UNIVERSITI TEKNIKAL MALAYSIA MELAKA

STAMPING OIL CONDITION MONITORING AT MIYAZU USING FT-iR

This report submitted in accordance with the requirements of the Universiti Teknikal Malaysia Melaka for the Bachelor's Degree in Manufacturing Engineering (Manufacturing Process) with honours.

By

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May 2009

UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)

BORANG PENGESAHAN STATUS TESIS*

JUDUL: STAMPING OIL CCONDITION MONITORING AT MIYAZU USING FT-iR.

SESI PENGAJIAN: 2008/2009

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I hereby, declared this Bachelor's Project entitled "Stamping Oil Condition Monitoring at Miyazu using FT-iR" is the result of my own research except as cited in references.

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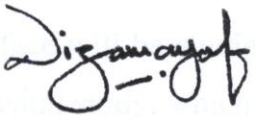
Author's Name	:	Na'ain Bin Shari
Date	:	11 MAY 2009

APPROVAL

This Bachelor's Project submitted to the senate of UTeM and has been accepted as fulfilment of the requirement for the Degree of Bachelor of Manufacturing Engineering (Manufacturing Process) with Honours. The member of the supervisory committee is as follow:



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En. Mohamad Nizam Bin Ayof
Project Supervisor
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ABSTRACT

A project titled "Stamping Oil Conditioning Monitoring at Miyazu using FT-iR" has been carried out at Miyazu (M) Sdn. Bhd in Shah Alam, Selangor. The objectives of this project are mainly to study the percentage of moisture existed in the oil and study the factor that caused the oil become insufficient to remove burr from stamping machine. There are some significant problems faced in this study which is possibility of the oil used in the stamping operation at Miyazu (M) Sdn. Bhd. contain any particles that can cause dent problem on the material produced and also possibilities of moisture existence in the stamping oil that can cause the oil insensitive and unfunctional when doing the stamping process. The study will be done in Chemistry Laboratory at Faculty Of mechanical Engineering, Technical University of Malaysia Melaka by using FT-iR (Fourier Transfer Infrared Spectroscopy), which will detect the moisture in oil. In addition, the sample of oil will be taken at the production Line G and H at Miyazu (M) Sdn. Bhd. The chosen line G and H because of the several factors, which is to be more specific and more accurate when getting the data and result for the research. The factor contributes to the problem also easy to detect when research is done in a specific line. The problem that happens in the stamping process can be identifying by using the lubricating oil in the specific production line. At the end of this research, i found that there is a present of water, soot, and oxidation in the oil that is why the oil is become weak and less functional to remove burr at the stamping machine.

ABSTRAK

Kajian ini adalah bertajuk ‘Stamping Oil Conditioning Monitoring at Miyazu using FT-iR’ dengan kerjasama syarikat Miyazu (M) Sdn. Bhd yang terletak di Shah Alam, Selangor. Objektif bagi pelaksanaan projek ini pada amnya adalah untuk mengkaji peratusan air yang terkandung di dalam minyak yang di gunakan dalam proses “*stamping*”dan kajian ini juga di jalankan adalah untuk mencari punca kepada permasalahan yang berlaku keatas produk yang dilakukan proses “*stamping*” ke atasnya iaitu masalah lekuk di atas bahan kerja. Masalah yang paling ketara bagi kilang tersebut ialah kemungkinan minyak yang digunakan oleh kilang tersebut mempunyai bahan-bahan asing yang boleh menyebabkan lekukan keatas bahan kerja tersebut dan juga kemungkinan kehadiran air di dalam minyak tersebut menyebabkan ketidakberkesanan minyak tersebut untuk melakukan proses “*stamping*” tersebut. Kajian tersebut dilakukan di dalam makmal Fakulti Kejuruteraan Mekanikal, Universiti Teknikal Malaysia Melaka dengan mengunakan perisian dan mesin FT-iR iaitu “Fourier Transfer Infrared Spectroscopy” dimana ia akan mengesan kehadiran bendasing dan juga air yang terdapat di dalam minyak tersebut. Sebagai tambahan, minyak yang digunakan untuk kajian ini adalah diambil daripada barisan G dan barisan H didalam kilang tersebut. Pemilihan barisan G dan barisan H di dalam kajian ini adalah kerana beberapa faktor antaranya ialah ianya lebih spesifik dan lebih tepat apabila data dikumpulkan. Faktor yang menyumbang kepada permasalahan yang dihadapi juga dapat ketetahui dengan cepat apabila ianya dilakukan dalam barisan yang spesifik. Di hujung kajian ini, saya mendapati bahawa terdapat kandungan air, jelaga dan pengoxidaan di dalam minyak dan di sebabkan itulah minyak yang di kaji itu lemah and juga tidak berfungsi dengan baik untuk membersihkan kotoran di mesin “*stamping*”.

DEDICATION

For my beloved family:

Shari Bin Che Hasan

Siti Minah Binti Deraman

Nik Hilmi Bin Tuan Ya'akub

Hanima Binti Shari

Abdul Khanan Bin Shari

Sabri Bin Shari

Rediah Binti Shari

Muhammad Hafizan Bin Shari

Marzuki Bin Shari

Muhammad Shukri Bin Shari

Muhammad Shukeran Bin Shari

Muhammad Hafizuddin Bin Shari

To all my beloved and cherish friends

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LIST OF ABBREVIATIONS

ASTM	-	American Society for Testing and Materials
Ppm	-	Part per Million
FT-iR	-	Fourier Transform infrared
FFT	-	Fast Fourier-transformation
ATR	-	Attenuated Total Reflectance
BSWB	-	Bottom sediment and water bowl
BLM	-	

CHAPTER 1

INTRODUCTION

1.1 Introduction

Stamping operation is a process that produces metalwork to a desired shape using machine press. The process is done in a various way and stage. According to kalpakjian (2006), the term of press forming is usually used in industry to describe the operation of press machine, because the operation is done on a presses and using various of dies. The common stamping operations are; piercing, fine blanking, bending, forming also progressive stamping and etc.

