UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF VISE FOR DRILLING MACHINE

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

By

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ABSTRACT

Nowdays vise is an important thing in manufacturing industry. The usage of this vise is to clamp workpiece in drilling machine.The vise like comprises a pair of movable jaws arranged to move in parallel and to cooperate with a fixed jaw for holding workpieces for machining. There are a lot of competition among machine manufacturer but none of them can clamping the workpiece in irregular shape.The objective of this project is to propose a solution related to the vise in clamping irregular workpiece in drilling operation. Thus, this project covered the drilling machine specification and problem occurred during drilling operation. In addition, the focus of this project is to increase the performance of vise in drilling machine usage and the system itself. However, project design can only produce the prototype but not covered usage of material factor which used in the vise, benefit of the design and development cost. Due to the implementation of this project, problem related to clamping of work piece in drilling machine can be solved with an additional function and vise performance in the industry. The solution of the problem related to surface of workpiece during clamping of workpiece when using ordinary vise is an indication of project can perform successfully.

ABSTRAK

Hari ini ragum adalah benda penting dalam industri pembuatan.Salah satu kegunaannya adalah memegang bahan kerja pada mesin gerudi. Ragum terdiri dari satu rahang bergerak yang disusun seiring dengan rahang tetap.untuk memegang bahan kerja pada mesin..Banyak persaigan dikalangan pembuat mesin tetapi sehingga hari ini tiada satu pun yang boleh memegang bahan kerja yang tidak rata secara pegangan terus. Objektif untuk projek ini adalah untuk mencadangkan penyelesaian berkaitan dengan ragum untuk memegang bahan kerja yang tidak rata dan berlekuk.ketika operasi menggerudi. .Oleh itu projek ini merangkumi spesifikasi mesin gerudi dan masalah yang berlaku pada ragum ketiaka menggunakan mesin tersebut. .Fokus projek ini adalah untuk meningkatkan keupayaan ragum pada mesin gerudi.dari segi penggunaan dan sistemnya. Namun pada bahagian rekabentuk, projek ini hanya menghasilkan prototaip sahaja dan tidak merangkumi faktor bahan yang digunakan, kelebihan bentuk rekaan dan kos pembuatan.Dengan terlaksananya projek ini, masalah yang berkaitan dengan pemegangan bahan kerja pada mesin gerudi akan dapat diselesaikan dengan penambahan fungsi dan prestasi ragum tersebut dalam industri pembuatan.Kejayaan projek ini juga dapat menyelesaikan masalah kerosakan permukaan bahan kerja semasa process memegang bahan kerja yang berlaku apabila menggunakan ragum biasa.

DEDICATION

Thankful to Allah S.W.T for the opportunity to finish this project

Specially dedicated to

Omar Ismail,Sahara Wahid En. Shafiq Jumali, brother and sisters

who have encouraged, guided and inspired me throughout my journey of education

ACKNOWLEDGEMENT

First of all, I would like to thank the Almighty Allah for His blessings and His power for me to complete this *Projek Sarjana Muda.*

I would like to take this opportunity to express my deepest gratitude to my project supervisor, En. Shafiq bin Jumali who has persistently and determinedly assisted me during the whole course of this project. It would have been very difficult to complete this project without the enthusiastic support, insight and advice given by him.

My outmost thanks also go to my family who has given me support throughout my academic years. I would like to thank them for understanding and always giving me courage and the strength I need to carry on this project. Without them, I might not be the person I am today.

It is to my advantage that I have received help and support from friends and staffs in the Faculty of Manufacturing Engineering My special gratitude to my father and mother for giving me amount of budget and idea to support my project. It is of my greatest thanks and joy that I have met these people. Thank you so much.

