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## AUTOMATED PNEUMATIC SHEET METAL CUTTING MACHINE

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**Abstract:** *One of the major challenges in innovating manufacturing process is to make a equipment or system affordable and as well as compatible for small industries and large scale businesses. Already existing traditional machinery is bulky and expensive which small scale industries can neither accommodate and nor can afford. Traditional machinery requires large capital investment and work force. This machineries have some basic flaws like to increase the production you either need more machines or skilled work force (or both). In this paper, we propose a small but efficient pneumatic metal cutting machines that can be automated using simple microcontrollers. Our machines uses simple fabrication and easily available but good quality parts which makes or machinery efficient and easily affordable for small industries or home based businesses.*

**KEYWORDS:** *Automated, Pneumatic, Sheet metal cutting machine.*

### I INTRODUCTION:

Today's world is more practical and thinks more of cost reduction, so the punching process for sheet-metal has to be done in economical way of operation, easier implementation for mass- production, as well as greater control on the other technical parameters. In most of the sheet metal operations punching is the main operation in the process sequence. Automating this operation results in reduced time and also can reduce human effort. Automation is a process in which combination of mechanical work, electronic work is carried out. Automation systems to operate and control production with help of computer and commanding software. The reason for automating this process may be to reduce manufacturing lead time, to increase labor productivity or to improve the worker safe. In these unit high-pressure air is used to move piston with required pressure and piston consist of punch with modified design to punch sheet metal into required shape and size. Thin and flat pieces of sheet metal are then obtained. It is one of the fundamental forms used in metal working and can be cut and bent into variety of different shapes. Sheet metals are available in flat pieces or as a coiled strip. Sheet metals has wide range of applications in car

bodies, airplane wings, medical tables, roofs of buildings and many other things.

### II PROBLEM STATEMENT:

In traditional pneumatic punching machine all operation is controlled manually and due to this the production rate is reduced and due to this the accuracy of the product may be reduced. In traditional pneumatic punching machine, the lot of time is wasted in to change the setting of the machine for new pitch distance. To overcome the above problem then the solution is to use the CNC Punching machine but the cost of the CNC Punching is high and the small-scale industries cannot afford the cost of the CNC Machine.

### III LITERATURE REVIEW:

A lot of researchers have worked on pneumatic systems as well as on sheet metal experiments. The work done by various authors are explained below.

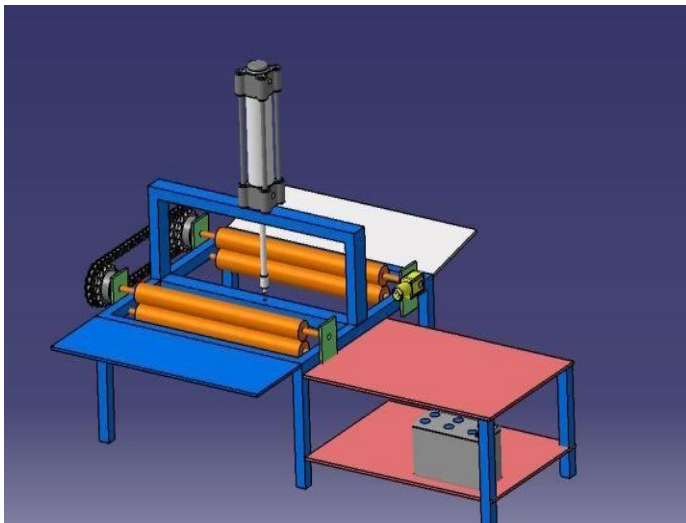
Pneumatics was first documented by Hero of Alexandria in 60 A.D., but the concept had existed before then. Vallance and Matlock (1992) studied the friction behavior of zinc-based coated sheet steels and laboratory scale friction

analysis techniques that involve sheet sliding over cylindrical dies.

Sanchez et al. (1999) has focused on systematic analysis of testing equipment as a measurement system of the friction phenomenon on sheet metal under plain strain. It has also provided experimental reference in order to optimize the usage of sheet metal and lubricants.

Mutoh et al. proposed that the exhaust pressure of the cylinder hold middle level is 0.2-0.5 MPa. If the exhaust flow is used effectively, losses can be reduced in pneumatic systems. If the exhaust pressure is set near 0.2 MPa, it reduces the losses by 15% of total consumption.

**Concept:**



**WORKING PRINCIPLE:**

The sheet metal will be fed through feed rollers. The gear arrangement on the rollers is meshed with the DC motor, which feeds the sheet. The inductive proximity switch/sensor will be used, it detects the metal sheet and also records the sheet length as the sheet passes over it. After detection, these informations are sent as a input to the microcontroller circuit containing series of relays. The microcontroller carries out the computations according to the coding done on it.

**IV CONCLUSION:**

1. By using modified die and punch we reduced punching force.
2. By automation using micro-controller we reduce the time required for setup of pitch distance.
3. Due to automation we successfully increase accuracy and productivity of machine by reducing time required to process metal sheet from 1-1.5 min to 10 sec.
4. By our this project we successfully made a machine which is affordable as well as compatible for small scale businesses under 10 to 12 thousands.

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