International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 03 | March - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

Design and Fabrication of Pneumatic Glass Cutter Machine

Prof. S.P. Tanpure
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: sptanpureme@sanjivani.org.in

Mr. Harshad Gaikwad
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: harshadg952@gmail.com

Mr. Aditya Pawar
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: adityapawar443411@gmail.com

Mr Prasad Deokar
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: prasaddeokar42@gmail.com

Mr. Suraj Kande
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: kandesuraj2005@gmail.com

Abstract:
This paper deals with the design and fabricate the air operated glass cutting machine. Cutter is a common tool used in various cutting shape for a variety purposes. In this project, a glass cutter is provided which can form, using a wheel, a uniform crack in glass even when a projection or an carlier-formed scribe line is present on the glass. When the wheel is moved on the glass, a fracture layer is formed causing a rib mark to be formed below the fracture layer and a crack to be formed below the rib mark. To cut the glass, the crack is required to be formed uniformly. A glass cutter may use a diamond to create the split or more commonly a small cutting wheel is used made of hardened steel or tungsten carbide 4-6 mm in diameter, with its cutting edge ground to a V-shaped profile. Some glass cutters hold a small amount of cutting oil, which both lubricates the wheel and prevents the split in the glass from closing. When properly lubricated a steel wheel can give a long period of satisfactory service. The improvement of cutter which is design and fabricate of a pneumatic cutter. This cutter also safe to use when press the ON button the high pressure air comes and leads the cutter to cut on the mirror surfaces. Hence, cutter can help people to cut the mirror easily and also can used it in a long term.

Keywords: -Pneumatic, DAC, Return Stroke, Compressor, Cutting Tool

---

I. INTRODUCTION

Pneumatic systems are used extensively in industry and factories are commonly plumbed with compressed air or compressed inert gases. [1] This is because a centrally located and electrically powered compressor that powers cylinders and other pneumatic devices through solenoid valves can often provide motive power in a cheaper, safer, more flexible and more reliable way than a large number of electric motors and actuators. [2]

II. Gases Used in Pneumatic Systems:

Pneumatic systems in fixed installations, such as factories, use compressed air because a sustainable supply can be made by compressing atmospheric air. The air usually has moisture removed and a small quantity of oil is added at the compressor to prevent corrosion and lubricate mechanical components.

Factory-plumbed pneumatic-power users need not worry about poisonous leakage, as the gas is usually just

air. Smaller or stand-alone systems can use other compressed gases that present an Asphyxiation hazard, such as Nitrogen-often referred to as OFN (oxygen-free Nitrogen) when supplied in cylinders.

Any compressed gas other than air is an asphyxiation hazard-including nitrogen, which makes up 78% of air. Compressed Oxygen (approx. 21% of air) would not asphyxiate, but is not used in pneumatically-powered devices because it is a fire hazard, more expensive and offers no performance advantage over air.

Carbon dioxide is an asphyxiant and can be a freezing hazard if vented improperly.

III. Comparison to Hydraullics:

Both pneumatics and hydraulics are applications of Fluid Power. Pneumatics uses an easily compressible gas such as air or a suitable pure gas-while Hydraulics uses relatively incompressible liquid media such as oil. Most industrial pneumatic applications use pressures of about 80 to 100 pounds per squareinch (550 to 690 kPa)

.Hydraulics applications commonly use from 1,000 to 5,000 psi (6.9 to 34 MPa), but specialized applications may exceed 10,000 psi (69 MPa).

IV. Advantages of Pneumatics:

- Simplicity of design and control Machines are easily designed using standard cylinders and other components and operate via simple on-off control.
- Reliability-Pneumatic systems generally have long operating lives and require little maintenance. Because gas is compressible, Equipment is less subject to shock damage. Gas absorbs excessive force, whereas fluid in hydraulics directly transfers force. Compressed gas can be stored, so machines still run for a while if electrical power is lost.
- Safety-There is a very low chance of fire compared to hydraulic oil. Machines are usually overload safe.
- do not overheat when overloaded and are therefore less of a fire hazard
- Ability to control pressure and force.

V. Solenoid Valve:

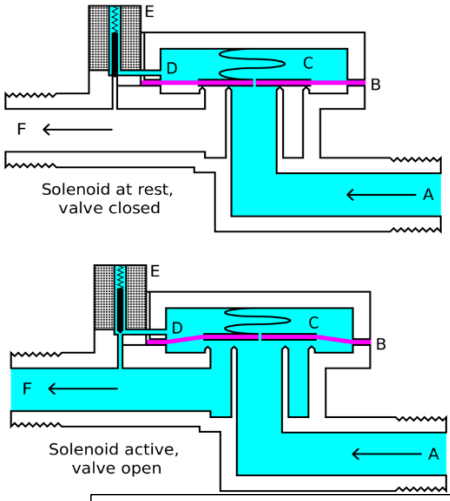


Fig.1.SOLENID VALVE

VI. Clamping Device:

Once workpiece is located, it is necessary tp press it against locating surfaces and hold. It there against the force acting upon it. The tool designer refers to this action are known as clamping.

