

EINSTEIN

COLLEGE OF ENGINEERING

Sir. C. V. Raman Nagar, Tirunelveli-12



Department of Mechanical Engineering

ME37-Manufacturing Technology Lab- I

Name :

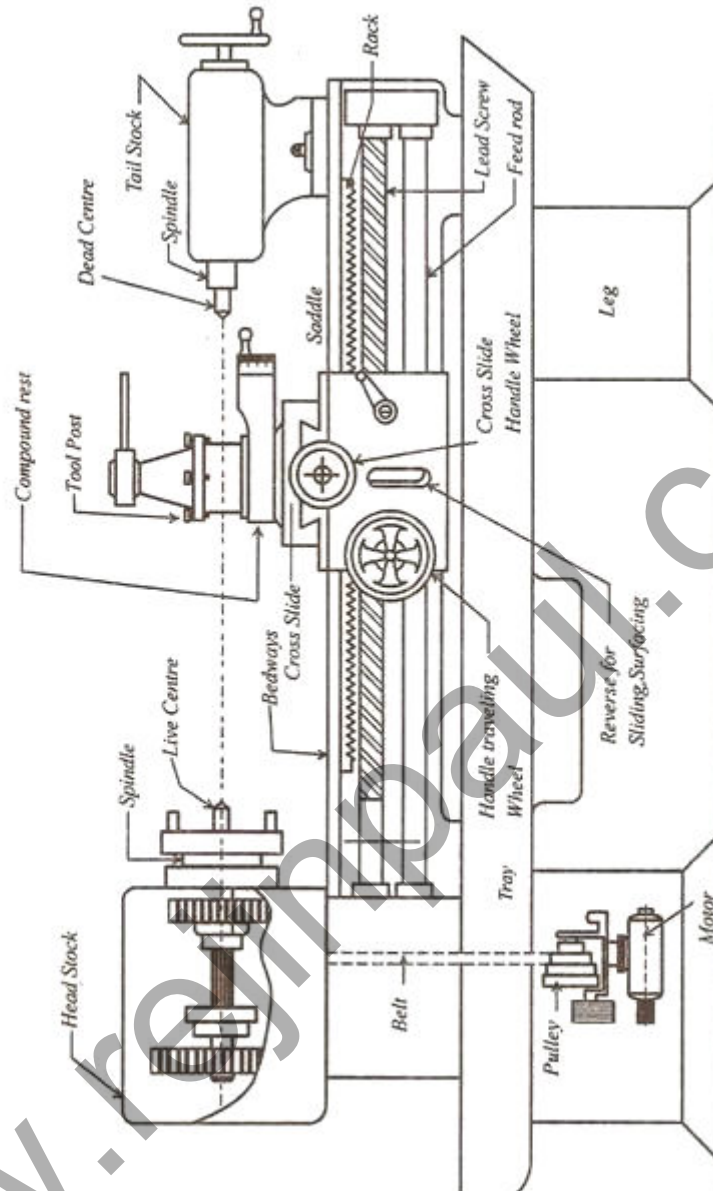
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Ex. No :

Date :

STUDY OF LATHE

Aim

To study about the lathe.

Introduction

Lathe is called the father of machine tools. The main function of lathe is to remove metals from work piece to give a required shape and size. In the lathe the work piece is held in a chuck. The tool is moved at an angle 90° to the axis. Various operations such as straight turning, taper turning, and chamfering, facing, knurling, grooving, thread cutting, taper turning are carried out. When the operations above set are done automatically, then the lathe is called automatic lathe.

Working principle of lathe

In a lathe, the workpiece is held in chuck and rotates about its axis by means of power. A single point cutting tool is mounted in tool post. When the chuck rotated the work piece also rotated. The tool moves parallel to the axis of rotation of work piece to produce a cylindrical surface, where as the tool moves perpendicular to the work piece to produce a flat surface. The tool moves at an angle to the axis of work piece to produce a turn surface. The material is removed in the form of chip from the work piece by giving proper feed and depth of cut. So, the required size and shape of the work is obtained.

Main parts of lathe

The lathe consists of various parts. Their parts and function are discussed below.

Bed

Bed is the base of the lathe. The headstock is mounted on the left end; the carriage is in the middle and the tailstock at the right end of bed. The bed is made up of cast iron, alloyed with nickel, chromium. The bed is made up of cast iron to observe shock and vibration created during machining. The guide ways of the bed may be flatter inverted 'V' shape.

Headstock

It is mounted on the left end of the bed. It carries a hollow spindle. The live center can be attached in the spindle. The spindle nose is threaded. In chuck faceplates can be attached to the spindle. The headstock may be back threaded type. The headstock has two types of driving mechanism

- Back geared mechanism
- Belt driven mechanism

Tailstock

It is located on the bed at the right end. It is used for supports right end of work and also for holding drills, reamer tools for drilling, reaming and such other operations. The tailstock can be moved along the bed and clamped at any position, to support the different length work.

Carriage

Carriage is used for giving various feed to the tool by hand or by power. The carriage is attached with the saddle.

Saddle

It is a H shaped casting fitted on the bed and moves along the guide ways. It carries the cross slide, compound rest and a tool post.

i) Cross slide

It is attached to the upper side of saddle and carries compound slide and tool post. The cross slide can be moved cross wise by hand or power. The micrometer dial is mounted on the cross slide hand wheel, with an accuracy of 0.05mm.

ii) Compound Rest

It is attached over the cross slide. It is used during the taper turning opening operations to set the tool for angular cuts. Here the micrometer dial is mounted to show the depth of cut.

iii) Tool post

The tool is clamped over the tool post. It is fixed over the compound rest. There are four types of tool post

- a. Single screw tool post
- b. Open side tool post
- c. Four bolt tool post
- d. Four way tool post

Apron

Apron is attached to the saddle and hangs in front of the bed. It has gears, levers, clutches for moving the carriage automatically. A split nut is attached for engaging and disengaging the carriage from the lead screw. It is used in thread cutting work.

