Application of Poka Yoke

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What is Poka Yoke?

a) Brother of Pikachu

c) A dise

Introduction

- Pronunciation POH -KAH- YOH- KAY
- Derived from Japanese words
  - Yokeru – Avoid
  - Poka – Mistakes
- Coined in Japan during 1960s by **Shigeo Shingo** part of the Toyota Production System.
- initially Boka Yoke – fool proofing
- Changed to POKA YOKE – Mistake Proofing

What is Error?

- A mistake deviation from what is correct, right, or true
- How to prevent error
  - Old way – scold people
    retain them
    tell them to be more careful
  - New way – training and motivation
    easy way to do a job
- The potential of human error can be dramatically reduced.

What causes error?

- Errors lead to defects
  - Poor Procedures and Standards
  - Machines
  - Non – Conforming Material
  - Worn tooling
  - Human mistakes

What is Poka Yoke or Mistake Proofing?

- Poka Yoke is a tool to have “zero defects” and even to reduce or eliminate quality control.
- Poka Yoke represents the intelligence of operator by excluding repetitive actions that require a thinking process.
- Mistake Proofing is a product’s design and its manufacturing process is a key element of design for manufacturability/ assembly.
- Mistake proofing is also a key element of improving product quality and reliability.

Factors contributing to Mistake Proofing

- Attention
- Perception
- Memory
- Logic reasoning

Principles of Poka YOke

- Elimination
- Replacement
- Prevention
- Facilitation
- Detection
- Mitigation

Functions of Poka Yoke

- Warning - When a defect is about to occur, a warning buzzer or light can be activated in order to alert workers.
- Control - Probably the most effective is achieved through the control of operations
- Shut Down - When an error is detected, an operation can be shut down, preventing defects from occurring.

Classification of Poka Yoke

- Prevention Based PoKa Yoke - Prevention based mechanisms sense an abnormality that is about to happen, and then signal the occurrence depending on severity, frequency or downstream consequences.

- Detection Based Poka Yoke - In many of the situations, it is not possible to economically feasible to prevent defects, particularly where the capital cost of the pokayoke mechanism, far exceeds the cost of prevention

Importance

- Helps people and processes.
- Refers to techniques that make it impossible to make mistakes.
- Helps to drive defects out of products and processes and substantially improve quality and reliability.
- Used to fine tune improvements and process design from six sigma.
- Use the ideas and methods in product and process design which can eliminate both human and mechanical errors.

When to use it?

- It is a technique, a tool that can be applied to any type of process in manufacturing or service sector.
- Poka Yoke can be used wherever something can go worng or an error can be made.

Types of Error

- **Processing error**: Process operation missed or not performed per the SOP.
- **Setup error**: Using the wrong tooling or setting machine adjustments incorrectly.
- **Missing part**: Not all parts included in the assembly, welding, or other processes.
- **Improper part/item** : Wrong part used in the process.
- **Operations' error**: Carrying out an operation incorrectly; having the incorrect version of the specification.
- **Measurement error**: Errors in machine adjustment, test measurement or dimensions of a part coming in from a supplier.

How to use it ?

Step by step process in applying poka yoke

1. Identify the operation or process.
2. Analyze the 5-Ws and understand the ways a process can fail.
3. Decide the right Poka-yoke approach, such as using a:
    1. Shut out type: Preventing an error being made, or an
    2. Attention type: Highlighting that an error has been made.
4. Determine whether a
    - **Contact Method**
    - **Constant Number or Counting Method**
    - **Motion-Sequence Method**
5. Trial the method and see if it works.
6. Train the operator, review performance and measure success.

Methods of Poka Yoke

- **Contact Method** :

  “Do not have to be high tech!”

  - These can be as simple as blocks that do not allow parts to be seated in the wrong position prior to processing.
  - Take advantage of parts designed with an uneven shape.
  - This method signals to the operator right away that the part is not in proper position.

- **Constant Number or Counting Method:**
  - Used when a *fixed number of operations are required within a process.*
  - *When a product has a fixed number of parts that* are attached to it.
  - A sensor counts the number of times a part is used or a process is completed and releases the part only when the right count is reached.

- **Motion-Sequence Method:**
  - The third poka yoke method uses sensors to determine if a motion or a step in a process has occurred.
  - If the step has not occurred or has occurred out of sequence, the sensor signals a timer or other device to stop the machine and signal the operator.

Implementation in manufacturing

- Poka-yoke can be implemented at any step of a manufacturing process where something can go wrong or an error can be made.

  Shigeo Shingo recognized three types of poka-yoke for detecting and preventing errors in a mass production system:

- The contact method identifies product defects by testing the product's shape, size, color, or other physical attributes.
- The fixed-value (or constant number) method alerts the operator if a certain number of movements are not made.
- The motion-step (or sequence) method determines whether the prescribed steps of the process have been followed.

Advantages

- They are simple and cheap.
- They are part of the process, implementing what Shingo calls "100%" inspection.
- They are placed close to where the mistakes occur, providing quick feedback to the workers so that the mistakes can be corrected.
- Once put in place, they require minimal supervision.

Conclusion

Poka-yokes deals with understanding why people make errors and how to analyze the process to know where errors are likely to occur and what root causes contribute to them.

Since the poka-yoke devices detect errors at their roots n prevent them from blowing up to become bigger problems, there is consistency in the quality of the products, saving the cost and time spent in subsequent quality inspection processes.