CHARACTERISTICS STUDY OF PIPE VICE IN WORK HOLDING DEVICES

Balamurali S[1], Janakiraman N[2], Ajithkumar K[3]

[1] *Associate Professor, Mechanical Engineering, Vidyaa Vikas College of Engineering and Technology, Tamil Nadu, India*
[2,3] *UG Scholar Mechanical Engineering, Vidyaa Vikas College of Engineering and Technology, Tamil Nadu, India*

ABSRTACT

This device the motorized high speed pipe vice for work shop garages has been developed to later the needs of small and medium workshops, who are normally man powered with very minimum of skilled labors. In most of the garages the work pieces are fixed by using vice. This needs high man power and skilled labors. In order to avoid all such disadvantages. This, motorized high speed pipe vice has been designed in such a way that it can be used to fixing the work piece very smoothly without any impact force. The operation is made be simple that even an unskilled labor can handled, by just demonstrating the working of the motorized high speed vice once .The D.C motor is coupled with the vice by shaft mechanism. The shaft moves clockwise and anti clockwise depends upon the rotation of DC motor rotary motion with. D.C motor runs with help of battery.

Keywords:-Motorised pipe vice, shaft mechanism, clockwise and anti clockwise, gear arrangement

1. INTRODUCTION

Certain models of pipe vise contain a linked chain component that is used to grip and hold the pipe. By placing the chain around the pipe and securing it into position on the vise, it is tightened by the vise handle and provides the ultimate in clamping force. The chain's ability to wrap tightly around the pipe instead of simply contacting two sides makes it possible to grip the entire circumference of the pipe, more than quadrupling the clamping surface of the vise. Some vises used in welding are equipped with an electric motor. This style of vise allows thewelder to rotate the pipe as it is being welded. By rotating the pipe, the welding bead is able to remain constant from start to finish without having any gaps or spaces in the bead. This rotational vise design is also available for pipe the readers. As the pipe is rotated in the vise, threads are actually rolled into the end of the pipe. The threads are installed in order to allow thread-on adapters, faucets and splices onto the pipe sections. In a manufacturing environment, the pipe vise is a critical component in the assembly of pipeline components. The vise is able to hold the section of pipe in place while an assembly line worker performs his task. Once the particular task is accomplished, the worker is able to release the pipe from the vise at his station and send it on its way to the next station.

2.LITERATURE SURVEY

Pipe vises are a plumber's tool, often used to hold pipes in place for threading and cutting. There are two main styles: chain and yoke. The yoke type vise uses a screw to clamp down the pipe, and the chain style uses a chain for securing the pipe. Metal pipe vices are attached to a workbench, typically flush with its work surface. Their jaws are made of plywood or metal but mostly metal, the latter usually faced with wood, called cheeks, to avoid marring the work. The movable jaw may include a retractable dog to hold work against a bench dog. "Quick-release" vises employ a split nut that allows the screw to engage or disengage with a half-turn of the handle. When disengaged the movable jaw may be moved in or out throughout its entire range of motion, vastly speeding up the process of adjustment. Common thread types are Acme and buttress. One common variety of

face vise is the leg vise, which has a long extension down to the floor, with a provision to adjust the spacing of the bottom of the leg, to keep the clamping surfaces of the jaws approximately parallel, even though the work to be clamped may be of various thicknesses. While there are many different makes and patterns of metal vises, there are two main types: the leg vise and the parallel-jaw vise. The leg vise is the older type, and is often preferred to the more modern parallel-jaw kind. It is usually made of mild steel or wrought iron, the jaws being faced with cast steel. It has the advantage of being more solid to work on than the parallel-jaw vise and will better withstand hard use. This type of vise is fixed to the bench by bolts through the strap, which is keyed to the leg use bolts, never screws, to attach a vise to a bench, as a screw will not hold for long. The leg, or staple, is let into the floor or supported in a wooden block firmly attached to the floor, and this helps to give rigidity which is sometimes lacking in other types fixed only to the bench top. The shorter jaw is fixed to the leg by a hinge arrangement, and a square threaded screw is passed through this shorter jaw into a nut or box in, the long leg.' By turning the long handle provided, the shorter jaw is forced tightly against the other. As this is unscrewed, the jaws are opened by the pressure of a strong, flat spring between the two.

