



World Class Manufacturing

Poka Yoke

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Poka Yoke

-
- *After completing this chapter you will understand*

History of Poka Yoke

Types of errors

What is Poka Yoke

Rules of Poka Yoke

Its importance

When and How to use Poka Yoke

Its implementation

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Poka Yoke

Poka-yoke (ポカヨケ?) [[poka yoke](#)] is a Japanese term that means "mistake-proofing". A poka-yoke is any mechanism in a [lean manufacturing](#) process that helps an equipment operator avoid (*yokeru*) mistakes (*poka*). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to [human errors](#) as they occur. The concept was formalised, and the term adopted, by [Shigeo Shingo](#) as part of the [Toyota Production System](#). It was originally described as [baka](#)-yoke, but as this means "fool-proofing" (or "[idiot-proofing](#)") the name was changed to the milder *poka-yoke*.



Mr.Shingo

Literally Translated as

- Yokeru: to avoid
- Poka: inadvertent errors
- Target of Zero Defects and elimination of QC Inspection

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Shingo distinguished between the concepts of inevitable human [mistakes](#) and [defects](#) in the production. Defects occur when the mistakes are allowed to reach the customer. The aim of poka-yoke is to design the process so that mistakes can be detected and corrected immediately, eliminating defects at the source.

Types of errors

Main types of error:

Processing

1. Omitted Processing - Step in process not carried out

E.g. form not checked, discount not included, invoice not sent, hole not drilled, part not cleaned

2. Processing Errors - step in process carried out incorrectly

Eg invoice sent to wrong address, hole drilled in wrong Place

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Materials

3. Missing materials/information

E.g. form not filled out completely, screw left out

4. Wrong materials/information

E.g. wrong form filled out, wrong screw used

Human Error

- Humans make mistakes (errors) because of.....
 - Forgetfulness - Misunderstanding
 - Lack of experience/skills - Lack of concentration
 - Laziness - Lack of standards
 - Rushing - Taking short cuts
 - Malicious intent (deliberate action)

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Errors (can) lead to defects.

Defects are not inevitable and can be eliminated by the use of simple, low cost methods – zero defects.

- Mistake Proofing should take over repetitive tasks that depend on vigilance or memory .

“Be more careful” not effective

The old way of dealing with human error was to scold people, retrain them, and tell them to be more careful ... but you can't do much to change human nature, and people are going to make mistakes. If you can't tolerate them ... you should remove the opportunities for error.

Training and motivation work best when the physical part of the system is well designed.

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If you train people to use poorly designed systems, they'll be OK for awhile. Eventually, they'll go back to what they're used to or what's easy, instead of what's safe.

You're not going to become world class through just training, you have to improve the system so that the easy way to do a job is also the safe, right way.

The potential for human error can be dramatically reduced.

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Rule for Defect Reduction

Your Supplier

You

Your Customer

Don't accept defects

don't make a defect

don't pass on a defect

Poka-Yoke

Don't allows any defects to occur in the first place

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Poka Yoke-What is it

The main objective of poke yoke is to achieve zero defects. In fact, it is just one of the many components of Shingo's Zero Quality Control (ZQC) system, the goal of which is to eliminate defective products.

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Poka yoke is more of a concept than a procedure. Thus, its implementation is governed by what people think they can do to prevent errors in their workplace, and not by a set of step-by-step instructions on how they should do their job.

Poka yoke is implemented by using simple objects like fixtures, jigs, gadgets, warning devices, paper systems, and the like to prevent people from committing mistakes, even if they try to! These objects, known as poka yoke devices, are usually used to stop the machine and alert the operator if something is about to go wrong.

Anybody can and should practice poka yoke in the workplace. Poke yoke does not entail any rocket science - sometimes it just needs common sense and the appropriate poka yoke device.

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Poka yoke devices should have the following characteristics:

- 1) Useable by all workers
- 2) Simple to install
- 3) Does not require continuous attention from the operator (ideally, it should work even if the operator is not aware of it.
- 4) Low-cost.
- 5) Provides instantaneous feedback, prevention, or correction.

Poka yoke is at its best when it prevents mistakes, not when it merely catches them.

Since human errors usually stem from people who get distracted, tired, confused, or demotivated, a good poka yoke solution is one that requires no attention from the operator.

Such a poka yoke device will prevent the occurrence of mistake even if the operator loses focus in what she is doing.

