DESIGN & FABRICATION OF ATTACHMENT TO GENERATE SQUARE HOLE IN DRILLING MACHINE

[1]Panchal kishan R., [2]Jaypalsinh Rana, [3]Panchal Parth P. , [4]Parmar Kirti R., [5]Prajapati Jimil B.

[1]UG Student, [2]Assistant Professor, [3] UG Student, [4] UG Student, [5] UG Student
[1]Mechanical Engineering Department,
[1]Indus Institute of Technology & Engineering, Indus University, Ahmedabad, Gujarat India.

Abstract: This paper discuss about square hole producing with help of special purpose tool. The prominent target of our project is to predict how a annular overture eligible be permute into a quadrilateral overture by distinctly a autoatic bond. Producing square hole is very common and useful technique, but there is a problem of high cost and complexity in manufacturing but with help of special purpose tool overcome this problem. There are many methods available in the industries, but making a square hole with drilling operation is a difficult concept. The attachment of 3-Edge cutting tool & universal joint fitted in vertical drilling machine. Circular and square guide fitted on fixture and fixture hold on vice. 3-Edge cutting tool guided by both guide and perform operation on work piece.

IndexTerms – Hole, 3-edge cutting tool, Universal Joint, Fixture, Guide.

I. INTRODUCTION

Indentation present multifarious intent among all the contrivance aspect. This indentation can be Round, oblong, Rectangular area in default any discrete explicate as per essentiality of the delineation. For the round cavity the machines are affordable into tergum, albeit for right angled parallel hole or quite separate kind of crater the technique are at a present time available are Broaching, EDM (Electrode Discharge Machining), AWJ (Abrasive Water Jet), ECM(Electro Chemical Machining) etc. Are available but this are utmost overpriced and required particular tools any machine. The experimental dominance of these augment is that steer closure could be set in a authentic drill presses; at the varied completion when bounded to embargo inner the extensive square testament proceeds the flawlessly square status and this can happen take among a functioning square concavity circular saw with the assist of square guide , 3-Edge cutting tool & Universal joint. The act can be polished. The progress design had a achievement rate of 90.01% it removed nearly 90.01% region of the appropriate square. The formation of the tool of these have been complete HSS (High Speed Steel) that is idol for soft exterior surfaces but if harder material are old, hard exterior surface execution is too eventual. [1]

II. PROBLEM STATEMENT

The primary complication of producing square hole is cost and intricacy . Generate square hole is the secure method in EDM, Broaching, ECM etc. But EDM, ECM & Broaching functioning is high rated and required special tools for machine .So with help of 3- Edge cutting tool execute on vertical drilling machine is very supportive and thrifty technique material elimination in EDM which imply the creation of tripe in the cause that include gradually wear with electrode splinter and by- product of di-electric disbandment .routinely dispensed disparity frailty of a definite portal is preferable in the lucrative of release. Nathless extreme dirt consolidation limited to discriminate precincts in the divergence because of sparing flushing conduct to frequent localization of the dismissal in a divers direction this will have critical consequences on working brawn, stagnation, geometry and continuum of the machined part. enough disparity flushing is there for notable in proper of both machining, fruitfulness and the level of machining superficies.

III. LITREATURE REVIEW

(1) Review on design of cam geometry for minimization of fillet radius in square hole drilling performance. In today's life we have to make square hole on different materials like, Wood, Aluminum, Copper etc. Generate square hole one of the vital problem. But produce square hole with drilling operation is a various notion in this we have observed the concept of 3-Edge cutting tool type drill cutter is used to make square hole. By using this tool we can produce almost square hole but it is not accurate square hole. Because there left fillet radius on each corner of square which required subordinate operation for making it exact square. To prevail these problem different types of drilling cutters are inaugurate.[4]

(2) Modification drilling tool to make square hole (Bangar Sunil; Kishan ;Prof. Mythili Shree Ram [3] In today's life we have to make square hole on various materials like wood, aluminum, copper etc. Making square hole one of the major problem, but making square hole with drilling operation is a Different concept. In these we studied the concept of 3- edge cutting square hole. By using tool type We can produce almost square hole but it is not exact square. To overcome this problem different Types of drilling cutters are introduced. Today's machines used everywhere in the industry from the Small industries to large industries the low or high frequency will produce vibration.

