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Improving production rate by modification of angular drill jig

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ABSTRACT

Objective of a mass production is to increase the productivity and the accuracy of the products. This is done by reducing the setup cost and manual burnouts. For large scale productions, unlike materials a lot of time is wasted in start of the device and clamping the device. An experimental approach method is regularly practiced until the axis of the hole is properly line up with the axis of the drill. By changing the base plate we can easily acquire new type of object to be produced successfully in mass production.

Keywords: Jigs, Base plate design, Production rate

INTRODUCTION

Jig is a tool-holding or supporting device used in manufacturing industry. Jigs are used to securely locate (position in a specific location or orientation) and support the tool, ensuring that all parts produced using the jig will maintain conformity and interchangeability. Using a jig, improves the economy of production by allowing smooth operation and quick transition from a part to part, reducing the requirement for skilled labour by simplifying how work pieces are mounted and increasing conformity across a production time. A jig differs from a fixture in that when a fixture is used, the tool must move relative to the work piece, a jig moves the piece while the tool remains stationary.

It also serves to reduce working time by allowing quick set-up, and by smoothing the transition from part to part. It frequently reduces the complexity of a process, allowing for unskilled workers to perform it and effectively transferring the skill of the tool maker to the unskilled worker. Jig also allow for a higher degree of operator safety by reducing the concentration and effort required to hold a piece steady. Economically speaking the most valuable function of a jig is to reduce labor costs.

A jig's primary purpose is to provide repeatability, accuracy interchangeability in the manufacturing of products. A jig is often confused with a fixture; a fixture holds the work in a fixed location. A device that does both functions (holding the work and guiding a tool) is called a jig It is usually better from an economic standpoint, for a jig to result in a small cost reduction for a process in constant use, than for a large cost reduction for a process used only occasionally.

LITERATURE REVIEW

Use acrylic material for jig manufacturing. Also, for reducing production cycle time and implemented combination of two PCD (Pitch Circle Diameter) on single jig [1].

Jig is a special device that holds, supports, or is placed on a part to be machined. It is a production tool made so that it is not only locates and holds

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the work piece but also guides the cutting tool as the operation is performed. Jigs are usually fitted with hardened steel bushings for guiding drills or other cutting tools.

A jig is designed and built to hold, support and locate every component (part) to ensure that each part that is drilled or machined within the specified limits. The correct relationship and alignment between the tool and the work piece is maintained. We studied the problems which were occurring during drilling operations in "Kirloskar Ebara Pumps Limited Kirloskar Wadi".

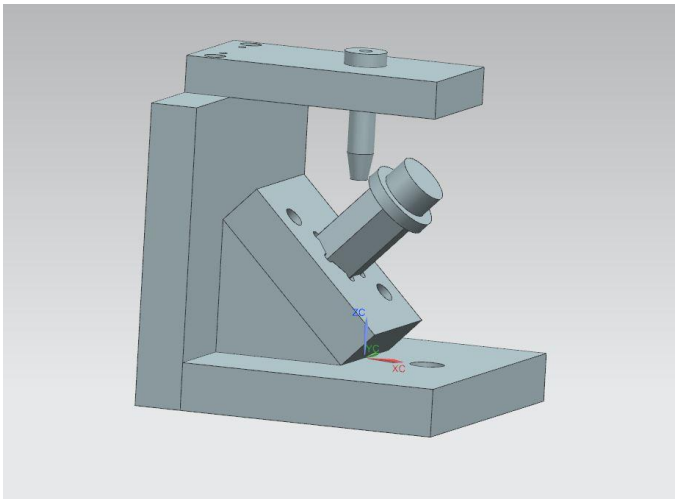
We find that we will make design and manufacture of acyclic jig so as to overcome the problem occurring when manual marking is performed. Also due to Acrylic jig the cost of jig manufacturing is reduced.

Jig is designed as per job requirements.

Suggested that the importance of jig for holding hollow cylindrical component. They have explained how difficult is the indexing and positioning of hollow circular component by indexing plate and with crank and sector mechanism. The author has an attempt to made the design and fabrication of drill and jig for indexing as well as positioning of the hollow cylindrical component for drilling machine at economical cost [2].

