AN ASSESSMENT OF QUALITY CONTROL SYSTEM IN MANUFACTURING INDUSTRY

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An Assessment of Quality Control System in Manufacturing Industry

Thesis submitted in accordance with the partial requirements of the University Technical Malaysia Malacca (UTeM) for the Degree of Bachelor of Engineering (Honours) Manufacturing (Management Engineering)

By

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……

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I hereby, declared this thesis entitled “An Assessment of Quality Control System in Manufacturing Industry” is the results of my own research except as cited in references.

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ABSTRACT

Quality has been a concern of human kind since the beginning of time. The important of quality is, to ensure that the product that has been produce are accepted and fulfill the customer requirement. Successful manufacturing companies rely extensively on people to produce quality product to exceed the expectations. So, it is necessary for the company to have the suitable quality control methods that fits to the needs, types of product and its activities. This report discusses on the assessment of quality control system in manufacturing industry. The purposes of this report are mainly to develop a thorough understanding on the method of quality control system in manufacturing industry as well as to apply the control chart for variable defects in processing of selected product or parts. Through the analysis, identification of solutions to quality control problems will be identifying. Chosen factory for fulfill this report is Advance Link Packaging Solutions Sdn. Bhd.(ALPS) and the chosen product that desires to analyze in the aspect of quality control system is food tray on vacuum forming machine and also discussed on stages that involve process vacuum forming. Based on the data collected for the characteristics of the product on various dimension, control chart variables are constructed and analyzed for its efficiencies and significance to the quality control system there. The analysis includes the comparison between the ALPS customer requirements as well as to the developed Upper Control Limit (UCL) and Lower Control Limit (LCL). Furthermore, the out-of-control chart patterns are identified for all constructed charts and the causes as well as potential causes are discussed in details. Recommendations are suggested as for improvement to the current quality control system.

ABSTRAK

Semenjak dari dulu, kualiti merupakan suatu kebimbangan kepada manusia. Kepentingan kualiti adalah untuk memastikan bahawa produk yang telah menghasilkan memenuhi permintaan keperluan pelanggan. Kejayaan sesuatu syarikat perkilangan bergantung kepada pengeluaran barang atau produk yang berkualiti pada masa jangka panjang. Oleh yang demikian, pentingnya sesebuah syarikat memiliki kawalan kualiti yang sesuai dalam kaedah pengawalan yang padan kepada kepelbagaian keperluan produk dan aktiviti-aktivitinya. Laporan ini menerangkan kajian mengenai penilaian terhadap sistem kawalan kualiti di dalam industri pembuatan atau perkilangan. Tujuan utama laporan ini adalah terutamanya untuk memberi pemahaman secara menyeluruh tentang cara atau kaedah sistem kawalan kualiti didalam industri pembuatan serta mengaplikasikan carta kawalan untuk kecacatan pemboleh ubah dalam memprosesan produk atau bahagian-bahagian terpilih. Melalui analisis sebegini, ia dapat mengenal pasti kawalan kaedah penyelesaian bagi sesuatu masalah-masalah. Kilang yang dipilih untuk memenuhi laporan ini adalah kilang Advance Link Packaging Solutions Sdn. Bhd.(ALPS) dan produk yang dipilih pula untuk menganalisis sistem kawalan dari segi kualiti adalah bekas makanan melalui process ’vacuum forming’ dan juga bincang mengenai peringkat-peringkat proses ’vacuum forming’. Berdasarkan data-data yang telah diperolehi daripada pelbagai bacaan dari bekas makanan, carta kawalan berubah dibina dan dianalisa keberkesanan dan signifikasi terhadap sistem kawalan kualiti disana. Analisa tersebut meliputi perbandingan terhadap spesifikasi keperluan pelanggan ALPS dan juga terhadap had kawalan atas dan had kawalan bawah. Selain itu, corak carta diluar kawalan telah dikenalpasti untuk semua carta dan punca-punca untuk corak tersebut dibincangkan dengan terperinci.

DEDICATION

For all your advice and encouragement, this thesis is gratefully dedicated to my beloved family, all my relatives, and friends.

Those who concern about quality matters.