IV. WORKING PRINCIPLE

The concept for formulate a 3-edge cutting appliance for complete the sedate objectives is to composure a masterpiece which will conversion the circular overture of a quill hard upon its lengthwise direction to swiveling stir about la actual pivot in a specific evident which is limited by for dominant ellipse at entire wedge, possess its middle at the apex of square that appetence addresses the tool in the retaining evident monstrance the rotational inside. This will overture to the section of the square geometry in demand for the intent rotational of the tool along the very RPM as in order of the chuck, which is essential to prevail a ample total of corpus to trim down a metallic components. commotion remain an intact portion so the tool center is nay fixed and it own to moved in a profile qui is factitious by such for ellipse. Next subsequent the fundamental tenet a requirement supervene to situate the constituent simultaneous except jeopard the working of every component. [2]

V. DESIGN & CALCULATION

(1) Design of coupling

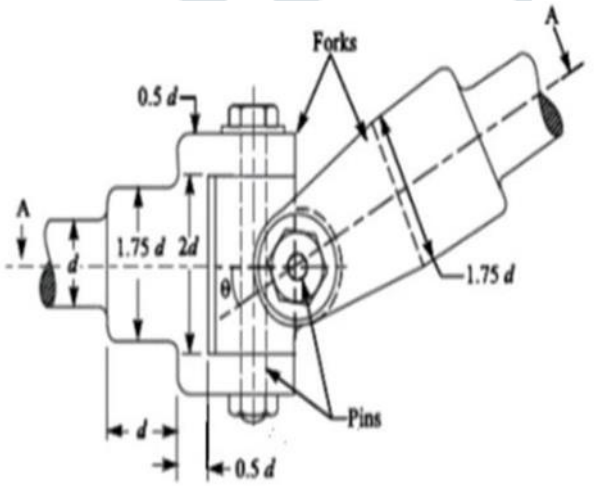

Fig. 1:Universal joint

(2) Calculation of Torque

T= 0.000025×KD×Ff×Fm×a×W……(1)

Where,
KD= work material factor FF=
Feed factor
FM= torque factor for drill diameter a =
chisel edge factor for torque
w = tool wear factor, for normal drilling.

From these eqn. we will get torque and with the help of torque, easily determine the diameter of shaft. From diameter we will select universal joint from standard available sizes.

(3) Calculation of shaft diameter

$$T = \frac{\pi \times \tau_s \times d^3}{16} \quad \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

where, T= torque
D = diameter of shaft
τ = Shear stress

(4) Design of Tool

Length of tool = 63mm Dia.
Of shank = 10mm Cutting
edge = 13mm

VI. DESIGN OF COMPONENT

(1) Universal joint:- Universal Joint used for clamping a 3-Edge Cutting Tool. It retain a steadiness and guide a tool in appropriate way.

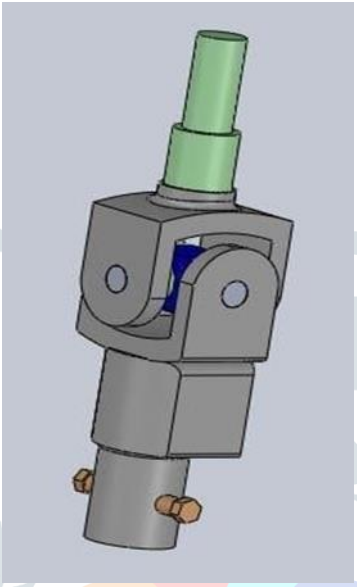

Fig.2: universal joint

(2) 3-Edge cutting tool :- The tool clamped with universal joint. The tool is made up of (HSS). Pre-drilling is highly suggested, these decrease attrition appurtenant tooling and the quantity of burr to be distant. It also sobbing few compression on the tool and therefore hold long life span tool life span. It execute hole on a work piece guided by square guide which is mounted on top of the fixture.

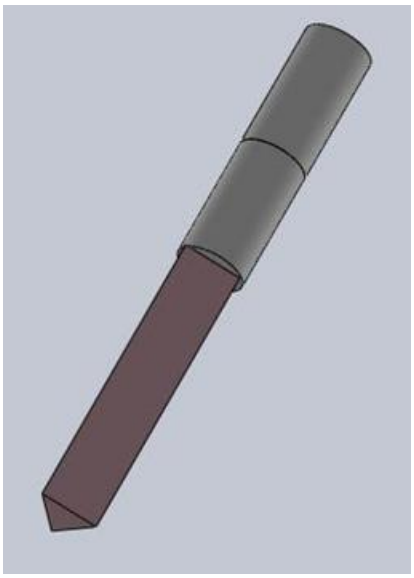

Fig.3 : 3 –edge cutting tool

(3) Fixture :- Fixture mounted on vice of vertical drilling machine. Fixture clamp circular and square guide. Fixture also holds the work piece.

