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Case Study of a Plant Layout, K38 Body Oil Pump and Machine Process Parameters of a Small Scale Industries

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CASE STUDY OF A PLANT LAYOUT, K38 BODY OIL PUMP AND MACHINE PROCESS PARAMETERS OF A SMALL SCALE INDUSTRIES..

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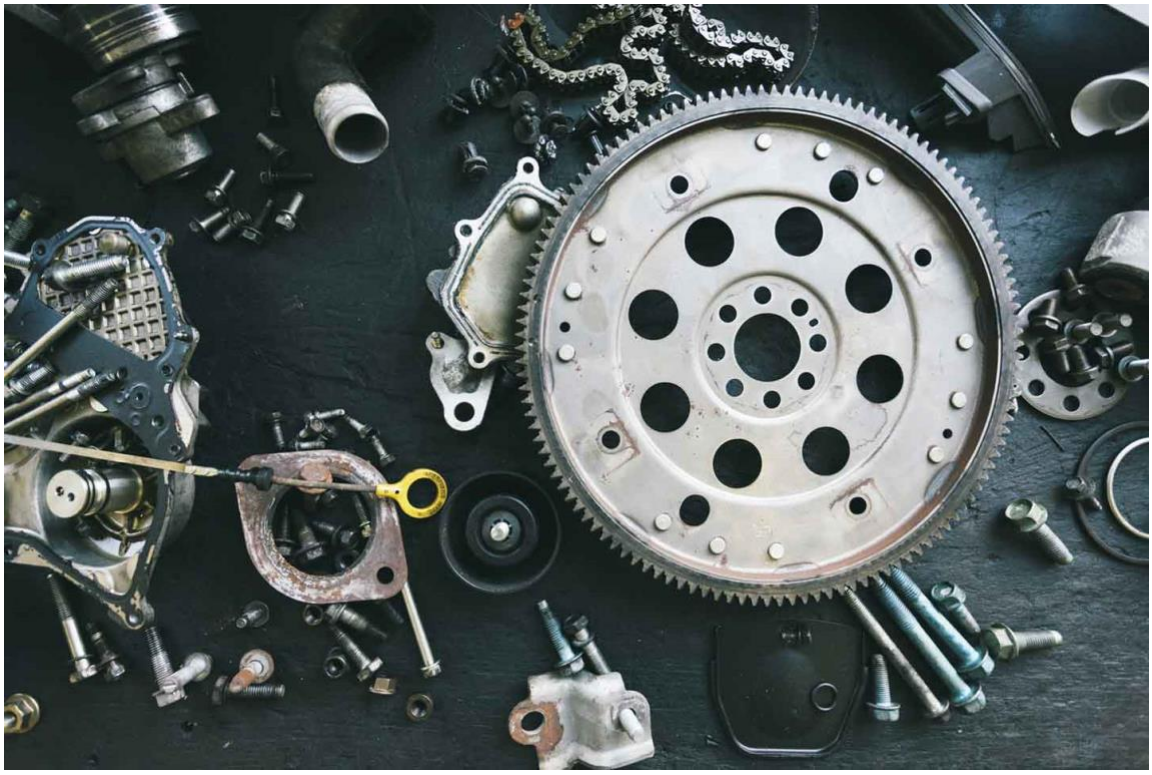
MACHINING SECTION IN PRADNYASURYA.

In this research paper we are studied the various types of machining Process are used in small scale industries and how to handling the machine.



CASE STUDY :- Case Study Of A K38 Body Of Oil Pump.

The great effort behind the production of each machining Process on small scale projects / Product.

Abstract.

Industrial training is an important phase of a student life. A well planned, properly executed and evaluated industrial training helps a lot in developing professional attitude. It develop an awareness of industrial approach to problem solving, based on a broad understanding of process and mode of operation of organization. During a period of one month training at PradnyaSurya Engineering Works Pvt.Ltd. , most of the theoretical knowledge that has been gained during the course of studies is put to test The great effort behind the production of each machining Process on small scale projects and other Industrial products have been understood during this training.

