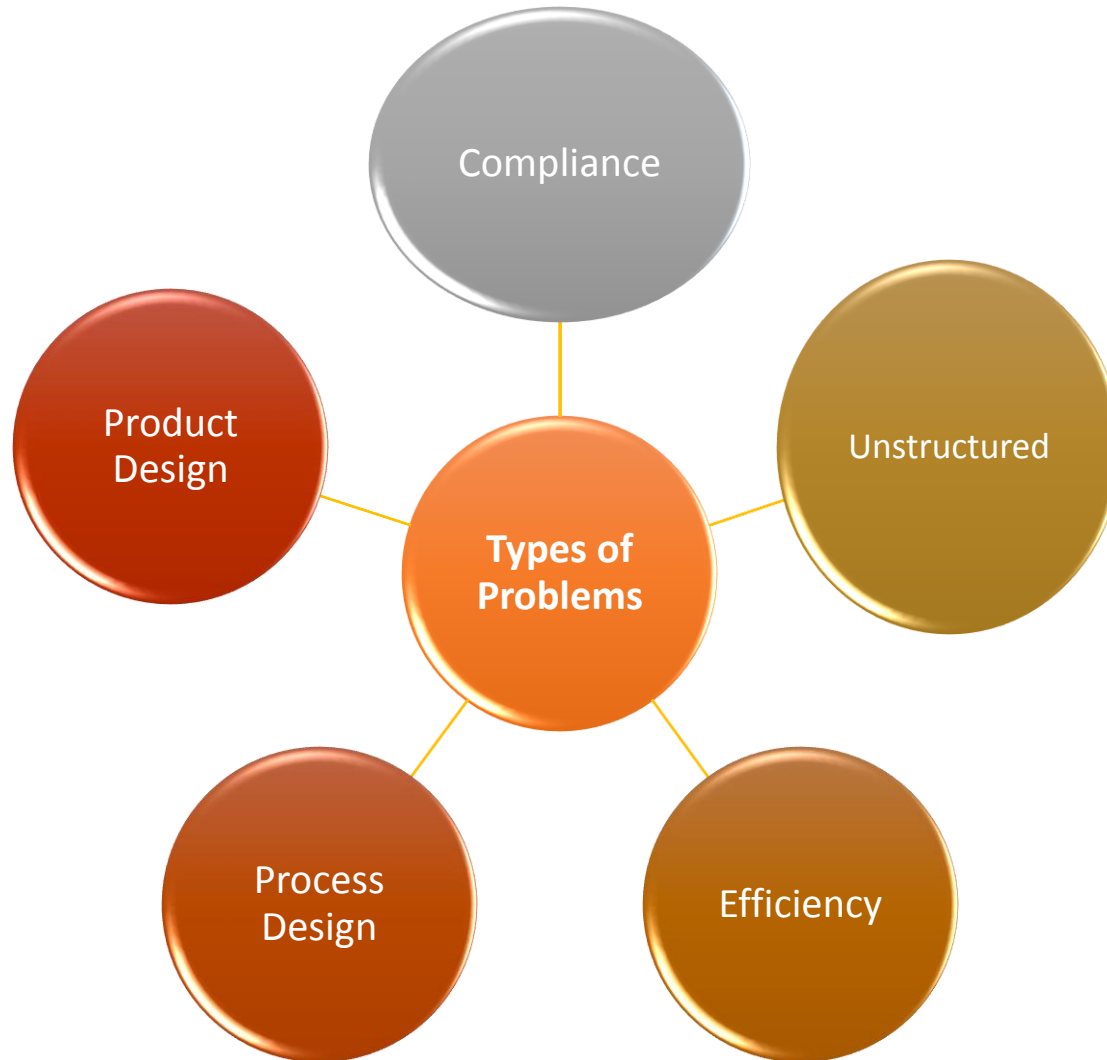
Example Car Painting Process

# Process

5 basic ways to improve process:

