



“Implementation of Poka-yoke on Effective System .”

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Abstract : Present opinions have stated that good quality can be gained only by organizations which implement the Quality Management Systems, which use the idea of continuous improvement of all processes and also which use the quality tools and quality methods, recycling technology inside of the production process. However in the new era of quality the methodology like Zero defects, continuous improvement, six sigma and method of quality (FMEA, QFD SPC) is a set of general measures to prevent defects. The aim of the system QC and techniques of Poka-Yoke is to ensure 100% quality products and their delivery to the customer as soon as possible and at a minimum cost. This means that the company ensures the monitoring and prevention of defects at each stage of production. The main motto of companies is 'not to manufacture, not to release on the market and does not accept product with defects'. They have been guided by the Poka-Yoke principle which are defects that arise most as a result of human errors where the same mistake has been made, errors due to misunderstanding, incorrect identification, forgetting, lack of training and improperly implemented good intention.

Keywords - mistake-proofing, poka-yoke, quality-control.

I. INTRODUCTION

In any system, mistakes happen even when we make sure that the process is occurring swiftly. When any organization decides to implement lean manufacturing then one of the objectives is to reduce scrap because no one is interested in compensating extra inventory on account of scrap. Hence it is better to find the root cause of any problem and avoid it which gives a defect free product. A failure in various areas of a system can have very serious consequences and potentially cause loss of life.

Nowadays, each and every company wants profit, high productivity, and value in the market. There are slogans in most factories stating defect reduction targets, but the ultimate aim should always be zero defects. "POKA-YOKE" is a vital factor in eliminating defects. Poka-yoke is a concept in total quality management which is related to restricting errors at source itself. It deals with "foolproofing" or "mistake-proofing". A poka-yoke is any idea generation or mechanism development in a total productive management process that helps operators to avoid (yokeru) mistakes (poka). Main aim of the Poka Yoke concept is to make a whole system error proof that means no one can make a mistake although some one wants to make mistakes intentionally. It eliminates the defects or faults. This term was coined by Shigeo Shingoin 1960s for the part of Toyota Production System. The aim of Poka-yoke is to design the process so that mistakes can be detected and corrected immediately, eliminating defects at the source. A methodical approach to build up Poka-Yoke countermeasures which consists in a three-step analysis of the risks to be managed:

- Identification of the need
- Identification of possible mistakes
- Management of mistakes before satisfying the need.

The Poka-Yoke method was introduced by Shigeo Shingo in 1961, when he was one of engineers at Toyota Motor Corporation. This method, in other words, is to prevent defects and errors originating in the mistake. Shigeo Shingo, Born in Saga City, Japan, the Japanese industrial engineer who distinguished himself as one of the world's leading experts on manufacturing practices and the Toyota Production System. It is therefore started in Japanese organizations to implement a Zero Quality Control (ZQC). One of its elements.

II. LITERATURE REVIEW

Solaimani & Sedighi (2020) [1] Lean implementation including Poka Yoke in Construction, Carry out and sustain the lean in construction and poka-yoke is part of them, particularly for safety.

Kumar et al. (2018) [2] To control the variation of slide cylinder grinding, PY was applied. It solved the problem of wheel dash mark by using a digital device for measuring the gap between the wheel and workpiece surface, while a dial indicator was used to display position of the wheel slide. The results showed improvement in rework time and product quality.

Che-Ani et al. (2017) [3] One of the main problems of an automotive assembly process was a broken plastic part connected to the sun visor of a vehicle. Color coding and designing different parts and dimensions have improved self-inspection done by workers to remove further assembly defects.

Rajendra et al. (2013) [4] At a starter motor assembly line, a problem was identified with the assembling process between a retainer and a stop ring. The team used fixtures to eliminate the missing step of final pressing, sensors between the retainer and the stop ring in order to follow appropriate assembly steps. Laser sensors were used for detecting the presence of parts and movement of the pressing head. Results showed that, during assembly, process PY can eliminate problems caused by human errors.

