A PROJECT REPORT

ON

“ AUTO-FEED HYDRAULIC CUTTING MACHINE ”

Submitted by

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In partial fulfillment for the award of the Degree

Of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

UNDER THE GUIDANCE

Of

Prof. Atul Mesharm

DEPARTMENT OF MECHANICAL ENGINEERING

ANJUMAN-I-ISLAM

KALSEKAR TECHNICAL CAMPUS NEW PANVEL,

NAVI MUMBAI – 410206

UNIVERSITY OF MUMBAI

ACADEMIC YEAR 2016-2017

ANJUMAN-I-ISLAM

KALSEKAR TECHNICAL CAMPUS NEW PANVEL

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CERTIFICATE

This is to certify that the project entitled

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To the Kalsekar Technical Campus, New Panvel is a record of bonafide work carried out by him under our supervision and guidance, for partial fulfillment of the requirements for the award of the Degree of Bachelor of Engineering in Mechanical Engineering as prescribed by **University Of Mumbai**, is approved.

Project co-guide	**Internal Examinar**	**External Examiner**
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APPROVAL OF DISSERTATION

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(Internal Examiner) **(External Examiner)**

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Date: _____

ACKNOWLEDGEMENT

After the completion of this work, we would like to give our sincere thanks to all those who helped us to reach our goal. It's a great pleasure and moment of immense satisfaction for us to express my profound gratitude to our guide **Prof. Atul Meshram** whose constant encouragement enabled us to work enthusiastically. His perpetual motivation, patience and excellent expertise in discussion during progress of the project work have benefited us to an extent, which is beyond expression.

We would also like to give our sincere thanks to **Prof. Zakir Ansari**, Head Of Department, **Prof. Atul Meshram**, Project Co-Guide and **Prof. Shaikh Rizwan**, Project co-ordinator from Department of Mechanical Engineering, Kalsekar Technical Campus, New Panvel, for their guidance, encouragement and support during a project.

I am thankful to **Dr. Abdul Razzak Honnutagi**, Kalsekar Technical Campus New Panvel, for providing an outstanding academic environment, also for providing the adequate facilities.

Last but not the least I would also like to thank all the staffs of Kalsekar Technical Campus (Mechanical Engineering Department) for their valuable guidance with their interest and valuable suggestions brightened us.

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ABSTRACT

In industries, the heavy hydraulic cutting machines are used which are so costly and small industries can’t afford it. To reduce its cost we have designed the low cost hydraulic cutting machine by sacrificing the thickness of sheet metal cut.

We also have reduce the effort of one skilled worker which is required for pulling the cutter handle to cut sheet metal and safety of operator is also considered in design by adding the sensor which detects hand if comes in the cutter then operation gets terminated.

TABLE OF CONTENT

INTRODUCTION

Hydraulic machinery and tools that uses liquid fluid power to do simple work. Heavy equipment a common example. In this type of machine, hydraulic fluid is transmitted throughout the machine to various hydraulic motors and hydraulic cylinders and which becomes pressurized according to the resistance present. The fluid is controlled directly or automatically by control valves and distributed through hoses and tubes. The popularity of hydraulic machinery is due to the very large amount of power that can be transferred through small tubes and flexible hoses, and the high power density and wide array of actuators that can make use of this power. Hydraulic machinery is operated by the use of hydraulics, where a liquid is the powering medium.

PROBLEM DEFINATION

In small industries, most of the work is carried out manually either by hand operated cutter or by scissor because they cant afford high costly hydraulic machines. For their range of investments, we have told to make such a machine which can cut upto 3mm of Mild Steel for small scale industries.

For designing the low cost hydraulic cutting machine, we have to sacrifice the sheet metal thickness. So we decided to make such a machine which is partially automatic and can be made fully just by adding some sensors and programming the circuits.

To manufacture a machine capable of cutting sheet metals exclusively mild steel (M.S.) upto 3mm.This machine will be combination of conventional manual cutting machine and hydraulic system. Hence, it will be operated in semi automatic mode using only switches and control valves eliminating manual work.

LITERATURE SURVEY

In shearing or cutting operation as or blade descends upon the metal, the pressure exerted by the blade first cause the plastic deformation of the metal. Since the clearance between the two blades is very small, the plastic deformation takes place in a localized area and the metal adjacent to the cutting edges of the blade edges becomes highly stressed, which causes the fracture to start on both sides of the sheet as the deformation progresses and the sheet is sheared.

Types of shearing Machine:

1) Hydraulically operated

2) Pneumatically operated

3) Rack and pinion operated

4) Spring operated

Brief description of all the types is as follows.

1) Hydraulically operated:-

Here the lowering and raising of the header is carried over using the hydraulic piston and cylinder arrangement. To actuate the piston and cylinder, the oil is allowed to enter the cylinder from front or the back side of the piston. In this type of machine high pressure oil is used as the working fluid for the transfer of power and the motion. The advancement of the header is carried out in the upward and the downward direction using the hydraulic double acting piston and cylinder unit arrangement along with the foot operated direction control valve.

