

Fabrication of Pneumatically Powered Grinding Machine

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Abstract – In today's world all systems are surrounded by automation, right from a switch to turn on the fan to operate complex industrial robots. Basically any kind of industrial automation is achieved by pneumatics, and then there are hydraulics, electro pneumatics and PLC's. Certain characteristics of air have made pneumatic medium very suitable for used in advanced manufacturing and modern production industries. The objective of this work of pneumatically operated grinding machine is to achieve high level of productivity of work-pieces as compared to the electrical grinding machine using pneumatic power. Grinding is an operation of metal cutting like any other process of machining removing metal in comparatively smaller volume. Grinding is the most important process to improve the life of equipment in industrial as well as domestic purpose. Everyone's focus in industry is to reduce the production cost with improved quality for achieving more profit. The grinding is the metal cutting machine tool designed to cut metal by applying pneumatic pressure. Air compressor can run with less input power which handles the grinding tool easily. The metal cutting operation in this unit is achieved by using a cylinder block and piston arrangement.

Key Words: Pneumatic grinding machine, compressed air

1. INTRODUCTION

Pneumatics is a branch of automation which makes use of gas compressed air to transmit and control energy. Compressed air of pneumatic systems is used in operating doors of bus or train, brakes of automotive vehicles also automatic production lines and pneumatically operated clamps in various industries.

Grinding is an operation of metal cutting like any other process of machining removing metal in comparatively smaller volume. The abrasive wheel is used as cutting tool having many numbers of cutting edges.

Now in industry, it is necessary to grind jobs with very high rate to achieve mass production requirements. So there is need to move for a new technology which gives us a mass production with less time and less energy input. It is impossible to depend upon conventional grinding machine. By using this pneumatic grinding machine the jobs can be ground maintaining tolerances to achieve high speed cutting rate and mass production for maximum benefit in manufacturing industries.

The DC motor is used as power source for existing grinding machine, but there is no any grinding machine which can be powered by pneumatic system.

The DC motor operated grinding machine run on electricity, but when there is absence of electricity the grinding work cannot be carried out. Therefore, the process of grinding can be carried out with the help of pneumatically operated grinding machine using stored compressed air.

2. PROBLEM STATEMENT

The conventional DC motor powered grinding machine operated manually to grind the job and the dimensional tolerances are completely depends on operator's skill. Also, it is impossible to conduct the grinding operation during uneven electric supply. Gradually hydraulic grinding came into the scene; though it brought automation with itself but it was very costly.

So it is required to design the set-up of pneumatically operated grinding machine which can be handled by unskilled operator during absence of electricity.

3. OBJECTIVES

The objectives of pneumatically operated grinding machine are as follows:

1. To overcome the problem of requirement of skilled operator for conventional grinding by inventing automation system in grinding machine.
2. To carry out the continuous grinding operation under the condition of uneven electric supply by using compressed air as an input power source for running of grinding machine.

4. METHODOLOGY

For the fabrication of pneumatically operated grinding machine methods used are as follows:

4.1. Study on topic as pneumatically operated grinding machine by understanding the problem.

The major problem in conventional DC motor powered grinding machine is to requirement of skilled operator to achieve the excellent grinding operation. Also, this machine cannot be operated during uneven electric supply. For overcoming of these problems new set-up of 'pneumatically

operated grinding machine' is invented. In this new set-up of pneumatically operated grinding machine, the grinding operation is carried out automatically; therefore there is no any requirement of skilled operator which saves the operating cost.

Also, pneumatically operated grinding machine use the compressed air as input power source for running of grinding tool. In case of uneven power supply, stored compressed air can be used which saves the idle time of grinding machine to improve the efficiency.

4.2. Finalization of objectives after understanding the problem with its solution in grinding machine.

There are some problems in the existing set-up of DC motor operated grinding machine; such as, uneven electric supply as well as requirement of skilled operator. Uneven supply of electricity causes discontinuities in the process of grinding whereas skilled operator demands more expectations which results more running cost of grinding process. To overcome this problem, it is required to invent the automation system in grinding machine with pneumatic input power instead of electric supply to achieve high level of productivity.

