

TOOL ROOM FOR SHEET METAL DIES

1. INTRODUCTION:

Sheet metal forming processes are complex and have interaction several parameters of material like geometry, surface topology, with properties of material being processed and forming processes, tooling design, machines used, etc. Process steps are planned based on ductility, thicknesses, micro-structure, etc. material parameters.

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

The process variants are to be carried out by dies and tools for sheet metal involves, cutting or blanking by shearing of sheets with help of punches/ blades etc., bending carried out with simple or complex die shapes as per need, and Punching or trimming to remove unwanted materials.

Complex die operations are combined with help of jigs and fixtures that are built in to die and perform multiple operations in die block also known as progressive or transfer dies. Sheet metal die design and manufacturing, therefore demands understanding of the materials and forming steps involved in the processing. Designing sheet metal dies and tooling will require planning, calculations and probably some in house testing.

2. PRODUCT & ITS APPLICATION:

The main components for die tool sets are:

- Die block – Main part that all the other parts are attached to.
- Punch plate – The plate that holds and supports the different punches in place.
- Blanking punches and Die – It produces the blank of parts for further processing.

- Pierce punch and die – This is a punch die that removes material from the blanked or processed finished part.
- Stripper plate – A plate that holds punched out scrap material down and unclogs die.
- Pilot – It is a locator pin that helps to place the sheet accurately for subsequent stage of operation in same or another die.
- Guides, back gauge, or finger stop – These parts are all used to make sure that blank always goes in the same position, within the die.
- Setting – Stop Pins/ block – These are used to control the depth of punch travel into the die.
- Shank – It is used to hold in the Die block in press. It is aligned at the center of the plate.

It is always advantageous to perform multiple operations on the part to achieve precision and cost advantages. This is called compound operation implementing more than one operation during the single stroke of press cycle. The sheet metal is fed through as a coil strip, and a different operation such as punching, blanking, and notching is performed at the same station of the machine with each stroke of a series of punches.

Many a times, Dies are also designed with for sequential/ progressive forming operations to be performed. The material moves through the die and it is progressively modified at each station until the final operation ejects a finished part.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

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

4. 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.

Sheet Metal processors are constantly in need of Dies and tooling suppliers and many of the Dies and tools are imported by our industry to achieve precision, reliability, productivity and durability of tooling. In view of this, there is very good scope for new unit with design and processing capabilities for new as well as spares for the dies and tooling.

5. RAW MATERIAL REQUIREMENTS:

Selection of material is very critical for dies and tools production. Tool steel is high carbon and high alloy steels with distinctive hardness, resistance to abrasion, shock and deformation, and ability to hold a cutting edge at elevated temperatures. The presence of carbides in tool steel plays the dominant role in the qualities of tool steel. The four major alloying elements that form carbides in tool steel are tungsten, chromium, vanadium and molybdenum. Martensitic steels have excellent wear resistance and good thermal conductivity suitable for high standards of polishing and surface coatings.

Various grades of tool steels are chosen depending on cost, working temperature, required surface hardness, strength, shock resistance, and toughness requirements. The more severe the service condition (higher temperature, abrasiveness, corrosiveness, loading), the higher the alloy content and consequent amount of carbides required for the tool steel.

All Tool steels are available from local and imported sources.

6. MANUFACTURING PROCESS:

The process starts with detailed designing of tools and dies. Various computer aided design software's are used to arrive at economical designs. Dies and tooling manufacturing requires very high dimensional accuracies and subsequent heat treatment and surface treatment

processes for the components of die and tool. Hardened steel molds are heat treated after machining, making them superior in terms of wear resistance and lifespan.

Main process steps are machining of tool steel like turning, shaping, milling, drilling, grinding, lapping, etc. Each component undergoes heat treatment processes like through hardening, skin or case hardening, nitriding, etc. The facilities in an integrated tooling shop, requires Solid Works etc. software's for Design, Precision Milling machine, Precision Lathe, surface grinding, cylindrical grinding, Wire EDM, Drill EDM, and in house or out sourced tool steel heat treating facilities.

7. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 13 employees initially and increase to 34 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	25000	3	4	6	10	14
2	Semi-Skilled/ Helpers	10000	4	4	6	8	10
3	Supervisor/ Manager	40000	2	3	3	4	4
4	Accounts/ Marketing	18000	2	2	2	3	4
5	Other Staff	8000	2	2	2	2	2
	TOTAL		13	15	19	27	34

8. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 8 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	4
4	Arrangement of Finance	2
5	Manpower Recruitment and start up	4
	Total Time Required (Some Activities run concurrently)	8

9. COST OF PROJECT:

The unit will require total project cost of Rs 222.54 lakhs as shown below:

Sr No	Particulars	In Lakhs
1	Land	30.00
2	Building	60.00
3	Plant and Machinery	113.25
4	Fixtures and Electrical Installation	4.00
5	<i>Other Assets/ Preliminary and Preoperative Expenses</i>	3.50
6	Margin for working Capital	11.79
	TOTAL PROJECT COST	222.54

10. MEANS OF FINANCE:

The project will require promoter to invest about Rs 64.48 lakhs and seek bank loans of Rs 158.06 lakhs based on 70% loan on fixed assets.

Sr No	Particulars	In Lakhs
1	Promoters Contribution	64.48
2	Loan Finance	158.06
	TOTAL:	28.02

11. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	2.87	40	1.15	1.72
2	Receivables	8.93	50	4.47	4.47
3	Overheads	5.03	100	5.03	0.00
4	Creditors	2.87	40	1.15	1.72
	TOTAL	19.70		11.79	7.91

12. LIST OF MACHINERY REQUIRED:

Sr No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Hacksaw machine	Nos	2	100000	200000
2	CNC Lathe machine	Nos	2	500000	1000000
3	Precision CNC Milling m/c center and all attachment	Nos	1	1600000	1600000
4	Heavy Duty Milling Machine	Nos	2	650000	1300000
5	Wire cut EDM / Spark erosion Machine	Nos	2	750000	1500000
6	Heavy duty Radial Drill machine	Nos	1	300000	300000
7	Precision Hydraulic Grinding M/cs	Nos	3	750000	2250000
8	Belt grinding Polishing machine	Nos	2	80000	160000
9	Welding Brazing set	Nos	1	60000	60000
10	Lapping machine	Nos	2	140000	280000
11	Heat treatment facility		1	750000	750000
11	Air Handling/ Clean room facility	Nos	1	250000	250000

Sr No	Particulars	UOM	Quantity	Rate	Total Value
12	Air Compressor	LS	1	200000	200000
13	CNC measuring machine with granite block 5 axis		1	500000	500000
14	Hydraulic Press		1	450000	450000
	<u>Sub Total:</u>				<u>10800000</u>
	Tools and Ancillaries				
1	Tools and gauges	LS	1	450000	450000
2	Misc. tools etc.	LS	1	75000	75000
	<u>Sub Total:</u>				<u>525000</u>
	Fixtures and Elect Installation				
1	Storage racks and trolleys	LS	1	35000	35000
2	Other Furniture	LS	1	25000	25000
3	Telephones/ Computer	LS	1	40000	40000
4	Electrical Installation	LS	1	300000	300000
	<u>Subtotal:</u>				<u>400000</u>
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	350000	350000
	TOTAL PLANT MACHINERY COST				12075000

13. PROFITABILITY CALCULATIONS:

Sr No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	35	45	55	65	70
2	Sales	Rs Lakhs	107.16	137.78	168.40	199.02	214.33
3	Raw Materials & Other Direct Inputs	Rs Lakhs	34.43	44.27	54.10	63.94	68.86
4	Gross Margin	Rs Lakhs	72.73	93.52	114.30	135.08	145.47
5	Overheads Except Interest	Rs Lakhs	18.11	18.11	18.11	18.11	18.11
6	Interest	Rs Lakhs	22.13	22.13	22.13	22.13	22.13
7	Depreciation	Rs Lakhs	18.08	18.08	18.08	18.08	18.08
8	Net Profit Before Tax	Rs Lakhs	14.42	35.20	55.98	76.77	87.16

14. BREAK EVEN ANALYSIS:

The project can reach break-even capacity at 28.06 % of the installed capacity as depicted here below:

Sr No	Particulars	UOM	Value
1	Sales at Full Capacity	Rs Lakhs	306.18
2	Variable Costs	Rs Lakhs	98.37
3	Fixed Cost incl. Interest	Rs Lakhs	58.31
4	Break Even Capacity	% of Inst Capacity	28.06