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360 Degree Flexible Drilling Machine

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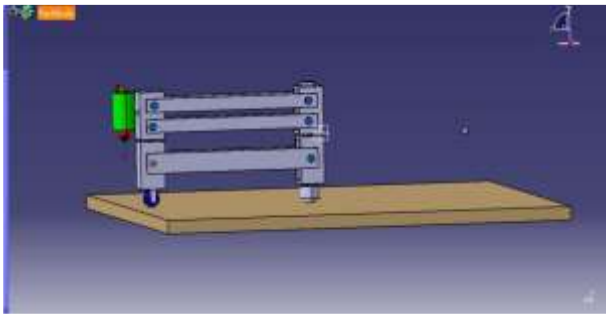
ABSTRACT:

A 360 flexible drilling machine is a versatile tool that offers a wide range of drilling capabilities in various applications. It is designed to provide precise drilling in difficult-to-reach areas, such as corners and tight spaces, making it ideal for use in the automotive, aerospace, and construction industries. The machine's flexible design allows for easy maneuverability, enabling operators to access hard-to-reach areas with ease. Additionally, its compact size and lightweight construction make it portable and easy to transport from one job site to another. With its high level of flexibility and precision, the 360 flexible drilling machine is an essential tool for any professional looking to improve their drilling efficiency and accuracy. The machine features advanced drilling technology that provides high-speed rotation and accurate drilling depth control. It also offers a range of customizable settings, allowing operators to adjust the drilling speed and torque to match the specific requirements of their application. Overall, the 360 flexible drilling machine is a reliable and efficient tool that is essential for professionals who demand the highest levels of precision and flexibility in their work. Its versatility and accuracy make it a valuable asset for a wide range of industries and applications.

Keywords:- 360˚, Flexibility, Drill Bit, Rotation, Arms, motors, Direction.

I. INTRODUCTION

Drill machine is one of the machines which is important Drilling machine is an important machine that is the heart of every business. Drilling is the process of cutting and removing the hole-formed or enlarged material with the help of a large number of pointed cutting tools. With power, as the drill rotates on the workpiece, the movement of the handle removes unwanted material in the form of chips. The aim of our project is 360 degree rotation which is easier to use. The machine minimizes production time and also eliminates clamping of the workpiece: once the workpiece is clamped to the magnetic base plate, there is no need to move the workpiece in different positions to drill holes in multiple locations and the number of machines. It should be less, Human error can be corrected. We can implement any aspect with less effort from this machine at any given time. The machine is installed on a flat surface such as a table or wall. In this drilling machine, we use rack and pinion to move the drill bit, so that the machine can work with high efficiency in a small space**.**



The punching machine works automatically and the whole machine is controlled by a single box. The machine works very easily. The weight of the machine is not as heavy as we thought, so everyone can use it comfortably without any discomfort. Here we use the rack and pinion mechanism of the arm to make the telescopic arm to increase and decrease the length of the arm. A magnetic plate was also introduced to clamp the workpieces. Machines can be easily moved from one place to another. The machine is light, easy to transport and transport. The total space required to install this machine is less. It exceeded our expectations and performed well; this can be further developed with a thought test.

