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Design and Making of Mono-Disc Bi-Directional Metal Polishing Machine

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Abstract

This paper is related to the making of disc polishing machine for preparation of metal samples for metallography for thesis (microscopic analysis).

Introduction:

The disc polishing machine is used to polish the metallic samples for doing research on the grains and bonding of grains so that by seeing the grains structure and bounding the characteristics of the metal could be judged. The size of the grains, grains with multiple metals in percentage of metals to form an alloy. The purpose of formation of alloy is to make a new metal for more advantages to performance or behavior.

The mono disc polishing machine made is the type that this machine is bi-directional i.e. the machine can rotate anti clockwise and clockwise direction. There are brakes to stop the rotation and change the direction of rotation.

The disc polishing machine is used for the surface texture improvement so that the microscope may be feasible to focus at the surface as uneven or irregularities may not become obstacles in it. If the surface may not be grinded the up and down on surface the distance from the lens to the sample will not be equal at every reference and the observer will not get the clear image from the microscope. For surface grinding the emery papers of different grit sizes could be used. For example 100, 200, 250, 500, 1000, 2000, 2500 grit size can be used to polish the surface.

Making Of Mono Disc Bi-Directional Metal Polishing Machine

1. Material Used For Fabrication:

The material required for fabrication is as follows:-

1. 2x1/2 inches rectangular pipe
2. Bi-directional motor
3. 4 rubber feet's to decrease the vibration
4. 9 rubber packing between motor and frame to decrease vibration
5. Bakelite sheets to cover frame and electrical connections
6. Nuts and bolts
7. 2 pin plugs and sockets
8. Regulator switch

2. Machine Tool Used For Fabrication:

The following materials are used for fabrication.

1. Angle grinder
2. Drilling machine
3. Screw driver
4. Welding machine
5. Electrical connections

3. Fabrication tools :

There are several machine tools are used to make or fabricate the frame and fixing the motors as follows.

A.) Measuring tape:-

For making the sizes of pipe so that machine tool could cut the pipe of that size which could be easily and also guiding the tool to cut the appropriate. And the L-stripes of 9 inches also marked**.**

Sr.No.	Material	cost
1	2x1/2 inches rectangular pipe	700
2	L-stripes 40”	300
3	Bi-directional motor of 750 watts	3000
4	4 rubber feet’s to decrease the vibration	150
5	9 rubber packing between motor and frame to decrease vibration	100
6	Bakelite sheets to cover frame and electrical connections	1000
7	2 pin plugs, sockets and wire 6m, 4switches, fuse	400
8	Nuts and bolts	200
9	Regulator switch	150
	Total	**6000**

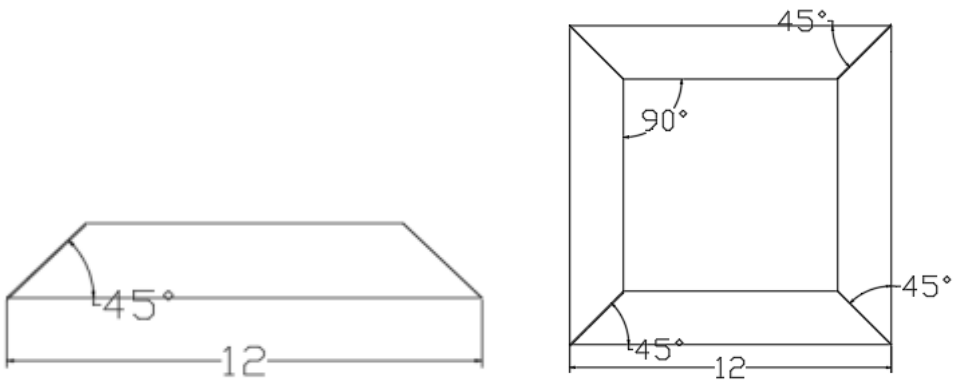


Fig.1

b.) Angle Grinder:-

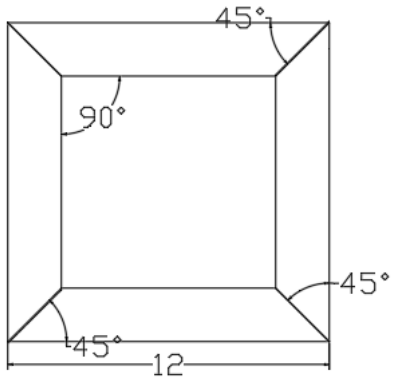
With this machine the rectangular pipes of 2 X 1/2 (inches) has have cut so that the misalignment could not be happened. The pipes of length 12” at 45° degree angle had cut and welding done as fig.1, also L-stripes of 9 inches has been cut.

c.) Arc Welding machine:-

The arc welding machine is used to weld the joints at 90 degree and also the strip of L-stripes welded to the cut piece.

d.) Drilling machine :-

The drilling msachine is used to making holes in frame so that the bakelite covers plates could cover the farme. And for allignment of the motor fix to the frame by using nuts and bolts.



