Pipe beveling machine from unused machine components

[1]Awhale M. J, [2]Chinchkar N.C., [3]Gunjawate V. P., [4]Phule N. S., [5]Amrute A.V.

SBPCOE, indapur

Abstract: The various machining process in manufacturing industries are carried out by separate machining machine. It need more space requirement and time with high expenses. But the fabrication of multi operation machine, which contains two operations in a single machine. The operations are namely facing, and chamfering. It is a new concept specially meant to reduce the work time and save the cost. Instead of using a pneumatic machine or electrical we are using the special arrangements for facing operation with the help of integrating a two machine component .same for the chamfering operation also, so we can save the investment cost of exceed facing and chamfering operation. The machine operates through Cylindrical grinding head with the help of electrical energy. Hence exactly we can carry out two operations in this machine, namely facing, and slotting. It is a simple in construction and easy to operate. Jaw, Collet, Facing tool, Chuck, Jaw assembly, bearings, are the main parts used in this machine.

Keywords: **Facing; Chamfering**.

1. Introduction

The Beveling machine is used to do the various like Facing, Chamfering, and which is used to save the time and fatigue of the worker. The main concept of machine is to do the operations like facing and chamfering by the use of jaw assembly to the cylindrical drilling machine.

2. Machine equipment's

The following components are the major components of the Beveling machine.

2.1 Facing

A facing is a tool fitted in the chuck with a Jaw assembly, usually a facing tool used for facing a pipe surface of various materials. The attachment is throughout the cylindrical head stock assembly. In the facing operation the tool is rotated with desired speed and the work piece is stationary. For performing the facing operation facing tool is moves forward with the help of the jaw nut. Material removal rate in the facing operation is depends on the speed .in this way the facing operation is perform.

2.2 Chamfering

Chamfering operation is same as the facing operation only the difference is that the difference in tool i.e the chamfering tool is used. A chamfering tool fitted in the chuck with a Jaw assembly, usually a chamfering tool used for facing a pipe surface of various materials. The attachment is throughout the cylindrical head stock assembly. In the chamfering operation the tool is rotated with desired speed and the work piece is stationary. for performing the chamfering operation chamfering tool is moves forward with the help of the jaw nut. Material removal rate in the chamfering operation is depends on the speed .in this way the chamfering operation is perform.

2.3 Feed shaft ,Central Mandrel and Jaw assembly

Fig.1

A feed shaft assembly is divided in to the three parts that are in the following ways

1.JAW ADJUSTMENT NUT
2.JAWS
3.CENTRAL MANDREL
4.FEED SHAFT

1. JAW ADJUSTMENT NUT ;

Jaw adjustment nut is used for the adjustment of jaws for pipe fitting. With the help of nut we can tight or loose the pipe or for well gripping purpose, it is at the back side of the machine head..

2. JAWS:

Jaws are in the taper in shape which are fitted at the taper side of the shaft .which is just before the mandrel, and for performing the operation the pipe is fitted over the jaws. according to the pipe size the jaws are adjusted., In these beveling machine we can perform the beveling operation up to the 90mm shaft diameter. fig. shows that the three jaws are used for for clamping the pipe.

Fig.2

3. MANDREL:

Tri Tool® ID mounted end prep equipment utilizes an expandable, self–centering mandrel system which mounts in the open end of a tube or pipe. Jaw blocks, corresponding to

the size of pipe being worked on are placed on the mandrel. When a draw rod is tightened, jaw block bases are drawn up an inclined ramp, expanding the jaw blocks against the inside bore of the pipe. This provides a solid, torque accepting grip for accurate machining operations. The standard ID mandrel works on the simple principal of tightening a threaded draw rod that pulls an end plate. The end plate drives several blocks up ramps, expanding the ramp blocks into the ID bore. This locates the tool both centered and square to the run of pipe.

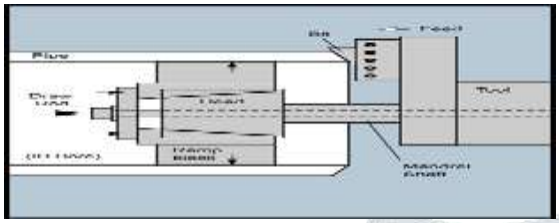

Fig. 3

4. JAW ASSEMBLY

fig shows the jaw assembly, in that the three jaws are placed along the periphery of the taper section of the shaft. When the pipe is inserted in the jaw that time with the help of the jaw adjustment nut jaws move forward or backward. When the jaws moves forward the tighting of the pipe will be done. Jaws size is varying with the size of the pipe i.e depend on the I.D.

Fig.4 jaws

4.1 EXTENSION JAWS SELECTION CHART

The selection chart of extension jaw set/sets as per the tube I.D. given below. Jaws is marked with the alphabet for easy selection.