Performed analysis on drilling jig and fixture find out stresses acting on jigs under working condition as well as they did modelling by using solid edge design tool and performed drilling operation on different operation [3].

DESIGN LAYOUT



WORKING PRINCIPLE AND ADVANTAGES

The Workpiece can be fixed in the component locator and then the C-washer can be used to hold tightly the workpiece. The tightness can be adjusted by the threaded screw.Before the drilling process gets start, the locator pin in the bush plate can be used to fix the Component locator and can disable its movement further, after the workpiece gets fixed. After the drilling operation initiated, the drill pit can be guided by the drill bush provided in the bush plate to workout a proper drilling process in a given workpiece.For drilling different points on the same workpiece, the screw can be adjusted and the workpiece can be turned and fixed again for the desired position. Finally, the most accurate drilling process in the workpiece can be successfully executed [4-7].

Advantages of this drill jig

- Production increase.
- Low variability in dimension, thereby leading to consistent quality of manufactured products.
- Cost reduction.

- Ensures interchangeability and high accuracy of parts.

COMPONENTS DESCRIPTION

There are several categories of components which are employed here and they are mechanical components. The brief descriptions on those are as follows:

Base plate

It is a sheet of metal forming the bottom of this Jig construction. This construction can be explained by the following diagram 4.1

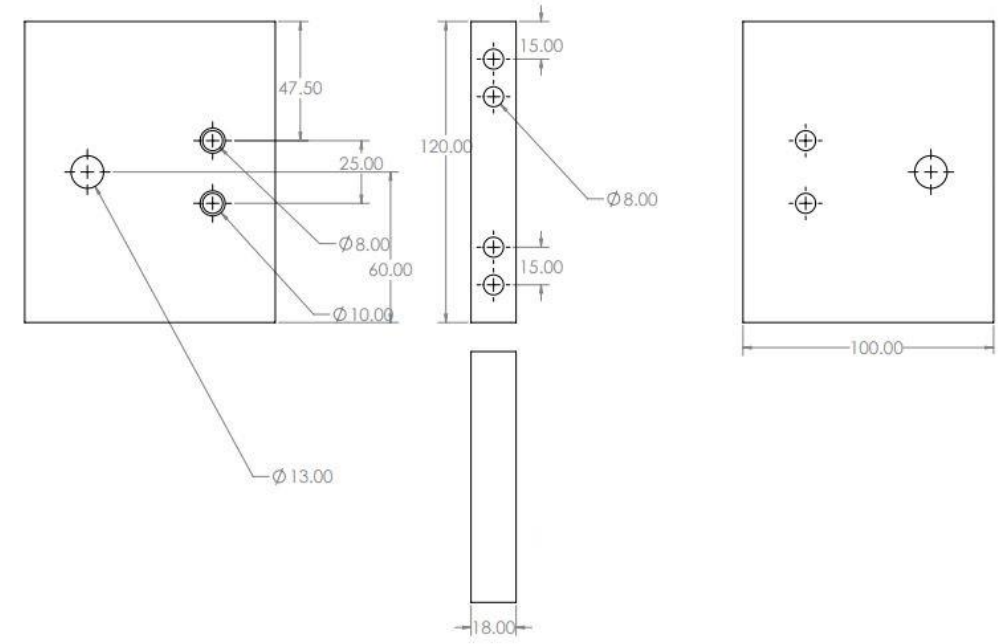


Fig 4.1 Base plate

Bush plate

In Fig 4.2 the bush plate can be employed as it is a fixed or removable cylindrical metal lining used to constrain, guide, or reduce friction. The following shows the basic bush plate and its dimensions as given below.

C-Washer

In Fig 4.3 the C-Washers are designed to be slide in and out of position on a bolt or shaft in a partially completed assembly or can be used as a retention device on a grooved shaft to keep components in place. The following shows the C-washer which have been given below.

Drill bush

A Drill bushing is a tool used in metalworking jigs to guide cutting tools, most commonly drill bits. Other tools that are commonly used in a drill bushing include Counter bores, countersinks and Reamers. They are designed to guide, position and support the cutting tool [7-10].

