



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

APPLICATION OF KAIZEN TO PREVENT SLIP OF DEFECTIVE PRODUCTS TO INTERNAL CUSTOMER IN AUTOMOBILE MANUFACTURING

Report submitted in accordance with the partial requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Manufacturing Engineering (Manufacturing Management) (Hons)

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ABSTRAK

Pengurusan kualiti yang baik dipengaruhi oleh keseimbangan di antara kos dan kawalan kualiti. Pendekatan ini diamalkan secara meluas di kalangan industri pembuatan terutamanya industri pembuatan kenderaan. Kajian ini melaporkan usaha penambahbaikan yang diaplikasikan di sebuah kilang pembuatan bahagian kenderaan untuk mengelakkan keciciran produk yang bercacat kepada pengguna dalaman. Punca utama masalah dikaji melalui kaedah pemerhatian dan forum kualiti. Salah satu cara penyelesaian yang dicadangkan ialah penambahan operasi pemeriksaan kualiti produk bernama 'Quality Filter' untuk mengelakkan penghantaran produk bercacat kepada pengguna dalaman. Selain daripada itu, stiker kualiti yang lebih efektif dan komprehensif diperkenalkan bagi meningkatkan tahap keseriusan pemeriksa kualiti ketika bekerja. Keberkesanan cara penyelesaian telah diuji dengan melaksanakan cara penyelesaian di kawasan operasi selama satu bulan. Kadar penolakan produk oleh pengguna dalaman sebelum dan selepas tempoh percubaan dibandingkan secara statistik. Keberkesanan cara penyelesaian turut dikaji dari segi kesesuaian operasi dan ekonomi. Kajian tersebut telah berjaya menyelesaikan isu produktiviti dalam jangka yang pendek.

ABSTRACT

In quality improvement, optimum controlling condition is determined by balancing control with cost of quality. This approach is widely applicable in all manufacturing process especially in automobile manufacturing industry. The study reports improvement effort that applied in a vehicle parts manufacturing factory with aim of preventing slip of defective vehicle parts to internal customer. The major cause of problem identified through field study and quality control session. In order to eliminate major causes of problem, a new in- house inspection operation known as Quality Filter proposed to prevent supply of defective parts. Besides, an effective and comprehensive quality control sticker introduced to enhance self-discipline among quality assurance staffs. The effectiveness of preventive actions evaluated by testing implementation at operation field for one month duration. Rate of rejection of vehicle parts from internal customers before and after implementation compared statistically. The solutions then further analyzed in term of operational and economic feasibility. The action research managed to solve the productivity problem within short period of time.

DEDICATION

To my beloved father, mother and sister, who always encourage me and make my life wonderful.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

TQM	-	Total Quality Management
PDCA	-	Plan-Do- Check- Act
PDSA	-	Plan-Do-Study-Act
ASQC	-	American Society of Quality Control
DMAIC	-	Define- Measure- Analyze – Improve- Control
FMEA	-	Failure- Mode- Effect- Analysis
CED	-	Cause- and- Effect Diagram
UTeM	-	Universiti Teknikal Malaysia Melaka

CHAPTER 1

INTRODUCTION

The chapter illustrates background of project, problem that been studied and objectives of study. The scope of study and overview of project explained in this chapter.

1.1 Motivation of Study

Cost, quality and reliability of product influence overall performance of manufacturing industry (Karim, 2009). Quality of a particular product justified based on customer satisfaction (Du, 2008). For the case of automobile industry, it is essential to satisfy respective internal customer in every stage of manufacturing in order to achieve best overall quality of final product (Mitra, 1993). Stamping process is the heart of overall car manufacturing process. This because the quality of stamped vehicle parts justify overall safety, aesthetic value and mechanical strength of car. The quality of stamped vehicle parts supports the smoothness of assembly process, trim comfort and safety features of car and aids automobile industry to be leading global mobility solution provider. Hence, stamping workstation given important responsibility to guarantee dimensional accuracy and zero defect of the vehicle parts.

1.2 Problem Statement

ABC Sdn Bhd, a competent automobile manufacturing industry is not exceptional from considering stamping quality. In fact, highest priority given to quality of stamped vehicle parts. Stamping Shop of ABC Sdn Bhd responsible to produce vehicle parts and supply them to Body Assembly Shop for subsequent car manufacturing process. Periodical quality inspection constantly implemented at production line and handwork line all the time. Still, number of slipped defective vehicle parts that detected at Body Assembly Shop rising dramatically since past thirteen months. Figure 1.0 shows trend of vehicle part rejection by internal customers over months.

