

Optimizing the Method of Work Holding Device- Drill Jig with Adjustable Drill Bush

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ABSTRACT: Tool design is the process of designing and developing the tools, methods, and techniques necessary to improve manufacturing efficiency and productivity. The main objectives of tool design are to lower the manufacturing cost while maintaining the quality and increased production by cutting down time between machining operations. Various parameters that forms the main criterion in the tool design are providing simple, easy-to-operate tools for maximum efficiency, reduction of manufacturing expenses by producing parts at the lowest possible cost, design of tools which consistently produce parts of high quality, increasing the rate of production with existing machine tools, design of tool to make it fool proof and prevent improper use, selection of materials that will give adequate tool life. Tooling refers to the hardware necessary to produce a particular component. Tooling consists of a vast array of cutting devices, jigs, fixtures, dies and gauges used in normal production. A special attempt has been made to develop a adjustable type of drill bush, which can enhance for the holding of workpiece with variable dimension.

KEYWORDS: Tool Design, Adjustable drill bush, jig and fixture.

I. INTRODUCTION

Tool design is the process of designing and developing the tools, methods, and techniques necessary to improve manufacturing efficiency and productivity. The main objectives of tool design are to lower the manufacturing cost while maintaining the quality and increased production by cutting down time between machining operations. Various parameters that forms the main criterion in the tool design are providing simple, easy-to-operate tools for maximum efficiency, reduction of manufacturing expenses by producing parts at the lowest possible cost, design of tools which consistently produce parts of high quality, increasing the rate of production with existing machine tools, design of tool to make it fool proof and prevent improper use, selection of materials that will give adequate tool life. Tooling refers to the hardware necessary to produce a particular component. Tooling consists of a vast array of cutting devices, jigs, fixtures, dies and gauges used in normal production. A special attempt has been made to develop a adjustable type of drill bush, which can enhance for the holding of workpiece with variable dimension.

Clamping elements hold the workpiece securely in the located position during operation. Clamping is accomplished by clamps. Clamps hold the workpiece, which is firmly engaged with locators during operation. The clamping system should be strong enough to withstand forces developed during operation. At the same time, clamping force should not damage the workpiece. The timing required for loading and unloading must be as minimum as possible. Clamping must be positive when subjected to vibration, chatter etc. Clamps should be positioned in such a way that clamping force shall act as a strong, supported part of the workpiece. Clamping on unsupported part bends the workpieces as This will affect the accuracy of the operation. A vertical hole drilled in bent workpiece will become angular when the unclamped workpiece come back to original shape. Clamping system should not obstruct the path of loading and unloading. Clamping system should be capable of holding the workpiece securely against the forces developed during the operation. Also clamping system should not damage the workpiece with excessive pressure. Clamping time should be minimized by using handles, hand wheels, hand knobs, tommy bars, knurled screws etc. Clamp can be loosened or tightened manually without using spanners because spanner will increase the motion of picking, aligning etc. If the number of clamps are to be loosened or tightened repeatedly, then it is preferable to use hydraulic or pneumatic clamping. This will reduce operators fatigue and saves clamping time also. Power clamping provides loosening and tightening simultaneously.

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II. BILL OF MATERIALS FOR COMPONENTS

S.NO	PART NAME	MATERIAL	QUANTITY
1	DRILL BUSH	OHNS	1
2	JIG BODY	C.I	1
3	CLAMING SCREW	M.S	2
4	CLAMPING NUT	M.S	2
5	WORKPIECE	C.I	1
6	SLIDING TABLE	C.I	2
7	JIG PLATE	C.I	1
8	LOCATORS	M.S	4
9	BOLT	M.S	6
10	NUT	M.S	10

DIMENSION OF THE ADJUSTABLE DRILL BUSH AND ITS JIG COMPONENTS

Base plate

Length = 300 mm

Breath = 300 mm

Thickness= 40 mm

Slot:

Length = 300 mm

Breath = 100 mm

Thickness = 10 mm

Jig plate

Length = 300 mm

Breath = 300 mm

Thickness = 40 mm

Diameter of hole= 100 mm

Supporting plate

Length = 300 mm

Breath = 140 mm

Thickness = 20 mm

No of plates=2

Drill bush

The inside diameter of the bush =18 mm.