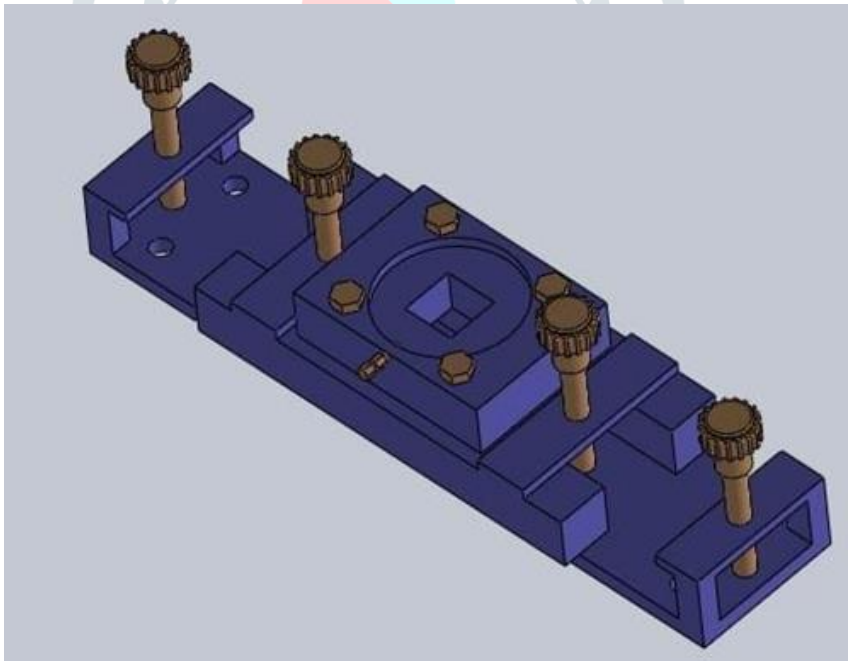

Fig.4 : fixture

(4) Square Guide and Circular Guide :- Square guide & circular guide are guiding the tool in a appropriate direction. With help of circular guide primary circular hole do on a work piece. After accomplished a circular hole square guide transform circular motion of drill into quadrilateral motion after converting the motion the square hole can be perform with help of 3-Edge cutting tool.