4.3. Prototype design and construction of model of grinding machine.

The sketch of experimental set-up of pneumatically powered grinding machine is drawn with its all required equipments. Fig. 01 represents experimental set-up of pneumatically powered grinding machine. The prototype design of pneumatically operated grinding machine is made by using AUTOCAD software.

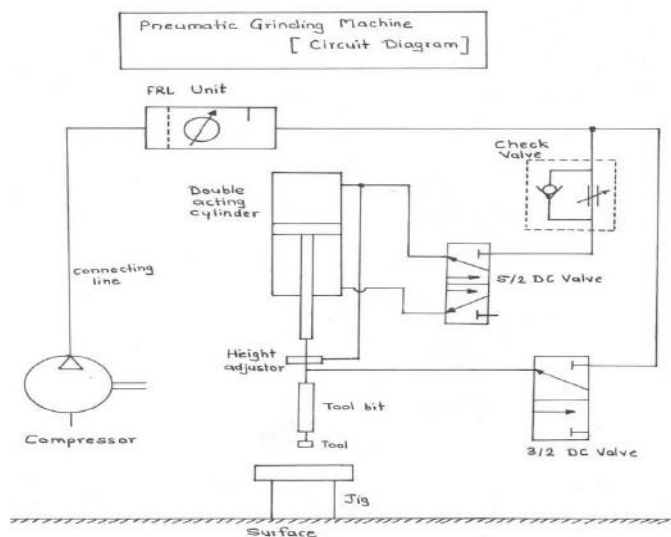


Fig. 01:- Experimental set-up of pneumatically powered grinding machine.

4.4. Fabrication of grinding machine parts.

After prototype designed model of pneumatically powered grinding machine, next step is to fabrication of required parts. The structure of grinding machine is by using square

metal pipes. This structure is made by cutting and welding operations. All the set-up of pneumatically powered grinding machine is made with measurements.

4.5. Assembly and testing the prototype.

Assembly of pneumatically powered grinding machine is made after fabrication of all its parts. The assembled parts are tabulated in the following table 01.

Table 01:- Parts of pneumatically powered grinding machine

Sr. No.	Name of the part	Cost
01	Air motor	1700
02	Flow control valve	360
03	Bench vice	1000
04	Solenoid valve	1700
05	Connecting nuts and pipes	410
06	Grinding wheel	350
07	Metal pipes for structure	2000

All the parts are assembled together and final model of pneumatically powered grinding machine is made.



Fig 02:- Pneumatically powered grinding machine

The pneumatically powered grinding machine is shown in Fig. 02. This model of grinding machine is working properly. This circuit of grinding machine is powered by compressor. The pressurized air from compressor enters in the FRL unit, in which filtration of air takes place to remove dust particles. Regulation of pressure is made as per the required speed of grinder. Lubrication of all the components of pneumatic circuit is achieved with the help of lubricator. This air passed towards the air motor which is coupled to the grinding wheel. The grinding operation is carried out with input power of compressed air.

5. CONCLUSIONS

The research work of pneumatically powered grinding machine instead of electric power is carried out and conclusions are made as follows:

1. Automation system is installed in the pneumatic powered grinding machine which is not available in conventional grinding machine.
2. There is no any requirement of skilled operator for this pneumatic grinding machine which reduces operating cost.
3. The continuous operation of grinding can be made under the condition of uneven power supply as this machine is powered by compressed air which is stored in pneumatic compressor.

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It is a great sense of satisfaction that I represent my real venture on practical computing in the form of project work. This project was undertaken for small part of invention in conventional grinding machine to reduce its operating cost. I wish to express our heart full thanks to all those who helped us in completing the project.

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BIOGRAPHY



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