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Review paper on Automatic Surface Grinding Machine

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ABSTRACT

Now day the accuracy in surface finish is an important aspect of production. Our main objective is to make automatic surface finish grinding machine within minimum cost and safe in compare with the manually grinding machine which is time consuming and hazardous to worker. Usually grinding machine are manually work. Our project will be done in "BASIL ENGINEERS". In manually operated machine we don't get precise result due to human errors while in automatic grinding machine we can reduce this error. We try to solve that manually working machine in to automatic operated machine. That cut down the time of operation and cost of finishing.

Keywords: Automatic Grinding, Emery Belt, Electric Motor.

I. INTRODUCTION

Grinding is a true metal-cutting process. Each grain of abrasive functions as a microscopic single-point cutting edge, shears a tiny chip that is analogous to what would conventionally be called a "cut" chip. The tolerances that are normally achieved with grinding are ±2×10–4 inches (5.1 μm) for grinding a flat material and ±3×10–4 inches (7.6 μm) for a parallel surface.

A wide variety of machines are used for grinding:

- Hand-cranked knife-sharpening stones (grindstones)
- Handheld power tools such as angle grinders and die grinders.
- Various kinds of expensive industrial machine tools called grinding machines.
- Bench grinders often found in residential garages and basements.

Grinding is used to finish work pieces that must show high surface quality and high accuracy of shape and dimension.

As the accuracy in dimensions in grinding is of the order of 0.000025 mm, in most applications it tends to be a finishing operation and removes comparatively little metal, about 0.25 to 0.50 mm depth. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly.

Grinding practice is a large and diverse area of manufacturing and tool making. It can produce very fine finishes and very accurate dimensions. Yet in mass production contexts it can also rough out large volumes of metal quite rapidly.
The various types of grinding use in Industries

- Surface grinding
- Cylindrical grinding
- Creep-feed grinding
- Centre less grinding

A grinding wheel is an expendable wheel used for various grinding and abrasive machining operations. It is generally made from a matrix of coarse abrasive particles pressed and bonded together to form a solid, circular shape, various profiles and cross sections are available depending on the intended usage for the wheel. Grinding wheels may also be made from a solid steel or Aluminium disc with particles bonded to the surface.

The Various Types of Grinding Wheel use in grinding machine

- Straight Grinding wheels
- Cylinder or wheel ring
- Tapered Grinding wheels
- Straight cup
- Dish cup
- Saucer Grinding Wheels
- Diamond Grinding Wheels

II. LITERATURE REVIEW

The author has presented model [1] in this paper, an investigation into the influence of belt grinding parameters on material removal depth based on the Taguchi parameter design method has been analyzed and presented. In the belt grinding experiments, three levels of cutting wheel speed, feed rate, force, grit size, and polymer hardness were applied.

The paper related to method of modelling and calculating the material removal the [2] A method of modelling and calculating the material removal using ANFIS is proposed in this paper. The ANFIS model developed is validated with experimental trials for given conditions. It has been identified that results produced by the designed regression model have acceptable deviations between the predicted and the actual experimental results with 93.5% accuracy. The ANFIS model developed in this research work is viable and could be used to predict the depth of cut, i.e., material removal for an Abrasive Belt Grinding process.

The paper deals with the degree of freedom [3] 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.

In this paper [4] In this study, the surface roughness and MRR in Surface finishing process of EN24 steel using Al2O3 was modeled and analyzed through RSM. Wheel speed, Table speed and Depth of cut have been employed to carry out the experimental study. Summarizing the main features, the following conclusions could be drawn 1.The predicted values match the experimental values reasonably well, with R2 of 0.9164 for Surface Roughness, R2 of 1.000 for MRR. 2 .The error between experimental and predicted values at the optimal combination of parameter settings for MRR and Ra lie within 4.96% and 4.30%, respectively. 3.From the multi-response optimization, the optimal combination of parameter settings are wheel speed of 850RPM, Table speed of 15m/min and Depth of cut of 11.94μm for achieving the required maximum MRR and minimum surface roughness.

This article deals with the Abrasive belt [5] 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. Also, the

system of two separate water tanks for water inlet and outlet is also there. Some of the major advantages of this machine over other machines

In this paper [6] China Based on the classical sectional profile method, a new algorithm by the optimization curve interval is advanced to generate more cutter locations at the local surface with large curvature and less cutter locations at the local surface with small curvature. With the optimization algorithm, the accuracy and efficiency of the robotic belt grinding are integrated. Firstly, by the concave hull property, the curve length of the sectional profile can be estimated and the number of the curve intervals can be obtained. Secondly, the parametric domain of the sectional profile is divided into equal intervals, and parametric coordinates and position of the target points can be achieved.

