



# Design Of Mini Abrasive Vertical Belt Grinding Machine

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**Abstract:** Grinding is an abrasive machining process that uses a grinding wheel as the cutting tool. A wide variety of machines are used for grinding. Although mini belt grinding abrasive belt have stronger cutting ability than that on the grinding wheel. The main aim of this paper is to design vertical abrasive belts grinding machine to achieve good tolerance as well as better surface finish for various materials such as metal, glass, ceramic, rock and specified material. The abrasive belt grinding can reduce the surface roughness of work pieces and accuracy meanwhile Aluminium oxide belt with high stock removal cleaning and polishing is effectual. The abrasive belt grinding as compared to wheel grinding have more efficient with efficiency and parameter range. It is conclude that Aluminium oxide belt hardness makes it suitable for use as an abrasive and as a component in cutting tools with significant proportion. We have designed such Abrasive Belt vertical Grinding Machine having better advantages over wheel grinding machine.

**Keywords:** Aluminium oxide, abrasive belt, wheel grinding.

## 1.INTRODUCTION

Abrasive belt grinding is a common finishing process in the metal and wood working industries. Coated abrasive belts are used in the same speed range as bonded wheels, but they are not generally dressed when the abrasive becomes dull. Abrasive belt grinding is a kind of grinding tool with special form, which needs straining device and driving wheel and to make abrasive belt strained and moved at high speed, and under certain pressure, the contact between abrasive belt and work piece surface can help to realize the whole process of grinding and machining. Belt grinding is a rough machining procedure utilized on wood and different materials. It is

commonly utilized as a completing procedure in industry. A belt, covered in rough material, is kept running over the surface to be handled so as to evacuate material or create the ideal finish. [6]

This Belt Grinder machine is designed using CATIA V5. It consists of 775 HP motor which is fundamentally rotates the pulley attached to it, along with a mini grinder, grinding paper and an abrasive belt grinder. The second pulley is attached to the wooden base vertically with the tensioner spring. Grinding paper is then fitted in pulley. To support the mini grinder a base frame is provided, it helps in grinding wooden material. Machine is designed using DC motor, spring, base Frame (support frame), abrasivegrinder belt, coupling and a pulley. This machine helps to shape the material without putting much effort and getting better surface finish, and also getting larges area of belt for grinding operation than wheel grinding.

Grinding is an abrasive machining process that uses a grinding wheel as the cutting tool. A wide variety of machines are used for grinding. Although mini belt grinding abrasive belt have stronger cutting ability than that on the grinding wheel.

Yun Huang et al. presented the literature survey on belt grinding shows certain limited understanding of material removal, wear and grinding process. The importance of belt related parameters in grinding and finishing of work piece can be seen in the illustration on grinding. Compared to the grinding with wheels, involving non rigid wheel with belt grinding is another way to enhance the flexibility. In abrasive belt grinding Titanium alloy blade of aviation engine experiment, through the single factor experiment method, the influence of abrasive belt linear speed and work-piece feeding speed on the grinding quantity is discussed. In abrasive belt grinding Titanium alloy blade of aviation engine experiment, through the single factor experiment method, the influence of abrasivebelt linear speed and work-piece feeding speed on the grinding quantity is discussed. [1]

A. Robert Henry et al. studied Machining processing industries have continuously developed and improved technologies and processes to transform finished product to obtain better super finished product quality and thus increase products. Abrasive machining is one of the most important of these Processes and therefore merits special attention and study. Belt grinding is an abrasive machining process used on metals and other materials it is typically used as a finishing process in industry. The main objectiveof 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. The0 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. [2]

Huang presented the surface finishing and stock removal of complicated geometries is the principal objective for grinding with compliant abrasive tools. To understand and achieve optimum material removal in a tertiary finishing process such as Abrasive Belt Grinding, it is essential to look in more detail at the process parameters/variables that affect the stock removal rate. The process variables involved in a belt grinding process include the grit and abrasive type of grinding belt, belt speed, contact wheel hardness, serration, and grinding force. Changing these process variables will affect theperformance of the process. [3] [4] [5]

