Profile No.: 28 NIC Code: 24209

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 conductibility 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 | *Other Assets/ Preliminary and Preoperative Expenses* | 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 |
|  | Sub Total: |  |  |  | 10800000 |
|  | Tools and Ancillaries |  |  |  |  |
| 1 | Tools and gauges | LS | 1 | 450000 | 450000 |
| 2 | Misc. tools etc. | LS | 1 | 75000 | 75000 |
|  | Sub Total: |  |  |  | 525000 |
|  | 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 |
|  | Subtotal: |  |  |  | 400000 |
|  | 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 |