International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Design and Manufacturing of Pneumatic Burr Removing Machine

Kakde D V[1], Lokawar V L[2]

[1]B.E. (Mechanical), Lecturer, MGM's Polytechnic Aurangabad, Kakde

[2]B.E. (Mechanical), Lecturer, MGM's Polytechnic Aurangabad

Abstract: ***Many machines today are using of electrical, hydraulic and pneumatic component as a source of system. So, to gain skills and knowledge on how to develop machine, this paper are recommend. With the title of "Design and Manufacturing of Pneumatic Burr Removing Machine", there are many requirements to know such as function of pneumatic component the purpose of this paper is making Burr removing machine for application of wheel clutch. The greatest advantage of Pneumatic punches is their speed. Pneumatic punches are approximate 10 times faster than hydraulic punches and they can perform many jobs faster and more efficiently. They can also be stopped at any time by opening the valves to release the air. Pneumatic punches are extremely flexible, that they can be placed in a factory in any required position, even upside down. The objective of this paper is to manufacture a pneumatic punching machine which is necessary for removing the burrs present in the holes of any casting product which saving the manufacturing lead time in the process and also system is worker safety, By using this system the productivity is also increases***

Keywords: Pneumatic, Burr, Flexible, Manufacturing, Design, Clutch, Productivity

1. Introduction

Pneumatic systems operate on a supply of compressed air. Compressed air must be made available in sufficient quantity and at a pressure to suit the capacity of the system. When the pneumatic system is being adopted for the first time, however it wills indeed the necessary to deal with the question of compressed air supply. The key part of any facility for supply of compressed air is by means using reciprocating compressor. A compressor is a machine that takes in air, gas at a certain pressure and compresses the air & delivered the air at a high pressure.

This project is study about the design and fabricates of pneumatic burr removal tool which shows capability to design more than one concept and fabricate the machine using a variety of machine. Other than that, it is important to studies on pneumatic and die for punching tool which are the main topic for this project. So, at the end of this project, we will practicing on how to build and steps to follow to complete the requirement for this project.

This project are also provided to familiarize to us about the technology on sheet metal forming which is used pneumatic concept yet has rapidly grown especially in the automotive and electrical industry. Furthermore, the strong concern is to obtain better product quality with lower cost. Then, cutting and punching are two important processes in the sheet metal industry; the former is flexible in processing while the latter is effective in production. To combine the advantages of both, the so-called combination machines that combine the cutting and punching processes are used in sheet metal processing. Using pneumatic systems is economical and environmentally friendly, as air is inexpensive, plentiful and easily compressed and stored in tanks.

In this project we use the pneumatic punching principle, there is we use burr removing tool instead of punches, and remove the burr. Punching is a metal forming process that uses a punch press to force a tool, called a punch, through the work piece to create a hole via shearing. The punch often passes through the work into a die. A scrap slug from the hole is deposited into the die in the process. Depending on the material being punched this burr may be recycled and reused or discarded. Punching is often the cheapest method for creating holes in sheet metal in medium to high production volumes. When a specially shaped punch is used to create multiple usable parts from a sheet of material the process is known as blanking. In forging applications the work is often punched while hot, and this is called hot punching.

Punch tooling (punch and die) is often made of hardened steel or tungsten carbide. A die is located on the opposite side of the work piece and supports the material around the perimeter of the hole and helps to localize the shearing forces for a cleaner edge. There is a small amount of clearance between the punch and the die to prevent the punch from sticking in the die and so less force is needed to make the hole. The amount of clearance needed depends on the thickness, with thicker materials requiring more clearance, but the clearance is always less than the thickness of the work piece. The clearance is also dependent on the hardness of the work piece. The punch press forces the punch through a work piece, producing a hole that has a diameter equivalent to the punch or slightly smaller after the punch is removed. All ductile materials stretch to some extent during punching which often causes the punch to stick in the work piece. In this case, the punch must be physically pulled back out of the hole while the work is supported from the punch side, and this process is known as stripping. The whole walls will show burnished area, rollover, and die break and must often be further processed. The slug from the hole falls through the die into some sort of container to either dispose of the slug or recycle it.

2. Literature Survey

1) According to A.S. Adityapolapragada, K. Sri varsha sthe pneumatic press tool has an advantage of working in low pressure, that is even a pressure of 6 bar is enough for operating the unit. The pressurized air passing through the tubes to the cylinder, forces the piston out whose power through the linkage is transmitted to the punch. The work piece thus got is for required dimensions and the piece can be collected through the land clearance provided in the die. The die used in this is fixed such that the die of required shape can be used according to the requirement. This enables us to use different type punch dies resulting in a wide range of products. Different types of punch as requirement can be thus got. According to the work material the operating pressure can be varied

2) Arun S, sreerajendra and vijayavithalbongalestated thatThe proposed work describes the design and fabrication of prototype of automatic punching machine controlled by PLC and shedding light on the working principle and the hardware structure of the system. Punching or pressing process is one of the most important and necessary processing step in sheet metal industry. By automating this process one can have a greater control over the process. Programmable Logic Controllers are used for the control of the system. This system can replace existing manual feed and operated punching and pressing machines. By interfacing PLC controls with the conventional machines, it is possible to achieve good results in the form of reduced manufacturing lead time, reduced cost and increased safety of the worker.

3. Working

When the system starts working, the hold the work piece in fixture provide at the bed. Then supply the compressed air to the system. When compressed air is supplied the air going through various sections i.e. from FRL unit, direction control valve & finally to the actuator.

