

# **SHEET METAL FABRICATION**

## **1. INTRODUCTION:**

Metal fabrication is the building of metal components and structures by cutting, bending, and assembling processes.

A fab shop will bid on a job, usually based on the engineering drawings, to build the end product. Large fab shops will employ a multitude of value added processes in one plant or facility including welding, cutting, forming and machining. These large fab shops offer additional value to their customers by limiting the need for purchasing personnel to locate multiple vendors for different services.

## **2. PRODUCT & ITS APPLICATION:**

Sheet metal Fabrication is a value added process that involves the creation of machines parts, panels, and structures from various steel sheet as raw materials.

Sheet Metal fabrication jobs usually start with design drawings including precise measurements as per customer or product specifications. The sheets are then move to the fabrication stage where different parts of design specified are cut from sheets or punched, bent, formed, deep drawn, and finally all the parts are welded or fastened to give final products. Some of the items may be joined at installation stage of the final product / project.

Sheet Metal Fabrication shops are employed by contractors, Original equipment manufacturers and Value Added Re-sellers. Typical projects include loose parts, structural frames for machines and equipment ranging from domestic appliances viz washing machine, refrigerator and furniture items viz stairs and hand railings fences for buildings to industrial machine panels, automobile body parts.

### **3. DESIRED QUALIFICATIONS FOR PROMOTER:**

Any ITI, Diploma or graduate preferably with fabrication or marketing experience.

### **4. INDUSTRY OUTLOOK/TREND**

The global sheet metal market can be bifurcated into automobile, aerospace, building & construction for roofing/ panels etc, steel pipes and tube industries, Air-Conditioning Ducts Pipe, agricultural machinery, shipbuilding, and others machinery viz industrial, chemical, pharma, food, etc as well as in furniture, utensils, consumer durable and electronic and computer industry, etc. The products are used in large volumes. Steel sheets of various grades, stainless steel, Aluminum and brass, copper etc sheet metals parts are being consumed in variety of equipment.

The global sheet metal equipment market is growing steadily since last decade and will post a CAGR of almost 7% by 2020. The market analysis identifies the growing demand for fabricated metal products. Though most manufacturing companies produce only a limited range of products, the requirement of fabricated metals has been considerably high in automotive and consumer durable/ appliances segments and other local machinery segments. The market of sheet metal fabricators and part manufacturers appears to be fragmented as competition among the major vendors in the market is quite intense in automotive and consumer durable market leaving out several industrial and electronics product market having huge demand that is still not met fully by local vendors.

The industry has several regional and local vendors offering customized parts having reasonable volumes at a comparatively lower cost, in turn, posing a stiff competition to international vendors. Though there are entry barriers for in terms of quality, features, functionalities, and services. The introduction of new products in computer, electronic, kitchen appliance, etc will generate new demand with new features and technologies that can be tapped by new units and offer competition to existing vendors.

### **5. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:**

Precision Sheet metal components and structures are having wide use in industrial and machinery manufacturing activities.

The main industries that require the sheet metal components are all types of automobile, off road, heavy vehicles for body and other components, domestic white goods, electronics for equipment chassis, material handling and mining, electrical control panels and internal components like cable trays, rails etc., Industrial machine casings, guards, housing and construction industry, medical equipment, defense and aviation sector.

All of these sectors are undergoing rapid growth in our country. Also there is good scope for exports of precision sheet metal components for diverse applications in electrical and electronic etc.

The entrepreneur should develop precision products in different industry sectors for diverse application and emerge as innovative and reliable supplier for success.

## **6. RAW MATERIAL REQUIREMENTS:**

CR carbon steel, stainless steel, etc. are the usual starting materials for fabrication, along with the welding wire, flux, and fasteners that will join the cut pieces. Other materials may include, welding electrodes, surface treatment chemicals etc. Steel sheets of various grades and gauges are required as per the customers' specifications.

## **7. MANUFACTURING PROCESS:**

Sheet Metal fabrication involves various processing technologies ranging from most common to advanced system depending on size, shape, other complexities, precision of components as well as volume to be produced.