Keywords :- PradnyaSurya, Oil-Pump, Machine- Shop, Industrial-Training, K38 oil Pump.

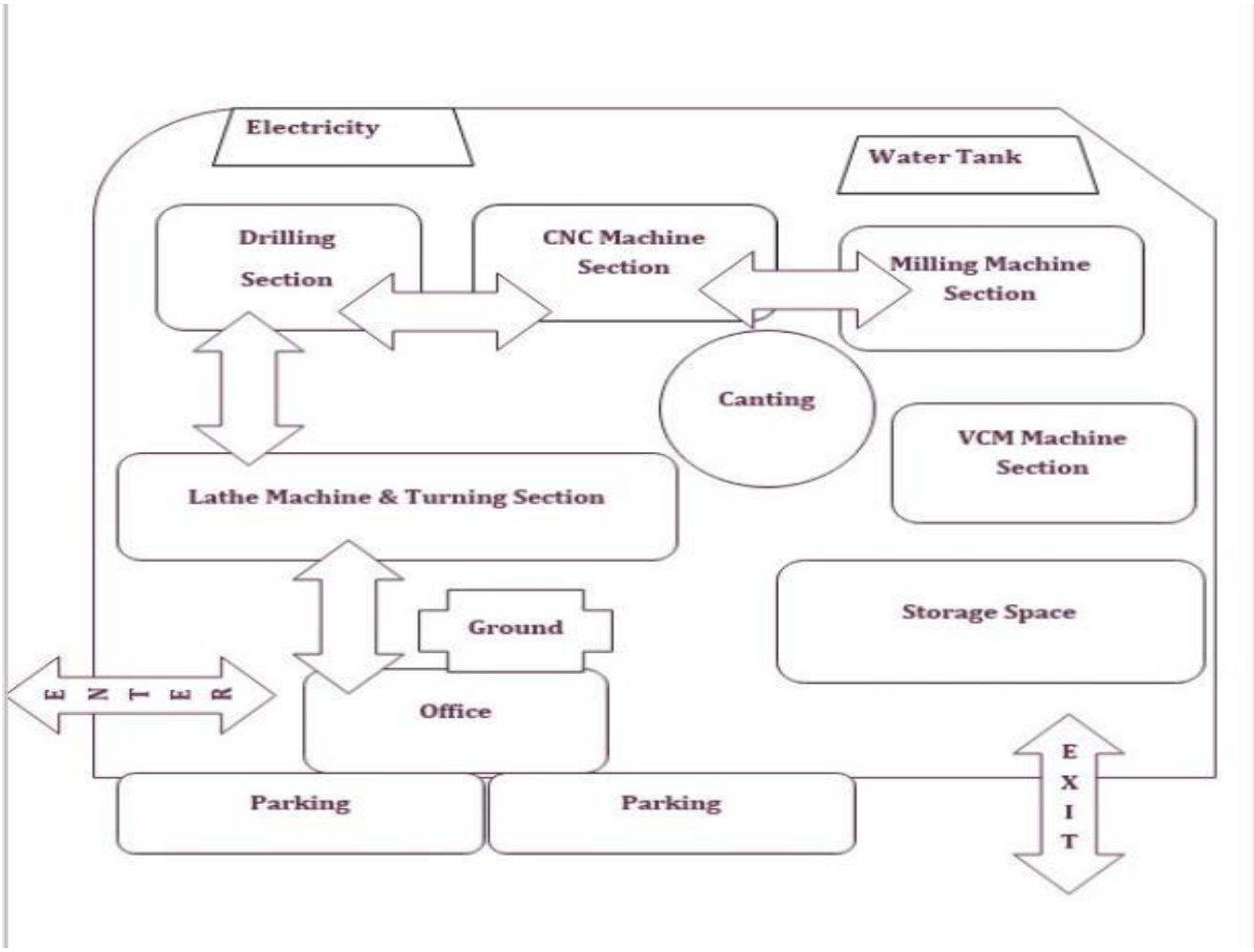
INTRODUCTION.