Lead Screw

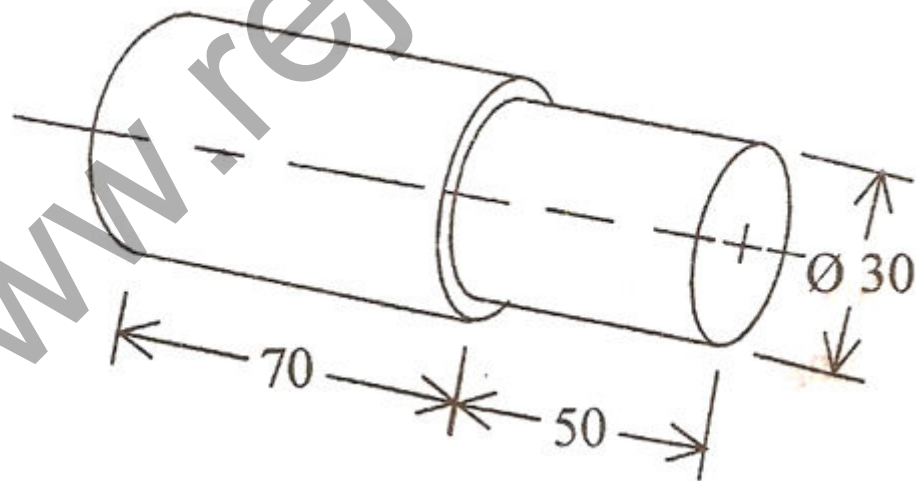
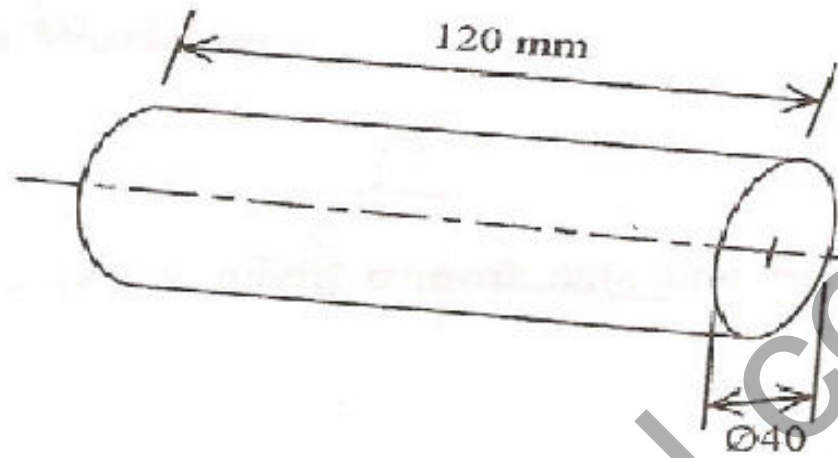
It is a longer screw with standard ACME square threads and used for transmitting power for automatic feed for thread cutting operation.

Feed rod

The feed rod is the long shaft used for the movement of carriage along the axis of bed. It is used for operations like facing, turning and boring.

Result

Thus the lathe was studied.



Ex. No :

Date :

FACING, PLAIN TURNING AND STEP TURNING

Aim

To perform turning, facing and chamfering on a cylindrical work piece.

Material used

Mild steel rod.

Tools required

- Lathe
- Three-jaw chuck
- Chuck key
- Vernier caliper
- Single-point cutting tool

Procedure

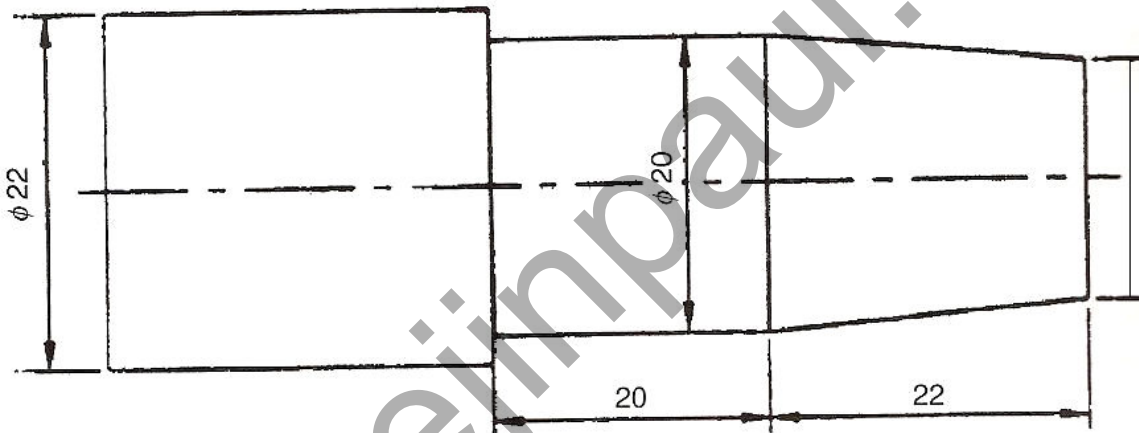
1. First loosen the jaw in the chuck key to position the work piece, and then tighten the jaws.
2. Fix the cutting tool in the toolpost.
3. Switch on the lathe and move the carriage near to the workpiece. Give it a small cross feed, and then move carriage longitudinally to the required length slowly.
4. Bring the carriage to the original position, give a small cross feed and move carriage longitudinally. Repeat this step until required diameter is obtained.
5. To get smooth surface give a very small feed when the diameter is nearing the required value.
6. To face the end surface of the workpiece, move the carriage to make the tool touch the end surface of the work piece.
7. Give a small feed in longitudinal direction, and then move the tool towards the axis of the workpiece using the cross slide to complete the workpiece.
8. The turning operation is done with cutting tool to reduce the diameter upto the required dimension for the two steps of various diameters.
9. The workpiece is removed from the chuck and the dimensions of workpiece are checked for the requirements.

