



**SYMBIOSIS INSTITUTE OF
OPERATIONS MANAGEMENT**

Empowering & Leading Operations Excellence



POKA – YOKE (Mistake proofing)

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MISTAKE-PROOFING (POKA-YOKE)

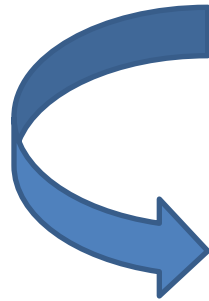
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GROUP NUMBER- 04

What Does POKA YOKE Mean????

Poka Yoke



INADVERTANT
ERROR
(Mistake)



YOKURE
(TO AVOID)
(Proofing)

Poka Yoke

- **‘Poka’** means **‘Mistakes’** & **‘Yoke’** means **‘Avoid’**. It’s objective is to achieve **Zero Defects**.
- Poka-yoke is a quality assurance technique ,the aim of poka-yoke is to eliminate defects in a product by preventing or correcting mistakes as early as possible.
- Term adopted by **Dr. Shigeo Shingo** as part of the **Toyota Production System** in 1960.
- It was originally described as “baka-yoke”, but this name mean “Fool-Proofing” so the name was changed to the Poka-yoke.

TO ERR IS HUMAN

BUT

INTELLIGENCE IS HUMAN KIND...

SO

NEVER STOP FINDING WAYS OF NOT MAKING MISTAKE

Typical Errors



- Processing errors
- Missing Operation
- Inappropriate procedures
- Missing parts
- Missing information
- Wrong parts
- Damaged materials
- Tools or equipment improperly prepared or setup
- Human Errors

DEFECTS AND ITS IMPACT



- Defect free product is a necessity to compete in the market place.
- Every Customers has a right to demand 100% good product /service and every provider has an obligation to provide the same.
- Bad products hurt both reputation and bottom line (Scrap, rework, warranty....etc.,.)
- Defects have a direct impact on process yield affecting speed and flow of the product to the customer.

METHODOLOGY

- **Identify a problem**
- **Observations at workstation**
- **Brain storm for ideas**
- **Zero in on best idea**
- **Implementation plan**
- **Implement**
- **Monitor & Sign-off**



Why is “Zero Defects” an Important Concept?

Maintain Customer Satisfaction & Loyalty

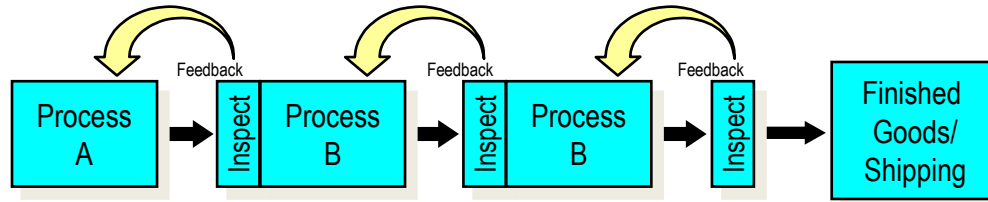
- Happy Customers mean more sales!



COSTS

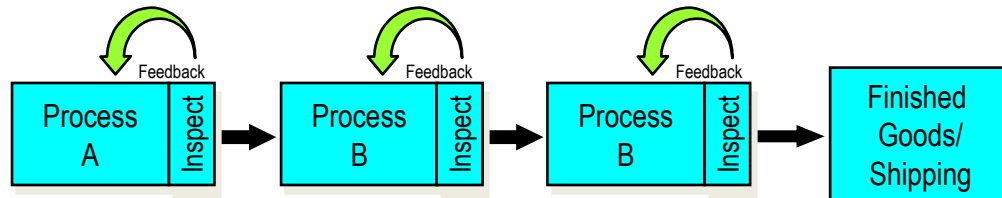
There is always a cost associated with manufacturing defects!

DEFECT DETECTION AND PREVENTION STRATEGIES



Successive Checks

- EACH PROCESS INSPECTS PREVIOUS PROCESS
- TYPICALLY, 3 OR LESS CRITICAL CHECKS PER STEP
- EFFECTIVE WITH SMALL TRANSFER QUANTITIES FROM PROCESS TO PROCESS.