2) Pneumatically operated:-

Here the advancement of the header is carried out in the upward and the downward direction using the pneumatic double acting piston and cylinder unit arrangement along with the foot operated direction control valve. In this type of machine high pressure air is used as the working fluid for the transfer of power and the motion.

3) Rack and pinion operated:-

Here the lowering and the raising of the header are carried out manually using the rack and pinion arrangement. In this case the required pressure is applied manually using direct hand pressure on the rack using pinion and lever arrangement. Since the machine is robust and requires large pressure, hence it is not suitable.

4) Spring operated:-

The working of spring operated machine is similar to the rack and pinion operated machine but differs from it in construction. Here the lowering and the raising of the heating handle are carried out manually and it requires too much pressure for its operation and also there is possibility of having damage to the work piece if not handled carefully.

Since hydraulic operated cutting machine is used for heavy cutting and suitable for large thick sheet metal. As we were making automatic feeding mechanism attached to it so that it must cut thick sheet metal other wise for small thickness sheet metal cutting, it would be not suitable. Hence, we opted for hydraulic cutting machine.

MATERIAL SELECTION

To prepare any machine part, the type of material should be properly selected, considering design, safety and following points. The selection of material for engineering application is given by the following factors:-

- Availability of materials
- Suitability of the material for the required components
- Suitability of the material for the desired working conditions
- Cost of the materials

In addition to the above factors the other properties to be considered while selecting the material are as follows :-

Mechanical Properties: These properties are color, shape, density, thermal conductivity, electrical conductivity, melting point etc.

Physical Properties: The properties are associated with the ability of the material to resist the mechanical forces and load.

Strength : It is the property of material due to which it can resist the external forces without breaking or yielding.

Stiffness : It is the ability of material to withstand the deformation under stress.

Ductility: It is the property of material due to which it can be drawn into wires under a tensile load.

Malleability: It is the property of material which enables it to be rolled into sheet.

Brittleness: It is the property of material due to which it breaks into pieces with little deformation.

Hardness : It is the property of material to resist wear, deformation and the ability to cut another material.

Resilience : It is the ability of the material to store energy and resist the shock and impact loads.

Creep : It is the slow and permanent deformation induced in a part subjected to a constant stress at high temperature. We have selected the material considering the above factors and also as per the availability of the material.

The materials which cover most of the above properties are

MILD STEEL :-

Why steel in particular?

Mild steel contains approximately 0.05–0.25% carbon making it malleable and ductile. Mild steel has a relatively low tensile strength, but it is cheap and easy to form; surface hardness can be increased through carburizing. It is often used when large quantities of steel are needed, for example as structural steel.

In the States, "mild steel" refers to low carbon steel; typically the AISI grades 1005 through 1025, which are usually used for structural applications. With too little carbon content to through harden, it is weldable, which expands the possible applications.

Properties :

Tensile strength = 44.54 kgf/mm

Yield strength = 28 kgf/mm

Hardness = 170 BHN

METHODOLGY

Literature of design : -

Initial survey of design was done on internet and actual visit to the manufacturing companies which make the hydraulic machineries. This whole thing was then clubbed to the process of designing.

Preliminary Design: -

A preliminary design was made which was based on operation to be performed and literature study. This design was later been validated by our guide considering all the parameters.

Improvements in design : -

The design which was made in preliminary stage went through certain changes when fabrication process was carried out. Due to some technical reasons the component which was fabricated was changed and in turn there was a change in the design.

Finalized Design: -

The manufacturing setup thus went through some changes in its design and the final setup was made as per the design

Procurement of Components (Buying) :-

According to our design, we selected 12 inch shearing cutter having capacity of twice that of our need and then we purchased the components after doing market survey from various location. We have purchased the Actuator (Market name is cylinder) from Darukhana place where the old things are being sold in cheap prices.

We bought the shearing cutter with 12 inch length blade from Chor Bazar because its cost is low in the Chor bazar market.

Operations Done For Big components :

By considering or design, we bought raw materials such as rectangular plate of 10mm thick of Mild Steel material of length 100 * 60 * 10 cm. Then we cut it to make upper body by gas cutting to L Shape for our upper design of machine.

We made trolley for making this mobile, easily movable. We took the plates of 8 mm thick MS Plate and cut it into desired dimension then we have welded it according to our rough design and fitted the roller wheel for moving the trolley.

Assembly of components :-

We have assembled the L-shaped 10mm thick MS plate on the top of cutter for mounting of the cylinder keeping the weight on both side equally. We made holes on the plate so that we can attach the cylinder by nut and bolt.

Since our Mounting of cylinder diameter was too large, we attached the bearing and bush for reducing its diameter so that our nut bolt should get fixed in it.

CALCULATION FOR DESIGN

Since our cutting operation is by shearing like scissor, so the cutting process will carry out step by step small small. Let's consider first the shearing is done of 5mm then carried out until 120mm. Hence we take length of cut as 5mm.

