

MULTI-PURPOSE MACHINE

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Abstract: *An engineer is always focused towards challenges of bringing ideas and concepts in life. Therefore, sophisticated machines and modern techniques have to be constantly developed and implemented for economical manufacturing of products. At the same time, we should take care that there has been no compromise made with quality and accuracy.*

In the age of automation machine become an integral part of human being. By the use of automation machine prove itself that it gives high production rate than manual production rate. In competition market everyone wants to increase their production & make their machine multipurpose.

The engineer is constantly conformed with the challenges of bringing ideas and design into reality. New machines and techniques are being developed continuously to manufacture various products at cheaper rates and high quality.

So, we are going to make 'MULTI-PURPOSE MACHINE' so that at a time four worker can work on the same machine while doing batch production. In our machine we are performing four operations cutting, grinding, belt polishing and buffing. Here we are mounting grinding and buffing tool on the same shaft and cutting wheel will be mounted on another shaft and we will use belt drive to transmit power and pulleys of various sizes for having change in speeds for various operations.

Keywords- Buffing, Cutting, Grinding, Belt polishing, Belt drive.

1. INTRODUCTION

It is a compact, portable unit capable of doing many operations that normally require expensive single purpose machines. With the different attachments that are available with the unit, cutting and grinding can be performed quickly and inexpensively. The Saw cutter is used to cut the wood boards which are used for various application in manufacturing. The disc cutter is a multi-micro point blade used to cut a material by moving cutting teeth against the stationary material. The disc cutter is used by the machinist has a dual meaning. It may refer only to the circular cutting blade or it may identify the entire assembled machine. Grinding is a metal cutting operation performed by means of abrasive partials rigidly mounted on a rotating wheel. Each of the abrasive partials act as a single point cutting tool and grinding wheel acts as a multipoint cutting tool. The grinding operation is used to finish the workpieces with extremely high quality of surface finish and accuracy of shape and dimension. Grinding is one of the widely accepted finishing operations because it removes material in very small size of

chips 0.25 to 0.50 mm. It provides accuracy of the order of 0.000025 mm. Grinding of very hard material is also possible.

1.1 METHODOLOGY

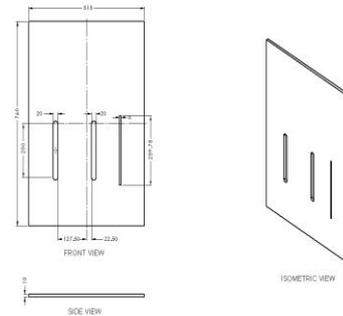
- First, we were aiming to develop a machine which would perform all the four operations such as grinding, saw cutting, buffing and sandpaper belt operating.
- We searched on various research papers from web and then we studied them to fulfill our motto and highlighted the points required for our project.
- We roughly made a design of our project setup and selected our materials to be required which were suitable from our project point of view.
- After selection of our materials we calculated all types of stresses which will be induced on different parts at different situations hence making our design safe.
- While designing the model we also took considerations of aesthetics and ergonomics in our mind.
- We made a cost estimation of our project before starting fabrications of our parts.
- After designing the whole model and knowing that our material selection was proper we started the fabrication stage.
- In model making stage first we bought angle of mild steel C-45 and with the help of cutter we cut those angle as per our requirements:
 - i. 6 angles of length 30.5 inches.
 - ii. 4 angles of length 20 inches.
 - iii. 4 angles for supports of length 35 inches.
- We also selected standard parts available in market such as saw cutting blade, 1/2 HP power motor, pulleys of diameter 50 and 100 mm, grinding belt, grinding wheel and pedestal bearing of no. P204.