Self-Checks

- FIND DEFECTS AS THEY EXIT PROCESS, IMMEDIATE FEEDBACK & CORRECTIVE ACTION.
- STOPS ADDING VALUE TO DEFECTIVE PRODUCT.

**Prevent the defect from occurring in the first place
or to make it immediately evident**

Poka-Yoke

SOME MISTAKE-PROOFING STRATEGIES

- Make it harder to create the error
- Make it possible to reverse the error
- Make it obvious that the error has occurred
- Detect deviations from procedures or fixed values (e.g., Number of parts)
- Design:
 - Design process so it tolerates the error and doesn't result in a defect
 - Design process to decrease complexity

APPROACHES TO MISTAKE PROOFING

- Control approach

- Shuts down the process when an error occurs
- High capability of achieving zero defects (ie robust design that can tolerate variation or eliminates variation or assembly mistakes)

- Warning approach

- Signals the operator to stop the process and correct problem or check for a problem (ie are parts still ok, is oil level ok)
- Sometimes an automatic shutoff is not an option
- Dials, lights, and sounds to bring attention to the problem

EXAMPLES OF SOME USEFUL MISTAKE-PROOFING DEVICES

- Guide pins, to assure that parts can only be assembled in the correct way.
- Limit switches, that sense the presence or absence of a part.
- Mistake-proofing jigs, detect defects immediately upstream of the process ensuring that only the correct part reach the process.
- Counters, that verify that the correct number of parts or steps have been taken.
- Checklist, that reminds operators to do certain actions.

EVERYDAY EXAMPLES OF MISTAKE PROOFING

- Home
 - Automated shut-offs on electric coffee pots
 - Child-Proof caps on medications
 - Ground fault circuit breakers for bathrooms or outside electric circuits
- Office
 - Spell check in word processing
 - Question prompt “Do you want to delete?” after pressing the “Delete” button on your computer.
- Factory:
 - Dual palm button and light curtains on machines
- Retail:
 - Tamper-Proof packaging
 - Bar coding at checkout.



“I have an extra part. I must have omitted a step!”

WARNING APPROACH



Warning lights alert the driver of potential problems. These devices employ a warning method instead of a control method.

(Seatbelts, High engine temperature, Low oil pressure)

Level 1 Poka-Yoke



Level 2 Poka-Yoke

Medium Gain 90%
Medium Cost



Level 3 Poka-Yoke

High Gain 100%
High Cost



Mistake Proofing Devices

- Types of mistake proofing devices within control or warning approach can be of:
 - **Contact type:**
 - The contact type makes contact with every product or has a physical shape that prevents mistakes.
 - *Example: Fixed diameter hole through which all products must fall and an oversize product does not fall through and a defect is registered.*
 - **Fixed value type:**
 - The fixed value method is a design that makes it clear when a part is missing or not used.
 - *Example: “Egg tray” used for supply of parts,*
 - **Motion step type:**
 - The motion step type automatically ensures that the correct number of steps have been taken.
 - *Example: An operator is required to step on a foot pedal every assembly cycle, Correct sequence for switches that do not work unless the order is correct.*

TYPES OF SENSING DEVICES

Sensing devices that are traditionally used in poka-yoke systems can be divided into three categories:

1. Physical contact devices
2. Energy sensing devices
3. Warning Sensors



Each category of sensors includes a broad range of devices that can be used depending on the process.