1. Reduce resources – uses more resources than necessary is wasteful
2. Reduce errors – errors are a sign of poor workmanship and require rework
3. Meet or exceed expectations of downstream customers
4. Make the process safer
5. Make the process more satisfying to the person doing it

# Types of Problems





# Improvement Strategies



## Repair

- Anything broken must be fixed so that it functions as designed
- 2 levels : quick fix and permanent solution



## Refinement

- Activities that continually improve a process that is not broken
- Incremental basis – improve efficiency and effectiveness



## Renovation

- Results in major or breakthrough improvements
- Key factor : innovation and technological advancements



## Reinvention

- Begins by imagining that the previous condition does not exist
- Feel current approach will never satisfy customer requirements

# Process Improvement

There are several different approaches towards continuous process improvement:

- **Juran's Trilogy** – approaches quality improvement from a cost-oriented perspective
- **Shewhart's PDSA Cycle** – engineering scientific method applied to continuous improvement and quality
- **Kaizen** – approach focuses on making small incremental improvements
- **Reengineering & Six-Sigma Concepts**

# The Juran Trilogy

- Developed by Dr. Joseph Juran
- Process improvement involves planning
- It has 3 components:
  1. Planning
  2. Control
  3. Improvement
- If based on financial processes (cost-oriented):
  1. Budgeting
  2. Expense measurement
  3. Cost reduction

# The Juran Trilogy

## **PLANNING**

1. Determine customers
2. Discover their needs – requires customers to state needs in their own words and from their own viewpoint
  - Real needs may differ from stated needs
  - Might discover these needs by:
    - a. Being a user of the product or service
    - b. Communicating with customers through product / service satisfaction and dissatisfaction information
    - c. Simulation in the laboratory
3. Develop product / service features that respond to customer needs
4. Develop processes able to produce the product / service features
5. Transferring plans to operations

# The Juran Trilogy

## **CONTROL**

- Used by operating forces to help meet the requirements
- Consists of the following steps:
  1. Determine items to be controlled and their units of measure
  2. Set goals for the controls and determine what sensors need to be put in place to measure the product, process or service
  3. Measure actual performance
  4. Compare actual performance to goals
  5. Act on the difference

## **IMPROVEMENT**

- Begin with the establishment of an effective infrastructure such as the quality council
- Quality council is the driver that ensures that improvement is continuous and never ending – incremental / breakthrough

# The Juran Trilogy

- Sporadic waste can be identified and corrected through quality control
- Chronic waste requires an improvement process