Indian subcontinent is the second manufacture of garments after chime being the gobble ladder in gamin production India is known for its high quality genet for men and mos. Of the garment manufactures are in small and medium scale industry men's catching industry has been growing steadily over the past few years this has been possible owing to the Indian becoming more fashions conscious. And hence there s more Consumption which has increased global demand of men's garments by the rest of the world

Indian garment industry has an advantage as it produces and exports stylish garments for men at economical price due to cheap bubo rates. Today the way of technician advancement and use of sophisticated machinery I has enable the manufacturers to achieve better quality and weld designed garments

The contribution of the garment export industries to the exports and foreign exchange earnings has increased in laps and bounds during the host decode. The demand for garments increasing the institutional market lading to a decreasing gap between the demand and supply. Since the beginning of the mankind humans have used some kind of garnets fun their body. The archelogies and anthropologists say that the earner catching was made of leather, leaves or gas's, draped or tried to the body, we in the modern times still drape, wrap or tie our cloths. The difference in that of different materials.

LAYOUT OF INDUSTRY AND MACHINE SHOP.



PradnyaSurya Engineering Work. pvt.ltd

PRADNYASURYA 'S PROCESS SHEET.

Sr..No	Holding	Pre CNC Operation
1	CNC Turning	Mtn bore 35 to depth Bore 1 to 2 depth OD to depth Bore 29 to depth
2	Milling Top & Bottom	Mtn
3	Drilling	4H – 9 mm thro 3.2 to depth
4	Drilling	11.5 mm thro 15 mm thro 14 mm thro 14.2 mm thro 4.2 mm thro
5	Drill &Tap	11.5 mm thro ¼ BSP Tap 20.5 mm to 21. 5 mm Counter
6	Tapping	¼ BSP / 17 mm Counter 12.5 mm depth & 21.5 mm Counter
7	Tapping	4 mm & 5 mm

Table 1 :- Process Sheet Of End Cover.

Sr.No	Holding	Pre Milling Operation
1	2 Side Milling On Lathe	Size to be maintain as per sample
2	5 Hole Drilling Throjig	10.2 mm drill 8.5 mm drill
3	Gang Milling	Size to be maintain as per sample
4	Side Milling	Size to be maintain as per sample
5	2 Hole Drilling Throjig	10.2 mm drill
6	2 Hole Tapping	M12 (Used Thread Gauge)

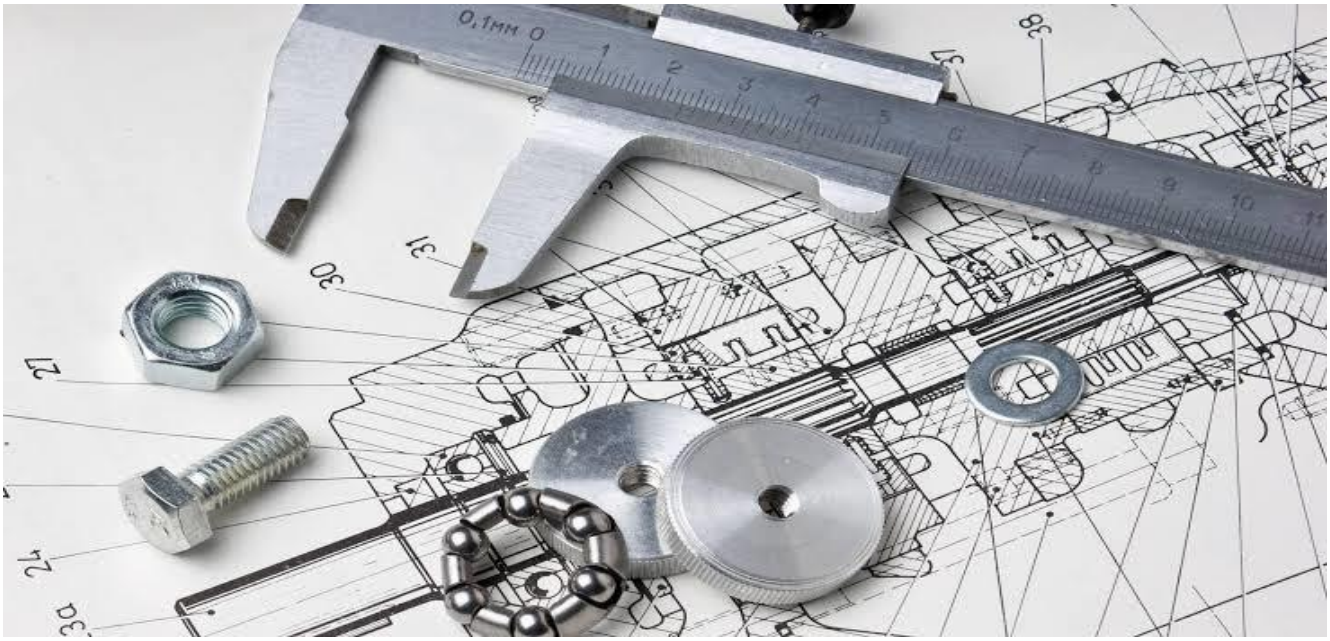
Table 2 :- Process Sheet Of Bracket.