Questions

1. Name some important lathe parts.
2. Where can we see C.I in lathe.
3. What is turning and facing.
4. Give the specification of lathe.
5. What is machining?

Result

Thus the required shape and size is obtained by Facing, plain turning and step turning



Ex. No :

Date :

TAPER TURNING USING COMPOUND REST

Aim

To get a required shape and size from a given workpiece by taper turning operations in the lathe.

Material used

Mild steel rod.

Tools required

- Single point cutting tool
- Lathe
- Vernier caliper
- Try square
- Chuck key

Procedure

1. First loosen the jaw in the chuck key to position the work piece, and then tighten the jaws.
2. Fix the cutting tool in the toolpost.
3. Switch on the lathe and move the carriage near to the workpiece. Give it a small cross feed, and then move carriage longitudinally to the required length slowly.
4. Bring the carriage to the original position, give a small cross feed and move carriage longitudinally. Repeat this step until required diameter is obtained.
5. To get smooth surface give a very small feed when the diameter is nearing the required value.
6. To face the end surface of the workpiece, move the carriage to make the tool touch the end surface of the work piece.
7. Then the taper turning operation is done on the workpiece according to the taper angle calculated. The compound rest base is swirled and set a calculated taper angle, for this the tool is moved by 45° to the lathe axis.
8. The workpiece is removed from the chuck and the dimensions of workpiece are checked for the requirements.

Questions

1. What are the types of Taper Turning.
2. Name the tool material.
3. What are the different lathe operations.
4. Name the different work holding mechanisms.
5. What is turret and capstan lathe?

Result

Thus the required shape and size is obtained by taper turning operation.

Ex. No :

Date :

BORING

Aim

To perform boring on a cylindrical work piece.

Material used

Mild steel rod.

Tools required

- Lathe
- Three-jaw chuck
- Chuck key
- Vernier caliper
- Cutting tools

Procedure

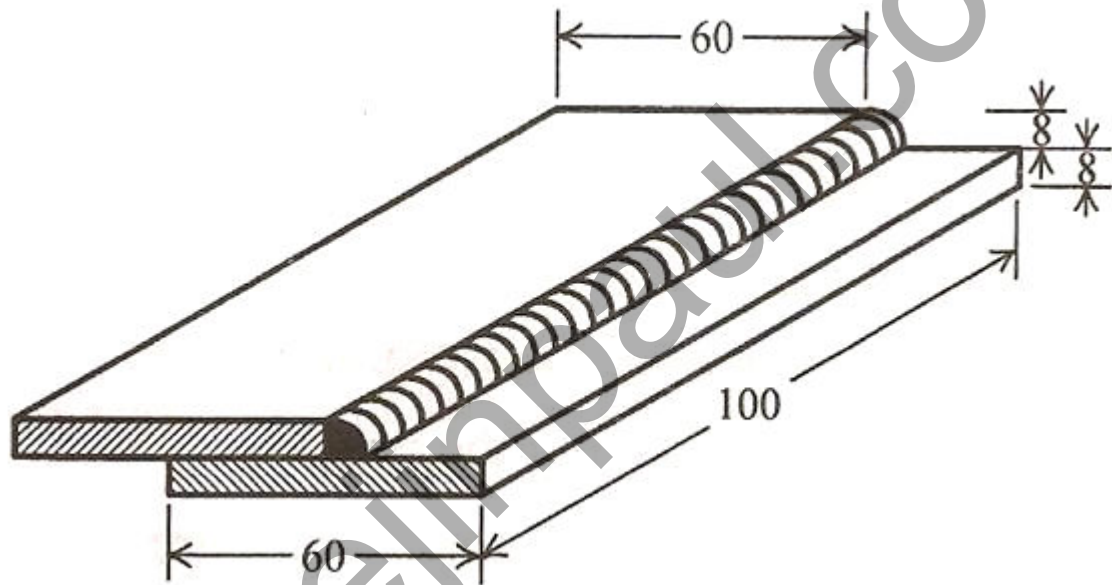
1. First loosen the jaw in the chuck key to position the work piece, and then tighten the jaws.
2. Fix the cutting tool in the toolpost.
3. Switch on the lathe and move the carriage near to the workpiece. Give it a small cross feed, and then move carriage longitudinally to the required length slowly.
4. Bring the carriage to the original position, give a small cross feed and move carriage longitudinally. Repeat this step until required diameter is obtained.
5. To get smooth surface give a very small feed when the diameter is nearing the required value.
6. The drill bit is fixed in the tail stock.
7. The hole is made by moving the tailstock through over the bed.
8. By rotating the hand wheel which is in the tailstock, the tailstock is move.
9. The drill bit is removed .Then the boring bar is fixed in the tailstock. The boring operation is done in the drilled workpiece.
10. Finally the dimensions of workpiece are again checked.

Questions

1. What is the difference between drilling and boring?
2. Name the drill material.
3. What are the different drilling machines.
4. Name the different work holding mechanisms in a drilling machine.
5. How drilling is being carried out in lathe?

Result

Thus the required size and shape of the given work piece is obtained.



Ex. No :

Date :

LAP JOINT

Aim

To join the given two work pieces as a lap joint by arc welding.

Material used

Mild Steel plates.

