



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN AND FABRICATION THE FIXTURE TO ELIMINATE
THE ABC SUSPENSION HOOK FROM THE UPPER DIE AT
JATI BERINGIN SDN BHD**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Process) with Honours.

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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I hereby, declared this reported entitled “Design and Fabrication the Fixture to eliminate The Part from The Upper Die for ABC Suspension Hook at Jati Beringin Sdn Bhd” is the results of my own research expect as cited in references.

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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 Process) with Honours. The member of supervisory committee is as follow:

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ABSTRAK

Lekapan adalah salah satu aksesori yang penting bagi sesebuah mesin dalam industri. Aplikasinya adalah amat meluas dan diperlukan untuk memudahkan operasi mesin di dalam sesebuah kilang. Penggunaannya dapat mengurangkan kos operasi dan mempercepatkan sesuatu proses. Projek ini melibatkan produk ABC Suspension Hook dan dijalankan di Jati Beringin Sdn. Bhd (JBSB) yang terletak di Durian Tunggal, Melaka. Fokus untuk projek ini adalah di bahagian operasi. Dimana, dengan merekabentuk and menstruktur lekapan ini, dapat memendekkan masa process dan memudahkan operasi. Bahan mentah yang di gunakan untuk menstruktur lekapan ini adalah bahan buangan dari syarikat itu sendiri. Ini dapat mengurangkan pembaziran didalam syarikat. Bahan mentah yang digunakan ialah keluli lembut atau nama lainnya keluli berkarbon rendah. Kaedah yang di gunakan untuk memilih lekapan adalah konsep mengadang (Concept Screening). Gambarajah penyebab dan kesan (C&E) digunakan untuk mengenalpasti pembaziran atau kerja lebihan pada proses menghentak. Rekabentuk terperinci ini dihasilkan dengan menggunakan perisian SolidWorks. Selepas menggunakan lekapan yang baru direka bahagian produk tidak melekat lagi dengan bahagian atas mould. Dari pembaikan proses tersebut, masa yang berlebihan dapat dikurangkan dari 12.28 saat kepada 7.82 saat dengan pengurangan 4.46 saat. Selain itu, keuntungan daripada produk meningkat 1 sen setiap produk. Sekiranya syarikat mengeluarkan 50,000 unit setiap bulan, keuntungan meningkat kepada RM 500. Bila produk itu dikeluarkan selama setahun, keuntungan syarikat menjadi RM 6,000 setiap tahun. Untuk menganalisis antara modal membuat lekapan baru dan keuntungan yang diperolehi oleh syarikat Titik Pecah Rata (Break Even Point) digunakan.

ABSTRACT

Fixture is an important accessory for machine in industry. The application of this part is very widely and need for some operation at the factory. By using this part can reduce the operation cost and cycle time. This project relates with the ABC Suspension Hook product and operates at Jati Beringin Sdn. Bhd (JBSB), which is located in Durian Tunggal, Melaka. The focuses of this project are at the operation line. Which by design and fabricate the fixture it can reduce process in time and ease the operation. The material using for fabricate this part are scrap from company. This method can minimize cost of company. It is a mild steel or low carbon steel. The method using for select the fixture is screening concept. Causes and Effect diagram using for identify the waste or extra job at the stamping process. The detail design is design by Solidwork Software. After using a new design fixture the part was not stick to the upper die. From this improvement the process was able to reduce the time waste from 12.28 sec to 7.82 sec with gain of 4.46 sec. Besides that, the profit of the product will be increase 1cent per part. If the company produced 50,000 per month the profit increase are RM 500. When the product is produce for yearly, the profit for the company became a RM 6,000 per year. For analyze between cost manufacture a new fixture and profit, Break Even Point (BEP) is using

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DEDICATION

Specially dedicated to my beloved family and friends who provide a loving, caring encouraging and supportive atmosphere. These are characteristic that contribute to the environment that is always needed to achieve the goals ahead.

