LABORATORY MANUAL

MECHANICAL ENGINEERING

II Year B. Tech II- Semester

Academic Year: 2025-26

****

MANUFACTURING PROCESSES LAB

R24A0383

****

Prepared By
Soma Vivekananda
Assistant Professor

MRCET CAMPUS

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

(Autonomous Institution-UGC, Govt. of India)

Secunderabad-500100, Telangana State, India. www.mrcet.ac.in

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Maisammaguda, Dhulapally, Komaplly, Secunderabad - 500100, Telangana State, India

LABORATORY MANUAL & RECORD

Name:.....

Roll No:..... Branch:.....

Year:..... Sem:.....

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Certificate

Certified that this is the Bonafide record of the work done by

Mr./Ms……Roll. Number…..…….of

B.Tech II year II Semester for Academic Year 2025-2026

In ……Laboratory.

Date: **faculty in charge** **HOD**

Internal Examiner **External Examiner**

INDEX

S.No	Date	Name of the Activity/Experiment	Grade/ Marks	Faculty Signature

DEPARTMENT OF MECHANICAL ENGINEERING

B. Tech LAB TIME TABLE

YEAR:II SEMESTER:II NAME OF THE LAB: MANUFACTURING PROCESS LAB

Day/ Period	1 9.20 AM – 10.20AM	2 10.20 AM – 11.20AM	4 11.30 PM – 12.30 PM	12.30 PM 01.30 PM	5 1.40 PM – 2.40 PM	6 2.40 PM – 3.40 PM
MON				**L U N C H**		
TUE					**MP lab**	**MP lab**
WED						
THU						
FRI						
SAT						

LAB FACULTY: **Mr.Soma Vivekananda**

TECHNICIAN : **Mr.Poorna Chandar**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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Department of Mechanical Engineering

VISION

- To Become An Innovative Knowledge Center In Mechanical Engineering Through State Of The Art Teaching –Learning And Research Practices, Promoting Creative Thinking Professionals.

MISSION

- The Department Of Mechanical Engineering Is Dedicated For Transforming The Students Into Highly Competent Mechanical Engineers to meet the needs of the industry, by strongly focusing in the fundamentals of engineering sciences for achieving excellent results in their professional pursuits.

QUALITY POLICY

- To Pursuit Global Standards Of Excellence In All Our Endeavors Namely Teaching, Research And Continuing Educations And To Remain Accountable In Our Core And Support Functions, Through Processes Of Self-Evaluation And Continuous Improvement.

- To Create A Midst of Excellence For Imparting State Of Art Education, Industry-Oriented Training Research In The Field Of Technical Education.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. TECH - II- SEM **L/T/P/C**

0/0/2/1

(R24A0383) MANUFACTURING PROCESSES LAB

COURSE OBJECTIVES:

1. Ability to function on multi-disciplinary teams in the area of materials processing.
2. Ability to use the techniques, skills and modern engineering tools necessary for handling welding techniques.
3. Understanding of professional and ethical responsibility in the areas of materials management.
4. Ability to communicate effectively the joining processes in welding.
5. Ability to apply plastic deformation techniques

LIST OF EXPERIMENTS

1. To determine sand properties- Exercise -for strengths, and permeability.
2. To Prepare Mould for Casting.
3. To prepare a butt joint with the specimens by Arc Welding.
4. To join the specimens by gas welding process.
5. To perform Plasma welding operation
6. To perform Spot welding operation.
7. To perform blanking & piercing operation.
8. To perform deep drawing and extrusion operation.
9. To prepare the product by Injection Moulding machine.
10. To prepare the product by Blow Moulding machine.
11. To manufacture components using by 3D printing.

NOTE: Minimum a total of 8 experiments are to be conducted.

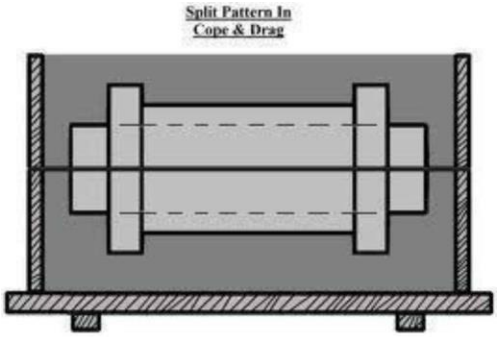
COURSE OUTCOMES:

1. To provide the students' knowledge in finding the different techniques in manufacturing processes.
2. To gain knowledge on welding techniques.
3. Get Exposure different types of plastic moulding processes.
4. To provide students hands on experience to handle the joining processes.
5. To know the application of extrusion, drawing, blanking.