Tools required

- Welding power supply
- Welding rod
- Electrode holder
- Gloves and apron
- Shield and goggles
- Flat file
- Chipping hammer
- Wire brush
- Earthing clamps

Procedure

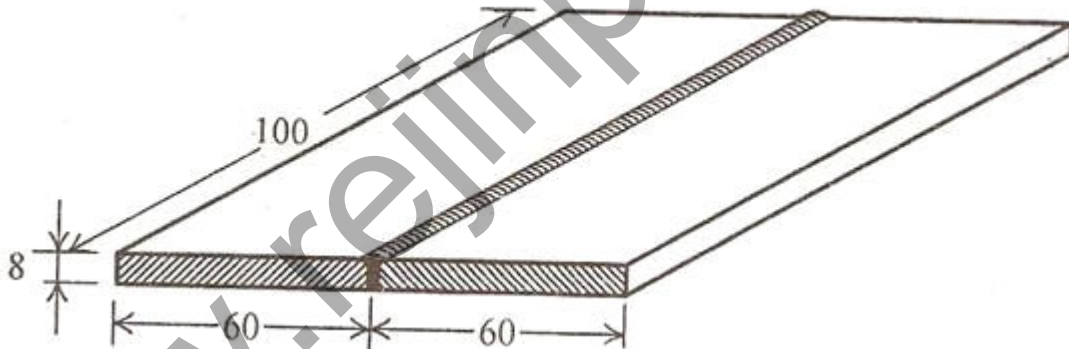
1. The given workpieces are thoroughly cleaned, i.e. rust, scales are removed and the edges are filed.
2. The electrode is held in an electrode holder and ground clamp is clamped to the welding plates and the power is supplied.
3. The workpieces are positioned on the table to form a “Lab joint”.
4. The tag weld is done on the both the ends of joining plates to avoid the movement of workpieces during welding.
5. The welding is carried throughout the length of the workpieces on both sides by maintaining 3mm gap between plates and the welding rod.
6. The welded plates are allowed for air cooling after the slags are removed.
7. The weld joint portions are cleaned by wire brush.

Questions

1. What is the difference between arc welding and gas welding?
2. What is pressure welding?
3. What are the components of arc welding machine?
4. Name the different work holding mechanisms in a drilling machine.
5. How drilling is being carried out in lathe?

Result

Thus the required Lap joint is made by arc welding process.



Ex. No:

Date :

SQUARE BUTT JOINT

Aim

To join the given two work pieces as a 'square butt joint' by arc welding.

Material used

Mild steel plates.

Tools required

- Welding power supply
- Welding rod
- Electrode holder
- Gloves and apron
- Shield and goggles
- Flat file
- Chipping hammer
- Wire brush
- Earthing clamps

Procedure

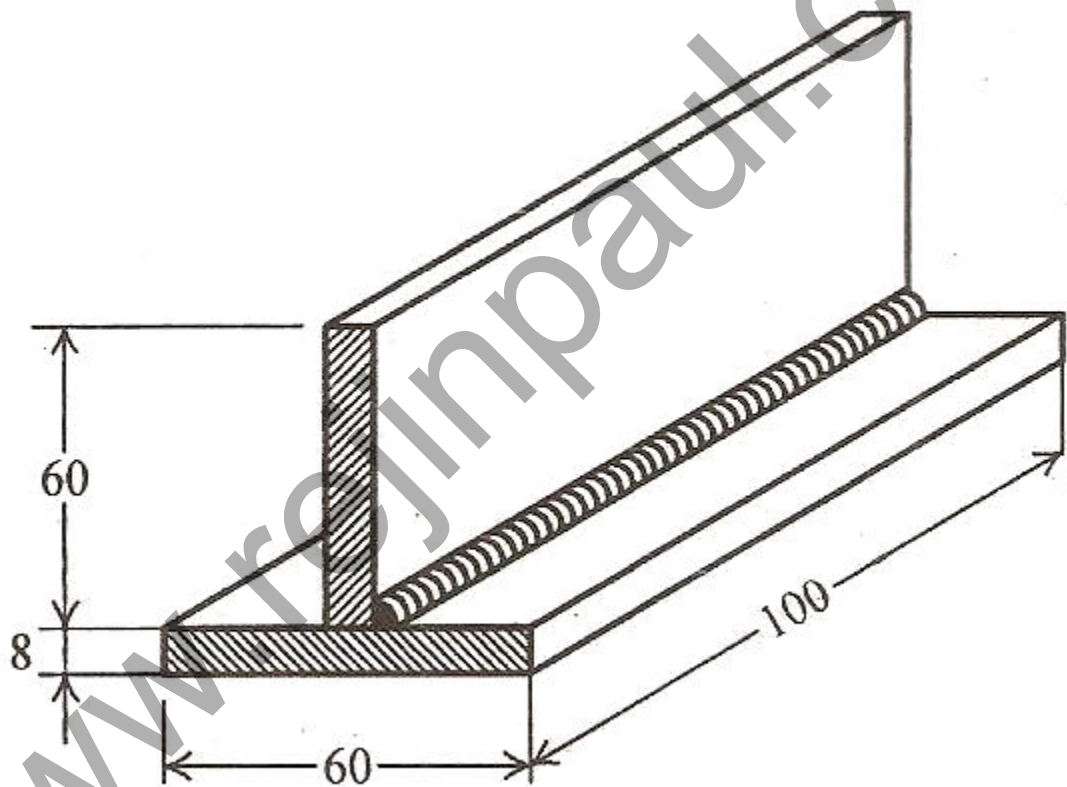
1. The given workpieces are thoroughly cleaned, i.e. rust, scales are removed and the edges are filed.
2. The electrode is held in an electrode holder and ground clamp is clamped to the welding plates and the power is supplied.
3. The workpieces are positioned on the table form a "square butt joint".
4. The tag weld is done on the both the ends of joining plates to avoid the movement of workpieces during welding.
5. The welding is carried throughout the length of the workpieces on both sides by maintaining 3mm gap between plates and the welding rod.
6. The welded plates are allowed for air cooling after the slags are removed.
7. The weld joint portions are cleaned by wire brush.