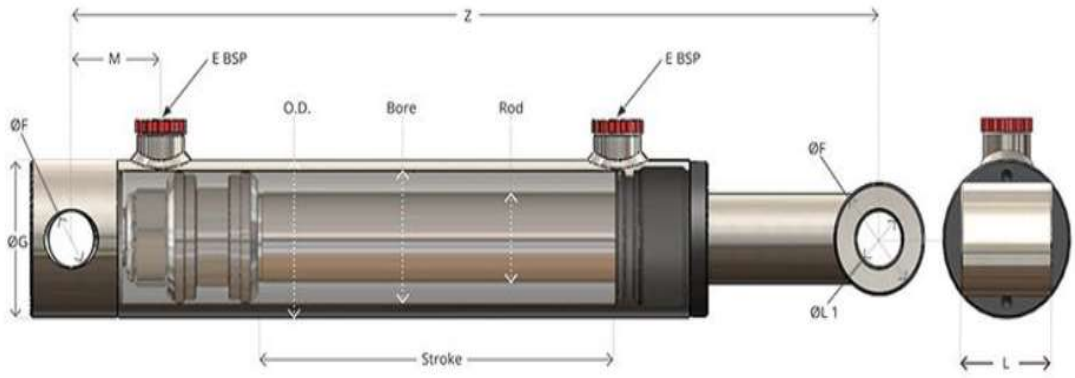


Fig. Hydraulic Cylinder

Lets consider mild steel because it is available in the market and maximum utilized in industry.

SHEET METAL MATERIAL	Mild Steel
THICKNESS	3mm
LENGTH OF CUT	120mm
STRENGTH OF M.S.	125 N/mm2

Now, **Force required to cut the MS sheet metal of thickness 3mm** is calculated below:

Force = (Shear stress) * (Area of cut)

Force = (Shear stress) * (Length of cut * Thickness)

But since the action of cutting blade is like scissor so it will cut in parts small by small. So we consider length of cut to be 5mm

Force = 125 * (5 * 3)

Force = 1875 N

So the total force required to cut the MS sheet metal of thickness 3mm is 375N.

Available pressure in the cylinder as we have 20 bar pressure available from our power pack setup present in our college.

$$\text{Area of cylinder} = \frac{Force}{Available\ pressure}$$

$$\frac{\pi}{4} * D^2 = \frac{Force}{Available\ Pressure}$$

$$D = \frac{4*Force}{Pressure* \pi}$$

$$D = \sqrt{\frac{4*1875}{20* 10^5* \pi}}$$

D = 34.5 mm

So the minimum bore of the cylinder should be of 35mm. So we selected standard bore cylinder of bore 45mm considering factor of safety.

Hence Our Cylinder Bore is 45mm and stroke length is 120mm.

MARKET SURVEY

We did a lot of market survey for our project. During our visit to market we came across many Hydraulic companies, WORKSHOPS, Industries, Shops. It gave us a bright idea about components available in market. We also had opportunity to interact with Engineer. Among many shops and industries visited by us we enlist few of them below.

- **MARCO HYDRAULICS**
- **PRESTON HYDRAULICS**
- **VIJAY HYDRAULICS**
- **KAZAF ELECTRONICS**
- **BHARAT BAZAAR**
- **RAJ TRADING &MFG. CO.**
- **M.M. TRADERS**

PHASE1: COMPONENTS AVAILABILITY

- After finalizing our project we had to check the market for availability of components according to our needs.
- We checked for hydraulic piston cylinder, cutting machine, electronic directional valve, etc.

PHASE 2: OPTIMIZING BUDGET

- After visiting above mentioned companies and shops we tried to figure out what stuff should be bought from which place

PHASE 3: BUYING

- We started with cutting machine of **12 inch cutting blade.**
- We managed to buy a second hand hydraulic piston cylinder which saved our **6000-9000 rupees**
- We also sought college permission for using Hydraulic setup which included **PUMP, MOTOR,HOSES, DIRECTIONAL VALVE**, etc.
- Next major component we bought was material for our frame and trolley. it constitute major cost of our project

COST ESTIMATION

Cost estimation may be defined as the process of forecasting the expenses that must be incurred to manufacture a product. These expenses take into a consideration all expenditure involved in a design and manufacturing with all related services facilities such as pattern making, tool, making as well as a portion of the general administrative and selling costs.

TYPES OF COST ESTIMATION:-

1) Material cost

2) Machining cost

1) Material cost :-

Material cost estimation gives the total amount required to collect the raw material which has to be processed or fabricated to desired size and functioning of the components.

a) Raw material cost :-

Raw Material	Total Cost(Rs)	Bharat Bazar cost (Rs)	Standard cost (Rs)
10 mm thick MS Plate (35 kg)	1400	30/kg	40/kg
6 mm thick MS Plate(28 kg)	840	28/kg	30/kg
Seal of Cylinder	400	300/unit	400/unit
Aluminium Roller	500	250/kg	300/kg
Bearing	200	100/unit	200/unit
Nut Bolt and Washer	500	Depend on size	Depend on size
Roller wheel (D=60mm)	500	350	600
Total	**4340**		

b) Finished Product Cost :-

Components	Cost
Hydraulic cylinder	2000
BRC Mounting	200
Cutter	2000
Bearing	400
Roller	1500
Cylinder Fittings	500
Grinding Tools	200
Total Cost	**6800**

2) Machining cost :-

Operation	Hours	Cost
Gas Cutting	½ hour	200
Welding	4 hour	500
Drilling	½ hour	50
Grinding	5 hour	200
Painting	2 hour	400
Total Cost	**12 hours**	**1350**

3) TOTAL COST : -

TOTAL COST = MATERIAL COST + MACHINING COST

= (RAW + FINISHED) + MACHINING COST

=(6800+ 4340) + 1350

= **12,490**

This total cost can be reduced to 20% if this machine made in mass production because the machining cost would be very less and material cost would be less if bought is bulk.

