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# Orientation Training Program

## What is "Poka-yoke"?

"Fail-Safing", "Foolproofing", or "Mistake-proofing"

**Poka-yoke** (ポカヨケ ?) (IPA: [poka joke]) is a Japanese term that means "fail-safing", "Foolproof" or "mistake-proofing"; Avoiding (yokeru) inadvertent errors (poka) is a behavior-shaping constraint, or a method of preventing errors by putting limits on how an operation can be performed in order to force the correct completion of the operation. The concept was formalised, and the term adopted, by Shigeo Shingo as part of the Toyota Production System. Originally described as Baka-yoke, but as this means "fool-proofing" (or "idiot proofing") the name was changed to the milder Poka-yoke.

Examples include:

- Automatic transmissions: the inability to remove a car key from the ignition switch of an automobile if the automatic transmission is not first put in the "Park" position, so that the driver cannot leave the car in an unsafe parking condition where the wheels are not locked against movement. (An example of a Trapped key interlock).
- 3.5" floppy disk: the top-right corner is shaped in a certain way so that the disk cannot be inserted upside-down. In the manufacturing world an example might be that the jig for holding pieces for processing only allows pieces to be held in one orientation, or has switches on the jig to detect whether a hole has been previously cut or not, or it might count the number of spot welds created to ensure that, say, four have been executed by the operator.
- High-security padlocks: it is impossible to remove the key from some high-security padlocks unless the shackle on the padlock is closed. Only by locking the padlock can the key be removed. Security mistakes/accidents are therefore much less likely to occur, particularly where the padlock key is kept on a chain attached to someone's belt. This is because the design ensures that a key cannot easily be left in an unlocked padlock, or a padlock left unlocked after opening it, or not fully closing the shackle of a padlock. Each of these three scenarios would be dangerous in high-security scenarios such as military installations, armories, prisons or bonded warehouses. In contrast, most standard-security padlocks do allow a key to be removed from a padlock, regardless of whether the shackle is closed or not.
- UK 13 amp electric plug: it is impossible to wrongly insert the plug into the socket, due to its arrangement of three rectangular pins.
- Microwave ovens: a door switch automatically disconnects the activation button when the door of the oven is opened. As a result, it is impossible to cook anything in a microwave oven unless the door (which contains a faraday cage to block microwaves) is fully closed. If it were possible to activate an oven with the door open, this would allow dangerous leakage of high intensity microwave radiation, which would be very harmful to any living creatures in the immediate area.

## Implementation

Shigeo Shingo recognizes three types of Poka-Yoke:

- The contact method identifies defects by whether or not contact is established between the device and the product. Color detection and other product property techniques are considered extensions of this.
- The fixed-value method determines whether a given number of movements have been made.
- The motion-step method determines whether the prescribed steps or motions of the process have been followed.
- Poka-yoke either give warnings or can prevent, or control, the wrong action. It is suggested that the choice between these two should be made based on the behaviors in the process, occasional errors may warrant warnings whereas frequent errors, or those impossible to correct, may warrant a control poka-yoke.