4. Construction of machine:

The construction of machine is as follows:

1. **Frame :-**The frame is the main part of machine as all the parts are tied on it. It is made of rectangular pipe of 2"X 0.5" and a thickness of 0.5mm. The pipes are cut at 45° and a length of bigger side is 12". The 8 pieces cut and 4 pieces welded at 90° to form a square of 12" X 12". The two squares are made and L-stripes welded at edges which made a cuboid. 4 rubber (cylindrical) piece are fixed with nuts and bolts by drilling a hole of 5mm.
2. **Bi-directional Motor (runs clockwise and anti-clockwise):** The motor is fixed by drilling three holes on pipe of 1" X 1" pipes and fixed by giving rubber packing and the height of top of motor also adjusted through packing. The circuit diagram is given in fig. 2. Circuits connected.
3. **Bakelite plates:** The Bakelite plates are made 12" X 9" of 4nos. and drilling of 4mm holes and bolted at tree end of plates. Two Bakelite plates of 12" X 12" drilled and bolted at bottom and top.
4. **Disc:** The wooden circular disc of 9" diameter and thickness 1". A Bolt of 0.5 inch is bolted by passing through shims in the Disc by drilling at center shims of 2". And clamped at the connecting end of bi-directional motor.

5. Advantages of Mono-disc Polishing machine:-

Advantages of the machine are as follows:-

1. The machine is portable and compact.
2. Emery paper can be easily could be changed.
3. Lesser costlier.
4. More power as could not be stopped while samples are more pressed.
5. Simple connection anyone can repair.
6. Samples can be made hastely.

6. Disadvantages:

As follows:

- Water could not be used by tap only can be separately cooled by dipping it in vessel.
- Because the machine has only one disc so only one function could be done as if need to changing cloths.
- There is no digital display of rpm.

Circuit Diagram Made In AutoCad

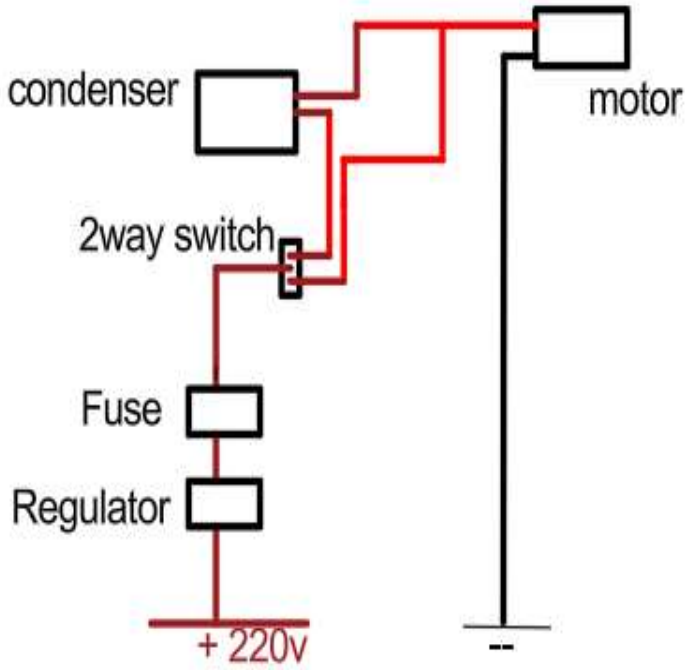


fig. 2

Working:-

After 220v AC supply there is a pedal while pressing the pedal the brake disengage and the push button extended and electric AC circuit completes and the disc rotation started. The first switch is the 2 way switch which will select the rotation anticlockwise or clockwise And the second switch is for connection of AC supply. The brake pedal is in connection as rotating on high rpm if we change the direction of rotation the motor could be damaged so while pressing the pedal so that the disc stops rotating. There is fuse in series if the is short circuit then the fuse burns and the system will be safely stops.

1. K.J. Sharif, H.P. Evans and R.W. Snidles, "Wear modeling in worm gears," IUTAM Symposium on Elastohydrodynamics and Microelastohydrodynamics, Springer, 2006, 371–383.
2. Polishing, Buffing & Burnishing Work, http://platers.org/polishing_buffing.php,2009, retrieved on 11th May, 2016.
3. Metallography, specimen preparation, http:www.materialography.org, assessed on 11th May, 2016.
4. Leonard E. Samuels, "Metallographic polishing by mechanical methods", fourth edition, ASM International, 2003. International Journal of Research Publication and Reviews, Vol 4, no 4, pp 4991-4996 April 2023 4996
5. 9.Antonio Barrero-Gil, Santiago Pindado, Sergio Avila, "Extracting energy from Vortex-Induced Vibrations: A parametric study"; Universidad Politecnica de Madrid, Plaza Cardenal Cisneros 3, E-28040 Madrid, Svain.
6. Saurav Bobde, Sameer Jadhav, "Study of Vortex Induced Vibrations for Harvesting Energy" IJIRST – International Journal for Innovative Research in Science & Technology| Volume 2 | Issue 11 | April 2016.