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LIST OF ABBREVIATION, SYMBOLS AND NOMENCLATURE

ALPS	-	Advance Link Packaging Solution Sdn. Bhd
ISO	-	International Standards Organization
QC	-	Quality Control
QA	-	Quality Assurance
CC	-	Control Chart
SQC	-	Statistical Quality Control
TQC	-	Total Quality Control
UCL	-	Upper Control limit
LCL	-	Lower Control limit
USL	-	Upper Specification limit
LSL	-	Lower Specification limit
X	-	Average
R	-	Range
C_p	-	Capability Index
C_{pk}	-	Performance Capability
Min	-	Minimum
Max	-	Maximum
mm	-	Milimeter

CHAPTER 1
INTRODUCTION

1.1 Background

Quality has been a concern of human kind since the beginning of time. For many years, quality control was a terms used to identify a department in a manufacturing organization whose primary responsibility was the in-house inspection of parts, assemblies, and final product before shipment. Successful manufacturing companies rely extensively on people to produce quality product. In engineering and manufacturing, quality control are involved in developing systems which ensure that products or services are designed and produced to meet or exceed customer requirements and expectations. These systems are often developed in conjunction with other business and engineering disciplines using a cross-functional approach. Basically, quality can be defined as an excellent product or service that fulfills or exceeds the expectations.

The important of quality is, to ensure that the product that has been produce are accepted and fulfill the customer requirement. The aspects of quality are in the three terms. There are; hardware, product and service and psychological impression.

Quality is everyone jobs. Means, not only quality department have to work for quality but everyone includes; assembly line worker, the typist, purchasing agent and the president of company.

1.1.1 Definition of Quality

Quality can be defined in many ways, ranging from 'satisfying customers requirement' to fitness for use to conformance to requirement. Quality is the totality of features and characteristics of a product or service that been on its ability to satisfy or implied needs.

As this definition implies, quality is an attributes of a product. A product is a quality product if it meets all the requirement establish for it, that is a defect –free product. In other words, quality means meeting requirement. It is obvious that any definition of quality should include customers, satisfying who must be take primary goal of any business. Quality is one of the most important factors for business success and growth.

Definitions of quality have been developed by many prominent professionals in the field. As Dr. W. Edwards Deming, well-known consultant and author on the subject of quality said, "quality as nonfaulty system. Dr. Deming stresses that quality efforts should be directed at the present and future needs of the customer. In other words, customers do not necessary know what they want until they have seen the product or received the service. Another definitions is from, Dr. Joseph M. Juran, in his book describes, quality as fitness for use. He discusses that quality as conformance to requirement and nonquality as nonconformance.

Quality can take many forms. Quality can be summarized as terms of an excellent product and service. There are three term in quality, Quality of design, Quality of conformance, and Quality of nonconformance. Quality of design means the product has been designed to successful fill a customer need, real or not perceived. The design should be an excellent product or service that fulfills or exceeds customer expectation. Quality conformance means, conformance to requirement. Refers to the manufacture of the product or the service that meet the specified requirement set by the consumer. Quality performance, means, that the product or service performs its intended function as identified by the consumer.

Clearly communicating the needs, requirements, and expectations of the consumer requires a more complex definition of quality. Notice that, there are no two customers will have exactly the same expectations for the same product. Besides, the customer's needs, requirements, and expectations changes over in many idea and even times.

1.1.2 Quality Aspects

There are three term of quality aspects in the quality control field. There are hardware, product or services and psychological impression. The three aspects can built up the quality standard.

Hardware

For hardware term, it consists two elements, there are, service and manufacturing. For service, it discusses about two things, which is, condition of equipment used and an esthetics of the location. For manufacturing (product characteristic), the terms are; appearance and style, durability, reliability, and service ability. The example for manufacturing aspect in quality is visible appearance and styling of an automobile. The other example is, ease of installation and use of a home computer.

Product or Service Support

Ease of warranty service for an auto repair and free technical support for computer support are examples for this product and service support aspect. To maintain the quality, always make the product or service support as important as itself. Good support can sometimes overcome other deficiencies; lower hardware quality and high price.

Psychological Impressions

The examples scenarios of Psychological Impressions are hard to overcome negative first impressions and interaction with personnel important. The important thing are; Personal appearance, Knowledge of products and services, Behavior (friendliness, attentiveness) and Truth in advertisement. Examples - Impressions

1.2 Problem Statement

Every manufacturing company wants to satisfy their customer, through making a good product. In competition, company is not only has to provide cost effective product but also good quality, which satisfy the demand. It needs quality control methods to checks their products performance consistently. Fail to check the level of their quality consistently will have a consequence on the continuation of the product. It is necessary for the company to have the suitable quality control methods that fits to the needs, types of product and its activities. This study will access the current quality control method in achieving company objectives, and recommend an improvement necessarily.

1.3 Objectives

There are a few objectives for this study. Those objectives are:

1. Identify the current method of Quality Control System in food tray manufacture industry using vacuum forming process.
2. Develop the Control Chart for Variable methods and the defect occur in processing of selected parts.
3. Analyze the control chart by compares customer specification and standard calculation.
4. Provide some recommendations for improvement of the current quality control system.