Questions

1. What is electrode and give its purpose?
2. What is consumable and non-consumable electrode?
3. What are the components of arc welding machine?
4. Define welding process.
5. Explain MIG and TIG?

Result

Thus the required square butt joint is made by arc welding process.



Ex. No :

Date :

TEE FILLET JOINT

Aim

To join the given two work pieces as a 'Tee fillet joint' by arc welding.

Material used

Mild steel plates.

Tools required

- Welding power supply
- Welding rod
- Electrode holder
- Gloves and apron
- Shield and goggles
- Flat file
- Chipping hammer
- Wire brush
- Earthing clamps

Procedure

1. The given workpieces are thoroughly cleaned, i.e. rust, scales are removed and the edges are filed.
2. The electrode is held in an electrode holder and ground clamp is clamped to the welding plates and the power is supplied.
3. The workpieces are positioned on the table to form a "Tee fillet joint".
4. The tag weld is done on the both the ends of joining plates to avoid the movement of workpieces during welding.
5. The welding is carried throughout the length of the workpieces on both sides by maintaining 3mm gap between plates and the welding rod.
6. The welded joint portions are allowed for air cooling after the slag is removed.
7. The weld joint portions are cleaned by wire brush.

Questions

1. Explain PAW?
2. Explain friction welding and its advantages?
3. Explain thermit welding?
4. Explain EBW?
5. Explain LBW?

Result

Thus the required 'Tee fillet joint' is made by arc welding process.

Ex. No :

Date :

GAS WELDING

Aim

To join the given two work pieces as required type of joint by gas welding.

Material used

Mild steel plate.

Tools used

- Oxygen and acetylene gas cylinder with the equipments (pressure gauge, regulators)
- Gas welding torch
- Filler rod
- Safety goggles, gloves
- Chipping hammer
- Wire brush

Procedure

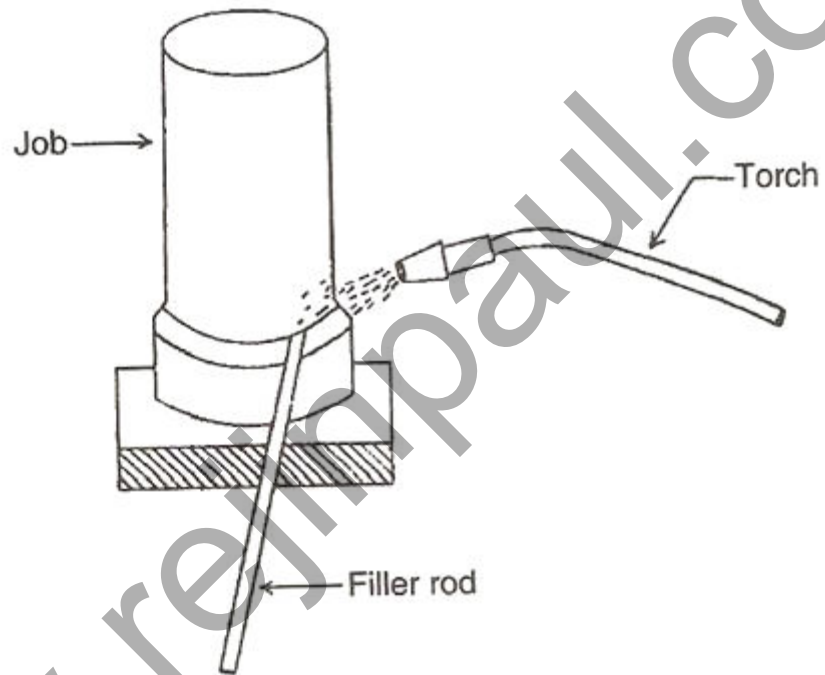
1. The given workpiece are thoroughly cleaned, i.e., rust, scales are removed.
2. The joining workpieces are positioned properly.
3. Acetylene and Oxygen cylinder valves are opened then the Acetylene torch valve is opened.
4. Light tip of torch using lighter.
5. Oxygen and Acetylene torch valves are adjusted and the required flame is obtained.
6. The welding torch and the filler rod are moved along the line of weld and welding is done by maintaining 3mm gap between plate and inner cone of flame.

Questions

1. Explain SAW?
2. What are the different types of flames?
3. Explain upset and flash butt welding?
4. Explain the types of gas welding?
5. What are the components of gas welding?

Result

Thus the required welding is obtained by gas welding process.



Ex. No :

Date :

BRAZING

Aim

To join the given two work pieces as required type of joint by brazing.

Material used

Mild steel plate.