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- Examples of Poka Yoke



Spring loaded & rounded point
when operator lets go,
the blade goes back in

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Elevators

Some common safety features are listed below:

- Doors sensors detect if an object/person is blocking

entrance, if so they automatically open

- 2 separate braking systems used. The first is opened by electrical current, if power is lost the brake closes under high spring tension.
- A host of switches and sensors control the positioning of the elevator
- Acceleration/deceleration alters with weight in carriage



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Electrical (Household)

RCD (Residual Current Device)

Automatically cuts off power supply if a leakage current to ground is detected



Mains Socket

Earth pin first to make and last to break contact

Earth pin has to enter socket to move protective shields from Live and NEUTRAL connections

Shape prevents incorrect fitment



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Electrical (General)

- Shapes and colours extensively used to prevent equipment being incorrectly connected



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Appliances

- Microwave

Will not work until the door is shut



- Washing machine

Will not start until door is closed

Will not allow door to be opened until cycle is complete



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In Short Poka Yoke is:

Mistake-proofing systems.

Does not rely on operators catching mistakes.

Inexpensive Point of Origin inspection

Quick feedback 100% of the time.

1-10-100 Rule

The 1-10-100 rule states that as a product or service moves through the production system, the cost of correcting an error multiplies by 10.

Activity

	Cost
Order entered correctly	Rs .1
Error detected in billing	Rs .10
Error detected by customer	Rs. 100
Dissatisfied customer shares the experience with others	

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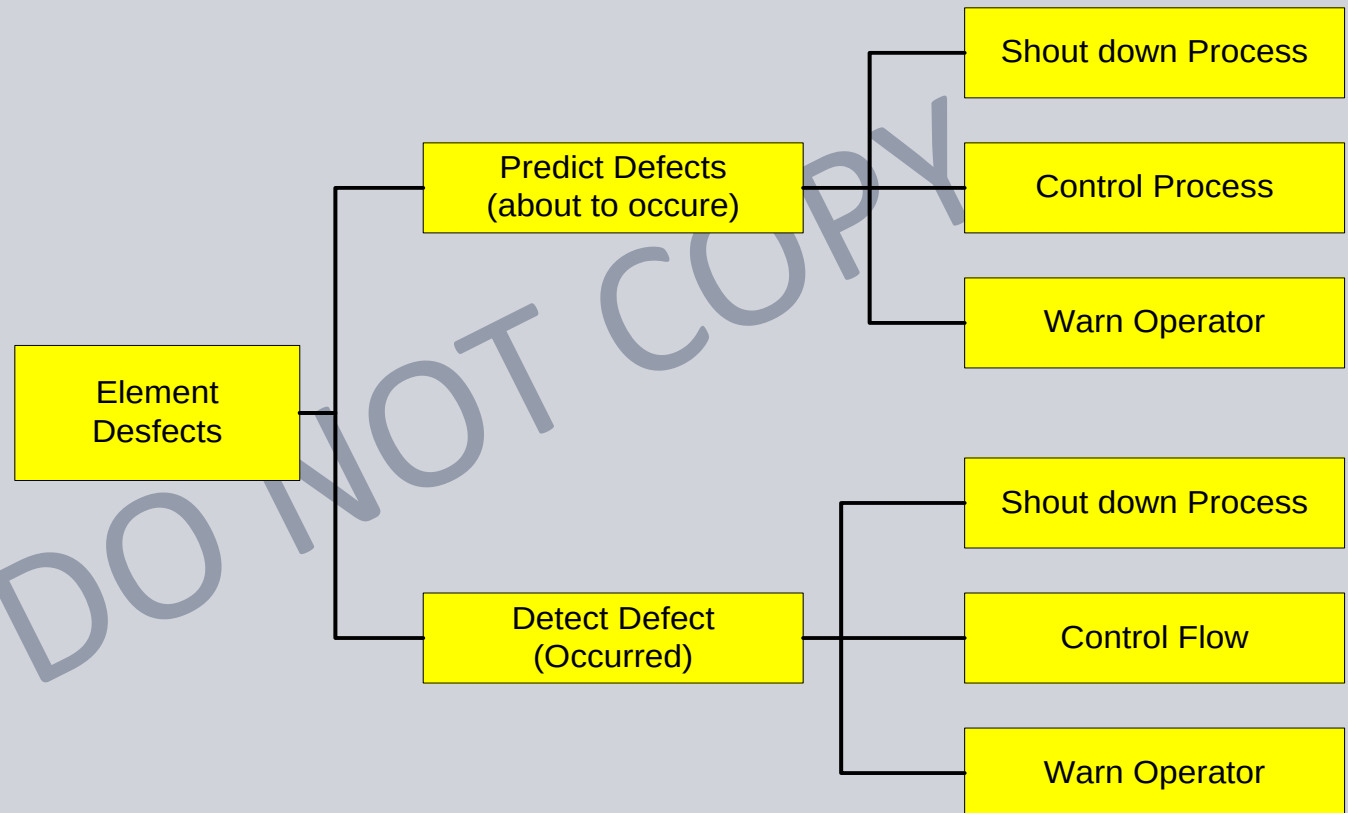
Rules of Poka Yoke