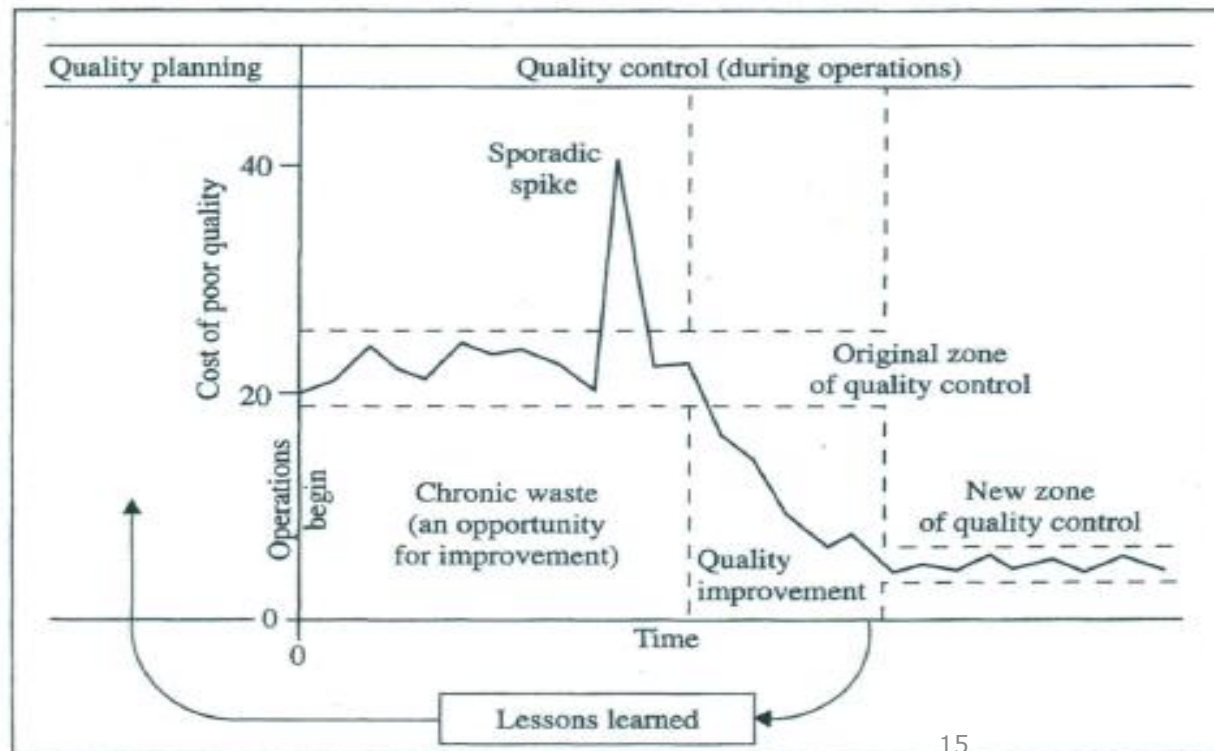


Figure 5-2 The Juran Trilogy Diagram

# PDSA Cycle

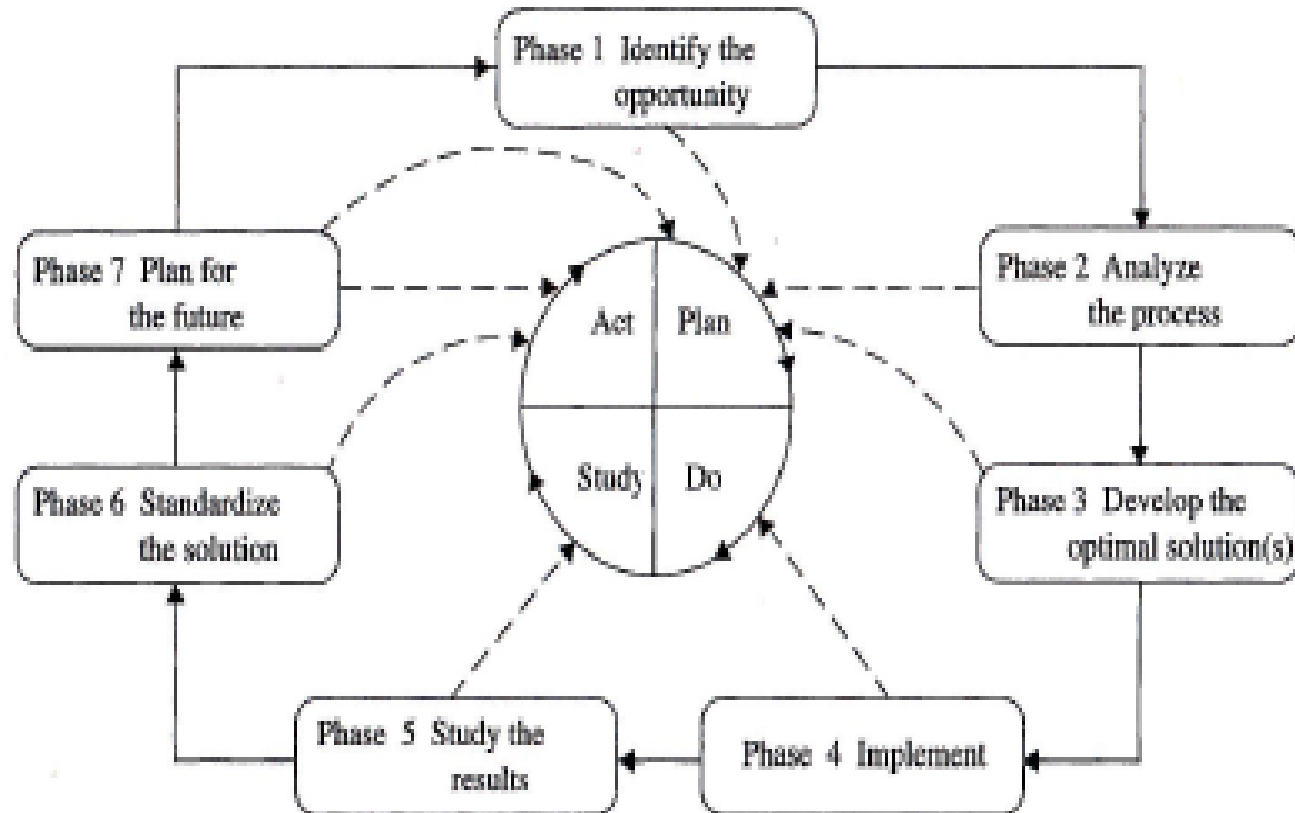


Figure 5-4 Continuous Process Improvement Cycle

# Kaizen

- Is a Japanese word for the philosophy that defines management's role in continuously encouraging and implementing small improvements involving everyone
- Process of continuous improvement is in **small increments** that make the process more efficient, effective, under control and adaptable
- Improvements are usually **accomplished at little or no expense**, without sophisticated techniques or expensive equipment
- **Focuses on simplification** by breaking down complex processes into their sub-processes and then improving it

改

= KAI = CHANGE

善

= ZEN = GOOD  
(FOR THE BETTER)