MACHINING SPECIFICATION.

1. **CNC Turning Center.**
   - **I. LMW Make**
   - II. Chuck Size :- 200 mm
   - III. Maximum Turning Dia. :- 320 mm
   - IV. Maximum Turning Length :- 330 mm
   - V. Controller :- FANUC Oti TD

2. **Vertical Machining Center.**
   - **I. Hurso US Make**
   - II. Bed Size :- 1170 mm × 610 mm × 610mm
   - III. Traverse :- 1020 mm × 610 mm × 610 mm
   - IV. Positioning Accuracy :- 0.003 mm
3. **Jig Boring Machine.**
   - **I. Newall Make (England)**
   - II. Bed Size :- 1000 mm × 600 mm
   - III. Traverse :- X – 600 mm Y – 450 mm Z – 600 mm
   - IV. Accuracy :- 0.010 – 0.020 mm (For Center Distance)
   - V. Boring from 6 mm – 150 mm
   - VI. Having 3 axis DRO with resolution one micron Sony Make
4. **Universal Milling Machine.**
   - **I. Induma Make (Italy)**
   - II. Bed Size :- X – 1000 mm Y – 500 mm
   - III. Traverse :- X- 1000 mm Y- 500 mm Z – 400m .

- **Machining Specification In PradnyaSurya.**



I. Lathe Machine Section.
II. V.M.C Machine Section.
III. C.N.N Machine Section.
IV. Drilling Machine Section.
V. Milling Machine Section

I. Lathe Machine Section.

Fig. 1 :- Lathe Machine Section.

Lathe is known as the mother of all machines. Lathe was considered to be very important during the Industrial Revolution. Lathe is thus a very convenient and easily operated machine used for machining processes.1 section of industry is lathe section. Generally 6 to 8 lathe machines are used for machining in industry. As we know that lathe machine is consist of three major parts.

1. Head stock
2. Tail stock
3. Tool post.

1. **Head stock:** The component or product is mounted on the head stock which is to be machined and head stock is mounted on the shaft which is driven by the electric motor with help of pulley as shown in right side of the fig.1
2. **Tail stock And Tool post:** It is generally used for drilling purpose i.e. On shaft of the tailstock. There is one arrangement to fit drill bit and last most important component in the lathe is tool post. Tool post is used to hold tool & this freely slide over lathe bed. Generally, it is having some arrangement for tracing process by giving some angle.
3. **Bed:** The bod of lathe acts as the base on which the different fixed and operations parts of the Lathe are mounted. Lathe beds are usually made as single piece casting of semi-steel (i.e. Toughened cast iron). Lathe bed are heavy rigid structure which is having damping capacity for the vibrations generated by machines during machining. The rigid structure will helps to avoid detections. The guides and ways which are present on the top of the bed will act as rails and supports other parts like tail stock. The bed will be designed in such a way that easily bolted to the floor of the machine shop.