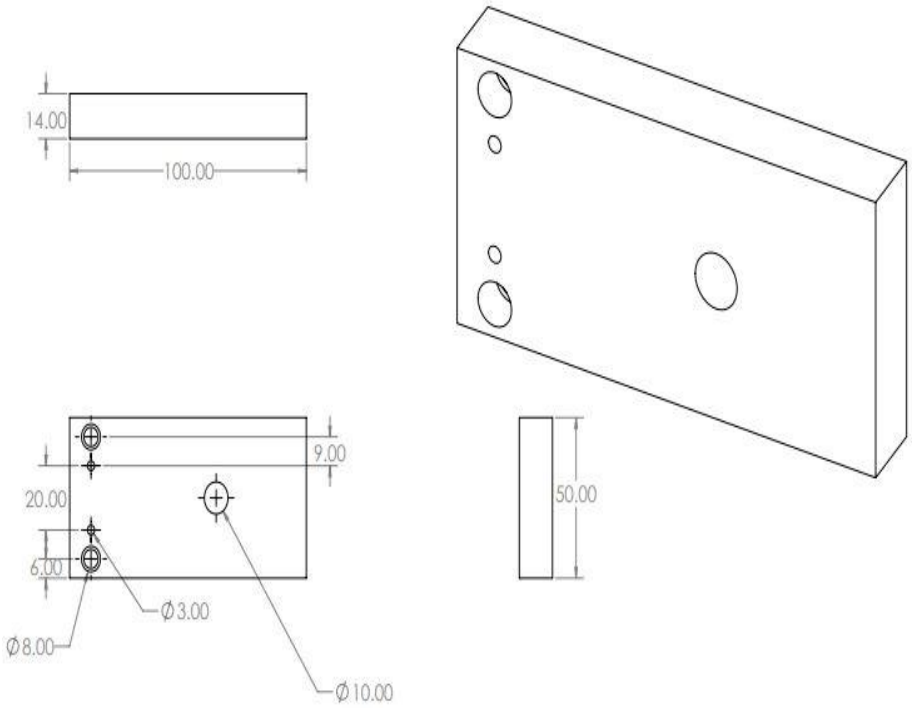


Fig 4.2 Bush plate

Vertical plate

It is a sheet of metal forming the vertical wall of this Jig construction and can be used for the better results in the components manufacturing under the Drilling jig. This construction can be explained by the following component diagram in Fig 4.5.

Component outer locator

In Fig 4.6 Component Outer Locator ensure work pieces are precisely positioned and rigidly supported. These Component locators must be selected to ensure that the work piece can be easily loaded and unloaded.

