

Role of Poka-Yoke Technique in Manufacturing Process

Bibhuti B Pradhan¹, Mr. Navneet Ballabh Gautam²

¹Department of Management, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha

²Department of Management, Sanskriti University, Mathura, Uttar Pradesh

Email - ¹bibhutibhusanpradhan@soa.ac.in, ²navneet.mba@sanskriti.edu.in

ABSTRACT

A new approach was introduced with the use of the Poka-Yoke system in the polish company to incorporate the quality principle Zero Quality Defects. The possibility of using the error proofing device is linked to monitoring and improving process operations. Currently, firms could incorporate standard instruments, procedures, approaches that assists prevention strategy & could pay attention to enhance every aspect & procedure. In general, the purpose of operation has been defined to prevent defects. The PokaYoke technique of preventing errors has been introduced by setting limits on how operation can be done to compel the operation to be conducted correctly. It is shown, potential of introducing technique of Poka-Yoke as an aspect into motorization companies to boost activity in the process. In these practical examples, the purpose of the Poka-Yoke approach is to eradicate or mitigate human error arising from mental and physical human imperfections in the manufacturing process and management.

Keywords

Mistake proofing; Quality management; Poka-Yoke technique; TQM, Zero quality deficiencies, Kaizen.

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Introduction

The intensification of competition in the international economy in recent years has caused a major shift in quality management approach. Therefore, Performance enforcement must provide customer support spanning the whole product development cycle, beginning with consumer recognition criteria and expectations. The organizations will strengthen the current control System, the methods developed & their components utilize the accessible methodology (TQM, Kaizen, & Zero quality deficiencies), guidelines, quality tools and quality management approaches by concentrating on the quality process approach (Fig 1) [1].

Effective firm procedures methodology is an area which is evolving rapidly. This principle is rather basic & fits with all organisations as it incorporates in a straightforward way all main structures that arise from specifications of quality control systems & production processes. Against the context of a new version of ISO standards the method at the time of preparation, execution & development of quality control management dependent upon performance with the goal of increasing customer satisfaction by meeting requirements.

Preventing defects in manufacturing process

Effective collection of continuous procedure management methods, where particular focus is put on avoiding policy, would be an significant element in the corporation's working. The preventive strategy replaced the identification strategy, a modern approach implies changing attention to the roles and tasks relevant to enhancing each aspect & broader activity. Currently they have processes, instruments and approaches to endorse these view of quality. After reducing costs, removing faults & thus further inspection and increasing the efficiency of production procedures, they are implemented in the organization [2].

Evaluation and evaluation associated with every incident into procedures & execution at every phases of process & each step procedure checks and precautions in contrast with occurrence of an issue are focused on defect prevention. Collecting and avoiding knowledge on emerging defects was effective method to improve standards as compared to quality management. Results associated with existing process issues can be shown by their source.

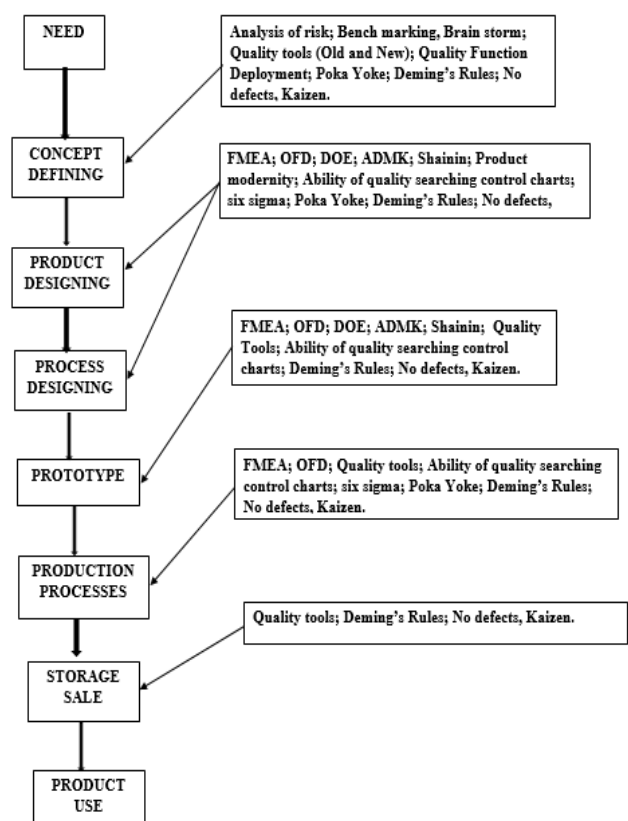


Fig. 1: Relationship between quality life cycle of product and quality estimation method and quality tools