The outside diameter of the bush=25.6 mm

The diameter range =18mm to 22 mm

Length of the bush = 30 mm

Table

X-Table

Length = 200 mm

Breath = 100 mm

Thickness = 40 mm

Slot:

Length = 100 mm

Breath = 100 mm

Thickness = 10 mm

Y-Table

Length = 200 mm

Breath = 100 mm

Thickness = 40 mm

LOCATORS

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Diameter of the locators = 25 mm

Length of the locators = 20 mm

No of locators = 4

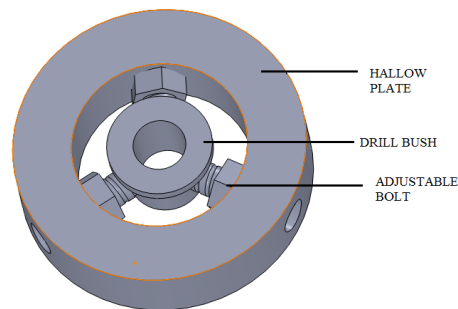


Fig 1 Adjustable Drill Bush

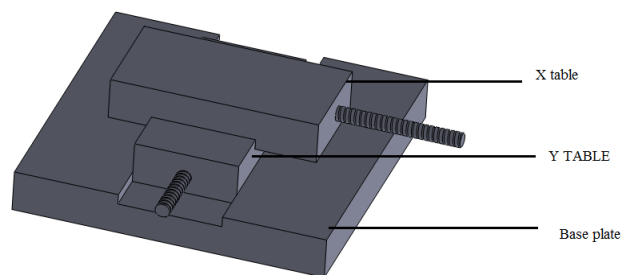


Fig.2 Special Table Setup-developed sliding table

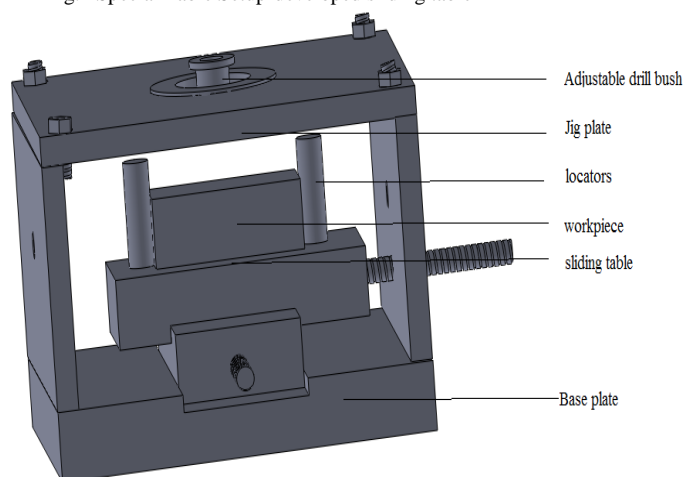


Fig.3 jig along with the adjustable drill bush in position

III. MERIT AND FURTHER SCOPE OF THE WORK

Merit

Common Drill bush is used for various type of drill bits by the way of adjusting the drill bush. The operation time is reduced. It becomes very useful in mass production and makes possible to employ unskilled or semi-skilled operator to

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makes savings in labour cost. It eliminates the individual marking, positioning and frequent checking. It reduces the cost of the production. It increases the machining accuracy.

FURTHER SCOPE OF THE WORK

It is only used for small size components. Forces causing deflection may come from handling. Initial investment is high. There is no special way to remove the chips produced by drilling, so it requires separate time also time consumption while changing the diameter of the drill bit.

IV. CONCLUSION

This report deals with the design and fabrication of drill jig and the detailed drawing of the component and assemblies. The project carried out by us made an impressing task in drilling works. It is very useful industries for mass production of identical parts. Jigs are used to hold and locate the workpiece that positions and guides or controls the cutting tool.

In jigs, drill bush is used to guide the tool. In conventional jigs we can't change the diameter of drill bush. Main objective of this project is to vary the diameter of the drill bush based upon the application. Drill jig is used to ensure a hole to be drilled, tapped or reamed in the workpiece at proper place. Jigs are generally used for mass production. Jig reduces operators fatigue and increases productivity. Jig consists of locating, clamping and tool guiding elements.

REFERENCES

- [1] M. Donaldson.C and Others, "Tool Design", Tata McGraw Hill, 1978
- [2] Kempster, "Introduction to Tool Design and Jigs and Fixtures", ELBS
- [3] ASTME, "Hand book of Fixture design"
- [4] Korsakov, "Fundamental of Fixture Design", MIR Publication, Moscow
- [5] Goroshkin.A.K., "Jigs and Fixtures Handbook", MIR Publication, 6) Moscovn Houghton, "Jigs & Fixture Design"