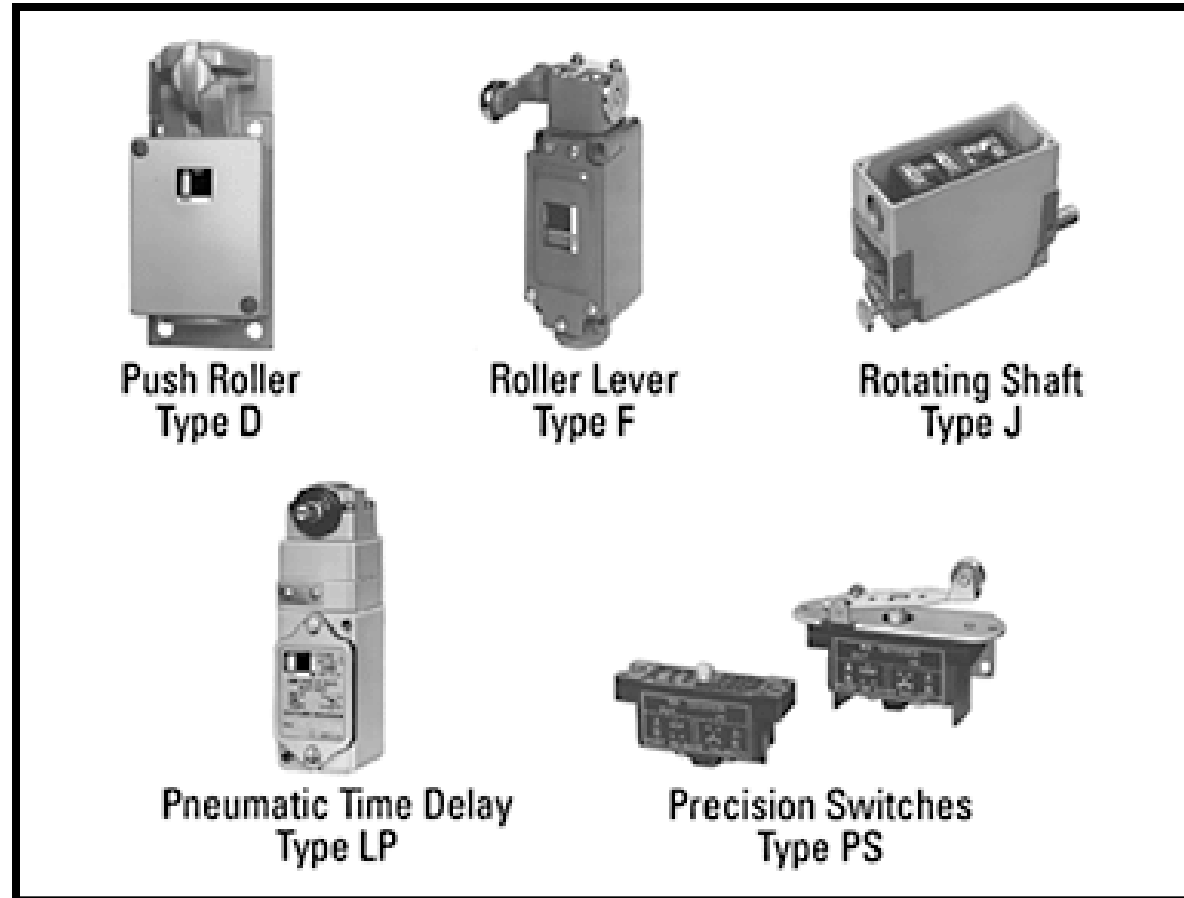
PHYSICAL CONTACT SENSORS

These devices work by physically touching something.

This can be a machine part or an actual piece being manufactured.

In most cases these devices send an electronic signal when they are touched.