II. LITERATURE REVIEW

[1]. Mr. K. I. Nargatti, Mr. s. v. Patil, Mr.G. N. Rakate (2016)- This paper bargains with enhancement in plan & Creation strategy of Different Shaft Penetrating Head for cycle time advancement of the portion. They create a demonstrate which may penetrate 2 gaps at a time with shifted center remove between two penetrating axle. [2]. R. Anandhan, P. Gunasekaran, D. Sreenevasan, D. Rajamaruthu(2016)- The most point is to turn bore effectively in any course. So that the work setting is no more complicated and the setting time will diminish. This strategy can be consider to be most productive strategy that can control the boring machine by physically. The wood, delicate engineered fabric, and lightmetals can be effectively penetrated by this framework. [3]. Mr. Jay M. Patel, Mr. Akhil P. Nair, Prof. Hiral U. Chauhan(2015)-It is based on 3- Directional boring machine which is utilized to boring gaps based on their different area and development. Due to this machine the operation can be done with less exertion, tall exactness and precision. This strategy makes a difference in progressing the Efficiency by decreasing add up to machining time , human exertion, fabricating cycle time. [4]. Lookesh kumar sahu, Pranesh kumar sahu, Pranesh Mohan Mishra, Deepak kumar singh, Vijay kumar Yadu(2018)- In this paper, the creator propose a 360 degree boring machine which may penetrate in evenly, vertically or indeed upside down. The bend penetrate bit of carbon steel fabric is utilized in this machine. [5]. Nandewalia Prajal,Malaviya Krunal, Prof. Chauhan Hiral, Prof. vipul Goti(2018)-In this paper , the creator examine approximately the Graphical Penetrating Machine, and creator proposed that this penetrate machine can bore graphically in all course, the bore pivot approximately two pivot (i.e x hub & z hub). These penetrating machine may be utilized to bore on fabric like wood, metal. And the most reason is to decrease time and vibration in machine. [6]. Prof. Ms. A.A. Shingavi, Dr. A.D. Dongare, examine the case think about of parts utilizing routine outspread penetrating machine and uncommon reason.

The growth of **the Indian economy depends** on its productivity **and production standards. Efficiency** depends on **many factors,** one of **which** is production. **Efficiency** can be increased by **reducing working hours.**

III. BASIC MODEL OF 360 DEGREE DRILLING MACHINE

Front view

Isometric view

Top view

Pictorial view

Left side view

Right side view

Figure: Drilling Machine

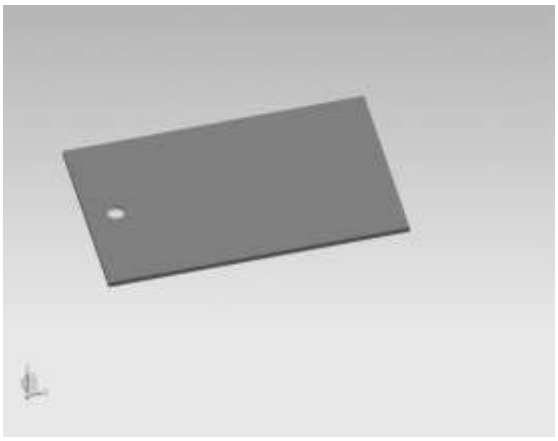


Figure: Base Plate

IV. PROCESS SCHEMATIC

Penetrating could be a machining prepare that includes employing a turning cutting apparatus, called a penetrate bit, to form a gap in a workpiece. The bore bit is regularly made of high-speed steel or carbide and is mounted in a chuck, which is at that point pivoted by a penetrating machine or handheld bore. Amid the boring handle, the bore bit is squeezed against the workpiece with a certain sum of drive, causing it to cut into the fabric and make a gap. The estimate and shape of the gap can be controlled by selecting the fitting measure and sort of penetrate bit and altering the speed and bolster rate of the boring machine. Boring can be utilized to form gaps in a wide range of materials, counting metals, plastics, and wood. It is commonly utilized in fabricating, development, and DIY applications, and could be a crucial handle in numerous businesses. Boring includes individual pivotal and rotational movements between penetrate and work piece. For the most part the penetrate turns and advances into the work piece, but in some cases the other is genuine. The Chips which are shaped amid penetrating prepare is evacuated by streaming through the grooves or woodwinds and so the coolant is required for higher rate of cutting, instrument life.

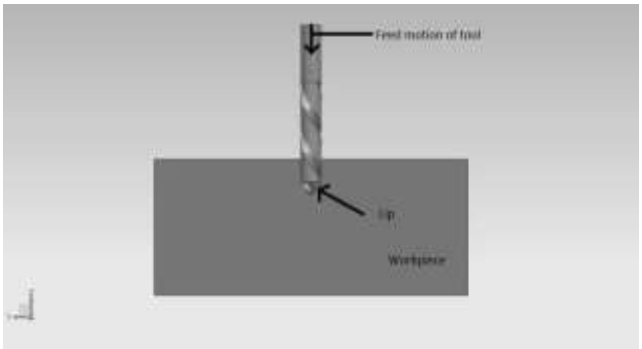


Figure: Process Schematic

A. Brad Point Drill Bit

Brad Point drills are a competitive tool that improves drilling in wood. Brad Point products are also known as lip and spur products. In metalworking, this is often encountered when drilling holes with a drill bit. Lip and spur bits can be used as an alternative to drilling in wood.