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LIST OF ABBREVIATIONS

JBSB	-	Jati Beringin Sdn Bhd
TNB	-	Tenaga Nasional Berhad
CAD	-	Computer-aided design
DOF	-	Degrees of Freedom
FSW	-	Friction Stir Welding
RBR	-	Rule-Based Reasoning
CBR	-	Case-Based Reasoning
CAFD	-	Computer Aided Fixture Design
BHF	-	Blank Holding Force
CNC	-	Computer Numerical Control
QC	-	Quality Control
MIG	-	Metal Inert Gas
BEP	-	Break Even Point
C&E	-	Causes and Effect

CHAPTER 1

INTRODUCTION

In this chapter, an introduction to the background of project will be given. Following by that, the problem statement, objective, scope of the project and review of methodology will also be presented.

1.1 Background

1.1.1 Tool Design in Manufacturing

Tool design is the process of designing and developing the tools, the methods and the techniques necessary to improve manufacturing efficiency and productivity (Edward G. Hoffman, 2004). It gives industry the machine and special tooling needed for today's high speed, high volume production. It does this at a level of quality and economy that will ensure that the cost of product become cheaper and be able to compete with another competitor. The tool design function is a well integrated position within the concurrent engineering team, requiring skills in computer technology and multiple communication mediums.

Since no single tool or process can serve all forms of manufacturing, tool design is an ever changing, growing process of creative problem solving. A fixture is a work holding or support device used in the manufacturing industry. What makes a fixture unique is that each one is built to fit a particular part or shape. The main purpose of a fixture is to locate and in some cases hold a workpiece during either a machining operation or some other industrial process. A jig differs from a fixture in that an it

guides the tool to its correct position in addition to locating and supporting the workpiece.

The primary purposes of jigs and fixtures are to:

- i. Reduce the cost of production
- ii. Maintain consistent quality
- iii. Maximize efficiency
- iv. Enable a variety of parts to be made to correct specifications
- v. Design tools to safe and easy to operate.

1.2 Problem Statement

Jati Beringin Sdn Bhd (JBSB) was a vendor for Tenaga Nasional Bhd (TNB) to supply the accessories of pole. One of product is ABC Suspension Hook. A product to be produced a round 50 000 units per month. Sometimes the order from vendor cannot be achieved because of delay, machine shutdown and etc. From the observation of process flow at the product, there have a few processes. Those stamping processes begin with the stamp operation following by a knock out the product from the die. The process takes about 12 second. This process can be improved by design and fabricate the new fixture to ease the process to reduce the cycle time. Figure 1.1 and 1.2 shows the problem statement:

- i. The fixture itself should capable to hold the product without any movement while stamping process.
- ii. Part produce are not consistent.
- iii. Take extra time and process to produce the product.

