



# Design And Fabrication Of Multi Job Surface Grinding Machine-A Review

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## Abstract:

The main objective of this project is to design and fabricate an abrasive belt grinding which can be used as versatile grinding machine; the work area can be rotated from 0 degree to 180 degree. The 0 degree work area can be used for bottom grinding of component, the 90 degree work area can be used for vertical grinding of component and The 180 degree work area can be used for top grinding of component. The concept of Multi-Function Operating Machine mainly carried out for production based industries. Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. The conceptual model of a machine which would be capable of performing different operation simultaneously and it should be economically efficient. The importance of belt related parameters in grinding and finishing of work piece done on efficient way and used by excess of RPM for the new operation. Abrasive machining is one of the most important of these Processes and therefore merits special attention and study.

## Keywords

Surface grinding, polishing, metal removal, Abrasive.

## I. Introduction

With the increasing requirements of modern industrial technology and high-performance technological products in respect of part precision, surface integrity, machining efficiency and batch quality stability, grinding has played a more and more important role. It becomes an important part of advanced machining technology and equipment, and is a research frontier in manufacturing science. Grinding is the process of removing metal by the application of abrasives which are bonded to form a

rotating wheel or belt. When the moving abrasive particles contact the work piece, they act as tiny cutting tools, each particle cutting a tiny chip from the work piece. It is a common error to believe that grinding abrasive wheels remove material by a rubbing action. Actually, the process is as much a cutting action as grinding is used to finish work pieces that must show high surface quality (e.g., low surface roughness) and high accuracy of shape and dimension. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly. Thus, grinding is a diverse field. Therefore we have designed grinding machine in miniature and portable form which can give very precise machining. Machining is one of the processes of manufacturing in which the specified shape to any work piece is imparted by removing the surplus material. Conventionally, this surplus material from the work piece is removed in the form of chips by interfacing the work piece with an appropriate tool. The process of chip formation during metal cutting is affected by relative rotator or translation motion between a tool and the work piece achieved with the aid of a device called machine tool.

Today latest techniques have made grinding operation practically possible on any object having complicated shapes various types of grinders are available today for various types of work. Grinding is done on jobs not just to have an aesthetic view but it has a big importance. Surface grinding and cylindrical grinding is extremely important to those parts in automobiles, which are used in I.C. engines and gearbox.

## II. Literature review

Fabrication of wet grinding machine and measure the metal removal rate using different grades emery paper” In this project an idea about the fabrication of



the wet grinding Machine is given. Some experiments were done using various grades of belts to check their material removal rate. From results we verified that as number of belt increases, the material removal rate increases. So for large material removal rate low number belt should be used .The main advantage of this machine over the existing machine is that it consists of motor and belt drive system which reduces the mechanical effort of the users. We can use three belts simultaneously for polishing.[1]

There are several objectives possible for grinding with coated abrasives. Among them is the right application (e.g. finish or stock removal), time saving and efficiency of the abrasive tool. To achieve the above objectives, it is essential to look in more detail to the variables which affect them. These include the work material properties, the grit and abrasive type of the grinding belt, belt speed, belt sequences, contact wheel hardness and diameter, serration, type of lubricant (or dry) and grinding pressure. Changing these variables will affect the performances of the belt grinding process. In the wide belt method, a contact wheel supports the abrasive belt. The selection of the contact wheel and abrasive to match the grinding parameters required for a specific operation is very critical. Stock removal generally requires a harder, serrated rubber contact wheel, and coarse grade ceramic abrasives. Finishing generally requires the use of a smooth faced contact wheel and fine grade abrasives. This PDF was generated via the PDL [2]

The project “Design and Analysis of Multi Station Grinding Machine” being done, to reduce the cost of machine shop and to the four operations likewise – grinding, cutting, buffing, and polishing can be done at the same time. Theoretical and Analytical calculations have been done for the applied load for the calculations of Theoretical Bending Moment value is 6.43Nm. Whereas the analytical bending moment value is 6.114Nm. Based on our observation both Theoretical values and Analytical Values more or less equal. So the design is safe. Multi Station Grinding Machine can be used in machine shop which may reduce manpower, machining time and reduces the cost.[3]

This paper deals with the problem identified during survey in company, case study of problem, and also with help of research papers, international journals; we conclude that Abrasive Belt Oblique Grinding is effective than wheel grinding. Abrasive belt oblique grinding and polishing combines many operations for efficient surface finishing. And it can fulfill the accuracy for super finishing of key which required for company as per their design. Also we can use the surface belt oblique grinder and we can obtain the

different super finishing quality with the help of using different grade abrasive belt. This Grinding machines has the versatile operations and achieve the operations of all other Belt grinding methods[4]