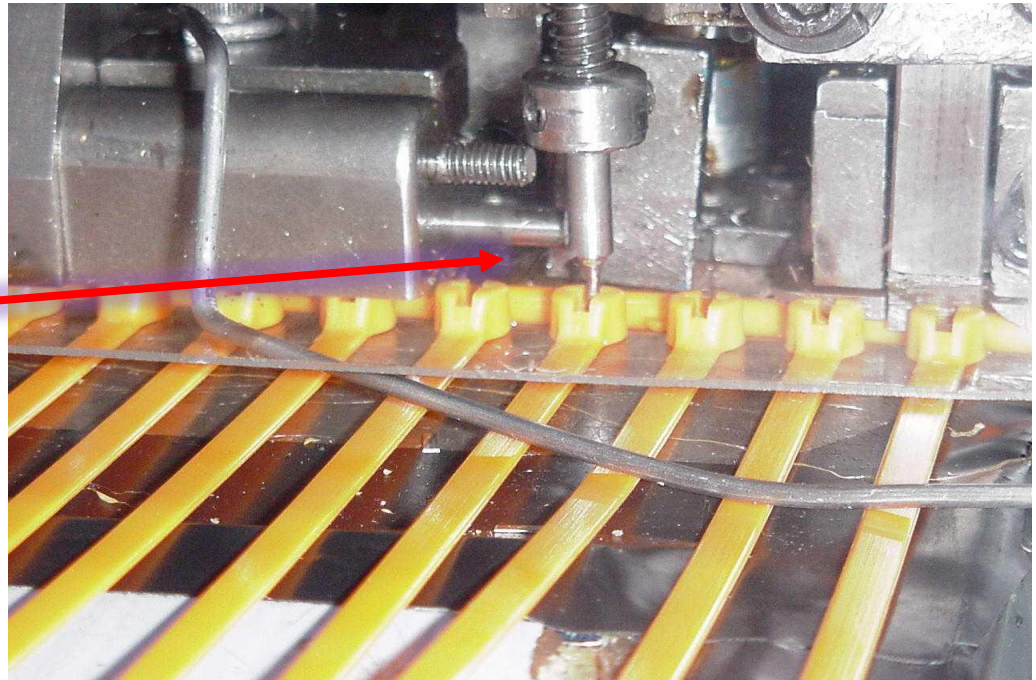
Depending on the process, this signal can shut down the operation or give an operator a warning signal.



TOUCH SWITCH

Used to physically detect the presence or absence of an object or item-prevents missing parts.

Used to physically detect the height of a part or dimension.



ENERGY SENSORS

These devices work by using energy to detect whether or not a defect has occurred.



**PFS-PRESSURE
& FORCE**



Fiber optic



Vibration



Photoelectric

WARNING SENS

Warning sensors signal the operator that there is a problem.

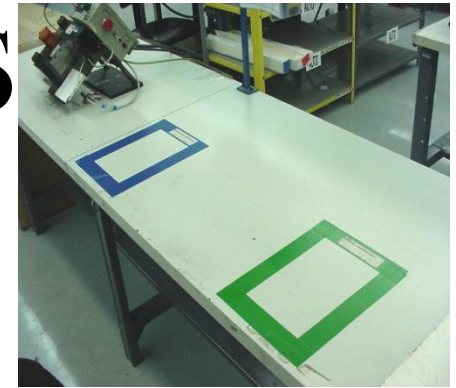
These sensors use colors, alarms, lights to get the workers attention !

These sensors may be used in conjunction with a contact or energy sensor to get the operators attention.

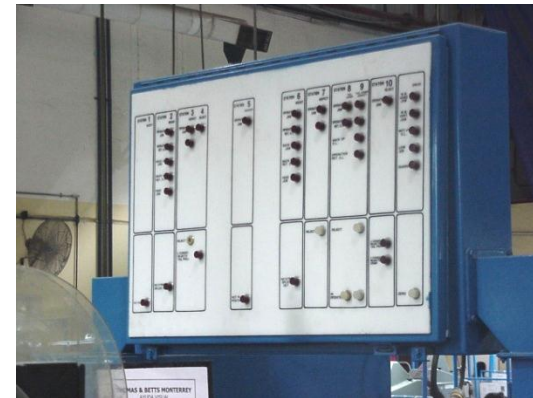


Lights

Lights connected to Micro switches & timers



Color Code



SET A STANDARD

- Errors are not acceptable
- Use cross-functional teams to design and maintain processes to be robust
- **RIGHT FIRST TIME**
 - Good: Design products and processes so that we make it right the first time
 - Best: Design products and processes so we **CAN'T** make it wrong any time and get a concurrent productivity improvement

ADVANTAGES

- Remove defect from root cause or source
- Faster defect detection and correction
- Less attention from worker/operators
- Improve safety of workers
- Improve equipment effectiveness and assures higher reliability

LIMITATIONS

- Requires special expertise in terms of instrumentation knowledge
- Requires work culture of 100% inspection and perfectionism, which is difficult to sustain
- Worker may sometimes fiddle with the instruments, especially settings on their machines, resulting in losses to the company

Remember 3 rules....

An error proofing system should take into consideration these 3 simple rules :



Ideally, design the product so that it **can't be assembled incorrectly!!!**

Thank You!