改善

= KAIZEN

= CONTINUAL  
IMPROVEMENT

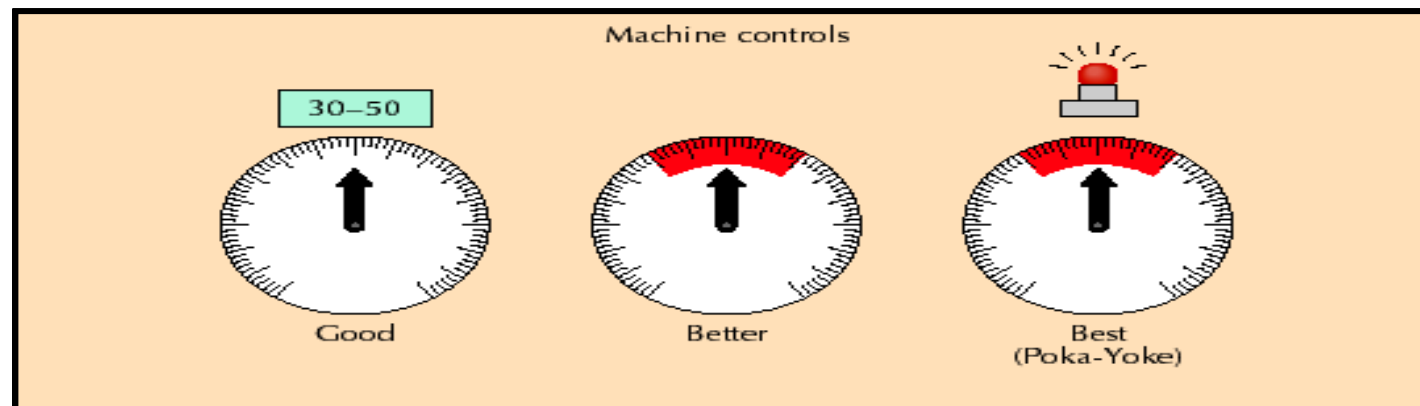
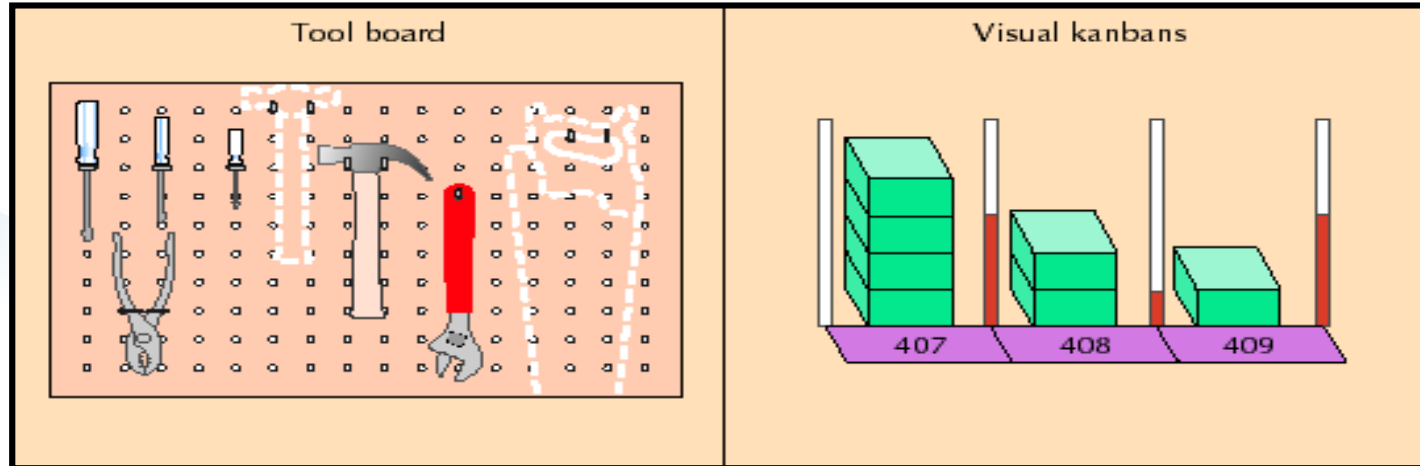


# Kaizen

Kaizen improvement focuses on the use of:

- Value-added and non-value-added activities
- **Muda** : which refers to the seven classes of waste – over production, delay, transportation, processing, inventory, wasted motion and defective parts
- Principles of motion study and the use of **cell technology**
- Principles of materials handling and use of **one-piece flow**
- Documentation of standard operating procedures
- **Visual management** by means of visual displays that everyone in the plant can use for better communications