This paper presents a development of a portable workshop which will be available for the small work. It is a multipurpose machine which can be used to perform various operations like drilling, milling, grinding of small work pieces very precisely. The purpose of developing and designing the portable workshop is to make aware the student about the basic operations at very minimum cost in the Institute, they can learn the basic mechanism behind the operations, beside that it can be useful for the industries and also at home for repairing purposes, and in the industries small job preparation can be done without using the heavy machines. In the designing of a portable workshop a shaft of 40C carbon steel and a dc motor of 100 rpm12v are used.[5]

### III.Problem Definition

The abrasive belt grinding which is used currently has the working area as fixed one. The work can be rotated here the work area cannot be changed. So it can be used only for components which can be carried by hand and the fixed components where we have grind down or upside cannot be done with the current machines. In normal hand grinding the burr removal and finishing process cannot done at same level in a large surface.

The literature survey on belt grinding show certain limited understanding of materials removal, wear and grinding process. The important of belt parameters in grinding and finishing of work piece can be seen in the instruction on grinding figure. Compared to the grinding with wheel, involving non rigid wheel with belt grinding is another way to in hands the flexibility the aim is through systematic approach to optimize parametric setting to achieve the desired output and precision in coated abrasive belt grinding



**Figure: 1-Grinding Methods**

### IV.Objectives

We can use the surface belt oblique grinder and we can obtain the different super finishing quality with the help of using different grade abrasive belt. This Grinding machine has the versatile operations and



achieves the operations of all other Belt grinding methods. They have reported that the performance difference between sol gel alumina grain and fused grains, it was observed, similar trend on material removal and belt wear for different work materials. Abrasives (grits) with large negative rake angle surrounded cutting edges do not for chips or rub. Proportion of cutting, plowing and rubbing will change continuously as the abrasives wear. Coated abrasives are also used on belts. Coated abrasives are also used as belts for high rate material removal.

### V. Description of The Proposed Work

Our proposed technique involves the machine performing many operations through the out of one single 2880 rpm, 2HP dual shaft dc shunt motor. In this we have included one fine grinding wheel coarse grinding wheel buffing and another side abrasive belt for the surface grinding operation and centre less grinding process also done by improving design.

The motor shaft is enlarge by fitting and couple by adjustable long shaft which is mounted on the motor shaft through help of nut arrangement form both the sides one end of motor shaft is connected with the pulley and roller the other end connected with the one more roller. On the pulley the abrasive belt is mounted for centre less process. On the other side of it its having a long shaft supported by bearing whose one end is connected with another belt type abrasive grinding belt. The V belt arrangement is also provided between the two shafts of motor so there will be no large amount of loss power from the motor.

In the project we are using motor of 2800 rpm, double shaft (long shaft) centrally placed at one side of the bed at a desired height. One side of shaft will be mounted with grinding wheel and other end carrying a pulley V-belt and extended part of shaft will drive abrasive belt through bearing.

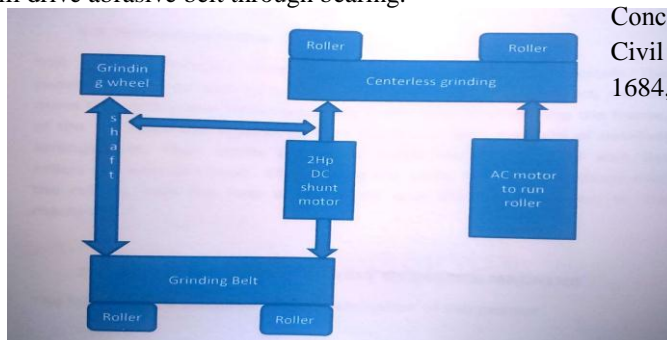


Figure:2- Block Diagram of Model

### VI. CONCLUSION

Still we are working over the project, As per the problem identified during survey in company, case

study of problem, and also with help of research papers, international journals; we conclude that Abrasive Belt Oblique Grinding is effective than wheel grinding. Abrasive belt oblique grinding and polishing combines many operations for efficient surface finishing. And it can fulfill the accuracy for super finishing of key which required for company as per their design. Also we can use the surface belt oblique grinder and we can obtain the different super finishing quality with the help of using different grade abrasive belt. This Grinding machine has the versatile operations and achieves the operations of all other Belt grinding methods.

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