

REDUCING REJECTION ON NICKEL FREE PLATING  
AT FINISHING LINE IN METAL MANUFACTURING  
COMPANY BY USING KAIZEN APPROACH

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REDUCING REJECTION ON NICKEL FREE PLATING AT  
FINISHING LINE IN METAL MANUFACTURING COMPANY BY  
USING KAIZEN APPROACH

This report submitted in accordance with requirement of the UniversitiTeknikal  
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## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: REDUCING REJECTION ON NICKEL FREE PLATING AT FINISHING LINE  
IN METAL MANUFACTURING COMPANY BY USING KAIZEN APPROACH

SESI PENGAJIAN: 2016/2017 Semester 2

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## **APPROVAL**

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) (Hons.). The member of the supervisory is as follow:

.....

(Dr. Effendi Bin Mohamad)

## **ABSTRAK**

Kaizen merupakan satu konsep yang memfokuskan kepada mempertingkatkan kawasan kerja atau organisasi dalam kaedah penambahan. Banyak organisasi telah mula untuk menggabungkan falsafah Kaizen melalui penggunaan metodologi Kaizen. Imai, yang menulis buku Kaizen (The kunci kepada perkhidmatan berdaya saing Jepun (1986)). Kajian ini menunjukkan Kaizen dalam Syarikat pembuatan logam, di kawasan pengemasan ini memberi tumpuan kepada mengurangkan kerosakkan daripada penyalutan Nickel Free Plating. Dalam masa yang sama, faktor-faktor yang menyumbang kepada kerosakkan penyalutan Nickel Free Plating dikenal pasti dan dianalisis. Berdasarkan analisis, keupayaan proses bagi dos manual ke dos automatik dikenal pasti dengan jumlah kepekatan mengikut had piawai dan oleh itu penambahbaikan akan dicadangkan. Peningkatan hanya tertumpu pada Rajah Ishikawa. Selain itu, Kaizen telah dilaksanakan untuk mengurangkan kerosakkan penyalutan pada Nickel Free Plating. Pada masa yang sama, standard prosedur operasi (SOP) bagi Nickel Free process telah dicadangkan untuk menseragamkan kaedah yang betul apabila melakukan tugas. Hasil kajian menunjukkan bahawa pelaksanaan ini membantu syarikat untuk mengurangkan kerosakkan penyalutan Nickle Free Plating. Peningkatan Nickel Free adalah dinilai berdasarkan Akta Pas mingguan produk. Peningkatan telah menunjukkan peratusan purata mingguan Akta Pas dari 67% ke 70%. Kesimpulannya, mengurangkan kerosakkan penyalutan Nickel Free Plating telah tercapai dengan perlaksanaan Kaizen di kawasan pengemasan.

## **ABSTRACT**

Kaizen is a concept that focuses on improving a work area or an organization in incremental methods. Many organizations have begun to incorporate the philosophy of Kaizen through the use of Kaizen Methodology. The most frequently cited proponent of Kaizen has been Imai, who wrote Kaizen book (The Key to Japan's Competitive Services (1986)). This case study illustrates Kaizen in Metal Manufacturing Company, at Finishing line. The case study is focused on reducing rejection of Nickel Free Plating. Firstly, factors contributing to the rejection of Nickel Free plating is identified and analysed. Based on the analysis, the process capability of switching manual dosing to auto dosing is identified with the number of concentration following the standard limits. Next, improvements are proposed. The improvement only focuses on Ishikawa Diagram. Apart from that, Kaizen was implemented to reduce the rejection of Nickel Free Plating. At the same time, the Standard Operating Procedure (SOP) for the Nickel Free Plating was proposed to standardize the proper method when worker performs task. The results show that this implementation helps the company to reduce the rejection of Nickel Free Plating. Improvement on the Nickel Free is evaluated based on the weekly act passes of products. The proposed improvement increases the average percentage of weekly act passes from 67% to 70%. As a conclusion, reduce rejection of Nickel Free Plating at finishing line can be achieved by kaizen Implementation.



## **DEDICATION**

I dedicate this project to God Almighty, my creator, my source of inspiration, wisdom, knowledge and understanding. I also dedicate this work to my lecturer, industry supervisor and friends who has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. Thank you. My love for you all can never be quantified.

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## LIST OF ABBREVIATIONS

NCP	-	Nickel-Free Plating
LM	-	Lean Manufacturing
JIT	-	Just-In-Time
SMED	-	Single Method of Exchange Dies
PDCA	-	Plan-Do-Check-Act
SOP	-	Standard Operating Procedure
RCA	-	Root Cause Analysis
VSM	-	Value Stream Mapping
TPM	-	Total Productive Maintenance
FMEA	-	Failure Mode and Effects Analysis
CI	-	Continuous Improvement
TPS	-	Toyota Production System
Cp and CPk		Process Capability
UCL		Upper Control Limit
LCL		Lower Control Limit
SOP		Standard Operating Procedure

## LIST OF SYMBOLS

KCN	-	Potassium Cyanide
$K_2O_2Sn$	-	Potassium Stannate
CuCN	-	Copper Cyanide
KOH	-	Potassium Hydroxide
Sn		Tin
g	-	Gram
mL	-	millilitre
rpm	-	Revolutions per minute
°C	-	Degree Celsius
%	-	Percentage
$\sigma$		Standard Deviation
min		Minute
KG		Kilogram

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

This chapter discusses the problem statement, the objectives of the project, project scope and scope of the study. This study focuses on the reduction of Nickel-Free in the metal manufacturing company.