Tools used

- Filler rod
- Safety goggles, gloves
- Brazing torch

Procedure

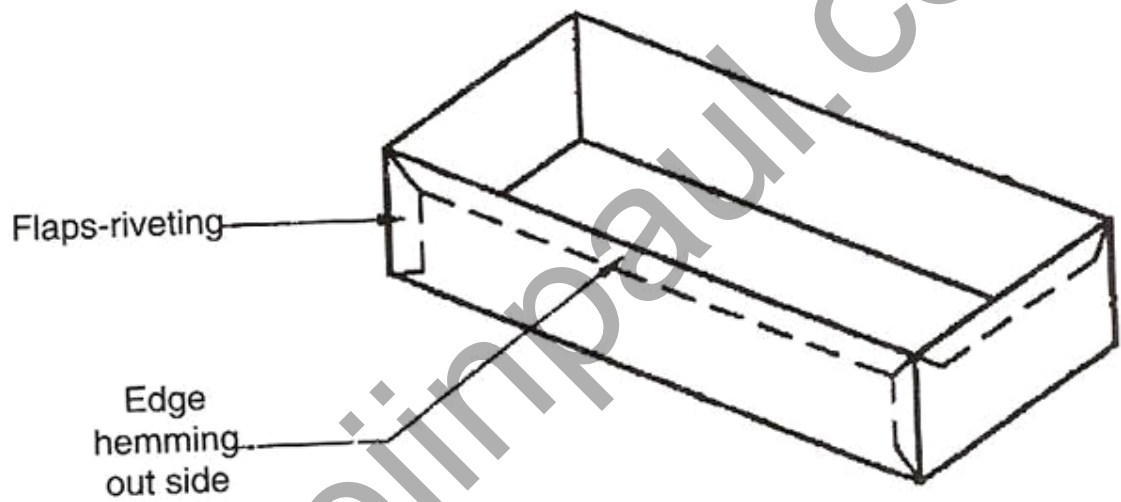
1. The given workpiece are thoroughly cleaned, i.e., rust, scales are removed.
2. The joining workpieces are positioned properly.
3. A flux is applied to all surfaces where the filler material is flow.
4. After that the joint is heated to the proper brazing temperature.
5. Solid filler metal may be replaced on the metal pieces and thus melted as the metal pieces are heated.
6. Only small amount of filler metal is needed to fill the joint completely.

Questions

1. Describe brazing process?
2. Name some welding defects.
3. Compare brazing and welding?
4. Explain soldering process?
5. Compare soldering and brazing?

Result

Thus the required welding is obtained by brazing process.



Ex. No :

Date :

SHEET METAL TRAY

Aim

To make a rectangular tray from the given sheet metal.

Material Required

- G.I Sheet

Tools required

- Steel rule
- Mallet
- Scriber
- Divider
- Protractor
- Snips
- Stakes
- Ball peen hammer

Procedure

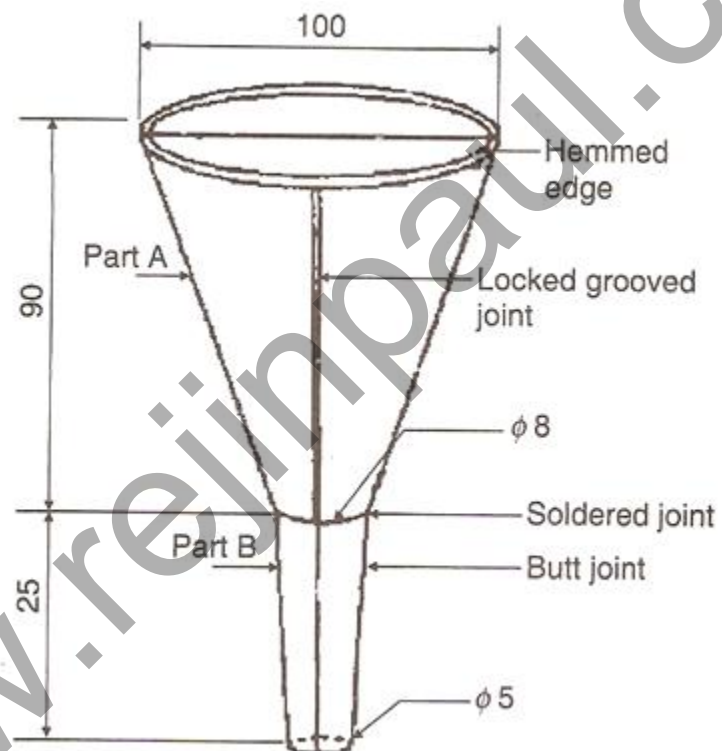
1. The size of the given sheet is checked for its dimension using steel rule.
2. Then the sheet is leveled on the leveling plate using a mallet.
3. The development procedure is followed the same as the square taper tray.
4. The dimensions are marked as shown in figure.
5. The sheet is cut as per the marked dimensions by straight snips.
6. Then a single hemming is made on the four sides of the tray as shown in figure.
7. The four sides of the tray bent to 90° using the stakes anvil.
8. Finally all the corners of the tray are joined by riveting.

Questions

1. What is sheet metal fabrication?
2. What is stretching?
3. What are the formability test methods?
4. Give some sheet metal characteristics.
5. What is super plasticity of metals?

Result

Thus desired rectangular tray is made from the given sheet metal.



Ex. No :

Date :

MAKING OF A CONE FUNNEL

Aim

To make a funnel from the given sheet metal.

Tools required

- Steel rule
- Mallet
- Scriber
- Divider
- Protractor
- Snips
- Stakes
- Ball peen hammer
- Solder

