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PNEUMATICALLY OPERATED SPRING RETURNED PISTON CYLINDER SHARING MACHINE

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ABSTRACT

The major concept behind this kind project is to minimize the effort required by human and simultaneously to reduce the time consumption for completing work. For achieving that criteria we are selected the pneumatically operated machine. In our mechanism pressurized air is considered as the working medium. Due to pressurized air which created the motion to spring piston in the cylinder for sheering work. By placing the required sized sheet over the stationary blades and supply the high compressed air in the cylinder to move the spring piston. The main advantage in this type is because of spring attachment the return movement of the piston is done by the spring action hence the quantity of compressed air requirement for return motion is reduced simultaneously the air is one again compressed during return motion of the piston. There four instead leaving the air into atmosphere we can store that air by proving proper path. The air is freely available source, its cleaning and machine maintenance is also easy and less expenditure to operate. But highly loading is not possible as compared to hydraulic but its very useful for small scale industry and workshops.

Keywords: Pneumatic System, Spring Return Piston Cylinder, Actuator, Control Valves, Solenoid Valve.

I. INTRODUCTION

The establishment of any kind of business or industry is started implementing the basic thought of the concept. The achievement in the progress of business is selective quality methods applied efficiently. By continues observation, periodic checking and feedback rectification is leads to positive growth, Based on that concept the new designs. technology changes and new methodologies come into existence.

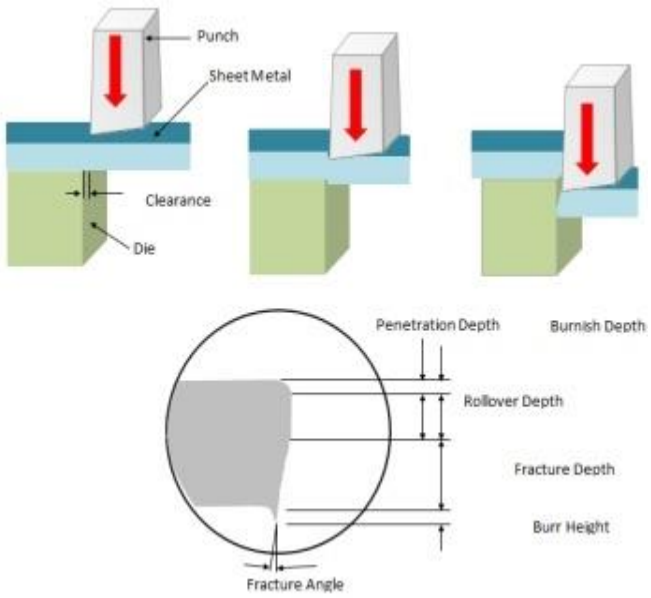

Fig 1: Sharing Operation

The Pneumatic components are widely used in industry because of its maintenance cost, operating features. It is majorly applicable in the small scale sectors for continues and effective working purpose. Compare to the hydraulic system its running cost and maintenance is very low. The working medium also obtained easily and its cleaning process is also very easy and simple process. The air compressors are used to pressurize the normal air in order to obtain higher positive results in the Pneumatic devices. For converting the high

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pressurized air into mechanical motion of the piston by adopting the actuators. The actuator design which specifies the type motion of the piston in the cylinder.