EXP:1 TO DEISGN AND MAKING A PATTERN FOR ONE CASTING DRAWING

Aim: To prepare a split wooden pattern detailed below with allowance for one casting allowance

Tools Equipment & Material: Steel rule, outside caliper, Mortise Chisel, inside chisel, peering chisel, Firmer Chisel, Wood rasp half round file, outside gauge, outside chisel, Try square, Handsaw, Mallet, Sandpapers, Teak Wood given size



Procedure: Match the two rectangular wood pieces of stock and fix them together by wood screws at either end in the excess portion of wood. This must give a firm clamping of the wood pieces to turn intosingle piece.

In body portion of the pattern mark a center link using marking gauge and extend it to the dressed end. Using the race with counter sunk make indentations at the center of each and to form locations for the head stock and tail stock center.

The wood stock is turned on the wood turning lathe using appropriate gauge and finally finished the dimensions.

Sanding paper No. ½ or No.0 does smooth finishing

The sand paper should be moved laterally on the rotating work.

PRECAUTIONS:

1. The tools are kept sharp to cut freely without burning and also without much pressure to cause chipping.
2. Maintain proper turning angles.
3. Be alert to avoid accidents.

Result: The Required Split pattern is prepared

EXP:2 TO DETERMINE SAND PROPERTIES- EXERCISE -FOR STRENGTHS, AND PERMEABILITY

AIM: To Determine the sand properties, strength and Permeability of the Moulding Sand.

APPARATUS REQUIRED: Sieves of different numbers and cubical block

EQUIPMENT REQUIRED: Sieve Shaker, Permeability Apparatus and Compression Strength Testing

MATERIAL REQUIRED: Molding Sand

THEORY:

PROPERTIES OF MOULDING SAND:

Moulding sand must possess some properties like permeability, flow ability collapsibility, adhesiveness, cohesiveness or strength and refractoriness. The properties are determined not only by the chemical composition, but by the amount of clayey matter in the sand, by its moisture content, and lastly by the shape and size of the silica sand grains.

Porosity: Molten metal always contains a certain number of dissolved gases, which are evolved when the metal freezes. Also, the molten metal, coming in contact with the moist sand, generates steam or water vapour. If these gases and water vapour evolved by the moulding sand do not find opportunity to escape completely through the mold they will form gas holes and pores in the casting. The sand must, therefore, be sufficiently porous to allow the gases or moisture present or generated within the moulds to be removed freely. When the moulds are poured. This property of sand is called porosity or permeability.

Flow ability: Flow ability of molding sand refers to its ability to behave like a fluid so that, when rammed it will flow to all portions of a mould and pack all-round the pattern and take up the required shape. The sand should respond to different moulding processes. Flowability increases as clay and water content increases. Collapsibility: After the molten metal in the mould gets solidified the sand mould must be collapsible so that free contraction of the metal occurs, and this would naturally avoid the tearing or cracking of the contracting metal.

Adhesiveness: The sand particles must be capable of adhering to another body, i.e. they should cling to the sides of the moulding boxes. It is due to this property that the sand mass can be successfully held in a moulding box and it does not fall out of the box when it is removed.

Cohesiveness or Strength: This is the ability of sand particles to stick together. Insufficient strength may lead to a collapse in the mould or its partial destruction during conveying, turning over or closing. The closing may also be damaged during pouring the molten metal. The strength of moulding sand must,

therefore, be sufficient to permit the mould to be formed to the desired shape and to retain this shape even after the hot metal is poured in the mould. This property of sand in its green or moist state is known as green strength. A mold having adequate green strength will retain its shape and will not distort or collapse even after the pattern is removed from moulding box. The strength of sand that has been dried or baked is called dry strength. It must have then strength to withstand erosive forces due to molten metal, and retain its shape.

Refractoriness: - The sand must be capable of withstanding the high temperature of the molten metal without fusing. Molding sands with poor refractoriness may burn on to the casting. Refractoriness is measure by the sinter point of the sand rather than its melting point**.**

SAND TESTING: Grain Size: Grain size of sand is designated by a number called "Grain Fineness Number" that indicates the average size as well as proportions of smaller and larger grains in the mixture. The apparatus required for determining grain fineness consists of a number of standard sieves mounted one above the other, on a power-driven shaker. The shaker vibrates the sieves and the sand placed on the top sieve gets screened and collects on different sieves depending upon the various sizes of grains present in the moulding sand. In this test place five standard sieves mounted one above the other on a stand and under the bottom most sieves is placed a pan. The top sieve is the coarsest and bottom most sieve is the finest of all the sieves.