The process variants are indicated along with the processes used in these shops.

- *Cutting* may be done by sawing, shearing, or gas torching, or by CNC cutting machines. Viz, Laser or water jet.

- *Bending* may be done by manual or electric powered or hydraulic presses with simple or complex die shapes as per need. Modern metal fabricators use CNC controlled machines to mark bend lines in the correct position. CNC controlled press brakes are very efficient.
- Punching may be done with manual or powered fly press, or hydraulic press.
- *Assembling* – joining of the pieces is done by arc gas or electro resistant type spot and seam welding. Other methods used are riveting, threaded fasteners, or bending and crimping and bead formations with help of special machines.
- As with other manufacturing processes, both human labor and automation is used. The manipulators or positioners and jigs and fixtures are used. Shops that specialize in this type of metal work may carry out surface treatments like pickling, passivation and spray/ powder painting of components.

## 8. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 15 employees initially and increase to 42 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	16000	3	6	8	10	12
2	Semi-Skilled/ Helpers	7000	10	12	15	18	24
3	Supervisor/ Manager	20000	0	1	1	1	1
4	Accounts/ Marketing	15000	1	1	2	3	3
5	Other Staff	7000	1	2	2	2	2
	<b>TOTAL</b>		15	22	28	34	42

## 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 137.33 lakhs as shown below:

SrNo	Particulars	In Lakhs
1	Land	15.00
2	Building	30.00
3	Plant and Machinery	68.15
4	Fixtures and Electrical Installation	3.70
5	<i>Other Assets/ Preliminary and Preoperative Expenses</i>	1.50
6	Margin for working Capital	18.98
	TOTAL PROJECT COST	137.33

## 11. MEANS OF FINANCE:

The project will require promoter to invest about Rs 48.57 lakhs and seek bank loans of Rs 88.76 lakhs based on 70% loan on fixed assets.

Sr No	Particulars	In Lakhs
1	Promoters Contribution	48.57
2	Loan Finance	88.76

	TOTAL:	137.33
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## 12. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	11.09	40	4.44	6.65
2	Receivables	10.12	40	4.05	6.07
3	Overheads	4.43	100	4.43	0.00
4	Creditors	15.18	40	6.07	9.11
	<b>TOTAL</b>	40.81		18.98	21.83

## 13. LIST OF MACHINERY REQUIRED:

Sr No	Particulars	UOM	Qty	Rate	Total Value
	<b>Main Machines/ Equipment</b>				
1	Sheet Shearing Machine	Nos	1	200000	200000
2	Laser/ Plasma Profile cutting m/cs	Nos	2	800000	1600000
2	Hydraulic Press Brake	Nos	1	450000	450000
3	Hydraulic Press	Nos	2	850000	1700000
4	Mech Power Press	Nos	1	250000	250000
5	Manual Shearing Press	Nos	3	40000	120000
6	Manual Sheet Folding Machines	Nos	2	45000	90000
7	Fly Press	Nos	3	35000	105000
<b>Sr No</b>	<b>Particulars</b>	<b>UOM</b>	<b>Qty</b>	<b>Rate</b>	<b>Total Value</b>
8	Spot Seam etc. Welding M/c	Nos	4	80000	320000

9	Profile Rolling Machine	Nos	2	350000	700000
10	Beading Curling Machine	Nos	1	120000	120000
11	Pillar Drill	Nos	1	50000	50000
12	Lathe	Nos	1	60000	60000
13	Sand Blasting Machine	Nos	1	200000	200000
14	Pickling and Surface treatment	Nos	1	200000	200000
15	Spray/ Powder Paint Shop	Nos	1	250000	250000
16	Paint Baking oven	Nos	1	200000	200000
	<u>Subtotal:</u>				<u>6615000</u>
	<b>Tools and Ancillaries</b>				
1	Misc. equipment Dies tools etc.	LS	1	150000	150000
2	Hand Tools and gauges	LS	1	50000	50000
	<u>Subtotal:</u>				<u>200000</u>
	<b>Fixtures and Elect Installation</b>				
	Storage and transport bins	LS	1	50000	50000
	Office Furniture	LS	1	20000	20000
	Telephones/ Computer	LS	1	50000	50000
	Electrical Installation	LS	1	250000	250000
	<u>Subtotal:</u>				<u>370000</u>
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	150000	150000
	<b>TOTAL PLANT MACHINERY COST</b>				<b>7335000</b>