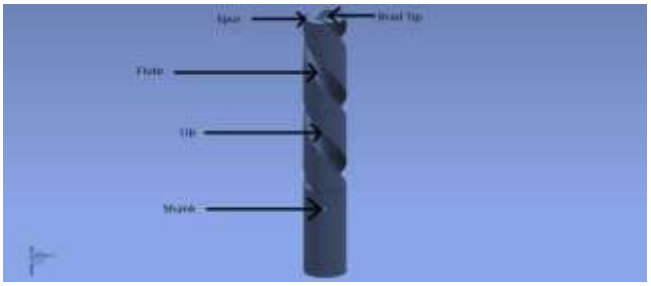


Figure: Brad Point Drill Bit

B. Twist Drill Bit

A turn bore bit could be a sort of cutting instrument utilized for penetrating gaps in different materials. It comprises of a round and hollow shank with a pointed tip and helical woodwinds that winding up the shank. The woodwinds are outlined to evacuate chips from the gap as the bit pivots, permitting it to cut easily and efficiently.

The pointed tip of the bend penetrate bit is known as the penetrate point, which is outlined to enter the fabric being bored. The penetrate point can have distinctive points and shapes depending on the fabric being penetrated and the particular application. Turn penetrate bits are commonly made of high-speed steel or carbide, which gives the fundamental hardness and strength for cutting through extreme materials. They come in a wide extend of sizes and lengths, permitting them to be utilized for penetrating gaps of different breadths and depths.

Twist drills bits are the first broadly utilized of all penetrating bit sorts. This penetrating bit can bore or cut anything from wood and plastic to steel and concrete. They are most as often as possible utilized for metal cutting, it's a metal bar casted into bend bit that have particular breadth that has two, three or four winding woodwinds running most of its length.

Two-flute drills are for essential penetrating, while three and four-flute drills are fair for broadening gaps amid generation circumstance.

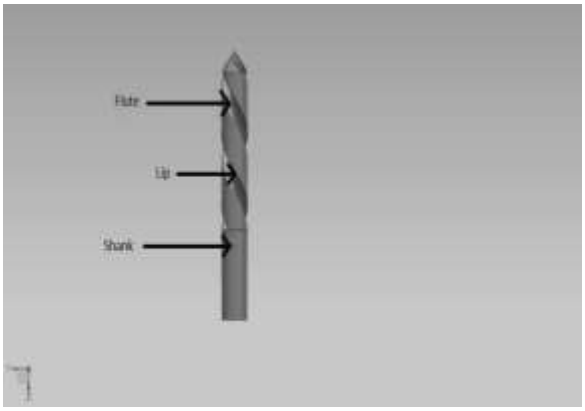


Figure: Twist Drill bit

V. COMPONENTS

A. Motor

A motor can be characterized as a electrical gadget which can be worked by utilizing coordinate or single-phase AC supply at roughly the comparable speed and with same yield. The shaft begun turning when supply is on. Shaft is underpinned by bush in it when control is supply through a rectifier. This shaft interfaces with the drilling bit through Chuck to turns drilling bit and dill a gap on the workpiece when it required.

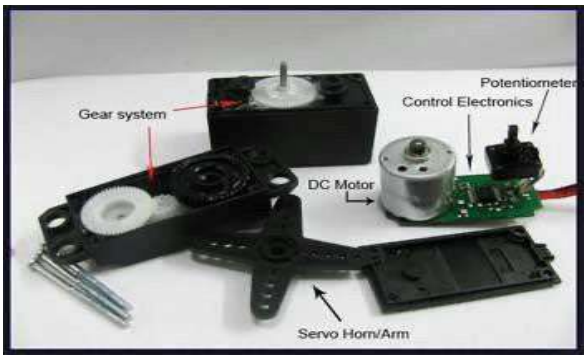


Figure: Motor

B. Connecting Arm

Interfacing arm is utilized to interfaces the two objects to each other for back between them to assist to move as craved. It interfaces two solid objects with the assistance of a pivot, this permits us to move at diverse points of revolution between bodies. Two objects are pivoted almost a settled pivot of revolutions associated by a perfect pivot, all other interpretations or rotational motion are being anticipated and hence a pivot encompasses a single degree of opportunity. In this we are employing a rack and pinion component over the arms to form it a adjustable arm compromising of the external arm and internal arm for expanding and diminishing the length of the arm. The pinion is joined to the external arm and the rack is joined to the inward arm which together makes movement between the arms