1. A sample of dry sand is placed in the upper most sieve and place the sieve stand on the vibrator.
2. Then vibrate the sieve stand for a definite period of time.
3. An amount of sand may be retained on each sieve and same is weighed.
4. Calculate the AFS grain fineness number**.**

Sieve-Mesh	**% of sand retained**	**Factor**	**% of sand retained* Factor**

PERMEABILITY TEST:

1. 2000 cc of water held in the inverted bell jar is allowed to pass through the sand specimen.
2. A situation comes when the liquid entering the specimen equals the air escaped through the specimen.
3. This gives a stabilized pressure reading on the manometer and the same can be read on the vertical scale.
4. Simultaneously, using as top watch the time required for 2000cc of water to pass through the sand of specimen is also recorded.
5. Permeability number can be determined by the following relation;

Permeability Number= V .H/A.P.T.

Where V = volume of air passed through the specimen H = height of the specimen A = area of the specimen T = time taken by the air to pass through the sand specimen P = pressure recorded by manometer.

COMPRESSION STRENGTH TEST:

1. The specimen is held between the grips.
2. Hand wheel when rotated actuates a mechanism which builds up hydraulic pressure on the specimen.
3. Dial indicator fitted on the tester measures the deformation occurring in the specimen
4. As the applied load is continues, the specimen breaks at a particular load.
5. At this point note down the reading of dial indicator which directly gives the compression strength of the sand.

Compression strength of the specimen =

Result:

EXP:3 TO PREPARE A MOULD FOR CASTING

AIM: To Prepare a Casting for the given Solid Pattern using Green Sand Moulding Processes.

MATERIAL REQUIRED: Moulding sand TOOLS REQUIRED: Pattern, Shovel, Riddle, Rammer, Trowel, Slick, Lifter, Strike – Off bar, Draw – spike, Mallet, Moulding Boxes, Vent rod, Runner, Riser, and Swab

PRINCIPAL INGREDIENTS: The principal ingredients of moulding of sands are:

1. Silica sand grains
2. Clay
3. Moisture and
4. Miscellaneous materials

Silica in the form of granular quartz, itself sand is the chief constituent of moulding sand. Silica sand contains from 80 to 90 percent silicon dioxide and is characterized by a high softening temperature and decomposition of granite, which is composed of feldspar and quartz. The feldspar, when decomposed, becomes clay (hydrous aluminium silicate). However, silica sand grains impart refractoriness, chemical resistivity, and permeability to the sand. They are specified according to their average size and shape. Clay is defined as those particles of sand (under 20 microns in diameter) that fail to settle at a rate of 25mm per minute, when suspended in water. Clay consists of two ingredients: fine silt and true clay. Fine silt is a sort of foreign matter or mineral deposit and has no bonding power. It is the true clay which imparts the necessary bonding strength to the mould sand, so that the mould does not lose its shape after ramming. True clay is found to be made up of extremely minute aggregates of crystalline, usually flake-shaped, particles called clay minerals. Most moulding sands for different grades of work contain 5-20 percent clay. Moisture, in requisite amount furnishes the bonding action of clay; it penetrates the mixture and forms a microfilm which coats the surface of flake-shaped clay particles. The bonding quality of clay depends on the maximum thickness of water film it can maintain The bonding action is considered best if the water added is the exact quantity to form the film.

On the other hand the bonding action is reduced and the mould gets weakened if the water is in excess. The water should be between 2-8percent. Miscellaneous materials that are found in addition to silica and clay, in mouding sand are oxide of iron, limestone, magnesia, soda, and potash .The impurities should be below 2 percent.

Gating system: Gating system refers to all those elements which are connected with the flow of molten metal from the ladle to the mould cavity. The various elements that are connected with a gating system are:

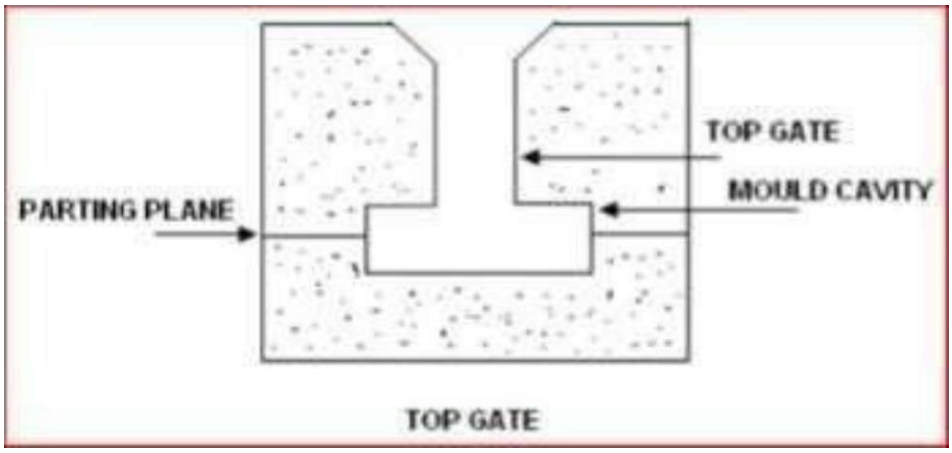
1. Pouring basin 2. Sprue 3. Sprue base well 4. Runner 5. Runner extension 6. Ingate 7. Riser

Gates: Also called the ingates, these are the openings through which the molten metal enters the mould

cavity. Depending on the application, various types of gates are used in the casting design.