MANUFACTURING

Manufacturing engineering or manufacturing process are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the product design, and materials specification from which the product is made. These materials are then modified through manufacturing processes to become the required part.

Manufacturing takes turns under all types of economic systems. In a free market economy, manufacturing is usually directed toward the mass production of products for sale to consumers at a profit. In a collectivist economy, manufacturing is more frequently directed by the state to supply a centrally planned economy. In mixed market economies, manufacturing occurs under some degree of government regulation.

Modern manufacturing includes all intermediate processes required the production and integration of a product's components. Some industries, such as semiconductor and steel manufacturers use the term fabrication instead.

Basically manufacturing is the process of combining various components by various operations so as to get the final product or machine. In our manufacturing the components required are as follows :-

1. Hydraulic system (Power Pack)
2. Hydraulic Cylinder
3. Shearing Cutter
4. Frame
5. Trolley
6. Feeding system
7. Coil Holder

1. HYDRAULIC SYSTEM

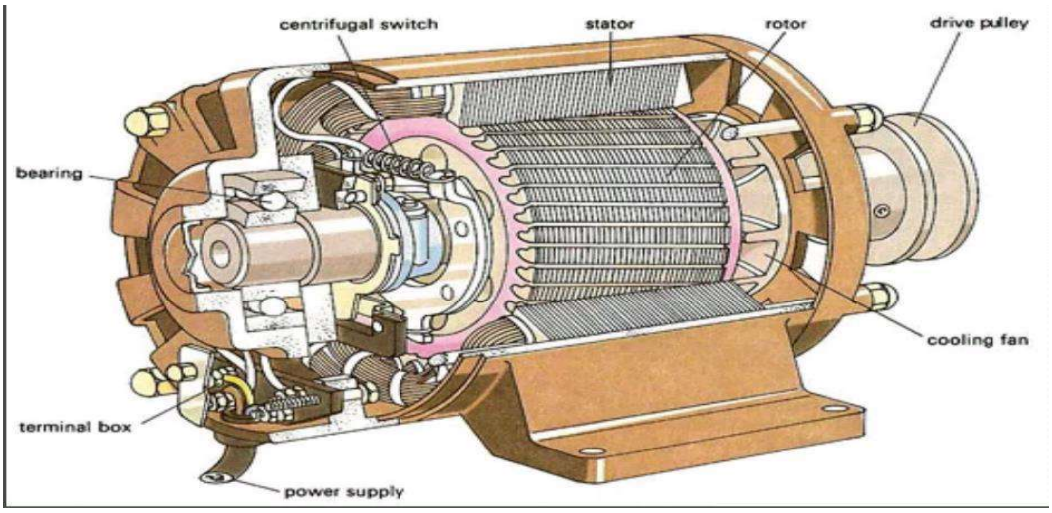
A hydraulic system is a drive or transmission system that uses pressurized hydraulic fluid to power hydraulic machinery.

1. A hydraulic system consists of three main parts:
2. The generator (e.g. a hydraulic pump), driven by an electric motor
3. Valves, filters, piping etc. (to guide and control the system)
4. The actuator (e.g. a hydraulic motor) to drive the machinery.

The following are the components require in a hydraulic system drive:

Electric motor :

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Electric motors are used to produce linear or rotary force.



Hydraulic Pump:

A hydraulic pump is a mechanical source of power that converts mechanical power into hydraulic energy. When a hydraulic pump operates, it creates a vaccum at the pump inlet, which forces liquid from the reservoir into the inlet line to the pump and by mechanical action delivers this liquid to the pump outlet and forces it into the hydraulic system.

Oil Tank or Reservoir:

The hydraulic fluid reservoir holds the excess hydraulic fluid to accommodate volume changes. The reservoir is also designed to aid in separation of air from fluid and also works as a heat accumulator to cover the losses in the system when peak power is used.

Control valve:

Direction Control Valve route the fluid to the desired actuator. They usually consist of a spool inside a cast iron or steel housing. The spool has a central (neutral) position maintained with springs; in this position the supply fluids is blocked or returned to tank. Sliding the spool to one side routes the hydraulic fluid to an actuator and provides a return path from actuator to tank.

Fig. Solenoid Operated DC Valve

Hydraulic Motor:

A hydraulic motor is a mechanical actuator that converts hydraulic pressure and flow into torque and angular displacement (rotation).