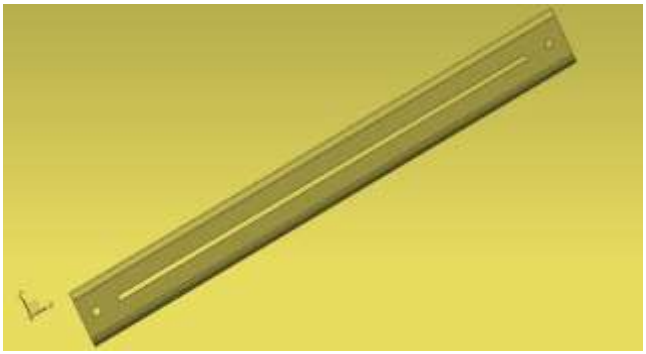


Figure: Outer Arm

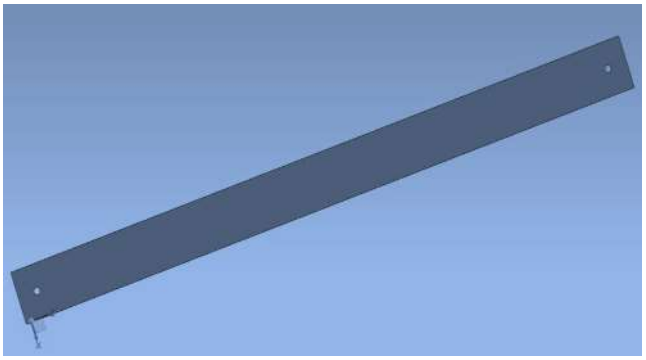


Figure: Inner Arm

C. Arduino UNO

A 360-degree adaptable drilling machine, on the other hand, could be a instrument that's used for drilling and other cutting operations. It ordinarily incorporates a adaptable shaft that can be maneuvered into tight spaces, making it valuable for a wide range of applications. If you need to utilize an Arduino Uno to control a 360-degree adaptable boring machine, you'd have to be decide how the machine is right now controlled and whether it can be interfaces with an Arduino. Depending on the specific machine, this may require custom equipment or computer program improvement. On the other hand, in case you need to utilize a 360-degree adaptable drilling machine to make a venture with an Arduino Uno, you may utilize the machine to form gaps or set patterns in a venture walled in area or other materials. You'll at that point utilize the Arduino to control other components inside the extend, such as sensors, shows, or motors

Reason to Arduino UNO:-

- Easy to use.
- Versatility
- Community support
- Cost-effective

Operation:- Determine the control system of the 360-degree flexible drilling machine: Before you can interface the machine with an Arduino Uno, you need to determine the type of control system used by the machine. This may involve researching the machine's specifications, examining the control panel, or contacting the manufacturer for more information.

Identify the appropriate input signals: Once you know how the machine is controlled, you can identify the appropriate input signals that the Arduino needs to provide. For example, the machine may use digital or analog signals to control the speed or direction of the drill, or to turn the machine on and off.

Connect the Arduino to the machine: You will need to connect the Arduino Uno to the machine's control system using appropriate hardware such as relays, optocouplers, or motor drivers. This may require designing a custom circuit or using pre-built modules depending on the requirements of the machine.

Write and upload the code: You will need to write code for the Arduino Uno that will interface with the machine's control system. This code will read input signals from the machine and provide appropriate output signals to control the machine's operation. The Arduino programming environment provides a simple interface to write, compile, and upload the code onto the board.