Data includes ISO series 8000:3000, development period & Deming regulations reinforced the need for modern quality control to be developed. The current quality control description differs entirely as compared to the classic description, that presumed - cost of process output must be high if the quality products are to be successful. According to the opinions of today, good quality can only be accomplished through the company that applied Quality control programmes follow principle of consistent enhancement of all operations & by incorporating

consistency techniques & practises, recycled technologies into manufacturing sector [3].

Therefore, implementing measures to prevent the formation of errors precisely at the moment they occur is an effective approach. Just such a process is the principle of "lands order defects" known as the Poka-Yoke system or technique. In an era of quality and use of methodology such as implementation, zero flaws, continuous improvement, Six Sigma and quality methods:, SPC, quality function deployment, Failure mode effect analysis general measures to prevent flaws are worth setting (Fig. 2).

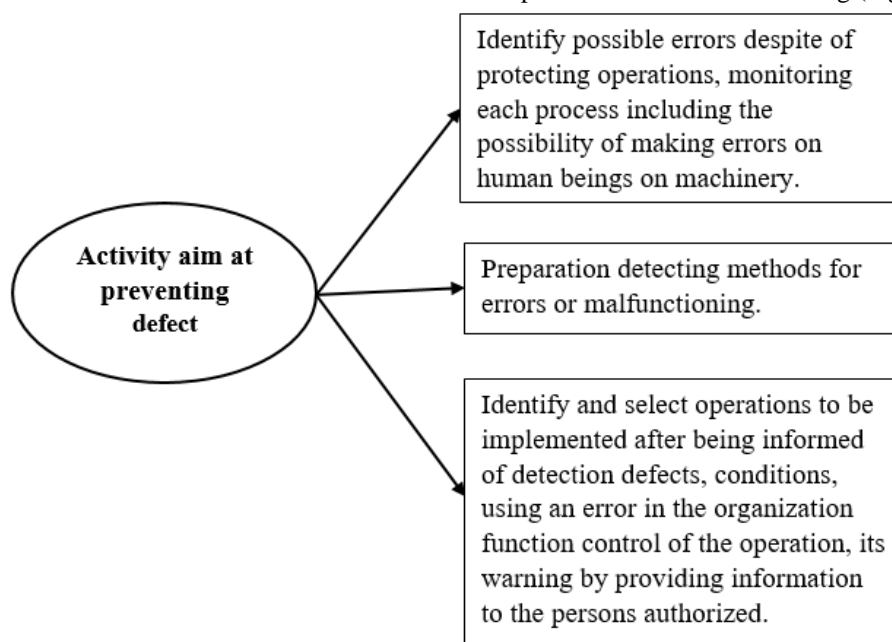


Fig. 2: General activity aim at prevent defects

Poka yoke method (a mistake proofing and error proofing method):

Shigeo Shingo invented the Poka-Yoke process in 1971, Toyota Motor Corporation's engineers. As per the previous reports, this approach was for avoiding errors that are caused by the mistake. Being a supporter of statistical procedures of the controlling system in Korean firms in the years 50 Shigeo Shingo felt that, these strategies will not enhance production procedure. Hence, a Zero Quality Control (ZQC) is initiated in Japanese organizations. Only the Poka-Yoke approach is one of its components following the ZQC theory [4].

Established in 1963, The word poka-yoke is interpreted as "opposition to mistakes" (avoiding (yoker) inadvertent mistakes (poka)). The philosophy that lies at the centre of the strategy of Poka-Yoke is reverence for human dignity, & above all its intelligence. Poka-yoke in assembly tasks that rely on vigilance or memory, will save time & reduce stress. There is a possibility of failures in every procedure & its processes at every point of the lifecycle of product. The final product has flaws as a result of mistakes and the consumer is dissatisfied and frustrated. The Poka-Yoke method is based on simplicity that even very small quantities of defective products cannot be produced. Development of goods without any defects at 100 percent is not just a problem for

the companies, but a requirement. The most eligible method that enables the production to be reached at optimum level is Poka-Yoke [5].