SR.NO.	I.D. OF TUBE (mm)	JAWS
01	28-31	A
02	31-34	B
03	34-37	C
04	37-40	D
05	40-43	E
06	43-46	F
07	46-49	G
08	49-52	H
09	52-55	J
10	55-58	K
11	58-61	L
12	61-64	M
13	64-67	N
14	67-70	O
15	70-73	P
16	73-76	S

2.7 Bearing

A bearing is a device to permit constrained relative motion between two parts, typically rotation or linear movement. Bearings may be classified broadly according to the motions they allow and according to their principle of operation. Low friction bearings are often important for efficiency, to reduce wear and to facilitate high speeds. Essentially, a bearing can reduce friction by virtue of its shape, by its material, or by introducing and containing a fluid between surfaces. By shape, gains advantage usually by using spheres or rollers. By material, exploits the nature of the bearing material used. Sliding bearings, usually called bushes bushings journal bearings sleeve bearings rifle bearings or plain bearings. Rolling-element bearings such as ball bearings and roller bearings. Jewel bearings, in which the load is carried by rolling the axle slightly off-center. fluid bearings, in which the load is carried by a gas or liquid magnetic bearings, in which the load is carried by a magnetic field. Flexure bearings, in which the motion is supported by a load element which bends. Bearings vary greatly over the forces and speeds that they can support. Forces can be radial, axial (thrust bearings) or moments perpendicular to the main axis. Bearings very typically involve some degree of relative movement between surfaces, and different types have limits as to the maximum relative surface speeds they can handle, and this can be specified as a speed in ft/s or m/s. The moving parts there is considerable overlap between capabilities, but plain bearings can generally handle the lowest speeds while rolling element bearings are faster, hydrostatic bearings faster still, followed by gas bearings and finally magnetic bearings which have no known upper speed limit.

3. Machine setup

Figure 5: Machine setup

4. Working principle

Here the bevel gear arrangement is used for carrying out the operations. Bevel gear is used to perpendicular (90) power transmission. One of the bevel gear is connected with the motor and another one with the drill chuck hence when the motor is rotated the drill chuck also rotates. The motor pulley shaft is connected to a cam arrangement on the other side. Cam arrangement converts rotary motion into reciprocating motion and the reciprocating motion is used for the slotting and shaping operation.

The slotting toll and shaping tool are guided by a horizontal guide bush. The up down table is mounted on a hydraulic bottle jack piston rod hence when the bottle jack handle is pumped the table height can be adjusted according to the requirement when the after the process is completed the pressure should be released through pressure relief valve to make the table come down. A vice is mounted on the table to hold the work piece.

5. List of materials factors determining the choice of materials

The various factors which determine the choice of material are discussed below.

5.1 Properties

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied that Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection

a. Physical
b. Mechanical
c. From manufacturing point of view
d. Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc. The various Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

The various properties concerned from the manufacturing point of view are,

a. Cast ability
b. Weld ability
c. Forge ability
d. Surface properties
e. Shrinkage
f. Deep drawing etc.

5.2 Manufacturing case

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

5.3 Quality Required

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

5.4 Availability of Material

Some materials may be scarce or in short supply it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

5.5 Space consideration

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

5.6 Cost

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored. Sometimes factors like scrap utilization, appearance and non-maintenance of the designed part are involved in the selection of proper materials

5.7 Merits

a. Easy to operate.
b. Reduces time and increases production rate.
c. Low maintenance.
d. Easy to implement

5.8 Application

a. Used in small scale industries to reduce machine cost.
b. In such places where frequent change in operation are required.

6. Conclusion

The project carried out by us made an impressing task in the field of industrial and automated workshops. It is very usefully for the workers to work in the industrial workshop are in the service station. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

Reference

[1] Bosetti, P., Leonesio, M. and Parenti, P. (2013) 'On development of an optimal control system for realtime process optimization on milling machine tools' 8th CIRP Conference on Intelligent Computation in Manufacturing Engineering, pp. 31 – 36.

[2] Jonghyuck Park, Ick-Hyun Kwon, Sung-Shick Kim and Jun-Geol Baek (2011) 'Spline regression based feature extraction for semiconductor process fault detection using support vector machine' Expert Systems with Applications, pp.5711–5718

[3] Liang Quan, Wang Yongzhang, Fu Hongya and Han Zhenyu (2008) 'Cutting Path Planning for Ruled Surface Impellers' Journal of Aeronautics, pp.462-471.

[4] Liu Huran (2011) 'The realization of the "SFM" and "HFM" method on the CNC hypoid cutting machine' Procedia Engineering, pp. 729 – 733.

[5] Martin Madaja and Miroslav Píška (2013) 'On the SPH Orthogonal Cutting Simulation of A2024-T351 Alloy' Procedia CIRP, pp.152 – 157.

[6] Ramezanian, R. and Saidi-Mehrabad, M. (2012) 'Multi-product unrelated parallel machines scheduling problem with rework processes' Scientia Iranica, pp.1887–1893.

[7] Sánchez, J.A., Plaza, S., Gil, R. and Ramos, J.M. (2013) 'Electrode set-up for EDM-drilling of large aspect-ratio microholes' Procedia CIRP, pp.274 – 279.

[8] Vaibhav A. Phadnis, Anish Roy, Vadim V. Silberschmidt (2013) 'A finite element model of ultrasonically assisted drilling in carbon/epoxy composite'Procedia CIRP, pp.141 – 146.