**DEFINITIONS**

POKA - Inadvertent Errors

YOKERU - Avoid

POKA-YOKE - Avoid Inadvertent Errors
            - Mistake Proof

**BASIC CONCEPT**

- Remove defect from repetitive actions that depend on vigilance or memory

- It is not acceptable to produce any defective products
DIFFERENCES IN JAPANESE AND WESTERN PRODUCTION PHILOSOPHY

A. Process Improvement and Simplification
   - Difference between process and operation
   - Automated warehouse vs. elimination of warehouse
   - Conveyor belts, cranes vs. need for transport
   - Better ways to remove glue, paint, burrs etc. vs. not to have them in the first place
   - Change the basic structure of the problem

B. Continuous Improvement

Influence of American Training Within Industries (TWI) on Continuous Improvement (Kaizen) and job simplification by workers in Japan

   - Continuous Improvement is everyone’s business
   - Involvement, Empowerment and Suggestions
   - Unending quest for better ways
   - Improvement means changes
C. Elimination Of Waste

- Adding cost without value is a waste
- Types of Waste
  - Waste of producing defects
  - Waste of transportation due to facility layout
- Waste of over production
- Waste of waiting
- Waste built in the process
- Waste of movement
- Waste of inventory

Process and Operation

The key operations of a manufacturing process are typically:

- Transportation Operation
- Inspection Operation
- Transformation Operation
- Storage Operation

[Diagram showing process flow with symbols for each operation type]
WHAT IS POKA-YOKE?

"Failsafing" or "Mistake Proofing" a process.

This method combines

Source Inspection with
Mistake Proofing
devices to detect errors before they become defects to
turn out the highest quality products in the shortest period of time.

Five Elements of Production

1. Operator
2. Materials
3. Machines
4. Method
5. Information

Quality problems result from each of the five elements of production.
Production and quality improvement requires investigation into each of these elements
**INSPECTIONS**

- Inspections are secondary to production and play only a passive and wasteful role.

- The most fundamental concept is to recognize that defects are generated by work and all inspections can do is to discover those defects.

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**THREE TYPES OF INSPECTION**

1. Judgment Inspection
2. Information Inspection
3. Source Inspection
**JUDGMENT INSPECTION**

- Compares parts to a standard and removes defects.
- Usually done on a sample basis.

**INFORMATIVE INSPECTION**

- Statistical Quality Control
  Improves the process to reduce future defects.
- Successive Checks
  Occurs after the operator has performed a self-check on his or her own work and that work is checked again by the next (successive) operator downstream.

**Plus:** Usually catches any defects overlooked by previous operator during self-check.

**Problem:** Corrective action occurs after the point of error, as compared to at the point of error.
INFORMATIVE INSPECTION

- Self-Checks
  Occurs when the operator who performs the work, checks the work before passing it on to the next process.

**Plus:** Represents 100% inspection Makes instant correction possible

**Problem:** Operator may sometimes make compromises on quality or forget to perform check.

SOURCE INSPECTION

[Diagram showing the cycle of action, check & feedback, defects, and results with labels for errors and feedback as causes]

CAUSES
Small Cycle of Error Prevention

RESULTS
SOURCE INSPECTION

- Discovery of "errors" at the source before they can become defects.
- Can "prevent" the errors from becoming defects.

SIGNIFICANCE OF SOURCE INSPECTION

Old System:
- An error takes place (Cause)
- A defect occurs (Effect)
- Defect is caught and the information is fed back
- Corrective Action is taken
- Large feedback loop

New System:
- An error takes place (Cause)
- Error is caught and feedback carried out
- Corrective Action is taken
**IMPORTANCE IN ACHIEVING ZERO DEFECTS**

- Source Inspection - 60%
  - Detect errors at the source
- 100% Inspection - 30%
  - Use inexpensive sensing device for inspection
- Immediate Action - 10%

**TRACKING DEFECTS**

Typically we track the defects rate by:
- Quantity
- Kind
- Percent

As we push towards "Zero Defects" we must be tracking:
- the point where defect is discovered
- the point where defect occurred
ERRORS vs. DEFECTS

The first step to "Zero Defects" is to distinguish between errors and defects

- DEFECTS are the RESULTS
- ERRORS are the CAUSES of the RESULTS
- ERRORS cause DEFECTS

EXAMPLES OF ERRORS & DEFECTS

The Error is:                                            The Defect is:

1. Not setting the timer properly on your toaster.     1. Burnt toast.
2. Placing the "original in your copier "face up".      2. Many black pages.
3. Able to pick from 5 different bins of components.    3. Wrong part on Printed Wiring Board.
GOAL OF POKA-YOKE
TO ELIMINATE ERRORS
AT THEIR SOURCE
BEFORE THEY BECOME
DEFECTS

TO ACHIEVE ZERO DEFECTS

- Eliminate ERRORS
- Prevent ERRORS from becoming DEFECTS
- Catch DEFECTS before they proceed to next process
THREE TYPES OF DEVICES

• **Type I** - Eliminates the error at the source before it can occur.

• **Type II** - Detects an error in the process of it occurring, before it results in a defect.

• **Type III** - Detects a defect after it has been made, but before it reaches the next operation.

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**Human Errors**

In any factory the essential ingredient is people. People make mistakes. Mistakes can lead to defects. No matter how much we wish to avoid making mistakes, sooner or later we will make one.

There are basically two essential attitudes about human error.

- **Errors are inevitable!**

  People always make mistakes. While we tend to accept the mistakes as natural, we blame the people who make them. With this kind of attitude, we’re likely to overlook defects as they occur in production. They may be detected only in final inspection or, worse yet, by the customer.
**Human Errors**

- Errors can be eliminated!

Any kind of mistake people make can be reduced and even eliminated. People make fewer mistakes if they are supported by a production system based on the principle that errors can always be prevented.

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**Ten Types of Human Error**

1. **Forgetfulness**
   Sometimes we forget things when we are not concentrating. For example, the station master forgets to lower the railroad crossing gate.

2. **Errors due to misunderstanding**
   Sometimes we make mistakes when we jump to the wrong conclusion before we’re familiar with the situation. For example, a person not used to a car with automatic transmission steps on the brake, thinking it is the clutch.

3. **Errors in identification**
   Sometimes we incorrectly assess a situation because we view it too quickly or are too far away to see it clearly. For example, a $1 bill is mistaken for a $10 bill.
Ten Types of Human Error

4. Errors made by amateurs
Sometimes we make mistakes because of our lack of experience.
For example, a new worker does not yet know the operation or is just barely familiar with it.

5. Willful errors
Sometimes errors occur when we decide that we can ignore rules under certain circumstances. For example, crossing a street against a red light because there are no cars in sight at the moment is such an error.

6. Inadvertent errors
Sometimes we make mistakes inadvertently or without realizing it. For example, someone lost in thought tries to cross the street without even noticing that the light is red.

Ten Types of Human Error

7. Error due to slowness
Sometimes we make mistakes because our actions are slowed down by our delays in judgment. For example, a person learning to drive is slow to step on the brake.

8. Errors due to lack of standards
Some errors occur when there are no suitable instructions or work standards. For example, measurement may be left to an individual worker’s discretion.

9. Surprise errors
Errors sometimes occur when equipment runs differently than expected. For example, a machine might malfunction without warning.