Poka-Yoke methodology can be implemented both to avoid triggers resulting in subsequent occurrence of errors and to perform cheap tests to decide whether the product should be accepted or rejected. The detection of all errors is not always 100 percent chance, within these situations that was job of detecting Poka-Yoke methods as soon as possible. Analysing cycle of product defect creation stated that there is still one possibility between an errors arising from the defect: the error of observation and its correctness [6].

Therefore, it is the proposal-method to minimize faulty Circumstances of preparation under which error does not exist or may be apparent & automatically recorded. Consider the aforementioned method produced a "zero fault" accomplishment under severe operating situations, i.e. as simple and cheap as possible. Was on the subject itself, that utilizing the sudden evaluations that was not possible to reduce defects. Complete evaluation - 99 percent controlling ability is required. They followed several hypotheses: 1) Within event of confusion the quantitative regulation of mechanism is inadequate; 2) the monitoring and control of the poka-yoke should be: autonomous, i.e. the activity of the contractor without any involvement from outside.

Shigeo Shingo has studied the process composition of the source-to-effect defects and errors. He said the producer's error in this moment when the consumer unintentionally this flaw becomes a defect for the product. Therefore, It must be a constant decreased & rapid operation binding back, & alike: as early as possible– the smallest defects must be found (data evaluation, 'after the event' common of empirical control), the earliest potential failure until it becomes the fault (in data analysis' upwards' means checking prior operation). Eliminate the possibility of the event error (source inspection, test the circumstances under which the procedure is conducted to delete the likelihood of structure inaccuracy). The Poka-Yoke is a working means of avoiding possible errors. In both states there is a flaw; either the fault has indeed taken place, trying to call for the fault detection, or that was regarding occurrence, trying to call for fault prediction. Poka yoke have 3 core abilities: shutdown, monitor, and alarm to prevent or reduce defects. The methodology initiates through evaluating the procedure for solving problems, defining components with dimensional, form, and weight characteristics, and identifying procedure deviations from nominal process & standards. 2 solutions exists for Poka-Yoke process implementation: method of control and method of warning (Fig 3).

In one of the automotive industry firms, the Poka-Yoke system has been applied. This company will have two main sectors of production: Production & assemble of automatic transmissions & production of factory motors run by a group of its own. Typically, the company has about 800 staff. The key goal is to manufacture these high-quality components that follow quality requirements in accordance with performance management criteria processes. Enhancement plan can be realized is by using Poka-Yoke techniques [7].

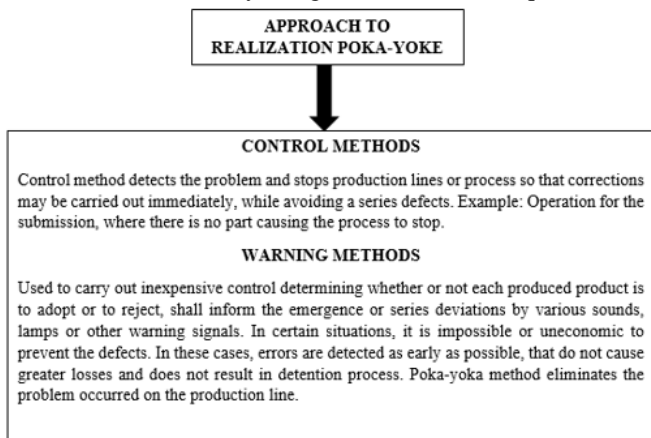


Fig. 3: Approach to realization the Poka-Yoke Method

Considering, engine would comprise of roughly 320-360 components, they are very valuable in just as businesses engaged in designing components & producing sections. Thus, the components generated must be highly precise to mitigate the likelihood of appearing in the procedures of a broad "anything" or faults of risk omissions. Within every company that is associated with business community, the development system is based on its own concept, in which QCS (Quality Control System) works alongside other systems. This system is a synthesis of various principles and techniques that many experts use. They work to ensure manufactured products of the highest quality. Poka-Yoke

techniques are also used in addition to methods and theory such as QC tale, MQA, QRQC, 5D & fundamental tool information (figures, histograms, sample analysis frameworks, Pareto-Lorenza-graph, quality control process charts). Frame has built a policy that illustrates techniques which could be utilized for eliminating errors that have been produced by human error. The goal of Poka-Yoke's QC program and techniques ensures well standardized goods & distribution to consumer at reduced expense as quickly as possible. The client is not only the end user of the prepared component but every operation in the operation, any of those other steps that follow. Which means the firm guarantees that errors are tracked & avoided at any point of manufacture [8].

