Manufacturing of Auto-Feed Hydraulic Cutting Machine

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# TABLE OF CONTENT

- Introduction
- Problem Definition
- Objective
- Literature
- Design Calculation
- Market Survey
- Fabrication
- Assembly
- Working
- Testing
- Conclusion
- Future Scope
INTRODUCTION

- Make a cost efficient hydraulic cutting machine
- Increase the speed of cutting of sheet metal process
- Decrease man power by making it automatic
- Make sure safety of operator
Problem Definition

To make a cost effective & efficient, Auto-Feed Hydraulic cutting Machine for Small scale industries to cut sheet metal of various thicknesses.
Objective

- Low cost Machine
- Suitable for small scale industries
- Fully Automatic
Four types of cutting machines
1. Rack and Pinion operated
2. Spring operated
3. Pneumatic operated
4. Hydraulic Operated

- All three are non efficient not capable for cutting more thick sheet metal but hydraulic is made for large thick materials.
- Hydraulic cutting has high efficient and heavy duty
Methodology

Followed below methodology for completion of our project on time

- Literature Survey
- Design Calculation
- Market Survey
- Procurement of components
- Fabrication
- Assembly
- Testing
Design Calculation

<table>
<thead>
<tr>
<th>Sheet metal Material</th>
<th>Mild Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>3 mm</td>
</tr>
<tr>
<td>Length of cut</td>
<td>140 mm</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>130</td>
</tr>
</tbody>
</table>

Force Require to cut = \( \text{(length of cut)} \times \text{(thickness)} \times \text{(Shear stress)} \)

\[
\text{Force} = 10 \times 3 \times 125 = 3750 \, \text{N}
\]

Available Force = \( \left( \frac{\pi d^2}{4} \right) \times \text{(Pressure)} \)

\[
\text{Available Force} = \left( \frac{\pi 55^2}{4} \right) \times 2 = 4751.9 \, \text{N}
\]

Since our available force is greater than force req. Hence our **Cylinder design is safe**
MARKET SURVEY
Available Hydraulic Machines

Hydraulic Cutting Machine

- Master Exports, India
  - Rs 1.25 Lakh/Unit
  - Send Enquiry

Hydraulic Sheet Cutting Machine

- Vivek Machine Tools
  - Rs 5 Lakh/Unit
  - Send Enquiry

Hydraulic Cutting Machine

- Parrytech Hydraulics
  - Rs 5 Lakh/pcs
  - Send Enquiry

- Courtesy: India Mart website

- Wo Master Export Keeping in mind the precise needs and necessities of our customers, we have come up with a vast collection of Hydraulic Cutting Machine. Offered hydraulic:
mORE...

- Shearing are available in capacities (size) of 4 feet / 5 / 6 / 8 / 10 / 12 feet & 13 feet length thickness of machine is 0.100 mm up to 16 mm capacity, rolling key clutch, spring loaded:
mORE...

- Our rich industry experience enables us to manufacture and supply impeccable quality Hydraulic Cutting Machine that comes with inner-inclined structure to make it easy for:
mORE...
MARKET SURVEY T

- Visited 3 industries and got cost of components
- Visited small scale industries to know their requirements
- Visited various shops for basic components
FABRICATION
UPPER BODY
GRINDING AND SURFACE FINISHING
LENGTH MEASUREMENT SYSTEM
POWER PACK

- It is present in mechatronics lab
WORKING OF CUTTING MACHINE
MACHINE SPECIFICATION

- Operating Pressure = 20 bar
- Motor speed = 1440 rpm
- Motor Capacity = 2 HP
- Gear Pump Capacity = 9 litres / min
- Feeding speed = 120 rpm
TESTING
LEAKAGE PROBLEM

- While testing, leakage problem occurred
TESTING
SHEET METAL TESTED

At 20 bar pressure
- 3 mm Mild Steel (2 cut of 22mm length sheet metal in 10 sec)
- 2 mm Galvanised Iron
- 2mm Stainless steel

Greater thickness can be cut if pressure is increased
CONCLUSION

- Eliminated one labor required for cutting process
- Tremendous reduction of human efforts
- Semi-Automatic machine
- Increase in production rate
Future scope

- It can be made fully automatic by adding arduino circuit and sensors.
- Thickness of sheet metal can be increased by increasing pressure
- Speed of cutting increase if discharge of pump increased
- Cutting capacity can be increased by increasing bore of cylinder
- Line detecting sensor will terminate cutting if hand comes while cutting
THANK YOU FOR BEING GOOD AUDIENCE