Procedure

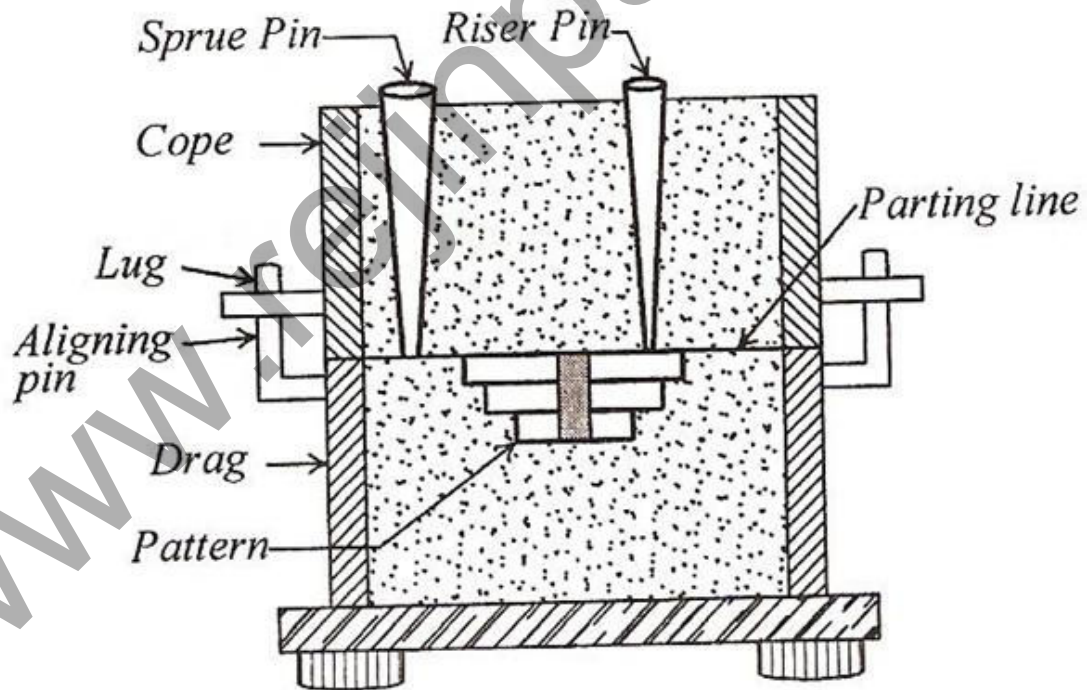
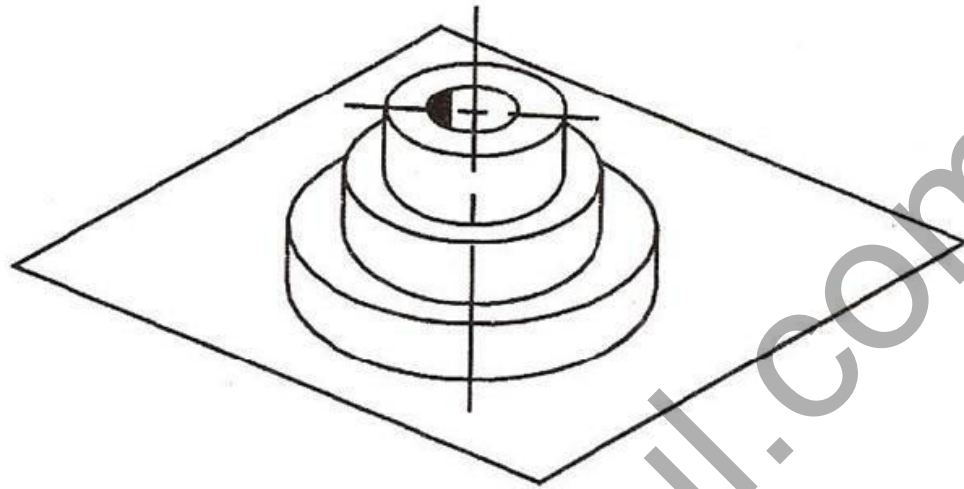
1. The size of the given sheet is checked for its dimension using steel rule.
2. The required development of surface is being made on the white paper which is overlapped on the sheet metal.
3. The marking is done on the sheet metal as per the development being done on the paper.
4. Now using straight snips, unwanted material are removed.
5. Now fold and bend the workpiece to make the funnel shape and joint is made on the workpieces.
6. Then using a groove, a locked grooved joint is made for about 5mm. also; hemming is done in the bottom of the funnel.
7. In between top face and bottom face, a butt joint is made using a solder.
8. Finally, trimming and finishing operations are carried out.

Questions

1. Explain different forming process?
2. Explain spinning process?
3. What are the types of bending process?
4. Describe shearing operation in sheet metal.
5. What is punching and blanking?

Result

Thus desired cone funnel is made from the given sheet metal.



Ex. No :

Date :

STEPPED CONE PULLEY

Aim

To make the mould for the given stepped cone pulley.

Material required

- | | |
|------------------|--------------|
| • Moulding board | • Riser pin |
| • Moulding box | • Sprue pin |
| • Green sand | • Rammer |
| • Trowel | • Lifter |
| • Riddle | • Draw spike |
| • Gate cutter | • Bellow |
| • Vent rod | |