Test and troubleshoot: Once you have uploaded the code and connected the Arduino to the machine, you will need to test and troubleshoot the system to ensure that it is working correctly. You may need to make adjustments to the code or hardware to achieve the desired functionality.

Figure: Arduino UNO

D. Bearing

Bearings are mechanical components that are used to reduce friction and provide support for rotating or moving components in a wide range of machines and systems. Bearings typically consist of two main components: an inner race and an outer race, which are separated by a series of rolling elements such as balls, cylinders, or tapered rollers. When a load is applied to the bearing, the rolling elements roll between the two races, reducing friction and allowing the component to rotate or move with minimal resistance.

Figure: Bearing

The primary function of a bearing is to reduce friction between two surfaces that are in relative motion, such as a rotating shaft and a stationary housing. This can be fulfilled by putting a rolling component, such as a ball or roller, between the two surfaces. The rolling component permits the surfaces to move with negligible contact, lessening wear and expanding the life of the machine.

Bearings are also used to support and guide loads, such as a rotating shaft or an axle. In this application, the bearing provides a stable and accurate axis of rotation, allowing the load to move with precision and minimizing the risk of damage or failure.

E. Screws

Single degree of development kinematic combine utilized in components of screw joints. Screw joints encourage single- hub interpretation movement by the utilize of the strings of the screws. This sort of joint is utilized basically on straight actuators. A screw joint is considered as a isolated shape of joint but it is really a differentiate of catapulted joint. Screws are a sort of mechanical latch that's utilized to hold two or more objects together. A screw comprises of a strung shaft and a head, which may be level, adjusted, or pointed. The strung shaft of a screw is outlined to be screwed into a strung gap or to lock in with a nut, making a secure association between the two objects.

One of the key preferences of screws is their capacity to make a solid and tough association between objects, even when subjected to tall powers or vibrations. This is often since the strings of a screw make a huge surface range of contact between the screw and the objects it is interfacing, dispersing the stack over a bigger zone and lessening the chance of the association coming free or falling flat.

Figure: Screw

F. Drill bit

The devices which are required to evacuate fabric in arrange to form gaps or extend them, generally of shape of circular shape. Bore bits are accessible in variable sizes and shapes and can make diverse sorts of gaps as required for operation in numerous distinctive materials. It is made up of carbon steel. In our demonstrate we are expected to utilize a bore bit of distance across of 2mm. These bits are utilized to create bore gaps on wood, plastic, light metals, etc.

Figure: Drill Bit

clamping or utilizing distinctive machine for boring. This machine moreover decreases the clamping time and increments efficiency time. 360 penetrating machine is as of now designed but in our show we are utilizing rack and pinion instrument over the arms for making it adjustable arm whose length can increment or diminish as required. A lasting magnet chuck is additionally presented which clamp the workpiece with its attractive field without utilizing any physical clamping gadget. This show is distant way better than our routine drilling machines.

VI. SPECIFICATION

A. Drill Bit: -

Twist drill bit =3.5mm Length = 31mm Material = HSS

2.1mm for wood , plastic , light materials.

B. Motor -

Servo motor

Rated voltage = 24V

Working voltage = 12V

Speed = 10,000 rpm

Diameter. = 37mm

Length = 58mm

Current variation = 0.3 - 1.2 amp

Power supply = 2.4 - 15 watt

Shaft dia. = 3.17mm

Length of shaft = 15mm

Material = Aluminum

C. Connecting Rod -

205mm 1st rod i.e. Outer Arm (Quantity-2) 205 inch 2nd rod i.e. Inner Arm (Quantity-1)

D. Arduino UNO: -

Microcontroller:ATmega32P Operating Voltage: 5V

Input Voltage 12V

Input Voltage (limits): 6-20V

Digital I/O Pins: 14 (of which 6 provide PWM output) Analog Input Pins: 6 DC Current per I/O Pin: 20 mA DC Current for 3.3V Pin: 50 mA

SRAM: 2 KB (ATmega328P)

EEPROM: 1 KB (ATmega328P)

Clock Speed: 16 MHz

VII. FUTURE SCOPE

- The total mechanization can be accomplished.
- This machine can be utilized in each industry.
- It will be more adaptable and simpler to alter.
- The strategy of revolution of arm and bore can be utilized in machining operation.
- The portability of a machine can be increase.
- Locking of the base with the flat surface can be improved.
- This mechanism can also improvise in other machinery for easy movement and increase the productivity.