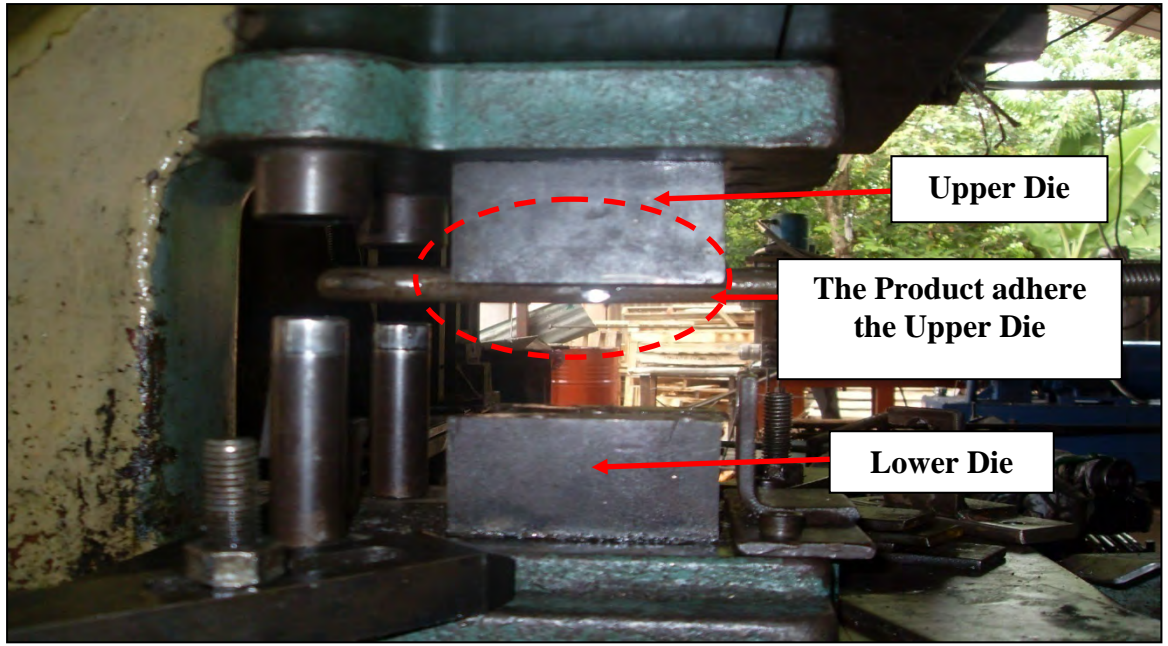


Figure 1.1: Stamping machine.

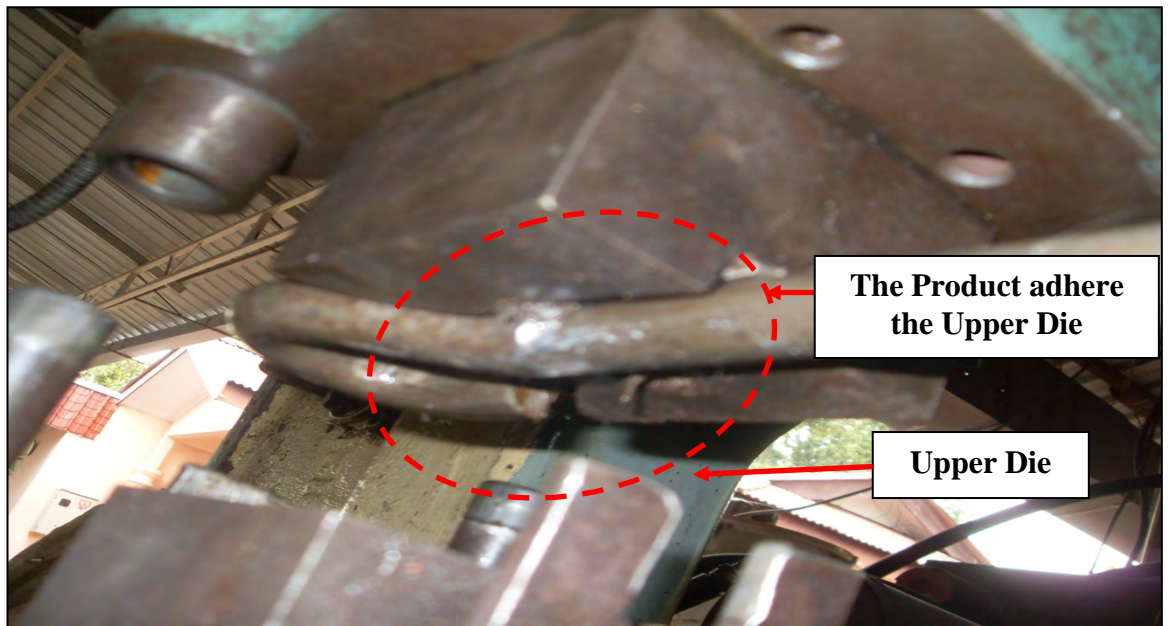


Figure 1.2: Stamping Process.

1.3 Objectives

The aims of this project are:

1. To design the fixture for stamping machine to eliminate the part from the upper die.
2. To fabricate the fixture using scrap material from company for stamping machine.
3. To improve the process flow for ABC Suspension Hook.(*Stamping Machine*)

1.4 Scope of the Project

Basically, this project is focused on design and fabricates the fixture using the scrap material from the company for stamping process to eliminate the part from the upper die and improve the process flow for ABC Suspension Hook at Jati Beringin Sdn Bhd (JBSB).

1.5 Structure of Report

Generally, this report is divided into two parts which are Projek Sarjana Muda (PSM) I and PSM II. In total, this report contains of five main chapters. These chapters are separated into two parts which the first part contains three chapters; introduction, literature review and methodology. Then the second part contains two more chapters, results and discussion. Finally, conclusion and recommendation of this study will be discussed in PSM II.