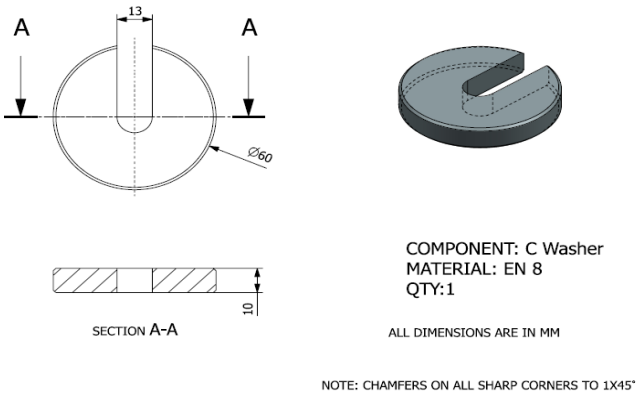


Fig 4.3 C-washer

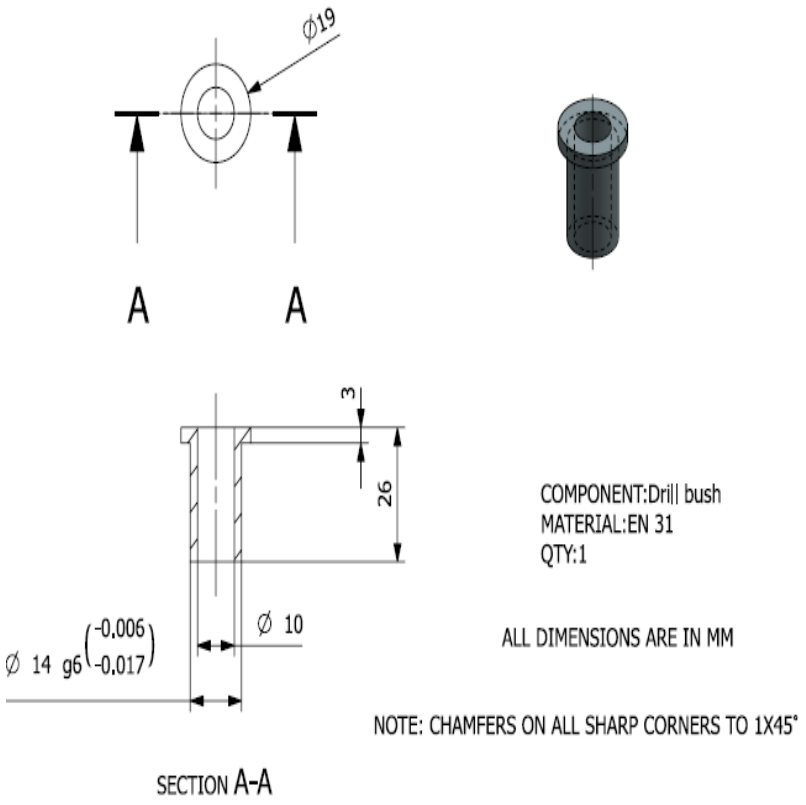


Fig 4.4 Drill bush

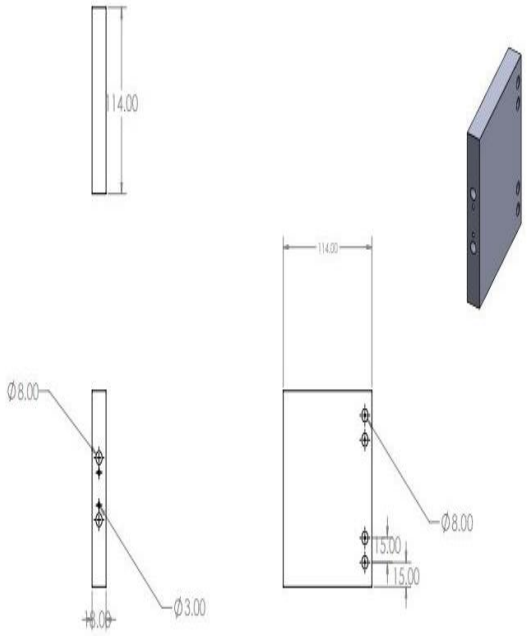


Fig 4.5 Vertical plate

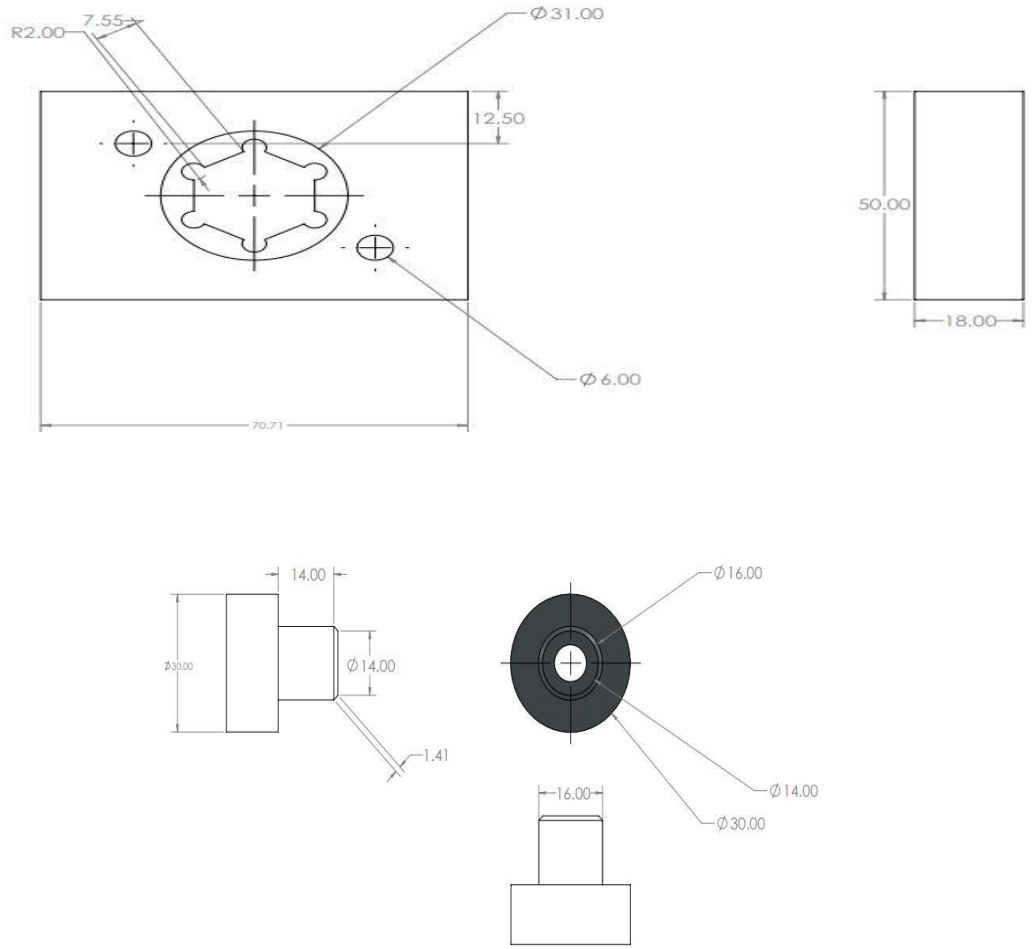


Fig 4.6 Component outer locator

ASSEMBLY PROCESS

The assembly can be done in this automated drill jig as the sequential order of arrangement and can be explained as follows.

Step 1

At first, the Drill bush can be mounted on the bush plate and then the bush plate can be tightened in the Vertical plate at the top portion of it.

Step 2

At the center of the Vertical plate, a ball bearing can be attached in which the component locator have been mounted and the locator pin has been used to hold the component locator and can disable the movement.

Step 3

The threaded screw can be used here to adjust the C-Washer, which can hold the work piece tightly and firmly.

Step 4

Then, the completed Vertical plate assembly can be fixed on the Base plate by the means of Bolts.

Step 5

Atlast, this automated drill jig unit has been mounted strongly at the Table of the Drilling machine.

CONCULSION

These angular drill Jigs are manufacturing tools that are employed to produce interchangeable and

