

FABRICATION OF PNEUMATIC SHEET METAL CUTTING MACHINE

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Abstract: - A sheet of metal is just a piece of metal that has been cut into small, flat pieces. It is one of the most basic forms used in metal processing and can be cut and bent in a wide variety of shapes. Many everyday objects are made of material. The size can vary greatly, although the largest size is considered to be a plate or leaf. The sheet has applications for car bodies, aircraft wings, medical tables, roofs (Architectural) and many more. Metal sheet and other materials with high magnetic fields, also known as galvanized steel cores, have applications for transformers and electrical equipment. There are three main processes in Layout. They are similar, equal and triangular. The main objective of our test was to learn about the air control system, to learn about a dual cylinder, to learn about the benefits of a pneumatic valve and to read at high speed.

1. LITERATURE REVIEW

There are many procedures for cutting a sheet metal. Laser metal cutting process is one of them. Many researchers have investigated by examining the effect of different process processes on different quality indicators in laser cutting of different categories of objects. Rajaram found the influence of laser power and feed power (cutting speed) on the kerf width at a laser cutting of 1.27 mm steel with a diameter of 4130. Joseph Bramah patented a hydraulic machine in 1795 while working in Bramah. Henry Maudslay suggested packing leather cup. Because of its high yields, the compressor eventually removed the moisture hammer from the metal. Hydraulic power has been widely used in the production of Bessemer steel. Hydraulic power is also used for elevators, using canal locks and rotating parts of bridges. Some of these systems continued to be used until the 20th century. Harry Franklin was named the "Father of Industrial Equipment" by ASME. [2] Pneumatics was first written by Hero of Alexandria in 60 A.D., but the idea existed before that. Air devices are used in many industrial applications.

2. OPERATION

The most common cutting procedures are performed using shaving power, so sometimes referring to shearing procedures. Cutting processes are those in which a piece of metal is separated using a force large enough to cause the tool to fail. When enough cutting power is used, the shear pressure of the content will exceed the final cutting power and the object will fail and split in the cut. This shear force is used with two tools, one above and one below the sheet. Whether these punch and die tools or the upper and upper blades, the tool over the sheet provides a quick hit on the

bottom of the metal case that sits on top of the tool below. There is a small clearance between the edges of the upper and lower tools, which helps to break the object. Cuts of cutting material as the cutting progresses and is visible at the edges of the cut material. When the punch or blade touches the sheet, the clearance between the tools allows the sheet to be paralyzed by plastic and "passed" on the edge. As the tool enters the sheet continuously, the shear creates a more precise visible surface, finally, the shear pressure is much greater and the material cracks in the corner with a small burr formed at the edges. The height of these cutting parts depends on a number of factors, including the sharpness of the tools and the removal between the tools.

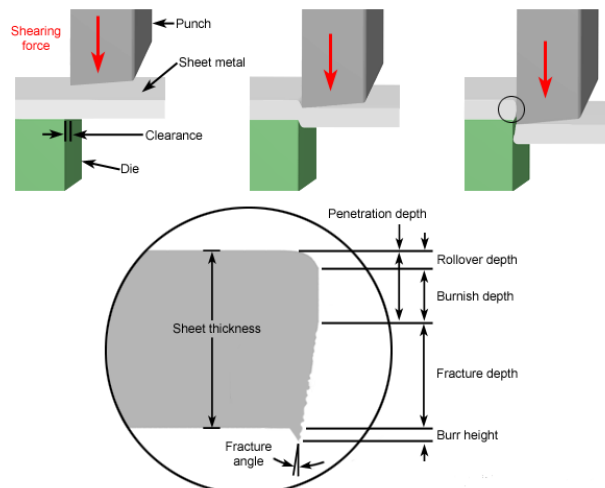


FIG. SHEET METAL CUTTING OPERATION

3. PNEUMATIC TRANSMISSION OF ENERGY

The reason for using pneumatics, or some other form of mechanical transmission, is to do the job. The completion of a task requires the use of kinetic energy in an resistant object that has caused the object to move a distance. In the air system, energy is stored in a state that may be under pressure. Operating energy (kinetic energy and pressure) leads to a pneumatic system where compressed air is allowed to increase. For example, a tank is charged at 100 psi with compressed air. When the valve is opened in the tank shop, the air inside the tank increases until the pressure inside the tank is equal to the atmospheric pressure. Air expansion takes the form of airflow. A good migration compressor basically consists of a moving member inside the house. The compressor has a moving member piston. The piston is connected to the crankshaft, which is also connected to the prime mover (electric engine, internal fire engine). In entry

and exit ports, valves allow air to enter and exit the room.