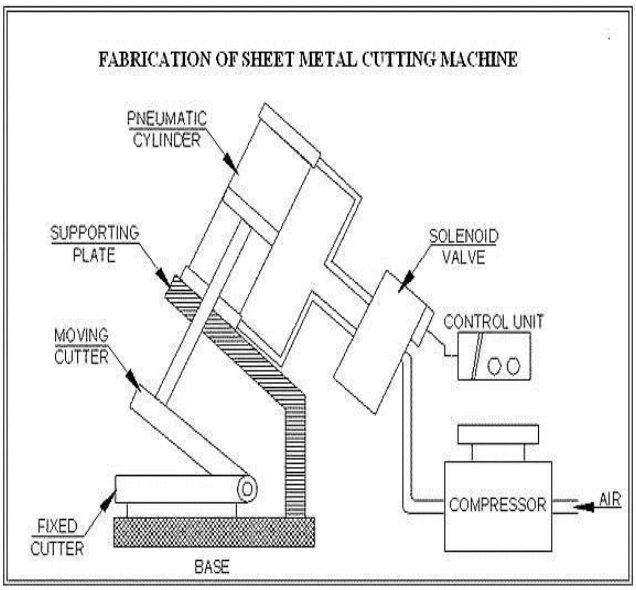

Fig 2: Pneumatic Sharing Process layout

II. LITERATURE REVIEW

In the sheet forming process is carried out by different mechanisms in that sheet bending is technique is most frequently used method. The bending of sheets is major application work in the small scale industries, it is categorized into mainly 2 purposes ie., initially considering the estimation of possibilities of spring back effect in the design parameters of the Die and profile control. And another criteria is calculation of bending effect due to vertical force in order to choosing the press strength, Stress analysis and profile of the dies.

Vallence and Mat1ock (l992) researched on the rubbing performance of zinc-grounded layered pane steels & test center gauge rubbing investigation performances which encompass pane gliding around the cylinder-shaped dies.

May Huoang and Gradeen (l994) given the assessment on the double curve shaped metal sheet circumference subjected to the spring back effect. Also given the in detail appendix of the spring back formation in the metal sheets.

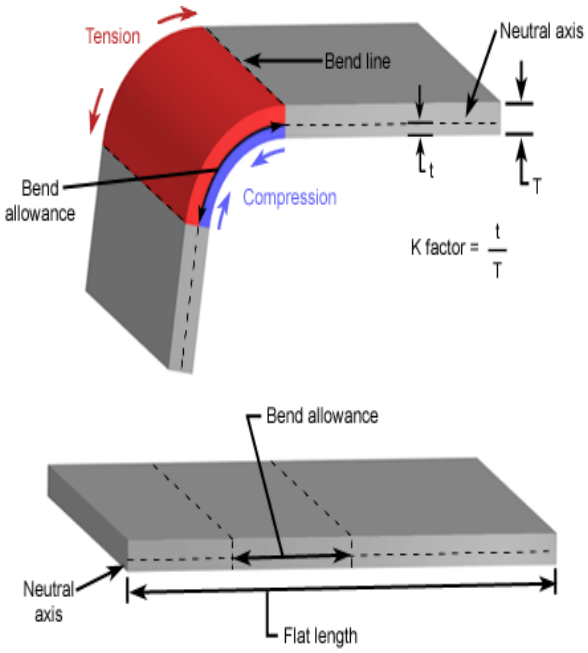

Fig 3: Bending Process

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Shanchez (l999) was concentrated on the effective performance over the components analysis by considering the rubbing parameter between the objects under the development of straining effect is measured. By considering the strain parameter during the experiments information to selecting the required types of lubrication system and lubricants in the metal sheets.

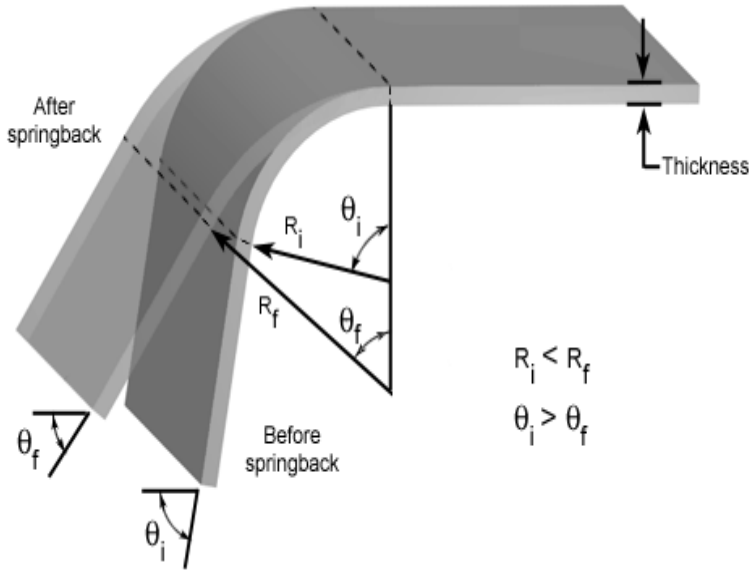

Fig 4: Spring Back Effect

Shamuel (2000) conducted the experimental analysis by selecting the symmetrical co-axis in spring back subjecting to the U shaped bending method by adopting the Finite Elemental Process and submitted the possible effects created in the profile of the tooling and possible load for getting the final shape of the blank holder by considering the spring back effect.

