

# Design and Fabrication of Mini Surface Grinding Machine

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**Abstract** - Grinding is one of the most important manufacturing process for high precision parts. Grinding force has a direct influence on grinding wheel wear, grinding temperature, the surface quality of the work piece and the design of machine tool component. Also, the cutting force is proportional to the specific energy in grinding and this influences the performance and surface integrity of the work piece. Hence the measurement of forces in grinding process is very important. In surface grinding, forces are measured using the dynamometer placed on the grinding table. But in cylindrical grinding the force measurement is a difficult process compared to other machining and surface grinding process, since the work piece and the wheel are in motion. Also, the available force measurement methods are more suitable for research laboratory than for industrial application. In all these methods the modifications are done either in the work piece or in the machine setup. Therefore, in this research work, a strain gauge based force measurement setup has been developed and it can be implemented in the industrial work without any major difficulty.

## I. INTRODUCTION

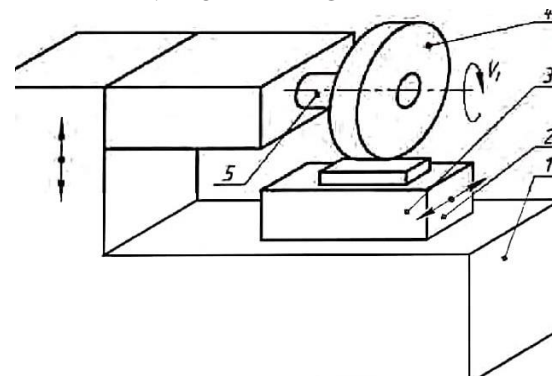
Surface grinding is used to produce a smooth finish on flat surfaces. It is a widely used abrasive machining process in which a spinning wheel covered in rough particles (grinding wheel) cuts chips of metallic or non-metallic substance from a work piece, making a face of it flat or smooth. Surface grinding is the most common of the grinding operations. It is a finishing process that uses a rotating abrasive wheel to smooth the flat surface of metallic or non-metallic materials to give them a more refined look or to attain a desired surface for a functional purpose. The surface grinder is composed of an abrasive wheel, a work holding device known as a chuck, and a reciprocating or rotary table. The chuck holds the material in place while it is being worked on. It can do this one of two ways: ferromagnetic pieces are held in place by a magnetic chuck, while non-ferromagnetic and non-metallic pieces are held in place by vacuum or mechanical means. A machine vise (made from ferromagnetic steel or cast iron) placed on the magnetic chuck can be used to hold non-ferromagnetic work pieces if only a magnetic chuck is available. Factors to consider in surface

grinding are the material of the grinding wheel and the material of the piece being worked on. Typical work piece materials include cast iron and mild steel. These two materials don't tend to clog the grinding wheel while being processed. Other materials are aluminium, stainless steel, brass and some plastics. When grinding at high temperatures, the material tends to become weakened and is more inclined to corrode. This can also result in a loss of magnetism in materials where this is applicable. The grinding wheel is not limited to a cylindrical shape and can have a myriad of options that are useful in transferring different geometries to the object being worked on. Straight wheels can be dressed by the operator to produce custom geometries. When surface grinding an object, one must keep in mind that the shape of the wheel will be transferred to the material of the object like a mirror image. Spark out is a term used when precision values are sought and literally means "until the sparks are out (no more)". It involves passing the work piece under the wheel, without resetting the depth of cut, more than once and generally multiple times. This ensures that any inconsistencies in the machine or work piece are eliminated.

## II. OBJECTIVES

1. To grind the surface of a metal object.
2. Understand the functioned the type of tools used in the universal surface grinding machine.
3. Knowing method about how the work

## III. MODEL DIAGRAM



#### IV. APPLICATION

- surface finishing
- slitting and parting
- descaling, deburring
- stock removal (abrasive milling)
- finishing of flat as well as cylindrical surface
- grinding of tools and cutters and resharpening of the same in cool drinks production.

#### V. ADVANTAGES

- Lubricants not required.
- This can produce a high surface finish with accurate can obtain.
- It can obtain highly accurate dimensions.
- Speed of cutting can be done by this process.
- In grinding abrasive particles, they are self-sharpened action.
- This can operate for complex things

#### VI. FUTURE SCOPE

Based on the limitations observed in the present research, there are considerable possibilities of scope for future work and they are presented below.

In this research work, the cutting parameters have been predicted to get desired surface roughness in minimum possible machining time using PSO technique. But machining is a complex phenomenon and so inclusion of many other machining parameters and constraints may enhance the result.

Multi-pass machining or component-based attempts can be carried out to show the ability and effectiveness of non-traditional optimizing techniques.

#### VII. CONCLUSION

The box shifting mechanism plays a major role in industries, the process of transporting or shifting products from one place to another was to be maintained by conveyors only. So we just successfully altered this with a box shifting mechanism using the kinematics links and a motor. We had just implemented our basic mechanical knowledge and designing skills for designing and fabricating this project successfully. Thus this project work might be useful in all industries. For practical applications this is fabricated for light duty operation. Its height, weight and other mechanical designs may be not suitable for any other heavy operation or work on hardened material. We are proud that we have completed the work with the limited time successfully. The project works with satisfactory conditions. We are

able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities.

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