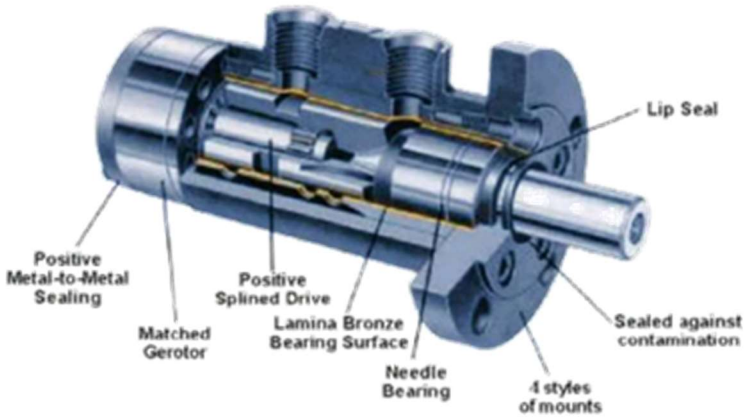


Fig. Hydraulic Motor

Hydraulic fluid:

Hydraulic fluid is the life of the hydraulic circuit. It is usually petroleum oil with various additives. The major function of hydraulic fluid is to provide energy transmission through the system which enables work and motion to be accomplished. Hydraulic fluids are responsible for lubrication, heat transfer and contamination control.

Tubes, pipes and hoses:

Hydraulic Tubes are seamless steel precision pipes, specially manufactured for hydraulics. The tubes are interconnected by different types of flanges, welding cones/nipples and by cut-rings.

Hydraulic pipe is used in case standard tubes are not available. Generally these are used for low pressure. They can be connected by threaded connections, but usually by welds.

Hydraulic Hose is graded by pressure and temperature, fluid compatibility. Hoses are used when pipes or tubes cannot be used, usually to provide flexibility for machine operation and maintenance. The hose is built up with rubber and steel layers.

Filters:

Filters are an important part of hydraulic systems. Metal particles are continuously produced by mechanical components and need to be removed along with other components

Hydraulic Manifold:

A hydraulic manifold is a manifold that regulates fluid flow from between pumps and actuators and other components in a hydraulic system. It is like a switchboard in an electrical circuit because it lets the operator control how much fluid flows between which components of hydraulic system.

Fig. Manifold Assembly

Circuit diagram of hydraulic motor system

The circuit of the system is designed in FESTO software

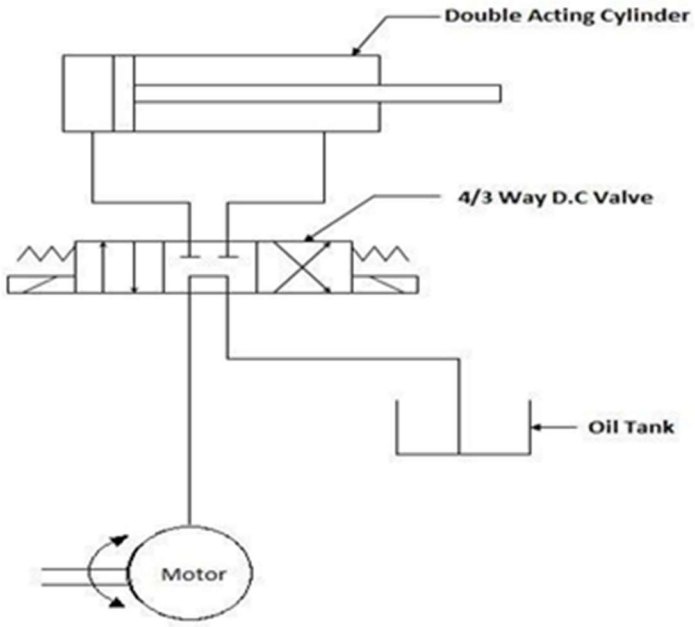


Fig. Circuit Design

Working of the Hydraulic System

A simple working diagram of the system is shown in the figure below. Pump-inlet and motor return (via the directional valve) are connected to the hydraulic tank. The flow is returned to tank through the control valve's open center; that is, when the control valve is centered.

Otherwise, if the control valve is actuated it routes fluid to and from an actuator tank. The fluid's pressure will rise to meet any resistance, since the pump has a constant output. If the pressure rises too high, fluid returns to tank through a pressure relief valve

2. HYDRAULIC CYLINDER

A hydraulic cylinder (also called a linear hydraulic motor) is a mechanical actuator that is used to give a unidirectional force through a unidirectional stroke. It has many applications, notably in construction equipment (engineering vehicles), manufacturing machinery, and civil engineering.

Hydraulic cylinders get their power from pressurized hydraulic fluid, which is typically oil. The hydraulic cylinder consists of a cylinder barrel, in which a piston connected to a piston rod moves back and forth. The barrel is closed on one end by the cylinder bottom (also called the cap) and the other end by the cylinder head (also called the gland) where the piston rod comes out of the cylinder. The piston has sliding rings and seals. The piston divides the inside of the cylinder into two chambers, the bottom chamber (cap end) and the piston rod side chamber (rod end / head end).