4. **Carriage:** The lathe carriage serves the purpose of supporting, guiding and feeding the tool against the job during the operation of the lathe. The carriage will present between head stock and tail stock which will slides on the bed ways of the lathe bed. The carriage will give feed to the tool and it holds the tool, for taper turning the feed is cross feed, for turning it is longitudinal feed.
5. **Compound Rest:** The compound Rest will be placed over the cross slide and it consists of a graduated circular base which is having swiveling nature. When we were there, they were machining a flat surface & they used back gear mechanism for that purpose. One more observation was they were designing different fixture for different product or component for machining according to their ease.

   A heavy duty lathe machine was used for the machining operations. There were in total 10 lathe machines which were used by the operators according to their respective shifts Simultaneous machining and drilling operations were being done in a shift of 12 hours.

II. V.M.C Machine Section.

Fig. 2 :- V.M.C Machine Section.

Diagram shows complete V.M.C. machine. V.M.C. stand for Vertical machining center .It consist of the many parts such as CRT(Cathode ray tube) display, Tool magazine, vertical spindle, work panel where work is mounted, pressurized air cylinder (cleaning purpose). V.M.C. is having vertical spindle which holds the tool in the vertical [Y] direction. Hence the name is V.M.C. This machine is capable of working in all direction that is X, Y, & Z direction. Generally these types of machines are used for machining flat surfaces. It consists of tool magazine.

Generally capacity of tool magazine is 22 tools (i.e. Carries 22 tool). The V.M.C. machine is numerical type controlled or automated. Once program is fed, operation is carried out according to that program. For the different operations tool is selected automatically from tool magazine and operations done on product. Once program is given, data is visualized in CRT display. The construction of CRT display is as shown in the fig below. CRT display shows instruction of the program, error occurred, and many such other things are displayed on the CRT display.

Machine Control Unit Of V.M.C

Tool magazine:

Machining centers are used to carry out multiple operations like drilling, milling, boring etc. in one set up on multiple faces of the workpiece. These operations require a number of different tools. Tool changing operation is time consuming which reduces the machine utilization. Hence the tools should be automatically changed to reduce the idle time. This can be achieved by using automatic tool changer (ATC) facility. It helps the workpiece to be machined in one setup which increases the machine utilization and productivity. Large numbers of tools can be stored in tool magazines. Tool magazines are specified by their storage capacity, tool change procedure and shape. The storage capacity ranges from 12 to 200

Fig. Drum Type Automatic Tool Changer

III. C.N.C Machine Section.

Fig. 3 :- C.N.C Machine Section.

The diagram shows features of CNC lathe machine. CNC stands for Computer numerical Control. It is essentially an NC machine with dedicated computer as it's integral part working as MCU (Machine Control Unit. It has more flexibility compared to an NC machine. The CNC machine having the following features.

1) Control system features
2) Memory features
3) Programming features.
4) Programmable logic control features.
5) Diagnostics features.

As we know that CNC control is essentially a microprocessor based control. The control may have single or multiple microprocessors. Normally 16 and 32 bit microprocessor are used, The commonly used microprocessors are INTEL 8086, INTEL 80816, and MOTOROLA 68000 etc.

The actual CNC machine which we saw was automated programmable numerical control machine. The operations performed on CNC are same as that are performed on normal lathe, but accuracy of CNC lathe is more.

IV. Drilling Machine Section.

Fig. 4 :- Drilling Machine Section.

Diagram shows construction of normal drilling machine which was used in industry main function of drilling machine is to produce hole. Generally various types of drilling machines are used. In that, radial drilling machine is one type & special feature of radial drilling machine is that it can rotate in 360 degrees.