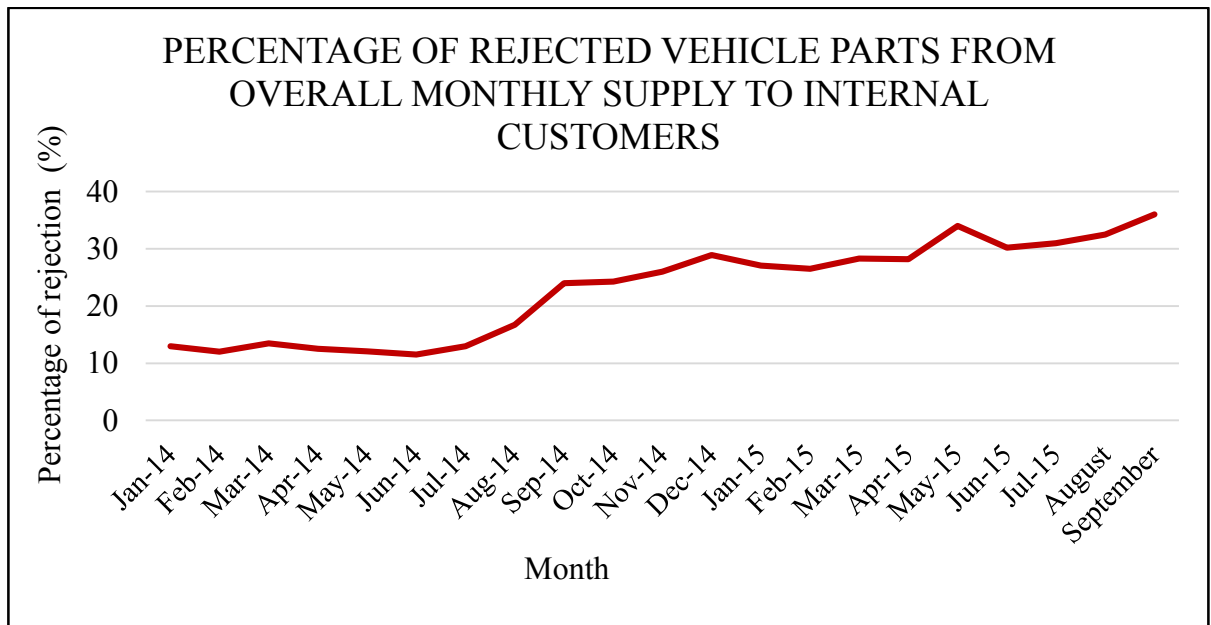


Figure 1.0: Trend of Vehicle Part Rejection Percentage over Months

Quality inspectors of Body Assembly Shop highly dissatisfied with supply quality and used to complain regarding the issue every month. Stamped vehicle parts are reworkable only within first two days. Reworking later than that period will cause rusting. Hence, those defective vehicle parts that rejected by internal customer unable to be reworked and eventually become scrap. Quality inspectors on duty at Stamping Shop have to leave their work and go sort out the slipped defects once receive complaints from Body Assembly Shop. This took about 15minutes in average. Their inspection time disturbed by this non-value added activity. The quality problem indirectly causes productivity problems in term of time and cost.

1.3 Objective

The objectives of study are as shown below:

- To determine major cause of increasing slipped defective vehicle parts to internal customers
- To develop most feasible preventive action for the problem
- To implement the preventive action
- To evaluate the preventive action
- To redesign solution in practical, productive and sustainable manner

1.4 Scope

The scope of the study covers all products of Stamping Shop but test of change limited to one month supply of vehicle parts due to time limitation. One month trial of suggested solution was implemented during semester break period. The cause and effect analysis limited to appearance defect as there is no rejection and complaints from internal customers regarding dimensional accuracy of vehicle parts. Besides, cause and effect analysis limited to inspection and quality flow of vehicle parts after stamping process until being supplied to internal customer. Analysis on stamping machine and causes for defect formation not covered in this study. As the press machine is old and very sensitive to changes, student was not permitted to make any physical study or analysis on stamping machine.

1.5 Project Overview

Chapter 1 gives introduction of the project. Fundamental ideas such as problem statement, background of study, objectives and scope of study discussed.

Chapter 2 presents literature review on defect, quality and Total Quality Management (TQM). Kaizen tool introduced as one of recipe for TQM. The discussion then furthered with findings of researchers regarding application of Kaizen.

Chapter 3 describes methodologies implemented throughout the study to achieve objectives of study.

In Chapter 4, results for each methodology that attempted in study presented in ordered manner.