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

1. PMT MACHINES LTD.  
Behind PCMC Building, Mumbai-Pune Road, Pimpri,  
Pune 411 018. Maharashtra, India.
2. Machineries and Spares  
Ranjit Chawla (Director)201, Karmastambh, LBS Marg, Vikhroli West  
Mumbai - 400083, Maharashtra, India
2. Pacific Engineering Corporation  
A-297, MIDC-Mahape, Near Mahape Bus Depot,  
Anthony Garage, Thane-Belapur Road, MahapeMidc,  
Navi Mumbai-400710, Maharashtra, India
3. Face Automation  
D215A, Ghatkopar Industrial Estate,  
Agra Road Industrial Premises Co Operative Society Limited,  
LBS Marg, Ghatkopar West, Mumbai- 400086, Maharashtra, India

Other well known machine manufacturers can be searched from directories/ internet are ACME TOOLINGS, Ace Manufacturing Systems Ltd., Batliboi Ltd., Bharat Fritz Werner Ltd. , HMT Machine Tools Ltd., Advani Oerlikon Ltd, Lakshmi Machine Works Ltd., TAL Manufacturing Solutions Ltd., Vigel Manufacturing Technologies (P) Ltd, Lokesh Machines Ltd., Praga Tools Ltd. , Toolcraft Systems Pvt. Ltd. , Vaddigiri Factory Automation Pvt Ltd

#### 14. PROFITABILITY CALCULATIONS:

Sr No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	40	50	60	70	80
2	Sales	Rs. Lakhs	121.42	151.77	182.13	212.48	242.84



3	Raw Materials & Other Direct Inputs	Rs. Lakhs	88.70	110.88	133.06	155.23	177.41
4	Gross Margin	Rs. Lakhs	32.72	40.89	49.07	57.25	65.43
5	Overheads Except Interest	Rs. Lakhs	14.13	14.13	14.13	14.13	14.13
6	Interest	Rs. Lakhs	12.43	12.43	12.43	12.43	12.43
7	Depreciation	Rs. Lakhs	10.34	10.34	10.34	10.34	10.34
8	Net Profit Before Tax	Rs. Lakhs	-4.17	4.01	12.19	20.36	28.54

The basis of profitability calculation:

The Unit will have capacity 350 MT of sheet metal parts. The sales prices range from Rs 40 per kg to Rs 150 per kg for depending on materials/ grade of metal used, complexities of cutting/ blanking/ bending and fabrication, scrap generation as well as volumes. The material requirements are considered for carbon steel from Rs 30 to 60 per kg including angles and sections. The SS prices range from 150 to 230per kg, Brass/ bronze and copper material cost and sales prices vary according to base metal prices.

Depending on volume, the die costs are to be amortized for new components. Consumables costs also considered at prevailing market 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 45.10 % of the installed capacity as depicted here below:

Sr No	Particulars	UOM	Value
1	Sales at Full Capacity	Rs. Lakhs	303.55

2	Variable Costs	Rs. Lakhs	221.76
3	Fixed Cost incl. Interest	Rs. Lakhs	36.89
4	Break Even Capacity	% of Inst Capacity	<b>45.10</b>

## **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 are required as per factory inspectorate and labor laws. Other registration 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 requirements, 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 consumer and industrial parts/ components and parts. 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 Job 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 production technology. However foundry technology can be obtained by joining as apprentice in foundry units. The Prototype Development Centers can provide some assistance and for foundry technology, casting, machining, dies and Tools development, courses run by centers of excellence viz Indo German Tool Room at Ahmedabad, Rajkot, Chennai, etc shall be helpful.

The most important scope of learning is in new 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 of Viz. North American, Europe, China etc markets.

Udyamimitra portal (link: [www.udyamimitra.in](http://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 all over India.

**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.