- While fabrication of rollers on which grinding belt will run is tapered from one side so that belt will not slip while running on rollers.
- The roller diameter is 60 mm and then we gave it a taper of 3 mm on one side hence having diameter 57 mm.
- The roller is fitted on a shaft of 20 mm diameter which was safe and effective as per our calculation.
- The next stage was fabrication of base table and assembly stage.
- With the help of electrode welding ($\Phi 2$ mm welding rod) we welded the angles and provided a base for model.
- While placing the motor we drilled a 10mm hole with help of drill and provided a slot with the help of grinder for adjustment of motor for tightness of belt.
- We made use of M10 type of bolts for fitting of our bearings.
- We inserted rollers pulleys in shaft and then connected to pedal bearings.
- We connected the motor shaft with 50 mm pulley with v-belt and other 100 mm pulley with 50 mm pulley which is connected to cutter.
- We connected the motor with 2-way switch for starting the process.
- In this way the whole machine works on a motor of $\frac{1}{2}$ HP and belt pulley arrangement.

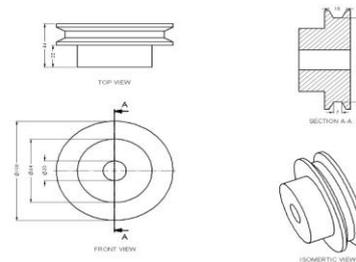
- To study the transmission and manufacturing process practically.

2 PRINCIPLE PARTS OF MACHINE

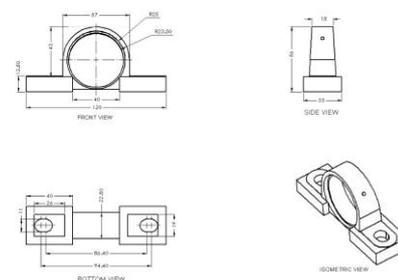
1. Base Plate: It is a plate which provides support to our model in dynamic state.



2. Pulley: we have used four pulleys for transmission of power in the whole model from motor to all the respective shafts.



3. Bearing: We have used pedestal bearing of series number P204 for convenience.



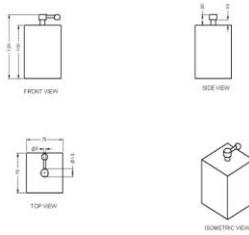
4. Switch: We have used two-way switch for the clockwise and anticlockwise rotation of parts.

1.2 PROBLEM DEFINATION

- High cost for individual machines.
- Individual machine will take more workshop area, here our machine is compact.
- Good for batch production.
- Economy in human effort.
- Improvements in the use of materials, machines & manpower.

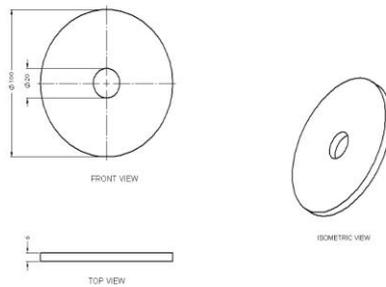
1.3 OBJECTIVE

- To make multi-purpose machine.
- At time four workers should work on same machine.
- For increase in efficiency of the machine.
- To take down the manufacturing cost of four machine to one.



- Shri Ramswaroop Memorial Group of Professional College Lucknow, Uttar Pradesh, JUNE 2014
- Rakesh Ambade, Akash Pande, Prasad Sangitrao, Rahul Katre, Pavan Bisen, "Design & Fabrication Of Human Powered Multi-Purpose", March 2015

5. Grinding wheel: It is made up of abrasive material to remove chips and for grinding of tool.



3. CONCLUSION:

It is a multi-functional machine which works on single motor and belt pulley arrangement. hence saving electricity, in process time and work space required.

We also made it in least manufacturing cost possible. hence it becomes accessible and affordable to small scale industries.

At time four workers can work on this machine effectively. More upgradations to thus machine can also be made possible.

REFERENCES:

- T. Moriwaki, Setsunan University, Neyagawa, "Multi-functional machine tool"- Japan- 2008.
- Sharad Srivastava, Shivam Srivastava Multi-Function Operating Machine
- Pradip R. Bodade, Chetan R. Khade, Shubham C. Hiwanj, Suyash A. Shete, VikrantR. Kaveri, Neel Chaudhary, "Multi-Function Operating Machine", May2016
- Ravi Teggina, Shivanand Kavadinattib And Shashank Hebbal Bagalkot Karnataka, India," Design and Fabrication of Machine Performing Multiple Wood Working Operations", -MAY 2015.