

MANUFACTURING OF HYDRAULIC PRESS AND SHEARING MACHINES

1. INTRODUCTION:

Hydraulic machines are machinery and tools that use liquid fluid power to provide movement and force to component that do mechanical work. The hydraulic machinery is becoming very popular mainly due to very large amount of power that can be transferred through small tubes and flexible hoses, high power density and wide array of actuators viz hydraulic cylinders that can make use of this power.

A fundamental feature of hydraulic systems is the ability to apply force or torque multiplication in an easy way, independent of the distance between the input and output, without the need for mechanical gears or levers, either by altering the effective areas in two connected cylinders or the effective displacement between a pump and motor. The most common example for this is the classical hydraulic jack where a pumping cylinder with a small diameter is connected to the lifting cylinder with a large diameter, to lift heavy loads.

2. PRODUCT & ITS APPLICATION:

In metal working machinery, standard stock steel and other metal come in sections, rods, flats, plates and sheets. For manufacturing components of various machines, equipment, and appliances metal requires cutting to size and shape as also deformation of cut blanks. The metal cutting can be done by several processes like sawing, tool cutting, gas cutting etc.

Hydraulic Shearing Machines:

Among all metal cutting processes, shear cutting is fast, precise and reduces material loss. Depending on material, size, shape etc. parameters, shearing machinery can be designed. The shear machine uses hard metal cutting blades. The blades act like scissor blades and upon application of force, cut metals. When machines are designed to apply force on blades through hydraulic cylinders. These are called hydraulic shears. The hydraulic system can also be used

to clamp the metal stock and position the gauge stops to carry out the repeated cutting operations. Similarly, for blanking and punching, the machines are designed that cut different shapes and sizes from sheet metals with help of dies and punches.

Hydraulic Press:

For deformation of metal, various processes are available, among which press forming is very common. In press the metal is forced within the dies to give shape to metals. The press can be designed to form metal in hot as well as cold conditions viz forging, and the material can be plastically deformed and sized like drawing, etc. Depending on application, press machines are designed. When machines are designed to apply force on blades through hydraulic cylinders. These are called hydraulic presses. Depending on size, type and force requirement for materials to be formed, these presses can be manufactured.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Any ITI, Diploma or Graduate with some background in manufacturing or marketing.

4. INDUSTRY OUTLOOK/TREND

Hydraulic presses and other machine tools used for metal forming, casting, forging, milling, drilling shaping and sheering. Industrial machine tools are widely used in a variety of applications where the end purpose is transforming raw metal (e.g., sheet, bar, wire, powder) into forms that are generally subject to secondary finishing processes. This segment is highly sensitive to the state of the broader economy. Changes in industrial production, capacity utilization, capacity expansions and the level of business confidence strongly influence demand in the marketplace.

The national growth trajectories in automotive and construction are expected to positively impact the industrial equipment market and, in turn, hydraulic press and other machine tool demand. Asia and especially India is expected to emerge as the largest manufacturing base for variety of mass produced components requiring precision for the world. India is emerging as major industrial machines and auto industry supplier.

The survey estimated recently for global machine tool consumption to reach \$75 billion – indicating positive recovery of industrial output. This trend will likely have a strong influence on hydraulic / fluid-power machines, parts and actuators.

Retrofitting the current equipment with hydraulics has seen emergence for machine tool industry that will require the replacement of certain critical parts with hydraulics that facilitate these processes, fully integrated with actuators and sensors. This may be considered by machine manufacturers to reduce significant upfront investment.

5. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:

Manufacturing machines of metal or Machine tool industry is the mother of all industries. The growth of various manufacturing activities is dependent on availability of general purpose and standard machines as well as specialized machines for the equipment and appliances industry. Shearing machines and press machines are used in all most all metal components manufacturing sector.

The impetus to manufacturing industry has given rise to demand for efficient and fast cycle machines like hydraulic shears and Hydraulic Press machines. A good machine designer and hydraulic system manufacturer will have good scope to establish a project for these as well as automation products for these machines. Innovation and robust design of machines will surely build a good reputation for the entrepreneurs.

6. RAW MATERIAL REQUIREMENTS:

Main raw materials are castings of frames, machine bed, columns, etc. and forged components of frame etc. as per design of machine. Hydraulic cylinders, plungers, pump – power pack and valves etc. circuit components can be either tailor made by the unit or they can be procured from reputed manufacturers. Other components are lubrication pumps and tubing, electrical / hydraulic motors and shear blades and electrical control circuits elements like switches etc. For automation, Control circuit and manipulators can also be manufactured like feed tables, part ejector, lube spray system, etc. are also procured and assembled as per requirements.

All these components and materials are available easily and can be procured as per standard design specifications.