There are a number of different hydraulic cylinder types we deal with at the Cylinder Service Centre. The following is a summary of the main ones which are popular only.

a) Single Acting Cylinder

b) Double Acting Cylinder

a) Single-Acting Cylinder

This single-acting cylinder only has a head-end port and is operated hydraulically in one direction. When oil is pumped into a port, it pushes on a plunger, causing it to extend.

The return or retraction is effected by draining the hydraulic oil back into a reservoir. The plunger will fall, or return, because of the weight of a load or else induced by an additional mechanical force such as a spring.

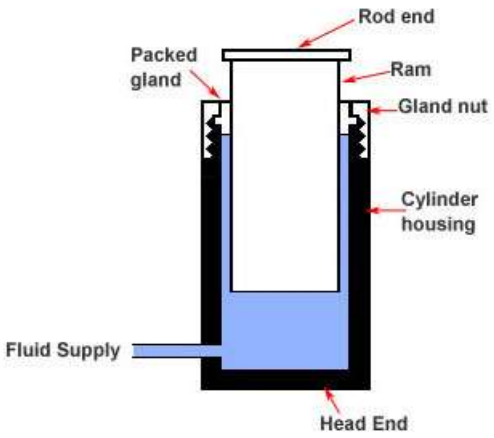


Fig. Single Acting Cylinder

b) Double-Acting Cylinder

The Double-Acting Cylinder must have ports at both the head and rod ends. The piston is moved by pumping oil into the head which moves the piston to extend a rod. Any oil in the rod end is pushed out into a reservoir. To retract the rod, the oil flow at both ends is reversed.

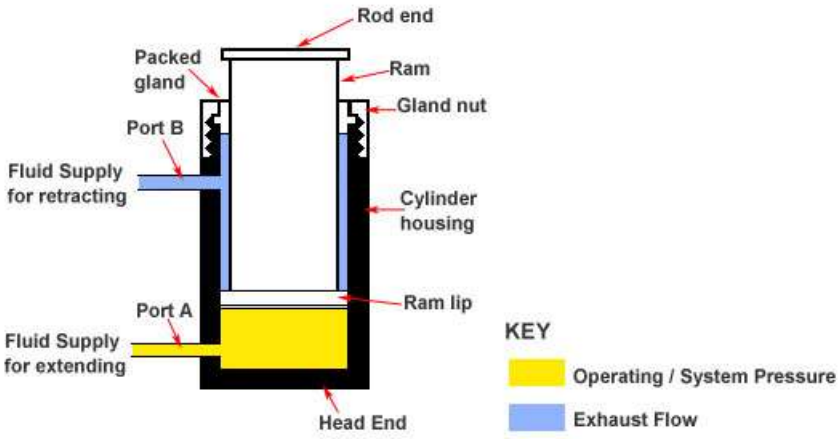


Fig. Double Acting Cylinder

Types of Cylinder based on hydraulic construction are as follows:

a) Tie rod cylinder

Tie rod style hydraulic cylinders use high strength threaded steel rods to hold the two end caps to the cylinder barrel. This method of construction is most often seen in industrial factory applications. Small bore cylinders usually have 4 tie rods, while large bore cylinders may require as many as 16 or 20 tie rods in order to retain the end caps under the tremendous forces produced. Tie rod style cylinders can be completely disassembled for service and repair, and they are not always customizable.

Fig. Tie Rod Cylinder

b) Welded body cylinder

Welded body cylinders have no tie rods. The barrel is welded directly to the end caps. The ports are welded to the barrel. The front rod gland is usually threaded into or bolted to the cylinder barrel. This allows the piston rod assembly and the rod seals to be removed for service.

Welded body cylinders have a number of advantages over tie rod style cylinders. Welded cylinders have a narrower body and often a shorter overall length enabling them to fit better into the tight confines of machinery. Welded cylinders do not suffer from failure due to tie rod stretch at high pressures and long strokes. The welded design also lends itself to customization. Special features are easily added to the cylinder body, including special ports, custom mounts, valve manifolds, and so on.

Fig. Welded Body Cylinder

After seeing all these cylinder of different types we opted for bi-directional welded construction type because welded body cylinder is for heavy duty and cutting operation is a heavy operation.

3. SHEARING CUTTER

There are two four types of cutter are available in the market are as follows:

i. Gear Type Cutter

Gear type cutter consist of gear attached to shearing blade. The shearing blade is rotated by gear as u can see in figure below.

Fig. Gear Type Cutter

ii. Spring Type Cutter

Spring type cutter consist of spring attached to the shearing blade of the cutter. It is one of the type of link type cutter.

Fig. Spring Type Cutter

iii. Link Type Cutter

Link type cutter is made by linkage with body and shearing blade of cutter. Linkage is used for rotating the shearing blade.

Fig. Link Type Cutter

iv. Lever Type Cutter

Lever Type cutter is cutter which has a liver connected to shearing blade used for rotation of the shearing blade.

Fig. Lever Type Cutter

Since we have to cut the linkage of shearing blade for attaching the end of the blade to cylinder we opted for link cutter because link cutter has very easy linkage for removing it. So we bought the linkage cutter and remove its linkage and cut bodies upper body for its movement.