- 1) Don't wait for the perfect POKA YOKE. Do it now!
- 2) If your POKA YOKE idea has better than 50% chances to succeed...Do it!
- 3) Do it now....improve later!
0% chance to succeed

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Function of Poka Yoke



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Why is it Important

- 1) Poka-yoke helps people and processes work right the first time.
- 2) Poka-yoke refers to techniques that make it impossible to make mistakes. These techniques can drive defects out of products and processes and substantially improve quality and reliability.
- 3) It can be thought of as an extension of FMEA. (failure mode effect analysis)
- 4) It can also be used to fine tune improvements and process designs from six-sigma Define - Measure - Analyze - Improve - Control (DMAIC) projects. The use of simple poka-yoke ideas and methods in product and process design can eliminate both human and mechanical errors.
- 5) Poka-yoke does not need to be costly

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When to use it:

Poka-yoke can be used wherever something can go wrong or an error can be made. It is a technique, a tool that can be applied to any type of process be it in manufacturing or the service industry. Errors are many types –

1 Processing error

Process operation missed or not performed per the standard operating procedure.

2 Setup error

Using the wrong tooling or setting machine adjustments incorrectly.

3 Missing part

Not all parts included in the assembly, welding, or other processes.

4 Improper part/item

Wrong part used in the process.

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5 Operations error

Carrying out an operation incorrectly; having the incorrect version of the specification.

6 Measurement error

Errors in machine adjustment, test measurement or dimensions of a part coming in from a supplier

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How to use it?

Step by step process in applying poka-yoke

- 1 Identify the operation or process - based on a pare to.
- 2 Analyze the 5-whys and understand the ways a process can fail.
- 3 Decide the right poka-yoke approach, such as using a shut out type (preventing an error being made), or an attention type (highlighting that an error has been made) poka-yoke take a more comprehensive approach instead of merely thinking of poka-yokes as limit switches, or automatic shutoffs a poka-yoke can be electrical, mechanical, procedural, visual, human or any other form that prevents incorrect execution of a process step
- 4 Determine whether
 - a contact - use of shape, size or other physical attributes for detection
 - constant number - error triggered if a certain number of actions are not made
 - sequence method - use of a checklist to ensure completing all process steps is appropriate

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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.

For example, a [jig](#) that holds pieces for processing might be modified to only allow pieces to be held in the correct orientation, or a digital counter might track the number of spot welds on each piece to ensure that the worker executes the correct number of welds.

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

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

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Either the operator is alerted when a mistake is about to be made, or the poka-yoke device actually prevents the mistake from being made. In Shingo's lexicon, the former implementation would be called a *warning* poka-yoke, while the latter would be referred to as a *control* poka-yoke.

Shingo argued that errors are inevitable in any [manufacturing](#) process, but that if appropriate poka-yokes are implemented, then mistakes can be caught quickly and prevented from resulting in defects.

By eliminating defects at the source, the cost of mistakes within a company is reduced.

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Summary:

Poka Yoke is a Japanese term that means “mistake proofing”. The concept of Poka Yoke was formalised by Shigeo Shingo and its goal is to eliminate defective products.

It is implemented by using simple objects like jig, gadgets, warning devices to prevent people from committing mistakes, even if they try to.

Poka Yoke devices should be useable by all workers, simple to install, low cost, does not

Require continuous attention and provide instantaneous feedback.

It helps people and processes to work right the first time thereby improving quality and reliability.

It is a technique, a tool that can be applied to any type of process be it in manufacturing or service industry.

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Thank You