## 1.Design of Belt Grinding Machine

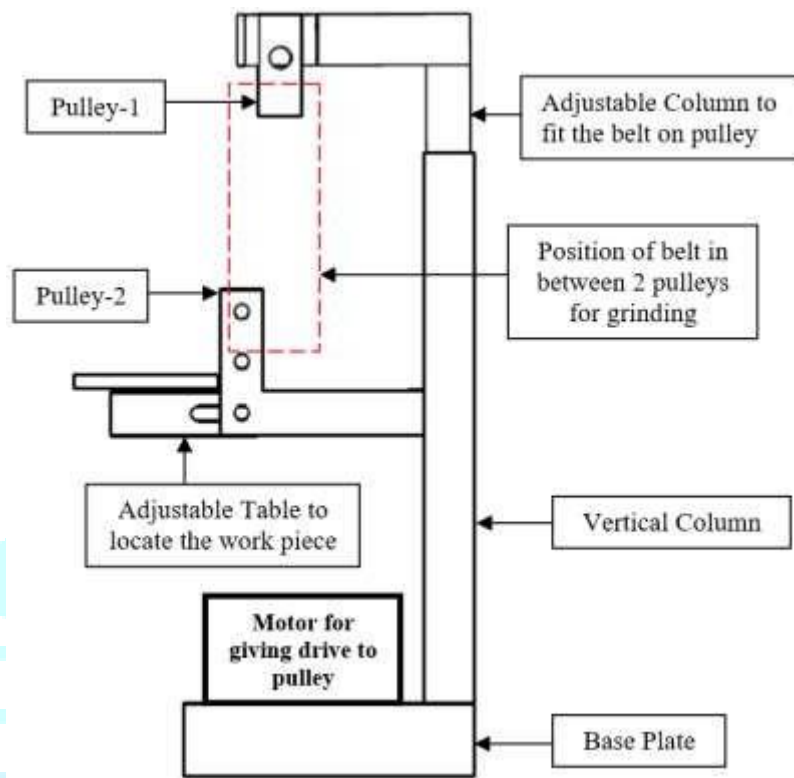


Figure 1. Front view of Belt Grinding Machine

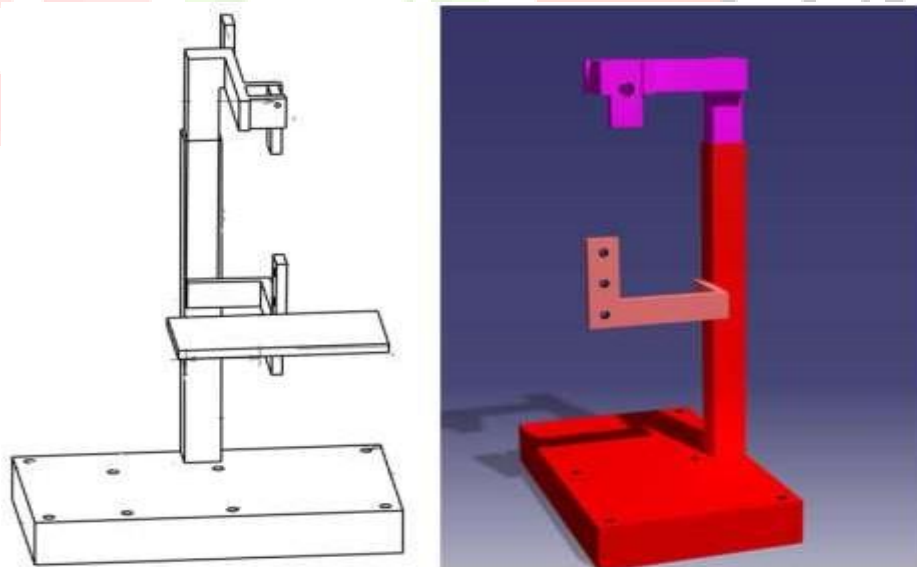


Figure 2. 3D modelling of Belt Grinding Machine in CATIA

## 2.1 Working Principal of Abrasive Belt Grinding Machine:

As you know that nowadays wheel grinding machines are mostly used for grinding operation. In most the workshops it is used for grinding, to remove the sharpen edges, sharpen the cutting tools by giving different angles. But in such wheel grinding machines there is one problem that very less area of wheel available to perform the grinding operation. Due to this area of contact in between grinding wheel and workpiece maximum time is required finish the surface or to grand the surface.