4. FRAME

After selecting the shearing cutter, we bought the shearing cutter and then bought various raw materials such as plates, screws, bushes, bearings, nut, bolt, etc. We have assembled all of them according to our design by doing various operations such as gas cutting, welding, drilling, fitting, etc.

Fig. Gas Cutting

Fig. Welding

Fig. Frame before aesthetic

Fig. Frame after grind and color

5. TROLLEY

A large metal frame on wheels, used for transporting heavy or large items, such as heavy machines, heavy material, etc. Trolley is used for convenience to move the machine easily just by pushing it. Hence, we have to add feature of mobility in our project so we added trolley in the project. We mounted the hydraulic cutting machine on it so project became easily movable whenever required.

For making the trolley we first made the rough design of it on the book with the dimensions. After designing we procured the MS metal plate of thickness 6mm then by gas cutting, we cut it to required dimension. Welding is done according to design after gas cutting.

We bought the wheels from chor bazar because it is cheap there and then directly welded wheels mounting on the trolley.

For good aesthetics of the machine, we added the shining color to it and done grinding for shining and safety of human being.

Fig. Trolley

6. FEEDING SYSTEM

In order to have continuous production we have added a feeding system to our project through our project can become fully automatic. But since for doing fully automatic, we requires various programming circuits and many programming things. Since we are mechanical engineers we can make only the mechanisms that's why we didn't made it fully automatic but we made it Partial automatic

In our feeding system, we have put many components are as follows

- AC MOTOR
- ROLLERS
- SWITCHES
- HOUSING
- FRAME

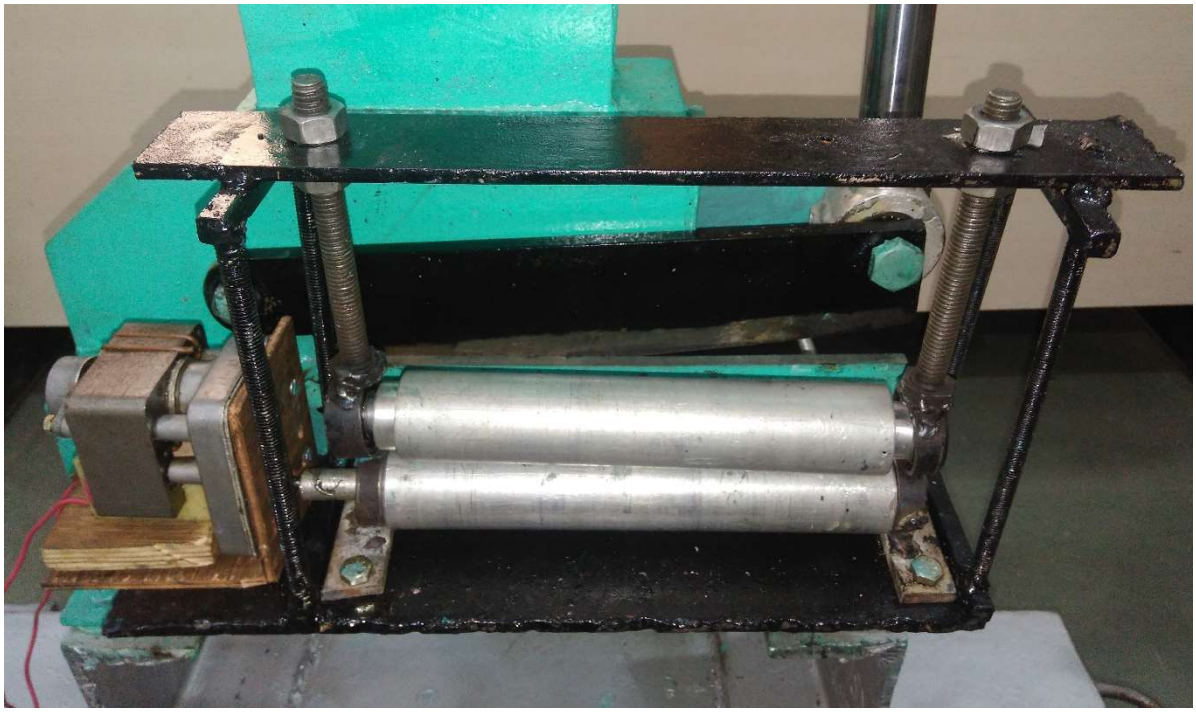


Fig. Feeding System

AC Motor :-

An AC motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic parts, an outside stationary stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft producing a second rotating magnetic field. The rotor magnetic field may be produced by permanent magnets, reluctance saliency, or DC or AC electrical windings.

Less commonly, linear AC motors operate on similar principles as rotating motors but have their stationary and moving parts arranged in a straight line configuration, producing linear motion instead of rotation.