In the first chapter, Introduction, briefly explain the background of the project which is about the important of the productivity in manufacturing. It is also contains the problem statement, objectives, scope, research methodology and also structure of the report. All theories were obtained and referred from the articles, journals, and some books related to the study are explain in detail in Chapter 2, Literature Review.

In chapter 3, Methodology, all methods that have been use are explained specifically in term to achieve the objectives and obtain the result of the study. On the other hand, in Chapter 4, for the results and discussion, this report are focus primarily on the data that been collected and identify the influence factor that achieve the result.

In the last chapter, Conclusion and Recommendation which conclude this study and also included some suggestion in order to improve this study for future. Finally, all the chapters are compiled separately in sequences in order to give a clear view to the readers.

1.6 Gantt Chart

Generally, Gantt chart is the standard format for displaying a schedule graphically. It is a chart that depicts progress in relation to time, often used in planning and tracking a project. It consists of a horizontal bar chart with time as the horizontal axis and either resources, operations, or orders as the vertical axis. Individual operations are displayed as horizontal bars in the chart, indicating the time at which the operation begins and ends (Asprova, 2008).

Gantt chart graphically represent the duration of tasks against the progression of time. The Gantt chart of the project has shown at **APPENDIX A**. It illustrates the duration of the study start from July 2010 until April 2011. The Gantt chart pictured the whole tasks that are needed to be done for the project for specific.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review explained about all the theory or methods for research. The resources obtained from book, journal, bulletins, newspaper and etc in the library or via the internet. They are many types of fixture that multiple or different kind of problem. Actually, fixture is important item to solve the problem in manufacturing industry.

2.2 ABC Suspension Hooke

ABC Suspension Hook is one of product from Jati Beringin Sdn Bhd (JBSB). This product was request from Tenaga Nasional Berhad (TNB). Function of this product to hang or suspend aerial bundle cable accessories such as suspension clamp and Dead End Clamp. Materials for manufacture are mild steel and to be hot dipped galvanized in accordance to BS 729. For more detail about ABC Suspension Hooke refer **APPENDIX B** and **C**.



Figure 2.1: ABC Suspension Hook

2.3 Fixture

Physically a fixture is comprised of devices capable of supporting and clamping the workpiece (Rong, 1999). There are many means of achieving this, ranging from simple vice grips or lathe chucks to more unusual fixtures that are based upon phase change materials in which the physical property (such as temperature or pressure) of a certain material is manipulated to initially change the materials phase from liquid to solid in order to locate and secure the workpiece, before being altered again to allow the material to revert back to a liquid form from which the workpiece can be removed. For the purposes of this dissertation however more conventional fixtures such as that illustrated in figure 2.2 will be studied.