Kovach et al. (2013) [5] Providing knowledge on error proofing strategies to healthcare managers can improve and prevent occurrence of errors in hospitals. Most of the strategies are used to prevent medication, pre-surgery and child errors by box labeling for special medications, different color coding, pillbox, sponge counter bags, and protective electric plugs.

Gamberini et al. (2009) [6] Italian producer of heat exchangers for sanitary warm water used PY to improve redesigned manufactory lines. Errors of mis-positioning were solved by customized pallets with pins for blocking the pallets on the manufacturing line. Quality improvements have been improved by placing a labeling rod near the press. Anti-rotation devices for press were introduced in order to sustain press position in place.

Yi and Yusof (2007) [7] A case study from an automotive part assembly company identified defects, misallocation and missing parts during the assembly process of wires. Human errors were reported as the main cause of such errors. Automated sensor mechanisms can be used to control an operator's assembly steps by opening and closing the lids containing the parts from the first step, to the last one. If any step is omitted by the worker, sound will be a signal for error detection and won't allow the next step.

Chase and Stewart (1994) [8] Classification of errors and steps for fail-safe implementation in service processes were introduced in this study. A case study from a car dealer showed some of the most frequent process errors: forgetting appointment time, unnoticed customer presence by an operator, prolonged waiting time, high

workload, misunderstanding, wrong diagnosis made by an operator, inventory problems. The solutions for these problems can be solved by bell signals, color coding, car tags, joint inspection methods, checklists, computer diagnosis systems, limitswitches, and motion step PY for alarming vehicle retriever specialists.

III. METHODOLOGY

When to use:

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

- 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:

Step by step process in applying poka-yoke:

- Identify the operation or process.
- Analyze and understand the ways in which a process can fail.
- 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.
- Determine whether a Contact Method Constant Number or Counting Method Motion Sequence Method.
- Trial the method and see if it works.
- Train the operator, review performance and measure success.

Step 1: Identify problem - In this stage, the complaints are collected. The principle of standard is determined by considering various criterias like number of complaints from the customer, the quantity of defects detected by quality control, materiality defects (their impact on the customer, costs, implemented process) and then data is collected broadly. As per analysis of the results of the collected data, the company plans to develop a poka-yoke system for the selected problem. In this way in first stage the problem carried out.

Step 2: Observation at work stations - In this step the actual on site study of the problem is carried out. The causes behind the problem are evaluated. The causes may be related to man, machine, material or method accordingly the complete sorting is carried out.

Step 3: Brainstorming for ideas - This is a technique to capture creativity and skills of employees .In brainstorming sessions the problem under study is put forward to the committee. Then all members study the problem and give various solutions to avoid that defect. As each person may come up with unique ideas this step concludes with various alternative solutions for the same problem.

Step 4: Select best ideas - After getting various alternative solutions it is time to select the best one out of all collected solutions. Criteria for selection may be cost, time required, changes in existing system, simplicity in operation etc. By referring to all selection criteria's committee concludes with one best solution.

Step 5: Implementation plan and implementation - This step is concerned with implementation planning. It deals with material requirements, processing the material and finally the manufactured mechanism is implemented at the actual working site.

Step 6: Monitoring and sign off - The manufactured products are checked for defects. Also the performance of the poka-yoke system is monitored.

IV. CONCLUSION

To make errors is human nature so we can't blame human beings for each and every mistake. As like error, Intelligence is also human nature so we can dominate preceding nature by next nature. Poka yoke is just a face of that intelligence. We can avoid the mistakes at the source itself by using the mentioned methodology. It also allows users to function without mistakes or prevent errors that are about to occur. In order to implement a quality management system successfully each activity should aim towards excellence. Poka yoke is one of the most important tools in TQM. Successful poka yoke results in increased productivity with minimum waste (waste due to rework, scrap) because we are sure about the quality of the product, as mistakes are blocked at the source itself. There may be some practical limitations in poka yoke but we have to overcome all that for achieving the aim of "Zero Defects, Zero Waste and Zero Delays' ". In one sentence poka yoke is launching preventive actions for systematic movement on the success ladder of QMS with higher level of performance and productivity of systems with high quality products at minimum cost.

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