In this paper [7] A new method, WEDG (wire electro-discharge grinding), for EDM machining very thin rods is proposed. Travelling wire is used as the tool electrode. However, the wire guide and the machining setup are different from the wire EDM. Several machining characteristics including accuracy and repeatability are investigated. The result shows that the method provides high accuracy and good repeatability with the error of less than 1μm. Many materials are successfully machined into a diameter of less than 15μm.

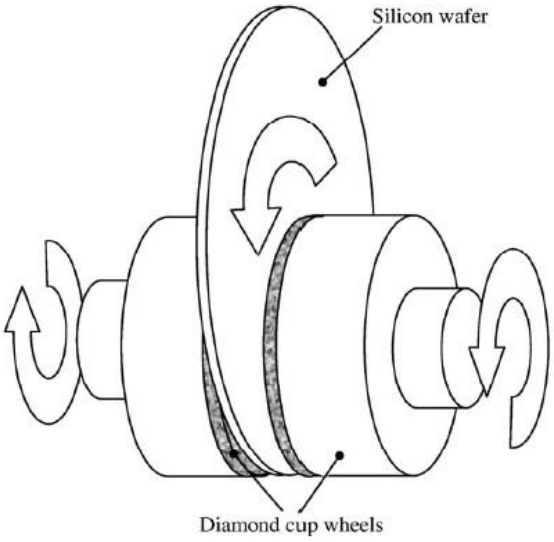

Fig.1 Illustration of SDSG process.

In this paper [8] Fig.1 shows Illustrates the Simultaneous double side grinding (SDSG) process. A pair of diamond Cup wheels are located on the opposite sides of a rotating silicon wafer. The two wheels rotate in opposite directions, Both sides of the rotating silicon wafer are ground simultaneously by the two wheels, which are synchronously fed towards the wafer.

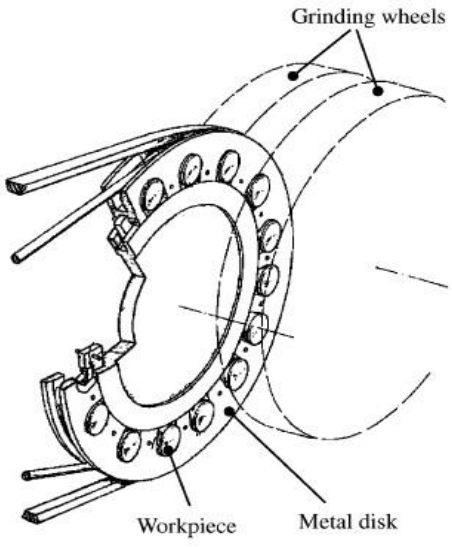

Fig.2 SDSG machine configuration for metal work pices in disk shape

In this article [9] shows a configuration to grind metal work pieces for rolling bearings. Two flat grinding wheels, rotating in opposite directions,

were located apart with a certain distance. The work pieces were positioned in the through holes provided in the periphery of a metal disk, which was rotated and fed between the two wheels. Both
Sides of the work pieces were ground simultaneously by the two wheels.

This article [10] presents an overview of current simulation methods describing the interaction of grinding process and grinding machine structure, e.g., vibrations, deflections, or thermal deformations. Innovative process models which describe the effects of the grinding wheel–workpiece interaction inside the contact zone are shown in detail. Furthermore, simulation models representing the static and dynamic behaviour of a grinding machine and its components are discussed. Machine tool components with a high influence on the process results are modelled more detailed than those with low influence.

III. CONCLUSION

In this paper technologies by either use of grinding wheel and materials has been summarized. From this paper we have anticipated that grinding and work peace materials have a wide range of application in day to day life and has tremendous scope in the grinding sectors with few of the developed technologies as described in above section. The most commonly used material was aluminium oxide due to its high abrasive material, compared to other abrasive material .One more important point derived from this paper is that the grinding range is high, which makes its highly effective for use in micro scale grinding. However by appropriate combination of belt grinding in parallel connection and materials of grinding wheel is the same and with proper mechanism.

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