Drilling machine is generally having vertical type of spindle on which tool is mounted. Generally a drilling machine is used for producing hole on component or product. When we were there, various operations were performed on the drilling machine such as producing hole on the jacket, producing hole on casing of pump. There are various kinds of tools asked for producing holes. Small diameter drill bits are used for producing small holes and large diameter drill bits are used for producing large diameter hole. Fig. shows actual product we saw while performing drilling operation.

JIGS AND FIXTURE USED IN DRILLING.

Jig :-

Definition:-It is a custom made device used for holding the piece to be worked-on in a correct position relative to its associated tool.

It is a work holding device that holds, supports and locates the work piece and guides the cutting tool for a specific operation. Jigs are usually fitted with hardened steel bushings for guiding or other cutting tools. A jig is a type of tool used to control the location and/or motion of another tool. A jig's primary purpose is to provide repeatability, accuracy, and interchangeability in the manufacturing of products. A device that does both functions (holding the work and guiding a tool) is called a jig. An example of a jig is when a key is duplicated; the original is used as a jig so the new key can have the same path as the old one.

Fixture :-

Definition:- A fixture is a work-holding or support device used in the manufacturing industry.

Fixtures are used to securely locate(position in a specific location or orientation) and support the work. It is a work holding device that holds, supports and locates the work piece for a specific operation but does not guide the cutting tool. It provides only a reference surface or a device. What makes a fixture unique is that each one is built to fit a particular part or shape. The main purpose of a fixture is to locate and in some cases hold a work piece during either a machining operation or some other industrial process. A jig differs from a fixture in that a it guides the tool to its correct position in addition to locating and supporting the work piece. Examples: Vises, chucks.

V. Milling Machine Section.

Fig. 5 :- Milling Machine Section.

Diagram shows actual milling machine used for machining in that industry. Milling machine is used for machining or surface finishing. There are various terms used in milling machine such as arbor, indexing plate etc. Arbor is a shaft on which tool is to be mounted for performing machining operation. Generally tool used in milling machine is multipoint cutting tool. Milling machine is used for finishing surface of the given workpiece. We can perform other operations on the milling machining such as gear hobbling .Gear hobbling is one of major operation performed on milling machine by using INDEXING plate

During visit, we saw that worker was doing surface finishing operation on component by using double helical gear pair. There is some specific arrangement designed by engineer to hold component or product. For all machine the engineer of the PradnyaSurya Engineering Works designs different jig and fixtures for different machine for performing the operation of machining.

INSPECTION DEPARTMENTS.

The fished part of flow measuring devices are than send to the inspection section. There each and every part is inspected very carefully. Inspection is done with the help of different gauges such as For inspection the components following conventional devices are used. This includes venire caliper, dial gauge, height gauge, micrometer, depth micrometer etc.

Sr. No.	Name Of Instruments	Range (mm)	L.C (mm)
1	Bore Gauge	18 – 35 35 – 60 50 – 150	0.01
2	Dial Gauge (plunger Types)	0 – 10	0.01
3	Dial Gauge (Lever Types)	0 – 10	0.01
4	Micrometer	0 - 25 25 – 50 50 – 75 75 – 100	0.01
5	Vernier Caliper	0 – 150 0 – 300 0 – 500	0.02
6	Depth Gauge	0 – 200	0.02
7	Height Gauge	0 – 300	0.02

Table.

QUALITY CONTROL DEPARTMENT .

Quality is of prime importance in any aspect of business. Customs demand and expect value for money as procedures of apparel there must be a content to procedure work of goods qualify. The system required for programing and c-ordination the refine of the curious group in an organization to maintain the quaky. As such quality control s seen as the agene of quality assurance or total quaky control establish acceptable working torrance in to al vibes on the speciation. Establish Ehud rate recording system Improve technical understanding of the product including.