1.4 Scope of Study

The scopes of this study are as follows:

1. To study the current QC system applied in the industry.
2. To identify the certain product or part of interest where quality is being checked.
3. Collect data from the production of food tray casing.
4. Perform necessary analysis on the data and the constructed charts as well as identify the significance of the data to the quality system employed in the chosen part manufacturer.
5. Develop alternatives as recommendations for the current system in the chosen manufacturer.

1.5 Company Background

The company that I choose for my studies is ADVANCE LINK PACKAGING SOLUTIONS SDN BHD(ALPS). ALPS was incorporated on 30th Nov 1996 establised by Mr. Ng Kean Joo a man with vast experience in the vacuum forming business and a visionary who preserved to make ALPS the success it is today.
The company is a simple organization that constantly evolves itself to maintain relevance to the changes and challenges of today's business world The company has received ISO 9002 certification since 2001. ALPS not only lead the way in product excellence but also in environmental protection with the achievement of the prestigious ISO 14001 certification in 2003.

Their corporate philosophy is on maintaining a world class manufacturing organization that dedicated to constantly innovate and excel on quality, costs, lead-time, flexibility, engineering and customer service. Some more ALPS Manufactures product must be the highest quality at a reasonable and competitive price in order to achieve our prime objective of customer satisfaction.

Company Address:

No.29, Lorong industri 11, Kawasan Industri Bukit Pancur, 14300 Nibong Tebal, Seberang Perai Selatan, Pulau Pinang.

1.5.1 Product

ALPS supplies to both Malaysian and export market in the area of vacuum forming. I choose vacuum forming product for my studies on quality control system focusing on the defect that occur on the vacuum forming machine. ALPS are produced so many things on this plan such as, cake tray, jelly tray, spare part plates, fast food container, electronic holder and so on. Figure 1.3, figure 1.4 and figure 1.5 shows the products that have produce by the ALPS Company.

Figure 1.1: Electronic holder and spare part plate

Figure 1.2: Jelly and Cake tray

CHAPTER 2

LITERATURE REVIEW

2.1 Review of Quality

Quality is term of excellent product or service that fulfills or exceeds expectation. In engineering and manufacturing, quality control and quality engineering are involved in developing systems which ensure that products or services are designed and produced to meet or exceed customer requirements and expectations. These systems are often developed in conjunction with other business and engineering disciplines using a cross-functional approach.

Quality has become one of the most important customer decision factors in the selection among competing products and service. The traditional definition of quality is based on the view-point that products and services must meet the requirements of those who use them. Quality means fitness for use. These are two general aspects of fitness for use; quality of design and quality of conformance. All goods and services are produced in various grades and levels of quality. These variations of grades and levels of quality are intentional and consequently, the appropriate technical term is quality of design. These design different includes the types of material used in construction, specification on the on the components, reliability obtained through engineering development of engines and drives trains, and other accessories or equipment.

The quality of conformance is how well the product conforms to the specifications required by the design. Quality of conformance is influenced by a number of factors,

including the choice of manufacturing processes. Unfortunately, this definition has become associated more with the conformance aspect of quality than with design.

In the application of statistical methods to quality engineering, it is fairly typical to classify data on quality characteristics as either attributes and variables data. Variables data are usually continuous measurements, such as length, voltage, or viscosity. Attributes data, on the other hand, are usually discrete data, often taking the form of counts.

2.1.1 History of Quality Control

In the beginning of the 20.sup.th century, American engineer T. W. Taylor proposed the idea of product inspection in his scientific management theory. Products are tested against their specifications to pass the good products and reject the bad ones. Although a very large percentage of products today are still made in this way, the technique has major shortcomings including that; it does not address the concept of quality; and defective parts are rejected not prevented.

In the early 1940s, the United States required a large volume of high-quality goods for World War II efforts. The government hired a group of scientists to implement a series of quality control standards, thereby forcing the industry to Statistical Quality Control (SQC) methods proposed by Dr. Shewhart and others. SQC is a quality control method based on statistics, which can distinguish the common causes and special causes of quality variations so that quality inspections can be simplified and quality problems can be prevented.

In the 1960s, Japan rebuilt its industry with the help of SQC introduced by Dr. Deming, an America quality control legend. Japan not only applied SQC to its production, but also improved it with a new name, Total Quality Control. TQC embodies a number of new concepts including the; QC is everyone's job and apply of QC to all areas possible.