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ANSI	-	America National Standard Institute
ABS	-	Acrylonitrile/ Butadiene/ Styrene
CNC	-	Computer Numerical Control
FKP	-	Fakulti Kejuruteraan Pembuatan
ISO	-	International Standards Organization
NC	-	Normally Closed
PFD	-	Process Flow Diagram
UteM	-	Universiti Teknikal Malaysia Melaka

CHAPTER 1
INTRODUCTION

This chapter is intended to provide background information of the study. It covers background of study, problem statements, objectives, scope and limitation of project, important of project, and outline of project

1.1 Background

Traditional drill vises provide a clamping jaw which has only one angle of attack in order to effect clamping. The clamping jaw is limited so it may only be moved laterally in the direction of the main body. However, the disadvantages of the structure is the workpiece being clamped is of an irregular shape and where one desires to bend the workpiece along the edge of the device while it is clamped

In addition, traditional drill vises also do not provide for an adequate working surface which can be utilized for working on the workpiece during the clamping thereof. Finally, traditional vises of which aware are not readily adaptable for use anywhere on the surface of a machine, but rather, are adapted to be used only at an edge thereof.

Thus, it will be appreciated that there remains a need for a drill vise having a clamping jaw capable of clamping a workpiece utilizing a variety of angles of attack. There is also a need to provide a bench vise which provides a surface adequate to permit work to be performed and combines all of these features, that is more compact, that provides better "purchase power" and stability and which is adaptable for use on any portion of the surface of a machine.

1.2 Problems Statement

Nowadays, in global market have many design of drill vise. Every manufacture compete each others in order to produce good product. However there is no one of vice can clamp for crooker shape with direct clamp till today. So, by producing this project, the problem can be solving in the future.

1.3 Objectives and Aims of this Project

In the preparation of this project, a few objectives have been identified. The main objectives of this study are to identify:

1. To propose solution problem related vise tool for holding irregular shape
2. To produce prototype vise that can holding irregular shape for drilling machine
3. Develop application of vise system in drill vise

1.4 Scope and Limitation of Project

The scope of this project is only focus on development of vise in drill vise. Design for the vise only produce prototype. This project is only focused on hold a irregular workpiece by two jaws. This project not covers types of material and specific process for market product because of the researcher ability time and financial constrain limit. The project is started from July 2008 until December 2008. Result of this project for drill vise only. The project is only covered

1.5 Importance of Project

The importance of project is to:

1. Improve functional of drill vise in manufacturing industry.
2. Reduce crack of material during holding workpiece.

3. Improve accuracy during drill a workpiece
4. Improve performance of produce in manufacturing industry
5. Reduce vibration during drilling process

1.6 Outline of Report

The Gant-chart has been constructed in managing this project (see appendix A).This project encompasses five (5) chapters which are:

Chapter 1

This chapter provide the introduction of this project, describes the background and problem statement of the project. The objective, scope, importance of the project and the project outline are also presented in this chapter.

Chapter 2

This chapter provides the literature review about drilling machine, parts of drilling machine and types of drilling machine. The literature review covered about vise, types of vise, vise system and previous case study.

Chapter 3

In this chapter will give the readers an overview of research methodology, presents the appropriate methodology of this project. This chapter includes the project process planning, flowchart, Gantt chart, and data analysis.

Chapter 4

In addition this discusses the analysis and discussion, present findings of the project.

Chapter 5

The conclusion, summarizing the project work that has been done will inform the readers of the overall of the project in this chapter. It will describe the recommendation and proposes future improvement about vise tool.

CHAPTER 2
LITERATURE REVIEW

2.1 Definition of Drilling Machine

From the resource of Krar, F.S (2005), the drilling machine or drill press is essential in any metalworking shop. Basically, a drilling machine consists of a spindle which turns the drill and can be advanced into the work, either automatically or by hand and a work table (which holds the workpiece rigidly in position as the hole is drilled). A drilling machine is used primarily to produce holes in metal. However, operations such as tapping, reaming, counterboring, countersinking, boring, and sport facing can also be performed. Figure 2.1 at below show the drilling machine.