identical components. They are unique tool-guiding and work holding devices designed specifically for machining and assembling large number of parts. They eliminate the need for a special set-up for every work-piece thereby facilitating production and also ensuring that every work piece is manufactured within a predetermined tolerance. The design of jigs is dependent on the operation type as well as the machine tool to be used for the operation. They are fabricated with heat-treated steel that are corrosion and wear resistant.

REFERENCES

[1]. Joshi, P. "Jigs and Fixtures" Tata McGraw Hill Education, New Delhi, India, 2010.
[2]. Nanthakumar, K. and Prabakaran, V. "Design and Fabrication Testing of Combined Multipurpose Jig and Fixture" IOSR Journal of Mechanical and Civil Engineering, 2014.
[3]. Lin, Q., Burdick, J., and Rimon, E. "Constructing Minimum Deflection Arrangements Using Invariant Norms" IEEE Transactions on Automation Science and Engineering, Science Research 3(4), 2015, 213-219.
[4]. Blogspot. "Introduction to Jigs and Fixtures", Accessed 2015, 2010.
[5]. Spogel "Mini project on Jigs and Fixtures", Accessed 2015, 2014.
[6]. Kaija, T. and Heino, P. "The Optimization of OnwaferShield-Based Test Fixture Layout" IEEE Transactions on Microwave Theory and Techniques, 54(5), 2006.
[7]. Meduettaxila. "Jigs and Fixtures Module", Accessed 2015, 2012.
[8]. Mechnol "Applications of Jigs and Fixtures", Accessed 2015, 2015.
[9]. Pachbhai, S. and Raut, L. "A Review on Design of Fixtures" International Journal of Engineering Research and General Science, 2(2), 2014.
[10]. Chennu, V. "Jigs and Fixtures and their Purposes", Accessed 2015, 2014.