Literature Review

As the user's requirement increases, software development complexity is also increasing. For software engineering, knowing, evaluating, handling, monitoring, and even reducing the complexity of the program is a great challenge and also increases efficiency. Websites and websites are a holy grail of the software-industry to boost software efficiency. A new approach in software performance engineering to apply the Poka-Yoke process was introduced. Poka-Yoke was a method utilized to show mistakes in designing of product [9].

Improving applications, websites and services output is the software industry's Holy Grail. A new approach is proposed in software engg. to incorporate the Poka-Yoke process. Poka-Yoke is a method used in product design to confirm mistakes. Researchers are introducing HQLS: a modern higher-quality methodology in this paper to build large-scale applications. Poka-Yoke's success A research report was used to quantify app development: the model modernization micro-project was presented to 6 classes of students for this monitoring & evaluation appraisal. [10].

Lean-Kaizen consists of two terms lean and Kaizen; lean means removing non-value-added behaviours and Kaizen means consistent enhancement. Lean-Kaizen therefore means continuous waste disposal by minor improvements. This paper discusses the application of the Lean-Kaizen model at a non-capital sector in country in a medium & small-sized enterprise (SME). The current location of the identified SME shop floor has been registered and the current state map has been prepared. Calculation of the tact period and detection of bottlenecks [1].

Conclusions

Every organisation that has enacted a quality assurance system, as well as aims & strategies recorded in the improvement strategy of the organisation, must have academic financial capital that allow the creation of procedure improvement & the similar completed products. Managerial procedures, its assessment, tracking and development are much supported by eight basic principles of quality and quality management: approaches, methods & instruments. This type of growth plan for future companies has been determined to improve firm productivity & maintain its market place.

The purpose of the Poka-Yoke technique was to remove or mitigate human-errors arising from mental & physical human imperfections in manufacturing processes and management. The main part is to eliminate independent errors. The main idea of this approach is to avoid triggers that can lead to errors and use a relatively cheap control system to determine the product's compliance with standard. In the organisations listed Poka-Yoke framework in connection with the manufacturing techniques assures top quality elements of engine produced, & via the underway evaluating all enable to minimise costs and to share no great attempt to enhance. This organizational organization calls for efficient execution by the high-quality managerial strategies & all the goals that are consistent with the program.

References

- [1] S. Kumar, A. K. Dhingra, and B. Singh, "Process improvement through Lean-Kaizen using value stream map: a case study in India," *Int. J. Adv. Manuf. Technol.*, 2018.
- [2] M. Vinod, S. R. Devadasan, D. T. Sunil, and V. M. M. Thilak, "Six Sigma through Poka-Yoke: a navigation through literature arena," *Int. J. Adv. Manuf. Technol.*, 2015.
- [3] P. Michalski and M. P. Hetmańczyk, "Validation process of the automatic poka-yoke systems in case of symmetrical objects," in *Advanced Materials Research*, 2014.
- [4] A. P. Puvanasvaran, N. Jamibollah, and N. Norazlin, "Integration of poka yoke into process failure mode and effect analysis: A case study," *Am. J. Appl. Sci.*, 2014.
- [5] J. P. Sondermann, *Poka Yoke*. 2013.
- [6] A. V. Rajan kumar, R.K.Dwivedi, "Poka-yoke technique, methodology & design," *Indian J. Eng.*, 2016.
- [7] M. Vinod, S. R. Devadasan, D. T. Sunil, V. M. M. Thilak, and R. Muruges, "POYSS: A model for integrating Poka-Yoke technique with Six Sigma concept," *Int. J. Product. Qual. Manag.*, 2017.
- [8] T. A. Saurin, J. L. D. Ribeiro, and G. Vidor, "A framework for assessing poka-yoke devices," *J. Manuf. Syst.*, 2012.
- [9] K. K. Baseer, A. R. M. Reddy, and C. S. Bindu, "Quantitative Validation of Poka-Yoke Approach for HQLS Using Regression Coefficient and Analysis of Variance," in *Proceedings - 2014 3rd International Conference on Eco-Friendly Computing and Communication Systems, ICECCS 2014*, 2015.
- [10] K. K. Baseer, A. Rama Mohan Redd, and C. Shoba Bindu, "Quantifying Poka-Yoke in HQLS: A new approach for high quality in large scale software development," in *Advances in Intelligent Systems and Computing*, 2015.