III. METHODOLOGY

The cutting the sheet metal is done by different approach, the selection of methods is depending upon the type material, type of load application and some other cost parameters also. In our project we are selected the Pneumatic type with double acting spring supported piston cylinder. The cutting action of the tool is directly connected to the piston movement. The type of sheet is to be shared is mainly depend upon the force obtained by the cutting blades from the piston. For our proposed system is suitable for small load applications operated by the Pneumatic compressed air. The pneumatic system mainly contains double acting spring supported piston cylinder, solenoid valves, direction control valves and flow control valves along with timing circuit. Metal sheet sharing is one of the basic need in the industry for any kind of operation.

The cutting of sheet is done in the initially by manual process later up gradation the technology to minimise the efforts applied by the humans is reduced by selecting hydraulic and pneumatic type of machines. In the pneumatic system by using the piston, cylinder, solenoid valves, directional and flow control valves etc.

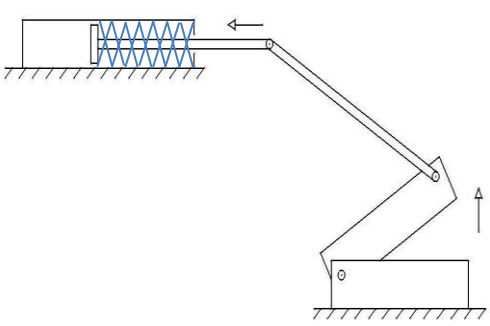

Fig 5: Initial Position on Piston in Cylinder

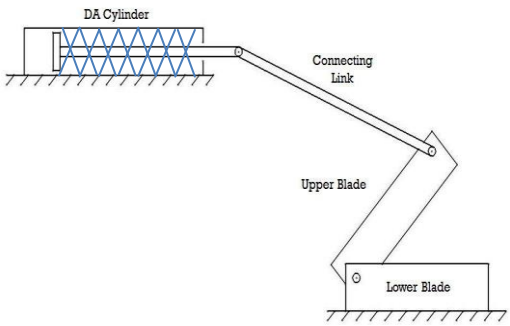

Fig 6: Middle Position on Piston in Cylinder

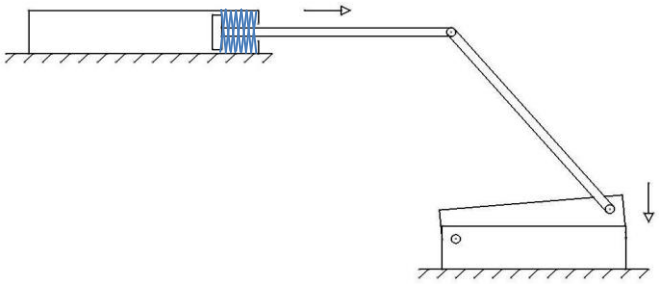

Fig 7: End Position on Piston in Cylinder

IV. WORKING PRINCIPLE

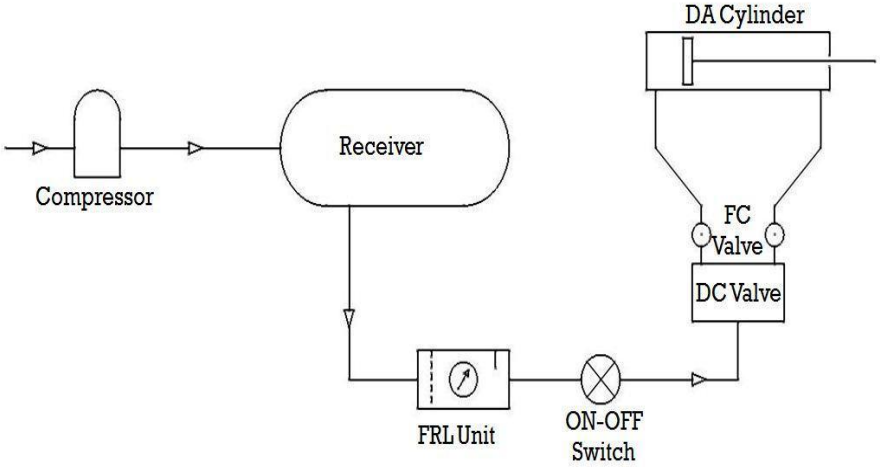

