

Poka yoke (Mistake Proofing)

Poka yoke is a quality management concept developed by a Matsushita manufacturing engineer named Shigeo Shingo to prevent human errors from occurring in the production line. Poka yoke (pronounced "poh-kah yoh-kay") comes from two Japanese words—"yokeru" which means, "to avoid", and "poka" which means "inadvertent errors." Thus, Poka yoke more or less translates to "avoiding inadvertent errors".

Poka yoke is sometimes referred to in English by some people as "fool-proofing". However, this doesn't sound politically correct if applied to employees, so the English equivalent used by Shingo was "error avoidance." Other variants like "mistake proofing" or "fail-safe operation" have likewise become popular.

The main objective of Poka 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.

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 Poke 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. Poka-Yoke does not entail any rocket science—sometimes it just needs common sense and the appropriate Poka yoke device. 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.
- A lot of Shingo's poke yoke devices cost less than \$50!

Of course, error proofing can be achieved by extensive automation and computerization. However, this approach is expensive and complicated, and may not be practical for small operations. Besides, it defeats the original purpose of Poka yoke, which is to reduce defects from mistakes through the simplest and lowest-cost manner possible.

"Unless you try to do something beyond what you have already mastered, you will never grow."

Ronald. E. Osborn

Where Lean Thoughts can become Reality

Poka Yoke – (Mistake Proofing)

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 de-motivated, a good Poke yoke solution is one that requires no attention from the operator. Such a Poke yoke device will prevent the occurrence of mistake even if the operator loses focus in what she is doing.

Examples of 'attention-free' Poka Yoke solutions:

- A jig that prevents a part from being misoriented during loading
- Non-symmetrical screw hole locations that would prevent a plate from being screwed down incorrectly
- Electrical plugs that can only be inserted into the correct outlets
- Notches on boards that only allow correct insertion into edge connectors
- A flip-type cover over a button that will prevent the button from being accidentally pressed

Three levels of Poka yoke:

- Elimination of spills, leaks, losses at the source or prevention of a mistake from being committed
- Detection of a loss or mistake as it occurs, allowing correction before it becomes a problem
- Detection of a loss or mistake after it has occurred, just in time before it blows up into a major issue (least effective)

Poka-yoke systems consist of three primary methods:

1. **Contact**
2. **Counting**
3. **Motion-Sequence**

A **Contact Method** functions by detecting whether a sensing device makes contact with a part or object within the process.

An example of a physical contact method is limit switches that are pressed when cylinders are driven into a piston. The switches are connected to pistons that hold the part in place. In this example, a cylinder is missing and the part is not released to the next process.

The **Counting Method** is used when a fixed number of operations are required within a process, or 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.

Another approach is to count the number of parts or components required to complete an operation in advance. If operators finds parts leftover using this method, they will know that something has been omitted from the process.

The third poka-yoke method, **Motion Sequence**, 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 the sensor signals a timer or other device to stop the machine and signal the operator.

Common Mistake-proofing Devices;

- Guide Pins
- Blinking lights and alarms
- Limit switches
- Proximity switches
- Counters
- Checklists