CHECKING SECTOIN

The checking section is most important section in the production department. If any careless made in this section the customer satisfaction of this organization will reduced. The supervisor receives the stiches garments for online. Piece to piece checking with they regard to measurement accessories, fabric stains, hoes and other if any. The checking

supervisor receives stitched pieces bang with order copy specification sheet and the approved accessories from the respective department heads. So verifies the delivery with the actual quality received. Each and every piece stitched garments will be checked with regard to project/ machine, material weight, stain, holes, piece weight accessories position brose thread parts positioning depends upon the requirements.

SALES DEPARTMENTS.

The sales manager is response for selling a company's products to computers, working with the team of sales representatives. And he is responsible to get order from international markets. Saks manager may also be responsible for recruiting sales representatives, settings sales target and monitoring achievement and client feedback. They as analyze sales data to uncover any trends and identify new information. Saks manager sometimes have to deal with major customers on a personal basis. They attend meetings, conference and trade fairs on behalf of the client. Saks manager spend mast of the time in office environment but may travel frequently to meet clients and attend trade shows.

STRUCTURE OF SALES DEPARTMENT.

1. Executive manager
2. Assistant manage
3. Workers

In export sales merchandisers are appointed when the buyers and sellers enter into contract. Through agents or merchandiser the company exports the garments to foreign companies.

COMPANY PROFILE.

1) Company Name – PradnyaSurya Engineering Works.Pvt.Ltd.

2) Proprietor Name -

- ***Mr. Er. SudaRshan Dilip Bhalshankar.***
- ***Miss. Er. Nisha Vidyasagar Sutkar***

3) Address - Vidi Gharkul, Solapur, Maharashtra India

4) Pin code – 413005

5) Contact – 8055551264

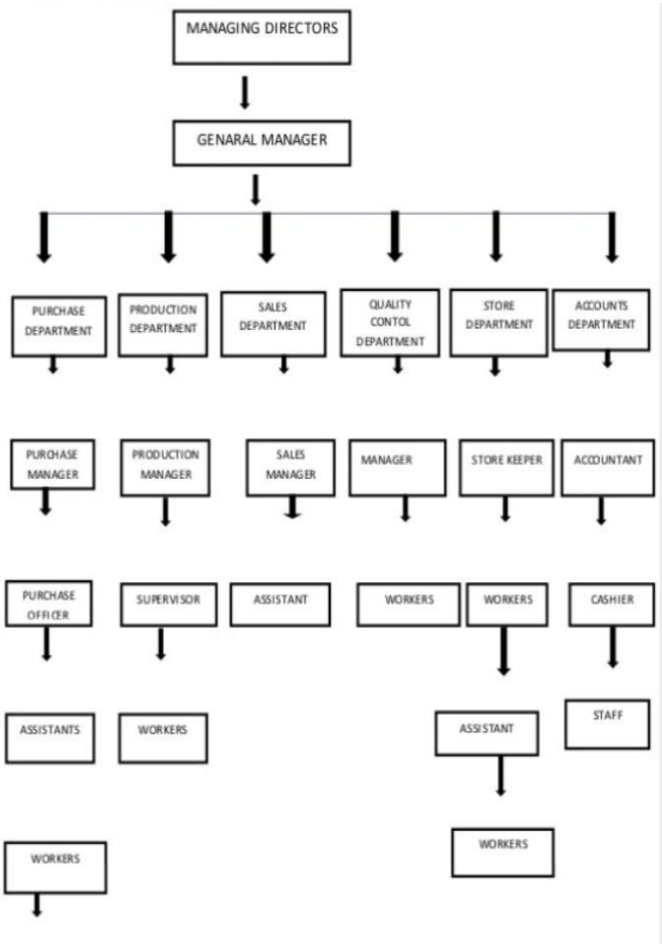
6) Email – pradnyasuryaengineerinworks@gmail.com

7) Year of Establishment – 2010

8) Manufacturing Items –

- *Agriculture Equipment And Machine*
- *Home Appliances.*
- *Water purification machine.*
- *Engineering projects*

ORGANIZATION CHART.