Fig 8: Circuit Diagram of the Pneumatic Process

The air is sucked from the atmosphere into the compressor and then the air subjected the compression and its pressure and temperature increases drastically. That compressed air is supplying to the cylinder where the piston subjected to the forward force and it starts moving towards right side this is called cutting stroke of the operation made by the blade. While the return stroke the spring which place major role in order to save quantity required for air for returning the piston backward motion by operating the control valves and direction valves. By continues operation the sheet metal will cuts as per the required length.

Specifications of the parts

1. Pneumatic Cylinder-

Qnty: 1

L: 350mm

D: 40mm

l: 200mm

d: 20mm

P: 10 bar

Wt: 3kg.

2. DC Valve-

Qnty: 1

Operating: Manual

No. of Ports: 5

No. of Positions: 3

3. Pneumatic Pipe-

L1: 3000mm

d1: 8mm

t: 1mm .

4. Fork End Nut-

Qnty: 2

L2: 16mm

d3: M16

5. Cylinder Bottom Plate Bolts-

Qnty: 4

L3: 32mm

d4: M6.

6. Blade Fixing Bolts-

Qnty: 3

L3: 25mm

d5: M10.

7. Connecting Rod Bolts-

Qnty: 2

L4: 45mm

d6: M6

V. STRUCTURE DESIGN

Dimensions of the components

1. Structure Frame: 1000 × 250 × 250 - mm (1 Qnty).

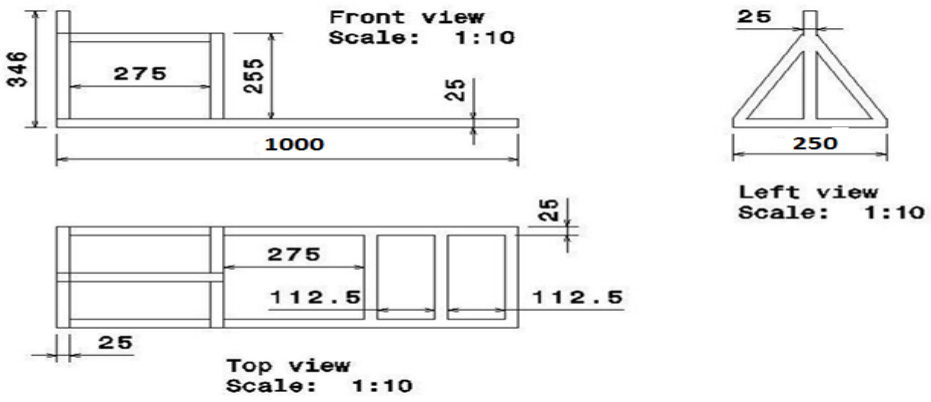

Fig 9: Structure Frame

2. Cutting Blade: 250 × 60 × 12 - mm (2 Qnty).

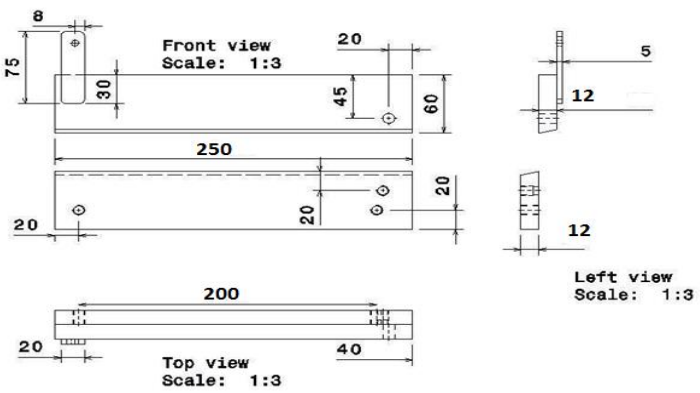

Fig 10: Cutting Blade

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3. Fork Model: 60 × 20 × 5- mm (1 Qnty).