Drill Press machine also define a machine used for drilling operations available in a wide variety of types and size to suit different types and sizes of workpieces (Rapisarda, M. 1996). Drilling machines are used for drilling holes, tapping, reaming, and small-diameter boring operations. The workpiece is placed on an adjustable table, either by clamping it directly into the slots and holes on the table or by using a vise, which in turn is clamped to the table. The drill is lowered manually by a hand wheel or by power feed at preset rates. Manual feeding requires some skill in judging the appropriate feed rate.

Drilling machine usually is designed by the largest workpiece diameter that can be accommodated on the table and typically range from 150 to 1250 mm. In order to maintain proper cutting speeds at the cutting edges of drills, the spindle speed on drilling machines has to be adjustable to accommodate different drill sizes (Kalpakjian, S. 2006)

According to Kibbe, R.R (2002)**,** drilling holes is one of the most basic of machining operations that is very frequently done by machinist. Metal cutting requires considerable pressure of feed on the cutting edge. A drill press provides the necessary feed pressure either by hand or power drive. The primary use of the drill press is to drill holes, but it can be used for other operations such as countersinking, counterboring, spot facing, reaming, and tapping, which are processes that modify the drilled hole.

Lastly, based on Oswald (1999), drill machine is machine to grip, revolve, and feed a twist drill in order to produce a hole in a piece of metal or other material

Figure 2.1: Drilling Machine

2.2 Parts of Machine

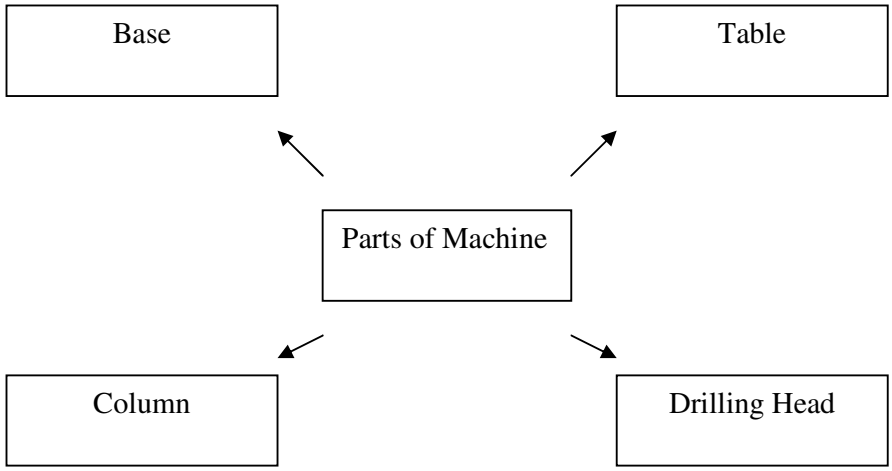

Figure 2.2: Parts of Machine

From the resource of Krar, F.S. (2005), although drill presses are manufactured in a wide variety of types and sizes, all drilling machines contain certain basic parts. The main parts on the drilling machine are base, column table, and drilling head. In base part, a material made by cast iron for provides stability for the machine and rigid mounting for the column. The base usually has holes so that it may be bolted to a table or bench. The slots in the base allow the workholding device or the workpiece to be fastened to the base. Figure 2.2 at the top show the parts of the machine.

According to study of Rapisarda, M. (1996), another main part in drilling machine is column. Column is an accurate cylindrical post that fits into the base. The table, which is fitted on the column, may be adjusted to any point between the base and head. The head of the drill press is mounted near the top of the column.

