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A STUDY ON IMPLEMENTATION OF POKA–YOKE TECHNIQUE IN IMPROVING THE OPERATIONAL PERFORMANCE BY REDUCING THE REJECTION RATE IN THE ASSEMBLY LINE

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***Abstract*— Quality is one of the most important aspects or requirements that must be fulfilled in the manufacturing industry. Errors can cause considerable damage or give rise to defects that may affect an organisation in term of cost or expenses. Some manufacturers might lose their credibility, customers, and even their entire business because of damages or defects in their products. Hence, manufacturers seek robust processes such as the Poka-Yoke technique that can increase productivity and profitability. The search for robust processes resulted in the introduction and development of the manufacturing concept.**

***Keywords*— Poka yoke, Quality, Process Improvement, Productivity.**

I. INTRODUCTION

Poka-yoke is based on prediction and detection. That is, recognizing that a defect is about to occur or recognizing that a defect has occurred. Consequently, there are two basic types of poka-yoke systems. The control poka-yoke does not allow a process to begin or continue after an error has occurred. It takes the response to a specific type of error out of the hands of the operator. A second type of poka-yoke provides some type of warning when an error occurs. This does not prevent the error, but immediately stops the process when an error is detected. This type of poka-yoke is useful for mass production environments with rapid processing as the device prevents mass production of scrapped material. For environments where large losses of time or resources do not result, a warning poka-yoke is warranted. All that is needed is a way to ensure that the error is investigated and corrected in a timely manner.

Poka-Yoke ensures that the right conditions exist before a process step is executed and thus preventing defects from occurring in the first place. Where this is not possible, Poka-Yoke performs a detective function, eliminating defects in the process as early as possible. Poka-yokes can be as simple as a steel pin on a fixture that keeps incorrectly placed parts from fitting properly, or they can be as complex as a fuzzy logic neural network used to automatically detect tool breakage and immediately stop the machine.

A. The two types of poka yoke system.

1) Prevention-Based Poke yoke

Prevention-based mechanisms senses an abnormality that is about to happen, and then signals the occurrence or halt processing, depending on the severity, frequency or downstream consequences. There are two approaches for prevention-based-Poka-yokes:

- Control Method: This method senses a problem and stops a line or process, so that corrective action can take place immediately, thus avoiding serial defect generation.
- Warning Method: This method signals the occurrence of a deviation or trend of deviations through an escalating series of buzzers, lights or other warning devices to detect and solve defects.

2) Detection-Based Poka-Yokes

In many situations, it is not possible or economically feasible to prevent defects, particularly where the capital cost of the poka-yoke mechanism, far exceeds the cost of prevention.
The three categories of detection-based poka-yokes are as follows:

- Contact Method: This method detects any deviation in shape, dimensional characteristics or other specific defects, through mechanisms that are kept in direct contact with the part.

- Fixed Value Method: This method is used in operations, in which a set of steps is sequentially performed. The fixed value method employs automatic counters or optical devices and controls the number of moves, rate and length of movement as well as other critical operating parameters.
- Motion Step Method: This method ensures that a process or operator does not by mistake perform a step that is not part of the normal process. An example of this is colour coding of electronic components on drawings and totes to prevent using mixed or incorrect parts.

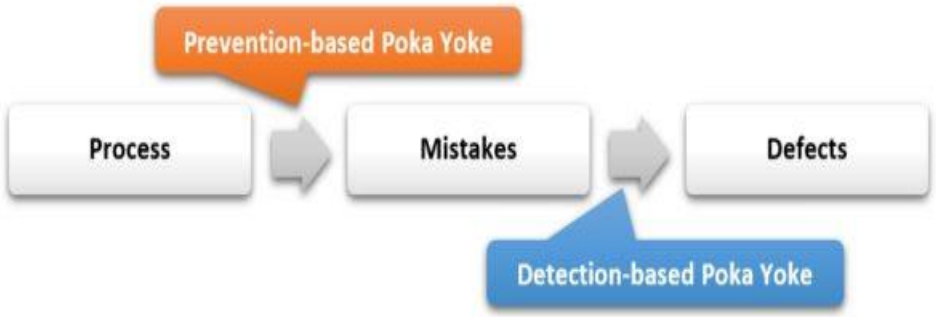

Fig. 1 Use of types of poke yoke system [Ref: Google]

II. OBJECTIVE OF STUDY

Nowadays, logistics has forced companies to prepare and deliver a very large number of daily orders in the shortest time possible. Against this backdrop, logistics managers strive to eliminate potential mistakes that could lead to delays and a loss of customer confidence. The main objectives of this study are as follows:

- To study the impact of poka yoke implementation in improving the operational performance in assembly line
- To study the impact of poka yoke implementation in reducing the rejection rate
- To study the improvement in productivity while practicing the poka yoke system

III.NEED OF POKA YOKE SYSTEM

Nowadays it is even important in day to day life to have error proof situations. In this project, recent rejection in the Barrier Audit stage is taken and Poka – Yoke is given as a solution to eradicate it. Barrier Audit is the final inspection stage before dispatch. The term poka-yoke was applied by Shigeo Shingo in the 1960s to industrial processes designed to prevent human errors. Shingo redesigned a process in which factory workers, (Satish Thatavarti and K. Thammi Reddy 2017) while assembling a small switch, would often forget to insert the required spring under one of the switch buttons. In the redesigned process, the worker would perform the task in two steps, first preparing the two required springs and placing them in a placeholder, then inserting the springs from the placeholder into the switch. When a spring remained in the placeholder, the workers knew that they had forgotten to insert it and could correct the mistake effortlessly.