7. MANUFACTURING PROCESS:

The manufacturing process of machine tools is very critical as the machines require precision. The process steps consists of

- The frames are large cast iron elements that are procured from foundry as per design.
- These are to be cast with care and inspected for porosity and other defects. If required these defects are repaired.
- Castings are annealed/ heat treated to relieve stresses and then seasoned for rigidity and stability.
- The frames elements are machined where moving parts are mounted like slides, shafts, pins etc.
- Moving parts like slides, columns etc. are machined, heat treated and ground for accurate tolerances desired,
- Sliding surfaces are lapped for accuracy and surface finish. Some components may be hard chrome plated.
- The components of machines are assembled with frame and the hydraulic cylinders and springs etc. if any.
- The hydraulic circuit elements like tubing, directional valves, poppet valves, pressure relief valves etc. are assembled and mounted on frame.
- The hydraulic circuit elements are cleaned thoroughly with air and oil jets to remove metal particulates, dirt, and moisture.
- The circuit is then charged with oil and connected with hydraulic power pack. Once hydraulic system is operational, final alignment of machine bed with other elements is ensured.
- In shear machine, shear blades are mounted and aligned with gauge stops/ measuring scales etc. and the trial run is carried out. After the final inspection and final adjustments are completed, machine is spray painted and labeled.
- The hydraulic press has is fitted with Die clamping block and aligned with the frame

and press plunger. The machine is tested for smooth operation and inspected for all alignment accuracy through various dial gauges. The press is then mounted with trial die halves and trial run is carried out to finish the machine build.

- The finished machine is tested as per specifications and acceptance test is carried out for customer before packing and dispatch.

8. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 13 employees initially and increase to 18 or more depending on business volume.

Sr No	Type of Employees	Monthly Salary	No of Employees				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Skilled Operators	20000	4	6	6	6	6
2	Semi-Skilled/ Helpers	9000	6	8	8	8	8
3	Supervisor/ Manager	30000	1	1	1	1	1
4	Accounts/ Marketing	20000	1	2	2	2	2
5	Other Staff	8000	1	1	1	1	1
	TOTAL		13	18	18	18	18

9. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 6 months from the serious initiation of project work.

Sr No	Activities	Time Required in Months
1	Acquisition of Premises	2
2	Construction (if Applicable)	2
3	Procurement and Installation of Plant and Machinery	2
4	Arrangement of Finance	2
5	Manpower Recruitment and start up	2
	Total Time Required (Some Activities run concurrently)	6

10. COST OF PROJECT:

The unit will require total project cost of Rs 108.58 lakhs as shown below:

Sr No	Particulars	In Lakhs
1	Land	20.00
2	Building	35.00
3	Plant and Machinery	30.40
4	Fixtures and Electrical Installation	2.80
5	<i>Other Assets/ Preliminary and Preoperative Expenses</i>	2.00
6	Margin for working Capital	18.38
	TOTAL PROJECT COST	108.58

11. MEANS OF FINANCE:

The project will require promoter to invest about Rs 40.93 lakhs and seek bank loans of Rs 67.65 lakhs based on 70% loan on fixed assets.

Sr No	Particulars	In Lakhs
1	Promoters Contribution	40.93
2	Loan Finance	67.65
	TOTAL:	108.58

12. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	10.72	40	4.29	6.43
2	Receivables	14.67	50	7.34	7.34
3	Overheads	3.89	100	3.89	0.00
4	Creditors	7.15	40	2.86	4.29
	TOTAL	36.44		18.38	18.06

13. LIST OF MACHINERY REQUIRED:

Sr No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Power Saw machines	Nos	1	60000	60000
2	Precision Lathes	Nos	1	250000	250000
3	Planning machine	Nos	1	450000	450000
4	Radial Drilling machine	Nos	1	300000	300000
5	Heavy Duty Milling Machine	Nos	1	350000	350000
6	Vertical Lathe	Nos	1	500000	500000
7	5 axis Measuring m/c CNC	Nos	1	650000	650000
8	Shaping machine	LS	1	80000	80000
9	Jib Crane	Nos	1	100000	100000
10	Welding Machine	Nos	1	80000	80000
	Tools and Ancillaries				
1	Die tools and gauges	LS	1	150000	150000
2	Misc. tools etc.	LS	1	70000	70000
	Fixtures and Elect Installation				
	Storage racks and trolleys	LS	1	50000	50000
	Other Furniture	LS	1	30000	30000
	Telephones/ Computer	LS	1	50000	50000
	Electrical Installation	LS	1	150000	150000
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	200000	200000
	TOTAL PLANT MACHINERY COST				3520000