The important parameters to monitoring the oil in this research are water peak, moisture in oil, degradation of oil, and also oil contamination. These parameters are used in the research to find the problem occurred in the stamping process that has done in line G and H. The stamping oil used in industries is usually to give a cleaning mechanism on the stamping machine die. The oil usually cleans the burr at the surface of the die. So that, when stamping operation is done, the product produced did not have dent problem at their surface. The oil used in cycle way and the process is undergoing in several year without changing it.

1.2 Project Background

This project strives to make a solution in oil stamping operation in line G and line H at Miyazu. Miyazu is the current Proton Holding's die producer. Miyazu are specialized in producing automotive tooling Engineering, design and manufacturing service. Miyazu has been producing an automotive tooling within in ten years times. At this time Miyazu are currently producing Proton SAGA part for Proton Holding. For the project involve in research, one of several line are taken which is line G and H. The chosen line G and H because of the several factors, which is to be more specific and more accurate when getting the data and result for the research. The factor contributes to the problem also easy to detect when research is done in a specific line. The problem that happens in the stamping process can be identifying by using the lubricating oil in the production line.

1.3 Problem Statement

There are several significant problems regarding to the project that are existed in the case study:

1) There is possibility of the oil used in the stamping operation at Miyazu contain any substance that can cause dent problem on the material produced.
2) There are possibilities of moisture existence in the stamping oil that can cause the oil less functional when doing the stamping process.
3) There is possibility that the usage frequency and oil age will be a factor that causes the oil become less functional.

1.4 Research Objective

Objective of this project are to:

(a) Study the factor that caused the oil become insufficient to remove burr from stamping machine by analyze water, soot and oxidation that exist in lubricating oil.

(b) Propose the right time when to change the stamping oil for Miyazu.

1.5 Scope of project

The project will focus on improvement on the quality of stamped work piece. In order to ensure the objectives are achieved, some of the important element must be considered:

(a) The study done in Chemical Laboratory at Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka.

(b) Using FT-iR (Fourier Infrared Spectroscopy) machine and software, which detect the moisture in oil.

(c) The samples of oil are taken at the production Line G and H at Miyazu.

(d) The sample of oil is taken according to the month of using it. For Line H, the sample taken each month from September 2008 to January 2009. For line G, the sample taken is at September 2008, October 2008 and January 2009.

1.6 Expected Result

After accomplishing the study, the expected result is hoped to help Miyazu (M) Sdn. Bhd. in increasing the efficiency and productivity of operators in production line, reducing material waste, minimizing workers work load, providing better oil changing system, and providing systematic schedule for oil changing system.

1.7 Research Methodology

The initial step is conformation of the title project. The second step is identifying the company for the case study. For this project the company involves is Miyazu (M) Sdn. Bhd. A several visit are done to take an overall view for this company to get better explanation for the case study. Step three is identifying the objective and scope of the thesis to limit the study area. The step further by collect relevant information and data from the company in simultaneously and also literature resources. The full discussion of this project will be described at Chapter 3 of this thesis.

1.8 Summary

This chapter introduced the project background and the objective of the project. In addition, the problem statements and expected results also being clarified in order to

come out with the improvement plan later. The following chapter consists of the literature review and knowledge that required in conducting the whole study.

CHAPTER 2

LITERATURE REVIEW

2.1 Metal Stamping

2.1.1 Introduction to Metal Stamping

Metal stamping processes one of the important processes in manufacturing industries. The stamping processes are giving a lot of advantage to the manufacturing company because of the variation stamp operation they can produce to the metal product. Akrout describes that the metal stamping is a forming process by plastic deformation of a metal surface carried by a punch in a die. The surface is transformed by molecular displacement of matter, with difficulty reversible, and then we consider that the obtained piece is not developable. Besides, it consists to warp a thin sheet metal (blank) in a no developable surface. It is a technique fluently used in the industrial environment.

WHO (1999) state that stamping variation is related to:

i. Check point location on a part (more rigid areas tend to be closer to nominal and have less variation).

ii. Measurement fixture design (checking fixtures with more clamps tend to reflect lower variation).

iii. Part size, complexity and thickness (smaller, less complex and thicker parts have lower variation).

iv. Press process control (different press lines demonstrate higher die set to die set mean shift control which often is reflected in the control of process variables such as draw press tonnage).

v. Shipping and handling (the shipping and handling of parts tends to increase variation and shift dimensions on the parts).

vi. Changes in stamping presses (for example, some dimensional shifts occur as dies are moved from a tryout press line to the home production press line).

2.1.2 Types of Metal Stamping

There is several type of operation that involve in stamping metal operation. Most of the car producers are using all this type to producing their product in stamping production line. WHO (1998) state that the types of metal stamping are:

i. Fine blanking is used when high accuracy is required. It is adopted when metal parts with smooth edges are to be produced. Fine blanking is a cold extrusion process not to be confused with stamping. This process is used to produce final shape parts that do not require subsequent finishing operations. Fine blanking process proves to be a cost effective as it is a single step operation.