### **1.2 Background of Study**

In today's ever-changing customer-driven market, industries need to increase their products and processes to satisfy customer needs. Concept of Kaizen focuses on continuous improvement involving everyone in the organization to eliminate waste. Kaizen can be employed in any area of the workplace that needs to be improved.

This study focuses on ways to reduce rejection of Nickel-Free Plating at ABC Company by implementing Kaizen. According to (Gijo, 2010), reducing rejection can improve the quality level of the product and is costs saving. In order to reduce rejection at finishing line, Kaizen is used as the solution for this study.

### 1.3 Problem Statement

The White Bronze Plating machine shown in Figure 1.1 undergoes the process of Nickel Free Plating in metal manufacturing company at Tanjung Kling, Malacca. This machine uses two types of materials, i.e. brass and steel. Product weighing 2kg will take 15 minutes to be plated using this machine. However, the appearances of the end-product sometimes do not meet the specification. The rejected products will be scrapped and rework cannot be done.



Figure 1.1: White Bronze Plating Machine

Table 1.1: Number of reject of Nickel Free

MONTH	DULL	YELLOWISH	WHITE PATCHES	MIXED	ENTANGLED
MAY	39	145	4	0	0
JUNE	15	41	0	0	0
JULY	0	8	10	8	0
AUGUST	27	20	1	1	2
<b>Total</b>	81	214	15	9	2

Table 1.1 shows data that has been gathered from May to August 2016 in metal manufacturing company at Tanjung Kling, Malacca. There are five types of rejection that occur after the process, i.e. dull, yellowish, white patches, mixed, and entangled. This

rejection occurs after the process of the Nickel Free Plating either due to improper method, concentration or improper solution .The two highest of number rejection are yellowish (214) and dull (81). This project only focuses on two highest rejections i.e. yellowish (Figure 1.2) and dull (Figure 1.3).



Figure 1.2: Dull



Figure 1.3: Yellowish

## 1.4 Objectives

The objectives of this project are:

- i. To study the process of Nickel-Free Plating.
- ii. To analyze the problem that affects to quality of Nickel-Free.
- iii. To increase the 1<sup>st</sup> time passes of Nickel-Free at finishing line by 80%.

## 1.5 Scope of the project

This study aims to increase the 1<sup>st</sup> time passes of Nickel Free by implementing Kaizen activities. This process brings out different type of rejects on Nickel Free. Due to the rejection that could not be avoided, and consequently to the large amount of rejection. Kaizen is an on-going, never-ending improvement process, a way to improve quality of the product and build the workplace more leisurely.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter will provide the review from previous research that is related to this final year project. There are previous researches on Lean Manufacturing using Kaizen Improvement. Other than that, Lean Manufacturing and Kaizen are discussed in this chapter. The literature review served as a theoretical framework for the structure and substance of the data collection instrument.

#### **2.2 Lean Manufacturing (LM)**

Based on the Rahman and Karim (2012) stated that LM is separate to a different tools on the elimination of waste and produce products to give the most satisfaction to the customer same with New and Brunet (2003). LM is the eliminating of waste and waste are detected when the process, not add value added to the product. Meanwhile, Chowdary *et al.*, 2011 says LM is a type of principles and methods, which is to eliminate waste and non-value-added activities at every single product or service process in order to meet customer needs. The objective of LM is to reduce the waste in human effort, inventory, time to market and manufacturing space to become highly responsive to customer demand while producing higher quality products in the economy (Pavnaskar *et al.*, 2003). Apart from that, Oehmen *et al.*, (2010) also says Lean is a technique and principles to reduce waste and identify the quality of the product and (J and Pullin, 2005) also says LM is a higher quality, lowering costs, improving delivery that is by eliminating waste and establish to add value for the customer. Besides that, LM is a minimizing useless costs, and lean manufacturing is very important because it produces results does not depend on additional system. (Ward *et al.*, 2014).

LM is displayed as a house where some element has an important objective of the system. The house of the LM was designed by Ohno to fit the objectives and an element of LM (William, 2010). This model as shown in Figure 2.1 gives a concept of which tools can be used.

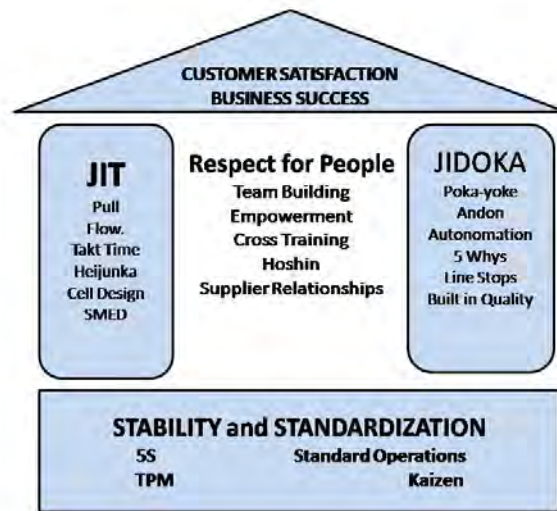


Figure 2.1: House of LM (Liker, 2006)

The house of LM is the crisis of the workforce that must be impressionable, improvement and the main objective is reducing waste of the system. Overall, the main focus of LM production is symbolized by the roof of the house “customer satisfaction”. The higher the quality deliveries to the customer while shorted lead-time is low cost. Safety is important for the working situation that helps to reach the target of the company (Fricke, 2010). From these interpretations and the literature findings that was organized on LM, it was clear that the main objective to eliminate waste and to improve the quality of the product.