Table is one of part for drilling machine. The table, either round or rectangular, is used to support the workpiece to be machined. The table whose surface is at 90 degree in either direction for drilling holes on a angle. Slots are provided in most tables to allow jigs, fixtures, or large workpiece to be clamped directly to the table (Krar , S. 2002)

Last part of drilling machining is drilling head. Drilling head mounted close to the top of the column, contains the mechanism which is used to revolve the cutting tool and advance it into the workpiece. The head contains the spindle, a round shaft that holds and drives the cutting tool, and is housed in the spindle sleeve or quill. The spindle sleeve does not revolve but can move up and down inside the head to provide a down feed for the cutting tool. The end of the spindle may have a tapered hole to hold taper-shank tolls, or it may be threaded or tapered for attaching drill chuck. The hand feed lever is used to control the vertical movement of the spindle, sleeve and the cutting tool. A depth stop, attached to the spindle sleeve, can be set to control the dept that cutting tools enter the workpiece **(Krar, F.S. 2005).** Figure 2.23 at the below show the parts of the radial drill machine.

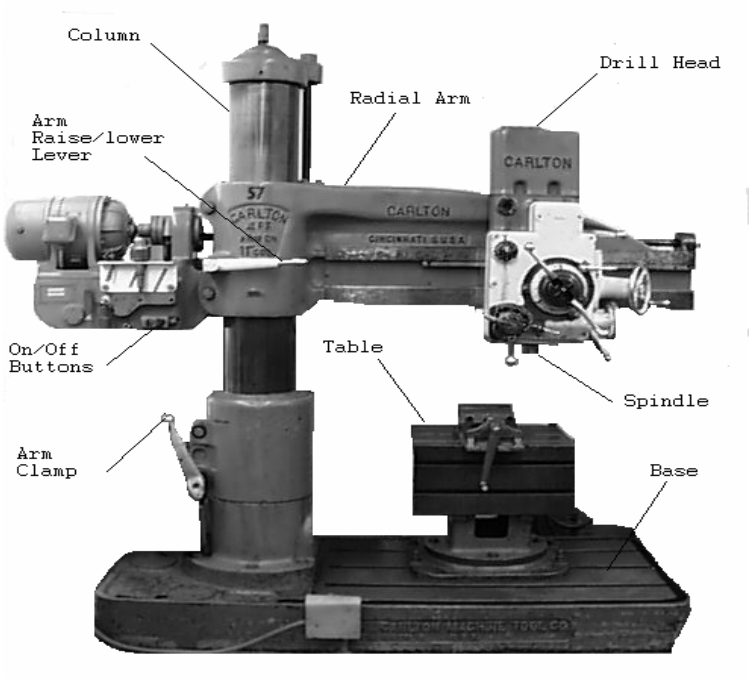

Figure 2.3: Parts of Radial Drill Machine (Krar F.S et al, 2005)

2.3 Standard Operations of Drilling Machine

Drilling machines may be used for performing a variety of operations besides drilling a round hole. A few of the more standard operations, cutting tool, and work setups will be briefly discussed.

1) Drilling maybe defined as the operation of producing a hole by removing metal from a solid mass using a cutting tool called a twist drill
2) Countersinking is the operation of producing a tapered or cone shaped enlargement to end of a hole
3) Reaming is the operation of sizing and producing a smooth, round hole from a previously drilled or bored hole with the use of a cutting tool having several cutting edges.
4) Boring is the operation of truing and enlarging a hole by means of a single-point cutting tool, which is usually held in a boring bar.
5) Spot-facing is the operation of soothing and squaring the surface around a hole to provide a seat for the head of a cap screw or a nut.
6) Tapping is the operation of cutting internal threads in a hole with a cutting tool called a tap.
7) Counterboring is the operation of enlarging th top of a previously drilled hole to a given depth to provide a square shoulder for the head of a bolt or cap screw.

2.4 Principal Types of Drilling Machine

A wide variety of drill presses are available, ranging from the simple sensitive drill to highly complex automatic and numerically controlled machines. The size of a drill press may be designated in different ways by different companies. Some companies state the size as the distance from the center of the spindle to the column of the machine. Other specifies the size by the diameter of the largest circular piece that can be drilled in the center (Krar, F.S. 2005)