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

1. Techno Machines
Chikkanahalli Road,
Opp. Shahi Exports (Unit No 6),

Near Annapoorneshwari Temple, Bommanahalli,
BENGALURU-560 068, INDIA

2. S. S. Engineering Works
Ajit Khanna(Proprietor)
Plot No. 100, Sector 6 IMT Manesar, Gurgaon - 122050, Haryana, India
3. Taurus Private Ltd Co
No. 24, D 2 / E 3, Kiab Industrial, Area At Pivele
Kiab Industrial Area
Bengaluru – 560100 Karnataka, India
4. Micro Engineering Works;
No. 6/140, Gandhi Nagar, Nallampalayam Road Nanjai Gounden, Pudur, G. N. Mills
Post, Coimbatore - 641029, Tamil Nadu, India
5. S. G. Profile
Plot No. 201/1, Gala No. 56, Morya Industrial Estate, MIDC, Bhosari, Bhosari Midc,
Pune-411026, Maharashtra, India

14. PROFITABILITY CALCULATIONS:

Sr No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	30	40	50	55	60
2	Sales	Rs Lakhs	176.06	234.75	293.44	322.78	352.12
3	Raw Materials & Other Direct Inputs	Rs Lakhs	128.68	171.57	214.46	235.91	257.35
4	Gross Margin	Rs Lakhs	47.39	63.18	78.98	86.87	94.77
5	Overheads Except Interest	Rs Lakhs	13.90	13.90	13.90	13.90	13.90
6	Interest	Rs Lakhs	9.47	9.47	9.47	9.47	9.47
7	Depreciation	Rs Lakhs	8.42	8.42	8.42	8.42	8.42
8	Net Profit Before Tax	Rs Lakhs	15.59	31.39	47.19	55.08	62.98

The basis of profitability calculation:

Unit will have capacity of 30 to 60 nos per year of hydraulic press and shearing etc. machines depending on design variety/ ratings taken up and quantity per type. Depending on the type/ size/ ratings of machines the price range is taken from Rs. 1.5 lakh per unit to Rs 25 lakh or more per unit. The material requirements are forged, cast parts, MS sections, bars, sheets, high Carbon alloy steel, and HCHCr etc. special alloys etc. They cost in range of Rs 25 per Kg to Rs 200 per kg. Other items like gear box, electrical drives, hydraulic and pneumatic components electrical control panels etc. are bought out and its cost depend on system ratings. The unit may generate scrap which is to be sold at @ Rs 20 ~ 80 per Kg depending on type. The income of same is added. Consumables costs also considered based on prevailing rate. Energy Costs are considered at Rs 7 per Kwh. The depreciation of plant is taken at 10 % and Interest costs are taken at 14 -15 % depending on type of industry.

15. BREAK EVEN ANALYSIS:

The project is can reach break-even capacity at 20.13 % of the installed capacity as depicted here below:

Sr No	Particulars	UOM	Value
1	Sales at Full Capacity	Rs Lakhs	586.87
2	Variable Costs	Rs Lakhs	428.92
3	Fixed Cost incl. Interest	Rs Lakhs	31.79
4	Break Even Capacity	% of Inst Capacity	20.13

16. STATUTORY/ GOVERNMENT APPROVALS

The unit will require state industry unit registration with District Industry center. No other procedures are involved. For export, IEC Code and local authority clearances. The industry registration and approval for factory plan, safety etc. is required as per factory inspectorate and labor laws. Other registration are as per Labor laws are ESI, PF etc. Before starting the unit will also need GST registration for procurement of materials as also for sale of goods. As such there is no pollution control registration requirement, however the unit will have to

ensure safe environment through installation of chimney etc. as per rules. Solid waste disposal shall have to meet the required norms. Entrepreneur may contact State Pollution Control Board where ever it is applicable.

17. BACKWARD AND FORWARD INTEGRATION

The machines and equipment offer scope for diversification in to producing several industrial parts/ components and parts of hydraulic systems and auto components. The unit can utilize the spare capacities. As such there is not much scope for organic backward or forward integration. The entrepreneur needs to ensure proper selection of product mix and also be careful in maintaining product parameters in terms of dimensions, tolerances and geometric profiles along with final weights of products.

The workshop business needs building up reputation, ensuring reliability and quality of services rendered. Also personal rapport of key persons can generate good business volumes from OEM units and ancillary component unit. The location with good catchment area ensures good market potential to new business units.

18. TRAINING CENTERS/COURSES

There are no specific training centers for product technology. The Prototype Development Centers can provide some assistance for precision machining, Tools development, etc. Other centers of excellence viz Indo German Tool Room at Ahmedabad, Rajkot, Chennai, etc. shall be helpful. The most important scope of learning is in product design and development by study of the new product designs, product range, features and specifications of leading Brands / competitors across the world by scanning the Internet and downloading data from websites.

Udyamimitra portal (link: www.udyamimitra.in) can also be accessed for hand-holding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.