Fig.2 TOOL HOLDER &FREAM

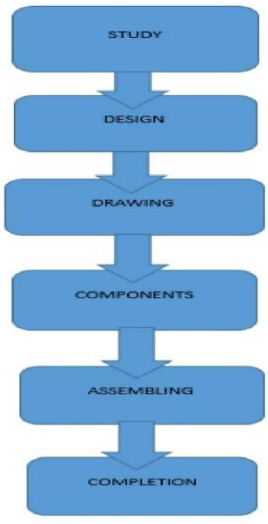
VII. Literature review

There are many glass cutting processes. Pneumatic devices are used in many industrial applications. Generally appropriate for applications involving less force than hydraulic applications, and typically less expensive than electric applications, most pneumatic devices are designed to use clean dry air as an energy source. A pneumatic system is a system that uses compressed air to transmit and control energy. In the big industries glass cutting machines are very much important to cut the glass as a large amount. As a simple pneumatic glass cutting machine could not afford much in these big industries. It works for simple glass cutting.

VIII. Methodology

The main goal of project studies is to study about pneumatic control system. Then, to study about double acting cylinder. Then, to study about the advantage of pneumatic hand operated valve. Then, to study about high speed blade. Then, to design & fabrication pneumatic glass cutting machine. Then, collecting the proper components. Then, machining them. Then, assembling the all components to a proper shape. Finally, Completion the process to make a proper pneumatic glass cutting machine.

IX. Working Flow Chart



X. **Working: This** work is based on Using PNEUMATIC system. In this project we using Double Acting Cylinder. Solenoid and Glass Cutter connected in a piston.

- Glass is clamped in a clamping device.
- Then the hoses are connected in solenoid switch. Then the hoses are connected in a Double Acting Cylinder (inlet and exhaust) from the Solenoid.
- After the hoses are fitted in a required position in a double acting cylinder for the Reciprocating motion of the cylinder.
- And then we connected Control Flow Valve to avoid the direct passage from the solenoid to Inlet and Exhaust of the Double Acting Cylinder.
- And then the required pressure bar is set to function the motion (6bar).
- Then the Cylinder engages from using the pressure bar of 3bar by controlling the 6bar using FLOW CONTROL VALVE.
- Then the small piston which is connected in the end of the piston rod from the double acting cylinder to engage in a vertical motion.
- This Reciprocating and Vertical motion is enough to engage and to make a scratch on the glass to break of it.
- After the completion of the forward stroke, then the Solenoid switch is switched ON.
- Then the Solenoid switch is engages and flow the air in to the return stroke.
- The Transmission is for making the return stroke of the Double Acting Cylinder.
- When the Solenoid is switched ON the small piston disconnects the air flow and it moves to the original position.
- So, that the scratch wont occur another time when. The Return Stroke takes place.

XI. Advantages

- Simple in construction.
- Less cost.
- High performance.
- Less time.
- Easy operation.
- It makes difficult to near impossible cuts very simple.
- The transfer of power and the speed is very easy to set up.
- Quantity of Rejection are decreased.

XII. Disadvantage

- Does not cut in other direction except linear motion

XIII. Conclusion

- Thus we have developed an “pneumatic glass cutter machine” which helps to know how to achieve low cost automation. The operating procedure of this system is very simple. By using more techniques, they can be modified and developed according to the applications.

XIV. References

1. Majumdar, S.R., 1995. Principles and Maintenance. New Delhi: Tata McGraw-Hill.
2. Chi-Neng, 2005. Design and Control for the Pneumatic Cylinder Precision Positioning Under Vertical Loading.
3. Tolomatic Pneumatic Actuators. Tolomatic. Retrieved May 3, 2011.
4. Pneumatic Cylinders-North America. Parker Hannifin. Retrieved May 3, 2011.
5. Hibbeler, R.C., 2007. Engineering Mechanics: Statics (l I ed.). New Jersey: Pearson Prentice Hall. ISBN 0-13-221500-4.
6. KMC Controls, 2013. "Air Today, Digital Tomorrow: Pneumatic to BAS Conversions". Retrieved 8 April 2013.