VIII. ADVANTAGES

- The setup of the machine is simple and compact.
- Machine is easy to handle.
- The machine can drill in any direction

IX. METHODOLOGY

In 360 Degree flexible drilling machine drill can be done at

automatically.

- It can drill in congested and difficult place.
- This method can reduce the setting time of operation.
- The handling cost of machine will be reduce.

X. CONCLUSION

Viable operation and competitive costs can be ensured in this wander. Since various operations and crevices can be performed from this machine. It is compelling and traditionalist as compared to other open resources. While taking thought of its livelihoods and taken a toll of the illustrate. This machine gets to be for the most part sensible when compared to other machines. This gives the office to work in-between the bore bit and bore bed where slightest spaces are open. In this rack and pinion instrument utilized over the arms to form it a versatile arm for extending and reducing the length of the arm. A appealing base plate in addition displayed for the clamping reason of the workpiece. The gauge of the machine is more diminutive than the more prepared machine. The clamping of the workpiece has been killed due to the appealing base plate. In this expand we are going enter as numerous holes as we required without moving the workpiece. In this way, it diminishes the number of machines required conjointly minimize the botch happens due to human.

REFERENCES

1. R.Anandhan, P.Gunasekaran. 2016, Plan and Manufacture of Precise Penetrating Machine,International Diary of Inventive Inquire about in Science, Designing and Technology.

2. Bhupendra Singh Tomar, Abhinav Kumar Y, 2019, Plan & Creation OF 360° Adaptable Boring MACHINE, Universal Diary For Innovative Inquire about In Engineering.

3. Ms. P.H.Dahake, Computerized Penetrating Machine, Universal Diary on Later and Development Patterns in Computing and Communication.

4. U. Hema Nikhitha, 2019, Plan of 360 Degree Adaptable Boring Machine, Universal Diary of Building Inquire about & Innovation (IJERT).

5. Lookesh Kumar Sahu, 2018, Plan & Creation of 360° Adaptable Boring Machine, IJSRD - Universal Diary for Logical Investigate & Development.

6. 360 DEGREE Penetrating MACHINE, Atmiya Organized of Innovation and Science for Recognition Studies.

7. 360 DEGREE Adaptable Penetrating MACHINE, SBM POLYTECHNIC COLLEGE, T.N.Paraipattai Pirivu, Thamaraipaadi(po), Trichy Fundamental Street, Dindigul-624 005.

8. Raut Shreyank Prakash, Routela Dinesh Singh Bahadur Singh, 2018, Design and Creation of Multi Hub Boring Machine, IJIRT.

9. Kamli Unforgiving, Parth Mistry, 2019, A Survey on 360 Degree Adaptable Turning Penetrating Machine, Universal Diary of Inquire about in Designing, Science and Management.

10. G.Prasanth Kumar, P.Guna Sekhar, 2018, Plan & Creation of 360° Adaptable Penetrating Machine, Universal Diary of Designing Patterns and Applications (IJETA).

11. Weishin-cnc.com

12. Mpimagnet.co.in

13. Globalspec.in

14. Mr. Jay M. Patel, Mr. Akhil P. Nair, 2015, 3-Directional Adaptable Penetrating Machine, IJSRD - Worldwide Diary for Logical Inquire about & Development.

15. Mr. K. I. Nargatti, Mr. S. V. Patil, Plan And Creation of Multispindle Boring Head with Changing Middle Remove, Universal Diary of Drift in Investigate and Development.

16. Dnyaneshwar B Bharad, Rahul D Gawande, 2017, A Paper on Two Shaft Penetrating Head, Worldwide Investigate Diary of Designing and Innovation (IRJET).

17. Prof.Ms.A.A.Shingavi, Dr.A.D Dongare, Prof. S.N.Nimbalkar, 2015, Plan of Different Shaft Penetrating Machine, Worldwide Diary of Investigate in Coming Innovation.