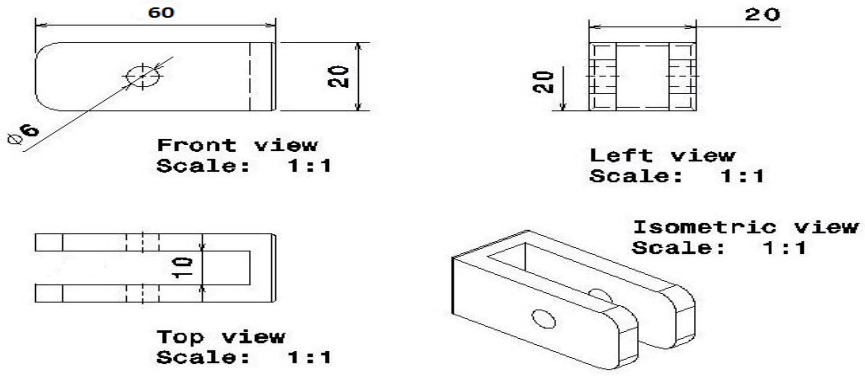

Fig 11: Fork Model

4. Slant Section: 250 × 45 × 40- mm (1 Qnty).

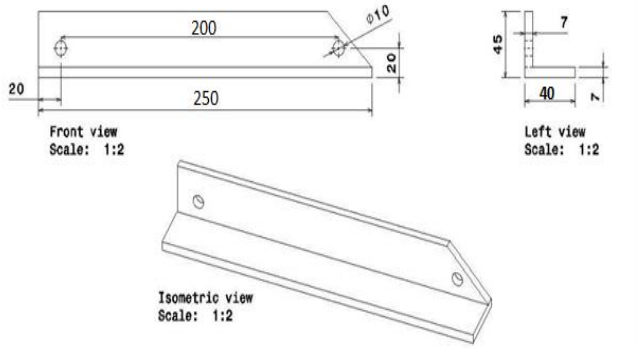

Fig 12: Slant Section

5. Connecting Rod: 340 × 25 × 6 - mm (1 Qnty).

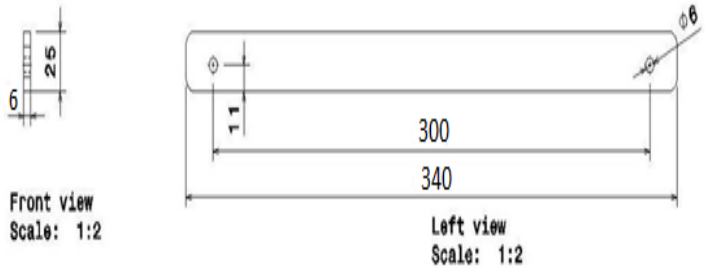

Fig 13: Connecting Rod

6. Supporting Bar: 90 × 20 × 8- mm (2 Qnty).

Quantity: 2

Height: 90mm

Width: 20

Thickness: 8

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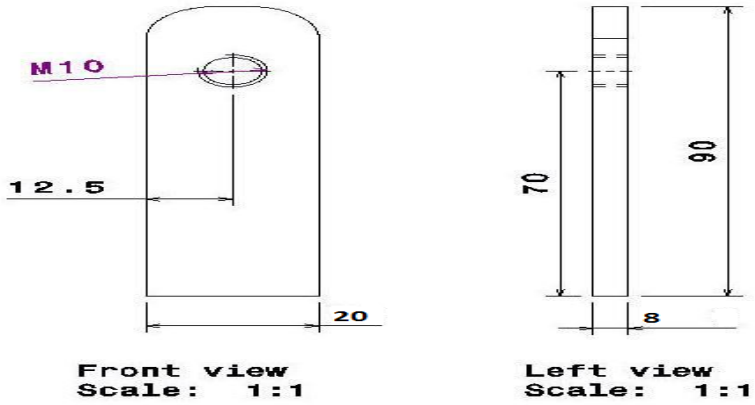

Fig 14: Supporting Bar

VI. CONCLUSION

Our proposed project is running effectively and its performance is good. This is very useful in the small scale industry and workshops for continues working purpose. The size of the sheet cutting is mainly depends upon the pressure supplying into the system. For higher cutting operations piston should provide greater movement to the cutting blades. The pneumatic systems are comparatively cheaper than the hydraulic systems. By providing the spring return mechanism which reduces quantity requirement of compressed air for the operation.

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