Procedure

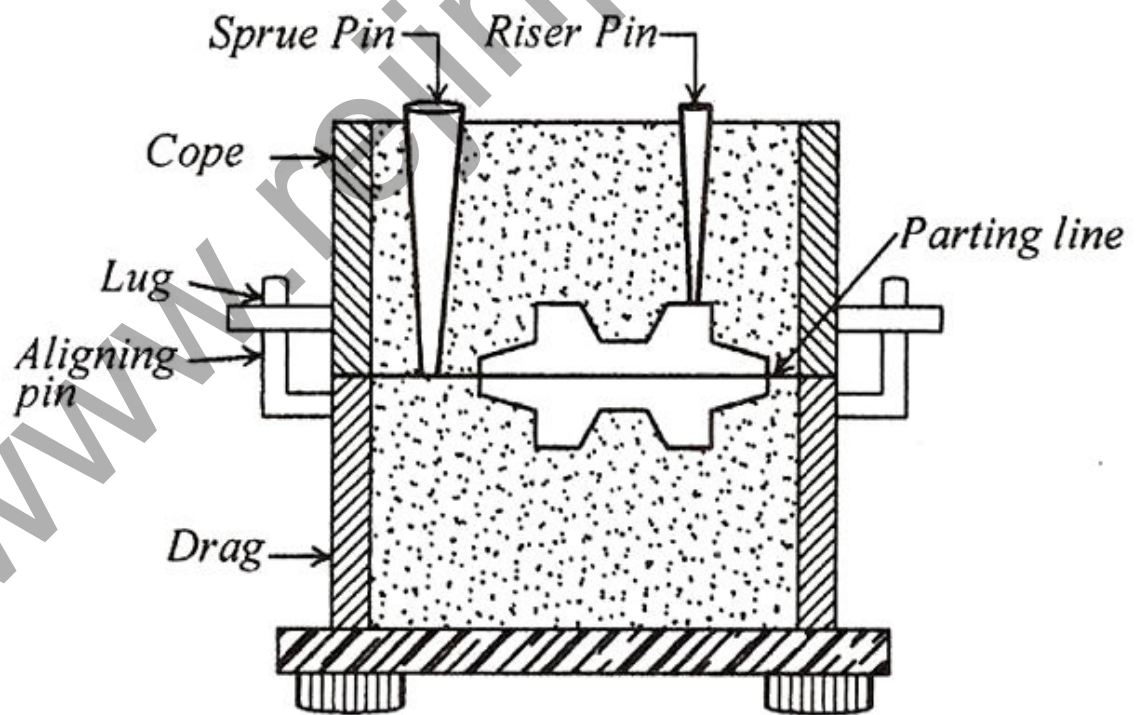
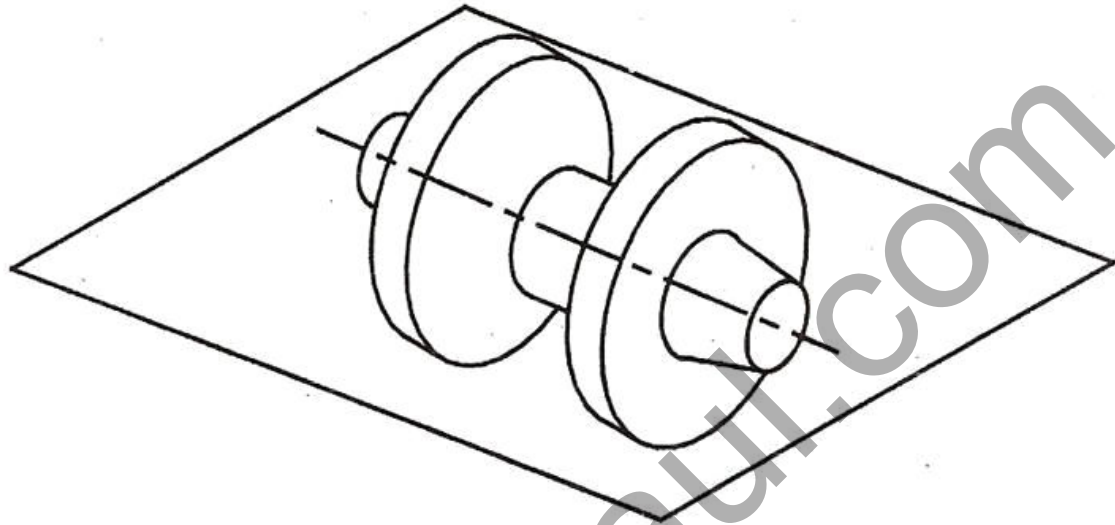
1. Place the moulding board on a horizontal surface.
2. A suitable core is prepared with the help of core box.
3. The drag box is placed above the moulding board. Now the pattern is kept at center of drag.
4. Now parting sand is sprinkled before we keep pattern.
5. Facing sand is sprinkled over the pattern to a depth of 5mm. then green sand is filled over it.
6. Proper ramming is done on the green sand to get a air tight packing.
7. Excess sand is removed by strike off bar.
8. The drag box is inverted upside down.
9. The cope box is placed over the drag box and locked.
10. The riser pin sprue pin placed at right position and green sand is filled over the pattern.
11. Proper ramming is done on the green sand to get air tight packing with strike off bar leaving is done.
12. Now riser pin and sprue pin get removed from the green sand mould. The pattern is removed by draw spike tool.
13. Gate is prepared using gate cutter and core is placed vertically inside the cavity.
14. The vent holes are made with vent rod and cope.

Questions

1. Define Casting.
2. Explain the core making process?
3. What are pattern allowances?
4. Describe the types of patterns.
5. Explain the composition and properties of moulding sand?

Result

Thus the mould is created for given stepped cone pulley.



Ex. No :

Date :

MOULD WITH SPLIT PATTERN

Aim

To make the mould for the given split pattern.

Material required

- | | |
|------------------|--------------|
| • Moulding board | • Riser pin |
| • Moulding box | • Sprue pin |
| • Green sand | • Rammer |
| • Trowel | • Lifter |
| • Riddle | • Draw spike |
| • Gate cutter | • Bellow |
| • Vent rod | |

Procedure

1. Place the moulding board on a horizontal surface.
2. The drag box is placed above the moulding board. Now one piece of pattern is kept at center of the drag as shown in figure.
3. The parting sand is spread before we keep the pattern.
4. Facing sand is sprinkled over the pattern to a depth of 2mm. then greensand is filled over it.
5. Proper ramming is done on the green sand to get a air free packing.
6. Excess sand is remove with strike off bar.
7. The drag is inverted upside down.
8. The cope box is place over the drag box.
9. Now the parting sand is sprinkled over the parting surface.
10. The other piece of pattern is placed over the drag pattern.
11. Facing sand is riddled over the pattern to a depth of 5mm. then riser is place over the pattern and another sprue pin above parting surface.
12. Now green sand is filled over it.
13. Ramming operation is done to get an air tight packing with strike off bar leaving it.
14. Riser pin and sprue pin gets removed from the green sand.
15. Pattern is removed gently now.
16. Gate is cut using gate cutter.
17. The vent holes are made with vent rod on the cope side.

Questions

1. Explain Casting Defects.
2. Explain the different types of furnaces?
3. What is shell moulding?
4. Describe the various moulding methods.
5. List the components used in moulding process?

Result

Thus the mould is created for the given split pattern.