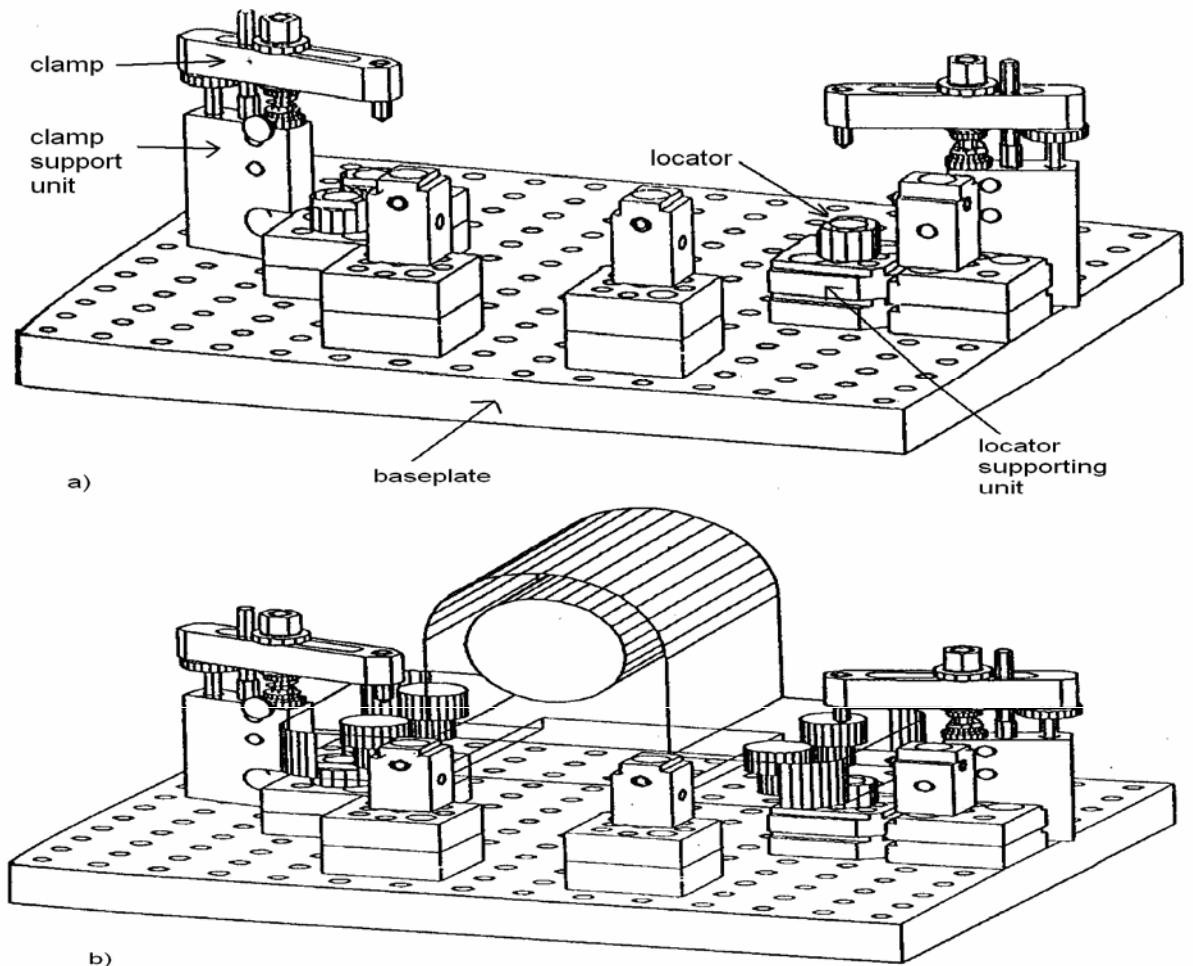


Figure 2.2: A typical modular fixture, shown a) without and b) with a workpiece (Rong, 1999)

In such typical fixtures the workpiece rests on locators that accurately locate the workpiece. Clamps are used to hold the workpiece against the locators during machining thus securing the workpieces location. The typical structure of a fixture consists of a base-plate, to which the clamping and locating units are attached. The locating units themselves consist of the locator supporting unit and the actual locator.

The locator is the part of the locating unit that contacts the workpiece. The clamping units consist of a clamp supporting unit and a clamp that actually contacts the workpiece and exerts a clamping force on it. Fixtures may contain different numbers and different types of clamping and locating units, but units generally always follow the same basic format that consists of a supporting unit upon which sits a particular type of locator or clamp.

Although the primary function of a fixture is to accurately locate and secure a workpiece, there are many other criteria that it should attempt to satisfy, most often concerned with ergonomic factors. These may include that the fixture should be:

- i. be simple and quick to operate (by facilitating easy loading and unloading of the workpiece from the fixture);
- ii. be error-proof (prevent the workpiece from being loaded into the fixture incorrectly orientated);
- iii. offer some means of preventing unnecessary chip accumulation during machining;
- iv. provide extra support where necessary for unusually shaped or large workpieces;
- v. offer some means of guiding the tool onto the workpiece (fixtures that have this particular feature are often referred to as jigs).

Finally one of the most important aspects of a fixture is that it should not add unnecessarily to production costs, whether the cost is incurred as a result of fixture assembly time, expensive materials, fixture manufacture costs, and so on.

A further aspect related to fixture design is that different design considerations often conflict with each other. For example a heavy fixture can be advantageous as this aids the stability of the fixture. However increasing the weight of a fixture can have