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Mini Belt Grinder

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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 – *Abrasive- Rough Surface, tolerance,ceramic, Aluminium oxide.*

I. 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.

This Belt Grinder machine is designed using Solidworks. 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), abrasive grinder belt, coupling and a pulley. This machine helps to shape the material without putting much effort and getting 2 better surface finish, and also getting larges area of belt for grinding operation than wheel grinding.

II. OBJECTIVE

The Objective of this project is to design and fabricate an abrasive belt grinding which can be used as versatile grinding machine by changing its work area from 0 to 180 degree with four rollers and length of the belt could be adjustable for making belt at proper tension.

III. METHODOLOGY

This machine is constructed on one base plate and is supported through vertical column shown in both figure . 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 work piece while performing the grinding operation shown in above figure. 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.

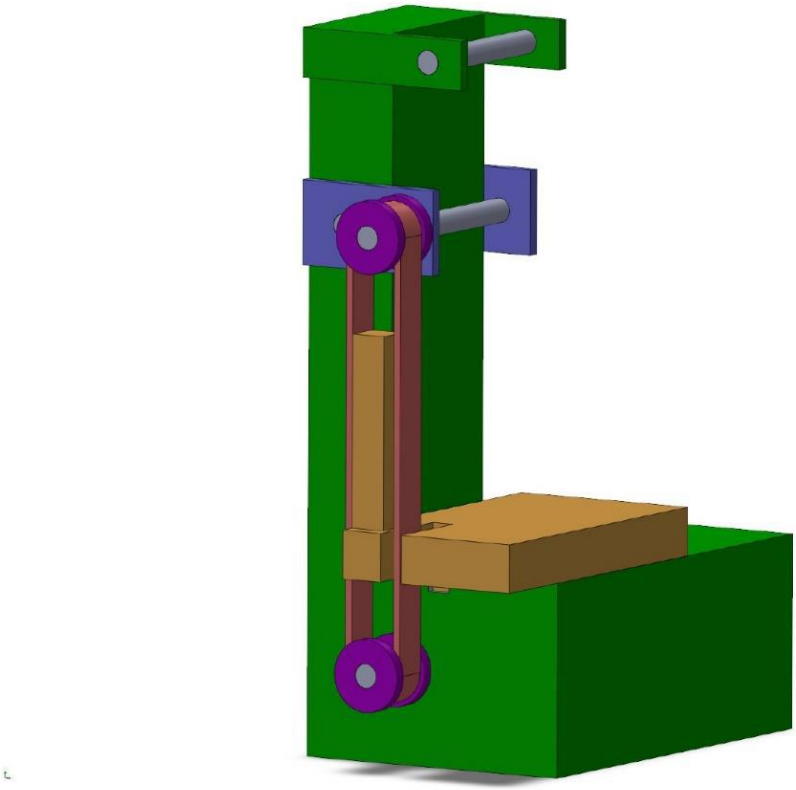

Fig 3.1 Mini Belt Grinder

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 Solidwoks 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 more in less time as compared to wheel grinding machine.

IV. LITERATURE REVIEW

[1] Kyle Odum , Mara Celeste Castillo, Jayanti Das, Barbara Linke, Sustainability analysis of grinding with power tools, 6th CIRP International Conference on High Performance Cutting, CIRP 14 (2014) 570-57.This paper discuss issue relating to the power supply, occupational Health hazard and advertised sustainable feature of abrasive power tool and abrasive media option in market today. The most common power sources are electricity through the universal motor are lightweight easy to control, and have desirable operating characteristic. It will operate at less than 50% efficiency due to friction between commutator and brush in a universal motor cause wear and limit inspection of motor. Also another sources of motor are Brushless Permanent magnet motor which have very high efficiency 80-90% more than universal motor. Aside from electric power tool, pneumatic power tool that run on a compressed air are the most common in the U.S. Some advantages are: the lack of electric shock Hazards, absence of spark or ignition sources and lightweight during operation.

[2] Vigneashwara Pandiyan, Tegoeh Tjahjowidodo, Meena Periya Samy, In Process Surface Roughness Estimation For Compliant Abrasive Belt Machining Process, 7th HPC 2016- CIRP Conference on High Performance Cutting, CIRP 46 (2016) 254-257. In this paper surface roughness inspection is an off-line operation which is time consuming in robotic abrasive belt machining process with Support Vector Machine (SVM). Predictive model such as ANN, ANFIS and SVM were developed in this researches and correlation were established between predicted surface roughness values .The technical features based on SVM such as Linear SVM, Quadratic SVM, Cubic SVM with four different surface roughness. By performance testing it is observed that Quadratic SVM and Cubic SVM were the best in terms of predictive ability. The accuracy of SVM's are 94.5%, 96.9% and 96.9% respectively. This technique is established on planar surfaces while machining free from surfaces are subject to further research.

[3] Dong Zhang, Chao Yun, Dezheng Song, Dexterous space optimization for robotic belt grinder, Procedia Engineering 15 (2011) 2762-2766. In this paper discussed a new structure of robotic grinding system in which a new robot frame including active work piece frame and passive tool frame was presented. In the industrial robot are recently introduced to the belt grinding of complex shape surfaces to obtain high productive efficiency and constant surface quality. The early development of robotic grinding focused on the robot holding a grinding wheel to finish a part with simply geometries and with relatively low accuracy requirements. The dexterity optimization ends are first, the establishment of an appropriate coordinate system for the general theoretical analysis; second, the robot placed in reasonable relative position to grinding machine ensuring that the robot has enough dexterous space of grinding.

V. PROBLEM STATEMENT

The abrasive belt grinding which is used currently have the working area as fixed done.
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 bed one with the current machines. In normal hand grinding the burr removal and finishing process cannot done at same level in a large surface.

VI. CONCLUSION

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 Solidworks 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.

VII. DISCUSSION

To Study of Mini Belt Grinder operated effortlessly. Making solid model of the Mini Belt Grinder and Selection of mechanism and discussion with guide. Study of mechanism, it's application, advantage and disadvantages. Discussed about the cost, working and failures of the mechanism. Prepared ppt and presented to guide and done correction suggested by guide. prepared ppt and project report , progress shear and submitted to the guide. Done with ansys to check failure in model. Started making actual model.

Acknowledgements

History of all great works into witness that no great work was ever done without either active or passive support of a person "surrounding and one's close quarters, thus is it not hard to conclude how active assistance from my group members could positively impact the execution of a project I am highly thankful to our project guide Miss. Aditi Pimpale for his active guidance throughout the completion of project.

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