IV. METHODOLOGY OF POKA YOKE

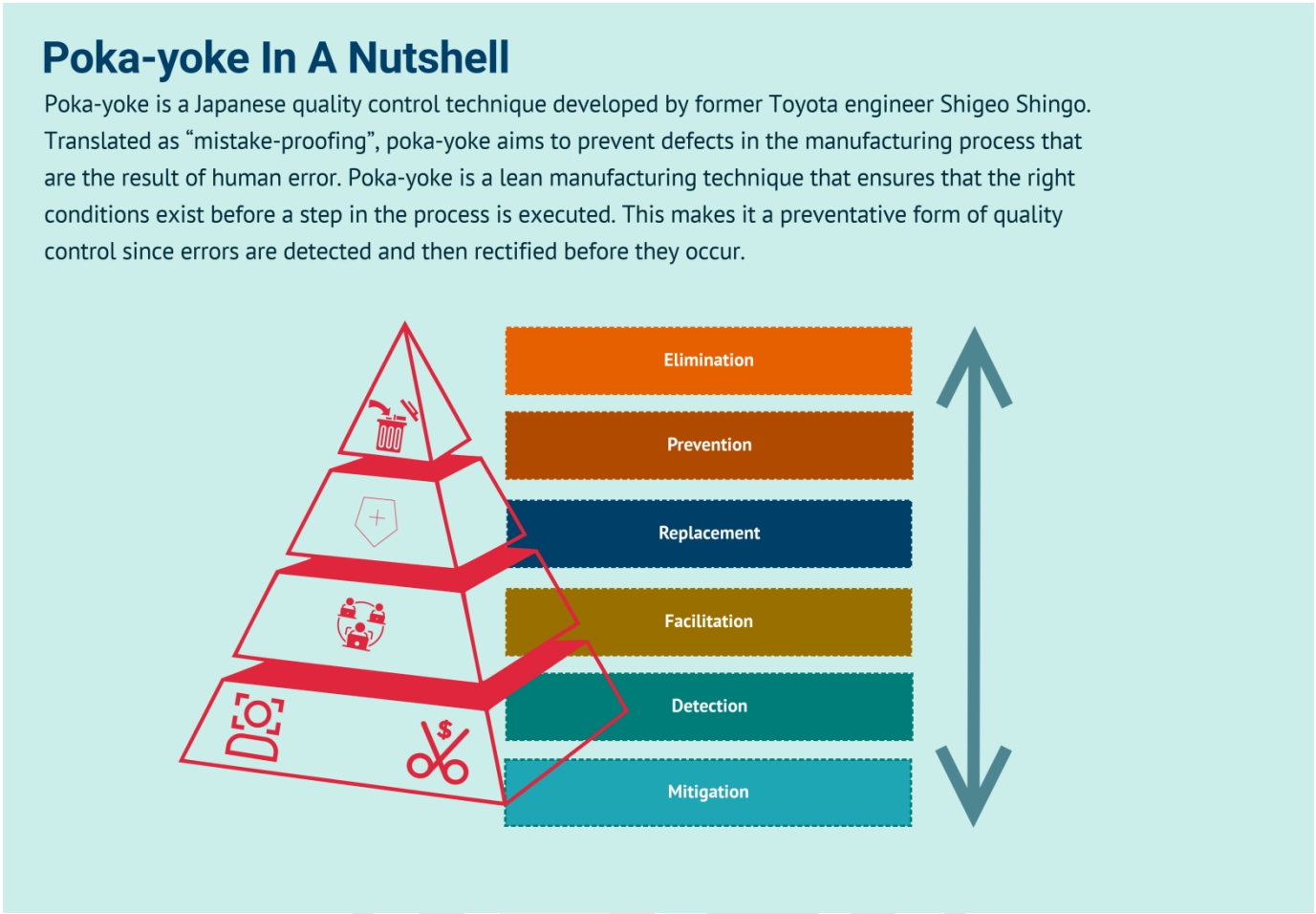

Fig. 2 CYCLE OF POKA YOKE SYSTEM [Ref. Google]

V. CONCLUSION:

Use Poka-Yoke to Make Work More Error-Proof, Increase Efficiency, Quality, and Safety, and ValuePoka-yoke, prevention through design, and the general idea of "error proofing" your production and work processes are a great way to get rid of what you don't want at work and get more of what you do want.

The aim of Poka-Yoke is to eliminate or minimize human errors in manufacturing processes and management as a result of mental and physical human imperfections. For the main part, it is to eliminate errors independently. The main idea of this method is preventing causes, which may result in errors and use relatively cheap control systems for determining compliance of the product with the model. By this project, the impact of Poka Yoke in the company‟s quality maintenance was clearly understood. The horns in the company which are using Poka Yoke in their manufacturing have 100% effectiveness in reducing the rejection rates. The study of Poka Yoke has helped in understanding the ways of eliminating mistakes from the root itself and before it happens.

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