In a BLDC motor, the electromagnets do not move; instead, the permanent magnets rotate and the armature remains static. This gets around the problem of how to transfer current to a moving armature. In order to do this, the brush-system/commutator assembly is replaced by an intelligent electronic controller. The controller performs the same power-distribution found in a brushed DC-motor, but using a solid-state circuit rather than a commutator/brush system. Because of induction of the windings, power requirements, and temperature management some glue circuitry is necessary between digital controller and motor. BLDC motors offer several advantages over brushed DC-motors, including higher efficiency and reliability, reduced noise, longer lifetime (no brush erosion), elimination of ionizing sparks from the commutator, and overall reduction of electromagnetic interference (**EMI**.) The maximum power that can be applied to a BLDC motor is exceptionally high, limited almost exclusively by heat, which can damage the magnets. BLDC's main disadvantage is higher cost, which arises from two issues. First, BLDC motors require complex electronic speed control to run. Brushed DC-motors can be regulated by a comparatively trivial variable-resistor (potentiometer or rheostat), which is inefficient but also satisfactory for cost-sensitive applications. Second, many practical uses have not been well developed in the commercial sector. For example, in the RC hobby scene, even commercial brushless motors are often hand-wound while brushed motors use armature coils which can be inexpensively machine-wound. BLDC motors are considered more efficient than brushed DC-motors. This means for the same input power, a BLDC motor will convert more electrical power into mechanical power than a brushed motor, mostly due to absence of friction of brushes. The enhanced efficiency is greatest in the no-load and low-load region of the motor's performance curve. Under high mechanical loads, BLDC motors and high-quality brushed motors are comparable in efficiency.

3. SELECTION OF BASE MATERIALS

3.1 FACTORS DETERMINING THE CHOICE OF MATERIALS

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

1. Properties:

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc.

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, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

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.

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.

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. Space consideration:

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

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.

4. EXPRIMENTAL TESTING

4.1 D.C MOTOR:

The DC generators and DC motors have the same general construction.

4.1.1 MOTOR PRINCIPLE:

An electric motor is a machine which converts a electrical energy to mechanical energy.

All D.C machines have five principal components viz (i) Field system (II) armature core (iii) armature winding (iv) Commutator (v) brushes

(i) Field system:

The function of the field system is to produce Uniform field within which the armature rotates. it consists of a number of salient poles(of course, even number) bolted to the inside of circular frame (generally called yoke).the yoke is usually made of solid cast steel whereas the pole piece are composed of stacked laminations. Field coils are mounted on the poles and carry the DC exciting current. The field coils are connected in such a way that adjacent poles have opposite polarity.

The m.m.f. developed by the coils produces a magnetic flux that passes through the pole pieces, the air gap, the armature and the frame. Practical DC machines have air gaps ranging from 0.5mm to 1.5mm.since armature and field systems are composed of materials that have permeability, most of the m.m.f of field coils is required to set up flux in the air gap. By reducing the length of air gap, we can reduce the size of field coils (number of turns).

(ii) Armature core:

The armature core is keyed to the machine shaft and rotates between the field poles. It consists of slotted soft-iron laminations (about 0.4 to 0.6mm thick) that are stacked to form a cylindrical core. The laminations are individually coated with a thin insulating film so that they do not come in electrical contact with each other. The purpose of laminating the core is to reduce the eddy current loss. The laminations are slotted to accommodate and provide mechanical security to the armature winding and to give shorter air gap for the flux to cross between the pole face and the armature "teeth".

(iii) Armature winding:

The slots of the armature core hold conductors that are connected in a suitable manner.this are known as armature winding. This is the winding in which "working"e.m.f. is induced.the armature conductors are connected in series-parallel: the conductors being connected in series so as to increase the voltage and in parallel paths so as to increase the current. The armature winding of a DC machine is a closed –circuit winding: the conductors being connected in a symmetrical manner forming a closed loop or series of closed loops.

(iv) commutator;

A commutator is a mechanical rectifier which converts the alternating voltage generated in the armature winding into direct voltage across the brushes. the commutator is made of copper segments insulated from each other by mica sheets and mounted on the shaft of the machine. The armature conductors are soldered to the commutator segments in a suitable manner to give rise to the armature winding. Depending upon the manner in which the armature conductors are connected to the commutator segments, there are two types of armature winding in a.DC machine viz(a) lap winding (b) wave winding.

Great care is taken in building the commutator because any eccentricity will cause the brushes to bounce, producing unacceptable sparking .the sparks may burn the brushes and overheat and carbonize the commutator.

(v) Brushes:

The purpose of brushes is to ensure electrical connections between the rotating commutator and stationary external load circuit. The brushes are made of carbon and rest on the commutator .the brush pressure is adjusted by means of adjustable springs. if the brush pressure is

Very large, the friction produces heating of the commutator and the bruches.on the other hand, if it is too weak, the imperfect contact with the commutator may produce sparking.