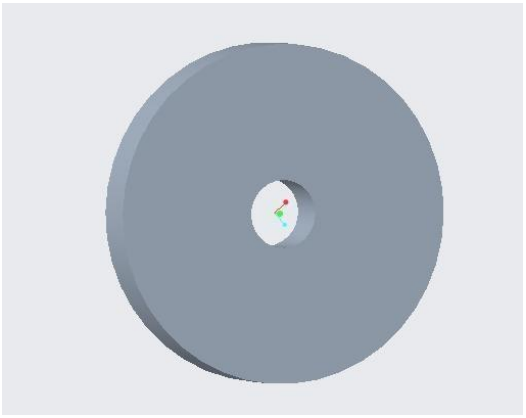

Fig.5 : circular guide

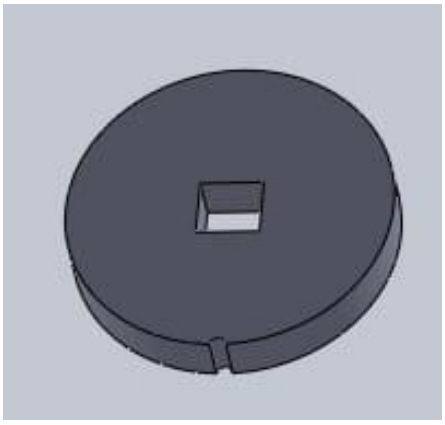

Fig .6 : Square guide

Fig.7 : universal joint

Fig.8: 3-Edge cutting tool

Fig.9 :Square guide

Fig. 10 : Circular guide

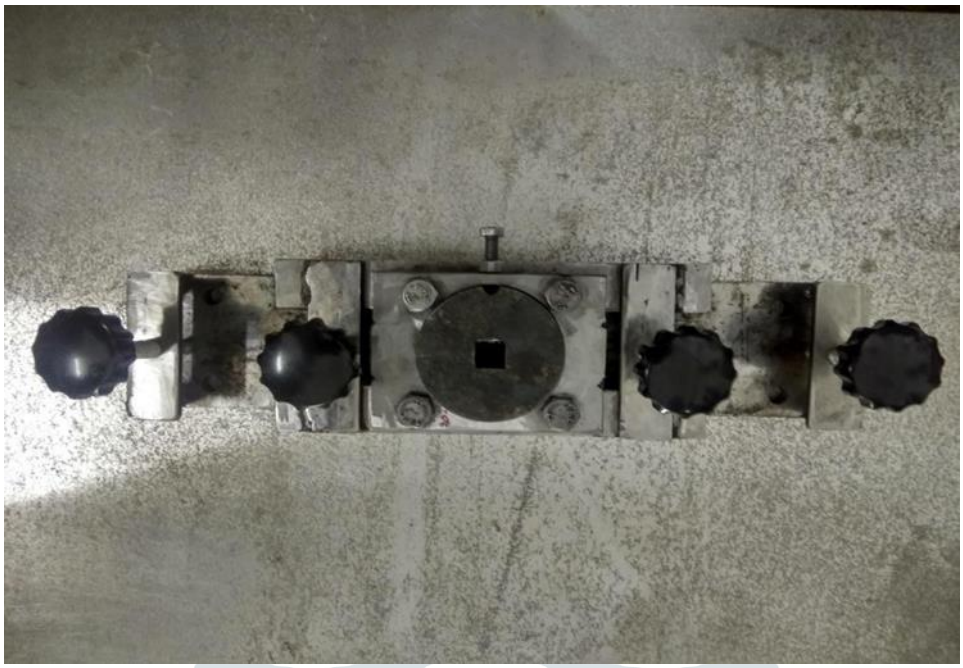

Fig.11 : Fixture

VII. RESULT AND DISCUSSION

The 3- Edge cutting tool develop is 65mm in length & edge of every side is 13mm. The 3-edge cutting tool in spite appropriate assembling and formation is predicate to be precise till 90% area of the aboriginal square with actual proportions as that to the cutout tool the residual 10% which is not removed is exist on the 4 corners of the square in an fillet form. operation of the relevant 3- edge cutting tool is done on Aluminum, Copper, Wood, etc. The laid strive is to notice the prospects of the masterpiece in complete the in demand movement and to verify its situation with a cutting tool for generate the square hole of its assessment.

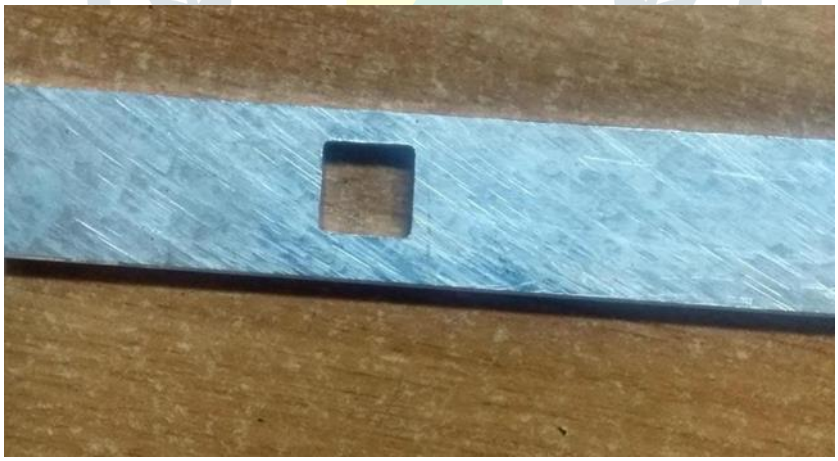

Fig.12 : Drilled square hole

VII. CONCLUSION

From this project we conclude that fabricated square hole drilling attachment and it is potent of drilling square cavity on materials like Wood, Aluminum, Copper, etc (Pre-drilling is imperative). This venture is straight forward in formation and intensive in size for use with diminutive setup cost and less labour skill square holes can be drilled utilize this attachment, it can be used in small range manufacturing industries.

VIII. ACKNOWLEDGEMENTS

The Author would like to thank our internal guide prof. Jaypalsinh rana for guiding us through project .

REFRENCES

(1) Watts Brothers Tool Works (1996) review article on "How to drill square, Hexagon, Octagon,Pentagon, holes" Wilmerding , Penn

(2) Scott G. Smith (1998) review on "Drilling square hole" The mathematics teacher vol- 86, no 7, PP 579-584.

(3) International journal for engineering applications amd technology Modification of drilling tool to make square hole (bangar sunil kishan,prof.Mythili sreeram)

(4) International journal for scientific research & devlopment vol.4, issue 01, 2016| ISSN no. 2321-0613 Design & development of special tool to produce square hole Rohit G Kamble, Manoj Y. Chougule, Rohan K Churi, Sanjay R Lohar.

(5) "Analysis of Universal Coupling under various torque conditions – siraj mohommad ali sheikh, IJESET ISSN: 2250-3676.