# Visual Management



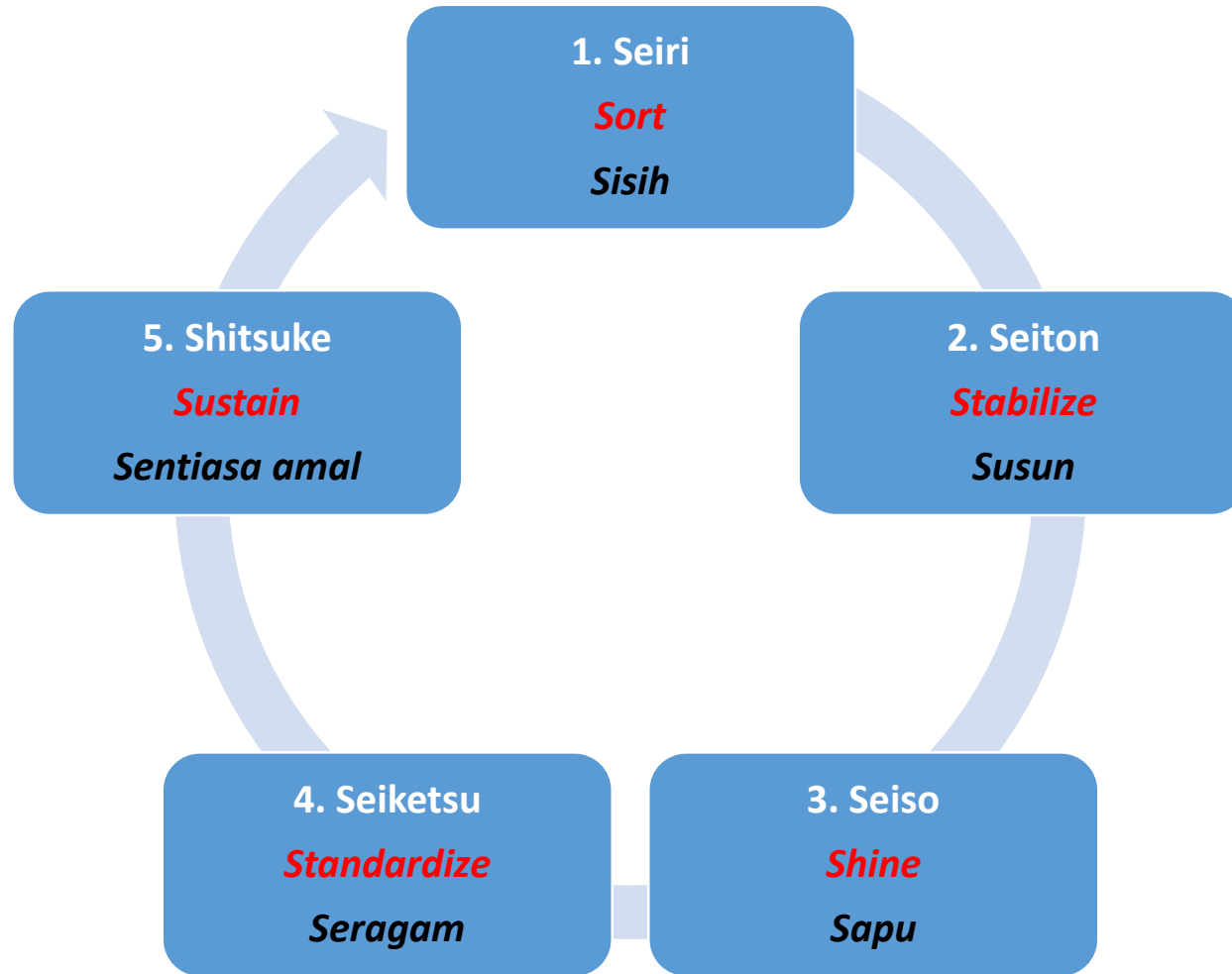
# Kaizen

- **5S's** for workplace organization
- **Just-in-time (JIT)** principles to produce only the units in the right quantities at the right time and with the right resources.
- Team dynamics which include problem solving, communication skills and conflict resolution
- **Poka-yoke** (techniques for avoiding simple human error at work) to prevent or detect errors



Poka-yoke example

# 5S



20

# 5S



# Reengineering

- The fundamental rethinking and radical redesign of business processes in order to achieve dramatic improvements in critical measures of performance
- Focus : identify and eliminate non-value added work and reduce corresponding costs while maintaining quality



# Six-Sigma

- Use process capability analysis as a way of measuring progress
- The statistical aspects tell us that we should reduce the process variability and try to keep the process centered on the target.
- The smaller the deviation value, the less variability in the process

**Nonconformance Rate and Process Capability  
When the Process is Centered**

<i>Specification Limit</i>	<i>Percent Conformance</i>	<i>Nonconformance Rate (ppm)</i>	<i>Process Capability (<math>C_p</math>)</i>
$\pm 1\sigma$	68.7	317300	0.33
$\pm 2\sigma$	95.45	485500	0.67
$\pm 3\sigma$	99.73	2700	1.00
$\pm 4\sigma$	99.9937	63	1.33
$\pm 5\sigma$	99.999943	0.57	1.67
$\pm 6\sigma$	99.9999998	0.002	2.00