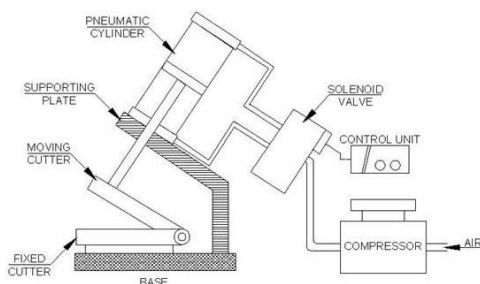
Post-Pressure Control:

In a pneumatic system, the compressor-powered energy is not usually used immediately, but is stored as potential energy in the air intake tank in the form of compressed air. In most cases, the compressor is built into the system for periodic operation. A compressor is a device that normally delivers compressed air to a reception tank until a high pressure is reached, and then shut off. When the air pressure in the tank decreases, the compressor enters and regenerates the tank. Endless compressor performance in this way is an advantage of saving system power. The standard method of sensing tank pressure and controlling the actuation and de-actuation of small compressors (2-15 HP), has a pressure switch.

4. CONSTRUCTION

The wind blade cutter is supported by a table including support arms to hold the sheet. The table also includes a side control valve. Two methods of valve control are also known as solenoid control valve. We used a directional valve on the two-way side connected to the compressor via an air pipe. The compressor has a moving member piston. The piston is connected to the crankshaft, which is also connected to the prime mover. In entry and exit ports, valves allow air to enter and exit the room. When the compressor is turned on, the compressed air flows into the air cylinder. The sheet is inserted between the upper and lower hem. The lower navel remains upright while the upper navel is forced to lower. The upper blade is slightly removed from the lower blade, approximately 5 - 10% of the sheet size. And the upper blade is usually suspended so that the cutting can continue from one side to the other, thus reducing the force required. When the air valve working with the solenoid valve is moved forward, the piston begins to move forward. The extra wire forced against the sheet, cuts the tool. When the wind-operated oar is pushed back, the upper blade will come to the starting point (i.e., the upper blade will move upwards) .After the material is cut, adjust the pneumatic hand operated solenoid valve to the middle position (ie, normal position). then the compressor is turned off.

DIAGRAM



5. DATA ANALYSIS & RESULTS

CYLINDER THRUST

Cylinder thrust for double acting in forward stroke.

Then,

Cylinder thrust for double acting in return stroke - $F = (\pi / 4) \times (D - d) 2 \times P$

where D = Diameter of bore in mm.

P = Pressure in bar. (1 bar = 0.1N/mm²)

d = Piston rod diameter in mm.

THEORITICAL AIR CONSUMPTION

$$C = \{(\pi / 4) \times D^2 \times (P + 1) \times L\} / 1000$$

when, P = pressure in the bar

D = Bore diameter in cm.

L = Length of stroke in cm.

The maximum air consumption of our air conditioner was, C = C = 22.85litres.

SHEET METAL CUTTING FORCE

$$\text{Cutting power} = L \times S \times T_{max}$$

Removal power = 10% -20% cutting power

L = Length of items to be determined in mm

Thickness = Thickness of the sheet in millimeters

T_{max} = Shear strength at N / mm²

T_{max} = 80% of strength is strong

6. CONCLUSION

Air systems are used to control train doors, automatic production cables, and mechanical ties. The metal sheet cutting process is a major part of all industries. The metal cutting machine is usually hand-operated by one of the medium and small industries. The metal cutting machine works with the help of a pneumatic double acting cylinder. The piston is connected to a moving cutting tool. A steel cutting machine can be used to cut a small weight metal without having to work hard. The machine can also be installed on a test board and displayed to engineering students. In this project I have tried my best to build a metal cutting machine that can cut metal into small pieces.

REFERANCES

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[2] P.M.Pradhan, “Experimental Investigation and Fabrication of Pneumatic Cutting tool”, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 6, June 2013.

[3] <http://engelectric.blogspot.com/2013/pneumatic-system-2.html>