Chapter 5 presents interpretation and evaluation based on result of test of change. Number of slipped defective parts compared before and after implementation of solution. The discussion continue with detailed productivity study to evaluate whether the implementation of solution is practically profitable to company.

Chapter 6 summarizes the finding of entire project and gives suggestion for future work.

CHAPTER 2

LITERATURE REVIEW

In this chapter, general knowledge about defect and quality reviewed. In addition, the importance of internal customer satisfaction is presented. The issue on whether quality inspection is a waste or necessity based on researchers findings and view emphasized. Strength of Total Quality Management (TQM) in term of cost benefit and its capability in solving arising problems based on researchers finding presented. Kaizen tool introduced as one of recipe for TQM. Effectiveness of Kaizen tool in solving problems in manufacturing operation presented. Then, capability of quality improvement tools in supporting performance improvement efforts discussed based on their success stories. Besides, types of experimentations to test improvement briefly highlighted based on theoretical information from books.

2.1 Seven wastes of industry

Industrial waste means thing that does not add any values on product manufactured by respective industry There are seven classification of industrial wastes which invented by Taiichi Ohno. The seven wastes are overproduction, high inventory, waiting, unnecessary motion, transportation, defect and over processing (Robison, 1991).

2.2 Defect

Defect is one of seven wastes. The American Society of Quality Control (ASQC) define defect as a departure of quality characteristic from its intended level or state that occur with a severity sufficient to cause an associated product or service not to satisfy intended normal or reasonably foreseeable usage of requirement (Mitra, 1993)

According Taguchi et al (2005), wastes due to defect generally measured in term of number of defective products, number of scraps, cost of defect inspection, frequency of customer rejection and need for rework operation. Eliminating defect waste aids in enhancement in term of customer feedback, rework cost and scrap disposal effort.

2.3 Quality

Presence of defect on product implies quality level of product. According to Mitra (1993), “quality of a product or service is the fitness of that product or service for meeting or exceeding its intended use as required by the customer.”

There are three main aspects of quality namely Quality of Design, Quality of Conformance and Quality of Performance. Quality of design highlights that product or service should be designed to fulfill at least minimally the needs of user. Quality of Conformance implies that product or service that offered must meet entire standard that fixed during design phase. Quality of Conformance basically assured via defect prevention. Quality of performance analyzes level of functioning and performance of product or service during its application phase. Quality of Performance also associates with degree at which a particular product or service gain customer satisfaction. The effectiveness of Quality of Design and Quality of Conformance contributes to Quality of Performance. Figure 2.0 explains the relationship between three quality aspects.

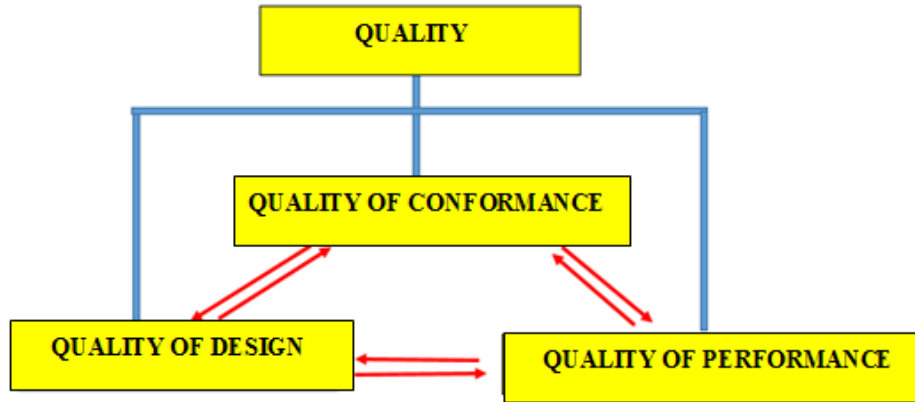


Figure 2.0: Relationship between Three Quality Aspects (Mitra, 1993)

2.4 Internal Customer Satisfaction

It is essential to maintain healthy relationship with internal customers. Internal customers are those receivers of product within the company. According to Duffy and Grace (2013), positive feedback from internal customers can be achieved by supplying them with undamaged and defect-free products. It is crucial for a product to fulfill need and requirements of recipient as it reflect its overall effectiveness and quality.

Data extracted from customer complaints, customer satisfaction survey and previous records on claim resolutions aids in determining need of customers. After tabulate and analyze the level of customer satisfaction, proper preventive measure discovered. Expected gain from preventive action must correlate with target that set previously. The gain would be used while evaluating the progress and effectiveness of improvement effort (Duffy and Grace, 2013).