To avoid this major disadvantage we have developed this vertical abrasive belt grinding machine. The above figure 1 shows the front view of this machine with all important components. Figure 2 represents 3D modelling or 3D views of belt grinding machine which is designed using CATIA v5 software. The basic working principal of this machine is too grand or to finish the surface using abrasive belts which to be mounted on this designed machine. Due to this abrasive belts used maximum area of belt is comes in contact with workpiece due to which material removal rate or surface finish rate is morein less time as compared to wheel grinding machine.

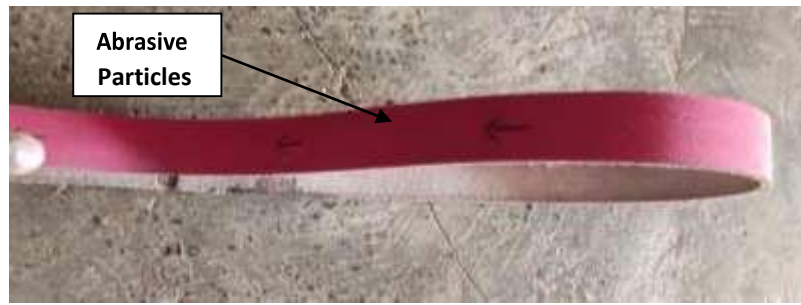
## 2.2 Construction of Abrasive Belt Grinding Machine:

The above figure 1 represents the construction of abrasive belt grinding machine with all its important components. This machine is constructed on one base plate and is supported through vertical column shown in both figure 1 and figure 2. The motor is also mounted on base plate from which drive is given to grinding belts through pulleys shown in figure 1. One adjustable column is also provided to attach and remove the belts easily. The grinding belt rotates when motor starts and its movement used to grind or finish the surface similar to grinding wheel.

The table is also attached to vertical column to put the workpiece while performing the grinding operation shown in above figure 2. Due this vertical rotation of belts its maximum area is utilized for finish the surface due to which less time is required for grinding with maximum material removal rate than wheel grinding operation.

## 2.3 Abrasive Belts used in Belt Grinding Machine:

There are different abrasive materials which are used to manufacture the grinding wheels or belts. Sometimes abrasives materials used in wheel and belts are common sometimes it is different. But nowadays some special abrasives belts are available or manufactured to perform the grinding operation. The basic advantages of belts overwheels we have discussed above. Following figures represents the types of abrasive belts used in belts grinding machine having different dimensions manufactured for different applications.



**Figure 3. Abrasive Belt (Ceramic and Nylon)**

**Table 2. Specifications of Ceramic and Nylon Belt**



**Figure 4. Abrasive Belt (Aluminium Oxide)**

**Table 2. Specifications of Aluminium Oxide Abrasive Belt**

Brand	Drillpro
Material	Aluminium Oxide
Size	30 mm width
Scope of Application	Grinding of metal, wood, furniture, stone, steel other fields etc.

## . Conclusions

Grinding is an abrasive machining process that uses a grinding wheel as the cutting tool. A wide variety of machines are used for grinding. Although mini belt grinding abrasive belt have stronger cutting ability than that on the grinding wheel. But as wheel grinding is having some disadvantages in form of time required to finish the surface, material removal rate, surface finish obtained etc.

To over such disadvantages this vertical abrasive belt grinding machine is designed using CATIA v5 software to overcome disadvantages of wheel grinding machine. Also this machine helps too grand or to finish

the surface using abrasive belts which to be mounted on this designed machine. Due to this abrasive belts used maximum area of belt is comes in contact with workpiece due to which material removal rate or surface finish rate is more in less time as compared to wheel grinding machine.

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