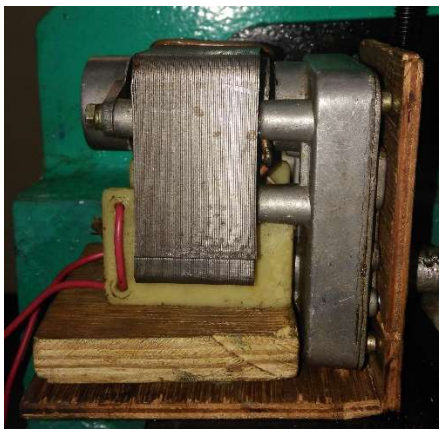


Fig. AC Motor

Specifications :-

Torque – 20 kg/cm

Speed – 120 rpm

Rollers :-

Rollers are the circular bars which provide rolling motions. In our project we have used them to pull the sheet metal from the stock of sheet metal rolled on another roller and push it into the cutting machine.

We have used two rollers for the pulling of sheet metals in which one roller is rotated by AC motor and one rollers is dead (Driven roller). Rollers are of aluminum material because they are light weight and easy to machine. So we have opted for Aluminum rollers

Roller Arrangements :-

For various sheet metal of variable thickness, we made an arrangement with two threaded rods and we have mounted the bearing on it by welding process. It can accommodate the sheet metal of variable thickness from **1mm to 7mm** .

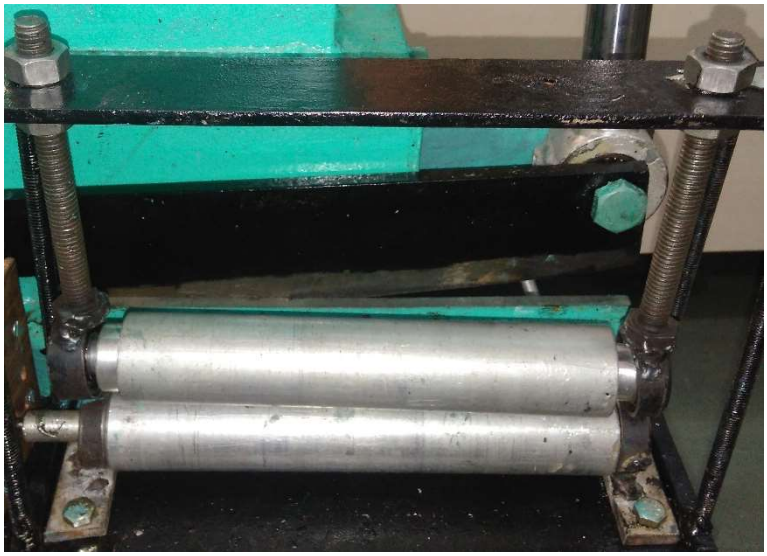


Fig. Roller Arrangement

7. COIL HOLDER

We have added coil holder for holding of the sheet metal, so that it can be easily pulled by the rollers of our machine without human interference also. Coil holder holder is consist of many parts are as follows

- Bearings
- Frame
- One Roller

Fig. Coil Holder

ASSEMBLY

After making all necessary components like frame, trolley, feeding system, sensor, shearing cutter and hydraulic cylinder. We assembled them by means of welding where there is must be welding otherwise we made it nut and bolt system so that if something get damaged then easily should be replaced. We have made use of all standard components so that there would be no shortage of components if something breaks.

We have made sure that there must be minimum maintenance required to our machine by choosing standard components. We used the measuring reference after our cutting blade where we didn't attach rod directly by welding instead of it we weld the couplings to the cutter body and attached the rod by thread. This will not only make our project smaller in length but also user friendly. If rod breaks, then no need to call the skilled labor just replace the rod.

Fig. Final Assembly

MACHINE SPECIFICATION

Operating Pressure = 20 bar

Motor speed = 1440 rpm

Motor Capacity = 2 HP

Gear Pump Capacity = 9 litres / min

Feeding speed = 120 rpm

SHEET METAL

Material – Mild Steel, Stainless Steel

Length = According to need

Width = 140 mm

Thickness = 3 mm

CONCLUSION

Now, we know that Hydraulic machine is cost efficient compare to other machines available in the market because it's cutting of sheet metal thickness is low as compare to other highly cost machines. So, our machine is suitable for small scale industries.

Its operation will increase the production rate and decrease production cost. The range of the cutting thickness can be increased by arranging a high pressure pump and this machine is made cheap for small scale industries for cutting small thickness sheet metal.

By manufacturing this machine, we have learned a lot about hydraulics market as well as its scope in the real world.

FUTURE SCOPE

Since old age man is always trying to gain more and more luxurious. Man is always trying to develop more and more modified technique with increasing the aesthetic look and economic consideration. Hence there is always more and more scope. But being the degree Engineers and having the ability to think and plan. But due to some time constraints, and also due to lack of funds, we only have thought and put in the report the following future modifications:-

- It can be made fully automatic by doing programming in arduino circuit or any other circuit where we have to just enter the length of cut of sheet metal then all cutting work will be done by machine itself.
- It's cutting speed can be increased by selecting pump of higher discharge and pressure.
- It's cutting capacity can be increased by increasing the bore of cylinder.

Thus in future there are so many modifications, which we can make to survive the huge global world of competition.

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