When the air is supplied from top side of the actuator then the piston start to move in forward or downward direction and hence the punch holder & punches attached to it are moves in that direction automatically, and hence the burr removal process is done in forward motion.

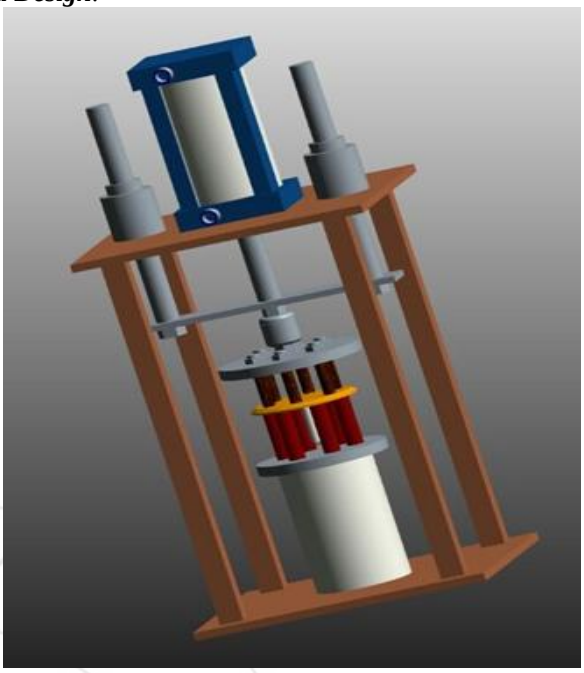
Now we have to remove the work piece from the fixture so we have to return the piston in upward direction, so we have to supply the compressed air from the bottom side of the cylinder. For this we have to change the position of the direction control valve. Then the direction control valve change the flow direction and supply the air to bottom side, hence the piston start to move in upward direction.

After that we replace another work piece and done the same procedure.

From that process the time required for the burr removing is less as compared to the manually burr removing process. And also the operation is very safety to the workers. And also increases the accuracy and also increases the productivity.

4. Model and Specification of Components:

Cad Design:



Specification of Components

Sr. No.	Name of Material	Specifications of Material
1	Pneumatic cylinder	**Cylinder Tube:** bore of 80 mm seamless honed & hard chrome plated steel tube is used **Piston Rod:** High tensile steel, Ground & hard chrome plated. Stroke: 125 mm **Seals :** Buna "N" (Nitrile elastomer) **End cover & piston:** Close grained cast iron
2	Hand lever	Hand lever: 5 x 2 hand lever Operating on: air
03	Connectors	ID: 12 mm Tube size: 10 mm
4	P-U tube	Material: Polyurethane ID: 10 mm OD: 13 mm
5	M S plate	Material: M. S. Dimensions: 250 mm x 250 mm Thickness: 8 mm
6	Square bar	Material: BRIGHT M. S. Dimensions: 20 mm x 20 mm Thickness: 400 mm
07	Round bar (M S bright)	Material: BRIGHT M. S. Dimensions: 20 mm length: 250 mm
8	M S plate (flat)	Material: M. S. Dimensions: 40 mm x 200 mm Thickness: 8 mm
9	Nut / bolts	8 mm / 10 mm / 12 mm
10	Allen key	3 mm / 4 mm
11	Round plate (M S)	Material: BRIGHT M. S. Dimensions: 60 mm Thickness: 10 mm
12	Roller bearings	ID: 20 mm OD: 32 mm
13	Round bar (M S Bright)	Material: M. S. (bright) Dimensions: 20 mm x 200 mm

5. Design Calculations

5.1 Force Calculation Of Cylinder

(Reference: Machine design by R S Khurmi& J K Gupta) ……..[6]
Cutting Force= Area * Shear Stress = ∏*27*0.7*55.2
=3277.56 N
Stripping Force= 10% To 20% Of Cutting Force
F= 491.63 N
Press Force = Cutting Force + Stripping Force
= 3770 N

5.2 Cylinder Design

Working Pressure of the compressor= 7 bar …….[3]
FORCE = AREA * PRESSURE
Hence the Dia. Of cylinder is= 80 mm
PISTON ROD DIA.= 21 mm
Stroke length = 125 mm
cylinder thrust,
For forward stroke = Area* pressure
=3770 N
For return stroke = 2086.84 N

5.3 Punch Specification

The outer punch size is 8mm
The smaller punch size is 5mm
The inner biggest punch size is 29.5mm

6. Conclusion

We have done this project in the MADHURA DIE-CASTING PVT. LTD. For the removal of burr from the wheel clutch. By implementing this project we conclude that the process is become faster & productivity is increases by 1320 pieces, also they have saving the cost of wages which they have pay to the worker because there is the reduction of worker, before implementation of project they require 3 workers and after implementation of project require only 1 worker. They saves the cost approx per month Rs. 18000/-

References

[1] A.S. Adityapolapragada, K. Sri varsha-“Pneumatic auto feed punching and riveting machine”
[2] Arun S, sreerajendra and vijayavithalbongale - “Automatic punching machine: A low cost approach” vol-4 (2014)
[3] A. K. Gupta, P. Bharadwaj, S. Sahgal, P. M. Pradhan - “Experimental investigation and fabrication of pneumatic punch” Vol-2, issue 6, june 2013.
[4] M.J. Lawrence, D. R. Buckmaster, W. J. Lamont, jr.-“A pneumatic dibbling machine for plastic mulch”
[5] K. Shanmugasundarama, M. Prakashb- “Study on impact of cad / cam tools on production of punched cards by indian silk saree designers for handloom industry”
[6] R S Khurmi& J K Gupta- A text book of “ Machine design” vol-1.