4.2 STATOR:

The stator is the stationary part of an electric generator or electric motor. Depending on the configuration of a spinning electromotive device the stator may act as the field magnet, interacting with the armature to create motion, or it may act as the armature, receiving its influence from moving field coils on the rotor.The first DC generators (known as dynamos) and DC motors put the field coils on the stator, and the power generation or motive reaction coils are on the rotor. This was necessary because a continuously moving power switch known as the commutator is needed to keep the field correctly aligned across the spinning rotor. The commutator must become larger and more robust as the current increases.The stator of these devices may be either a permanent magnet or an electromagnet. Where the stator is an electromagnet, the coil which energizes it is known as the field coil or field winding.

4.3 ROTOR:

The rotor is the non-stationary part of a rotary electric motor or alternator, which rotates because the wires and magnetic field of the motor are arranged so that a torque is developed about the rotor's axis. In some designs, the rotor can act to serve as the motor's armature, across which the input voltage is supplied.

4.4 SUPPORTING PLATE:

The plate is made up of m.s plate which is placing below the belt. It is for to transmit the object to straight bath. It does not affect the belt to be of rest.

4.5 BATTERY:

In our project we are using secondary type battery. It is rechargeable type. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current. There are two types of batteries, primary (disposable) and secondary (rechargeable), both of which convert chemical energy to electrical energy. Primary batteries can only be used once because they use up their chemicals in an irreversible reaction. Secondary batteries can be recharged because the chemical reactions they use are reversible; they are recharged by running a charging current through the battery, but in the opposite direction of the discharge current. Secondary, also called rechargeable batteries can be charged and discharged many times before wearing out. After wearing out some batteries can be recycled.One half-cell is the positive electrode, and the other is the negative electrode. The electrodes do not touch each other but are electrically connected by the electrolyte, which can be either solid or liquid. A battery can be simply modeled as a perfect voltage source which has its own resistance, the resulting voltage across the load depends on the ratio of the battery's internal resistance to the resistance of the load.Batteries have gained popularity as they became portable and useful for many purposes. The use of batteries has created many environmental concerns, such as toxic metal pollution. A battery is a device that converts chemical energy directly to electrical energy it consists of one or more voltaic cells. Each voltaic cell consists of two half cells connected in series by a conductive electrolyte. One half-cell is the positive electrode, and the other is the negative electrode. The electrodes do not touch each other but are electrically connected by the electrolyte, which can be either solid or liquid. A battery can be simply modeled as a perfect voltage source which has its own resistance, the resulting voltage across the load depends on the ratio of the battery's internal resistance to the resistance of the load.

5. RESULTS AND DISCUSSION

The project carried out by us made an impressing task in the field of automobile and automobile workshops. It is very usefully for the workers to work in the automobile 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.

6. CONCLUSION

This device the motorized high speed pipe vice for work shop garages has been developed to later the needs of small and medium workshops, who are normally man powered with very minimum of skilled labours. In most of the garages the work pieces are fixed by using vice. This needs high man power and skilled labours.In order to avoid all such disadvantages. This, motorized high speed pipe vice has been designed in such a way that it can be used to fixing the work piece very smoothly without any impact force. Clamp-on vises are basically very light-duty bench vises. They usually have smooth jaws for wood, plastic and light metalworking, but some have serrated jaws for getting abetter grip on metal. Some unique vises combine these features in a rotating design. They also help to secure an object while working on the object. The operation is made be simple that even an unskilled labor can handled, by just demonstrating the working of the motorized high speed vice once. The D.C motor is coupled with the vice by shaft mechanism. The shaft moves clockwise and anticlockwise depends upon the rotation of DC motor rotary motion with gear arrangement. D.C motor runs with help of battery.

REFERENCES

[1]. David L. Goetsch (2000).Technical Drawing (5th ed.). Thompson Delmar Learning ISBN: 1-4018-5760-4

[2] BS EN10226:Pipe threadswhere pressure tight jointsare made onthethreads.(The European versionofISO7.)

a) Part 1:Taper external threads andparallel internal threads — Dimensions,tolerancesanddesignation.

b) Part 2:Taper external threads andtaper internal threads — Dimensions,tolerancesand designation.

[3] BS 21:Pipe threads for tubesandfittings wherepressure-tight joints are made on thethreads (metric dimensions). British Standards Institution,1985.(Supersededby BS EN10226:2004).

[4] InternationalstandardISO228-1:Pipe threads where pressure-tight jointsare notmade onthethreads— Part 1: Dimensions,tolerances anddesignation.

[5] BS 2779:Specificationfor pipethreadsfortubesandfittings where pressure-tightjoints are notmade on thethreads (metricdimensions),1986.