CASE STUDY.

CASE STUDY OF A K38 BODY OF OIL PUMP.

1) **FACING OPERATION:-**Facing. Facing is a lathe operation in which the cutting tool removes metal from the end of the work piece or a shoulder. Facing is a machine operation where the work is rotated against a single point tool. A work piece may be held in a 3, 4, or 6 jaw chuck, collets or a faceplate. For FACING Operation40mim diameter end milling cutter is used.
2) **CENTERING OPERATION:-**Centering operation also called center drilling, this operation drills a starting hole to establish its location for subsequent drilling accurately. The tool is known as a center drill. For CENTERING OPERATION 12mm diameter drill bit is used.
3) **DRILLING OPERATION:-** Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute For DRILLING OPERATION7.5mm diameter drill bit is used.
4) **CHAMFERING OPERATION:-**Chamfering: Chamfering removes the burrs and sharp edges, and thus makes the handling safe. Chamfering can be done by a form tool having angle equal to chamfer which is generally kept at 45°. For CHAMFERING OPERATION45 degree chamfer tool is used.
5) **REAMING OPERATION:-**Reaming is a cutting process in which a cutting tool produces a hole of a very accurate size. Reaming is done to a hole which has been already drilled, to produce a truly circular hole of exactly the right diameter. Reaming is a cutting process in which a cutting tool produces a hole of a very accurate size. For REAMING OPERATION 7.93diameter reamer is used.
6) **END MILLING OPERATION:-**The end milling is the operation of production of flat surface which may be vertical, horizontal or at an angle in reference to the table surface. The cutter used is an end mill. For END MILLING OPERATION 40 diameter end milling cutter is used.
7) **SIDE MILLING OPERATION:-**The side milling is the operation of production of a flat vertical surface on the side of a work piece by using a side-milling cutter. The depth of cut is adjusted by rotating vertical feed screw of table. For SIDE MILLING OPERATION 32mm diameter milling cutter is used.
8) **SIDE MILLING OPERATION SECOND:-** For SECOND SIDE MILLING OPERATION 152mm diameter milling cutter is used.

i. **Raw Material Section:-**Raw material of cast iron is selected from the raw material section.
ii. **Lathe Machine Section:-**On lathe machine the lathe operation such as turning & facing are done.
iii. **VMC machine section:-**By using automatic tool changing machine which contain 20to24 tool different processes are performed on the component.

iv. **CNC Machine section:-**By using computer numerical control machine complicated operation like casing curvature are done on the component

v. **Drilling machine section:-**By using simple drilling machine &radial drilling machine different diameters holes are created on the components.

vi. **Milling Machine section:-**Milling machine is used for the surface finishing of the component by using multipoint cutting tool.

vii. **Inspection section:-**Inspection is done on the component by using inspecting instruments like Vernier caliper ,micrometer gauge.

viii. **Painting section:-**Paint is given to the casing for corrosion resistance and good looking Serial numbers are given to the component for the identification again.

CONCLUSION.

The training at the ***PradnyaSurya Engineering Works.Pvt.Ltd.*** for period of 15 days helped me for clarifying the concept about industrial organization & its functioning. This training show the important of practical knowledge of various manufacturing process which was got me at PradnyaSurya Engineering Works was a life time experience for me.

This training focus on some following points:

1. In PradnyaSurya Engineering Works oil pump casing. Drilling components are machined
2. After training from PradnyaSurya Engineering Works, all the concepts of machining were understand properly
3. In PradnyaSurya Engineering Works, we were understand the various programs on CNC Lathe Machine ,and VMC
4. In this training we experienced that industrial atmosphere

REFERENCES.

1) Workshop Technology by O P Khanna/Chapter 6/6.1-6.8
2) Elements of Workshop Technology Volume 2 by S.K. Hajra Chowdhary, A.K.Hajra Chowdhary Nirjhar Roy/ Chapter 3/ 3.1-3.3

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