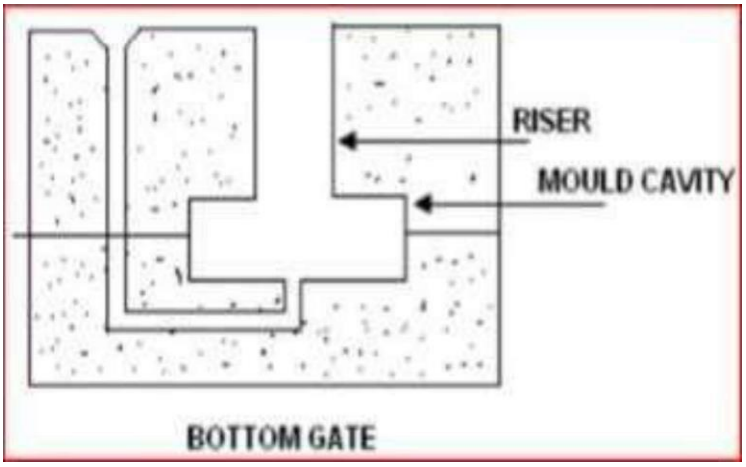
They are: 1. Top Gate 2. Bottom Gate 3. Parting Gate

Top Gate:



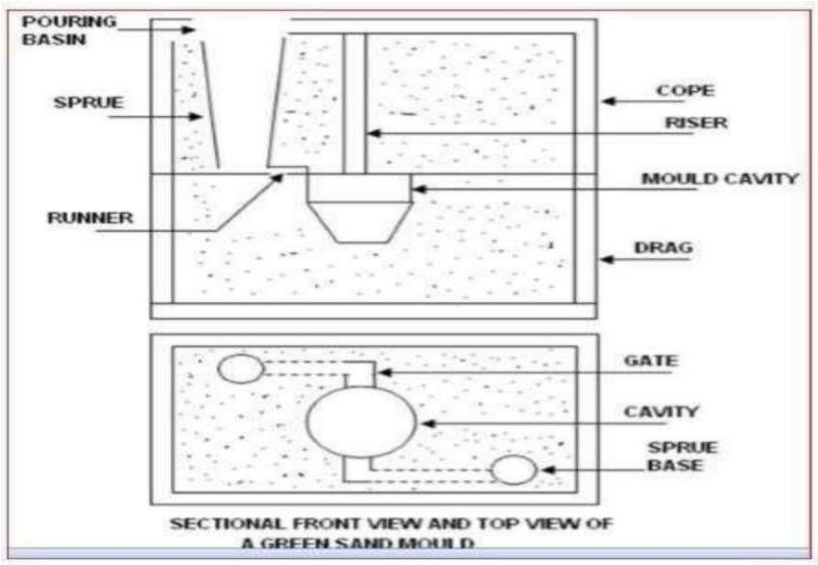
This is the type of gating through which the molten metal enters the mould cavity from the top as shown in fig. since the first metal entering the gate reaches the bottom and hotter metal is at the top, a favorable temperature gradient towards the gate is achieved. Also the mould is filled very quickly. But as the metal falls directly into the mould cavity through a height, it is likely to cause mould erosion. Also because it causes turbulence in the mould cavity it is prone to form dross and as such top gate is not advisable for those materials which are likely to form excessive dross. It is not suggested for non – ferrous alloys and is suggested only for ferrous alloys. It is suitable only for simple casting shapes which are essentially shallow in nature

Bottom Gate:



When molten metal enters the mould cavity slowly as shown in fig., it would not cause any mould erosion. Bottom gate is generally used for very deep moulds. It takes higher time for filling the mould and also generates a very unfavorable temperature gradient.

PROCEDURE:



1. First the pattern is placed with its larger diameter side is on a mould board.

2. The drag section of the flask is set over the pattern on same board.

3. After powdering the pattern with lycopodium, talc or graphite, a 15 to 20 mm layer of facing sand is riddled over the pattern.

4. The drag is then filled by layers of green sand mixture from 70 to 100 mm thick, compacting each layer with rammer.

5. The top of the mould is rammed with the butt end of a rammer. The object of ramming the sand is to consolidate it, thereby preventing the cavity of the mould from being enlarged by the metal.

6. After the sand is rammed a strickle is used to scrape off the excess sand level with the top of the flask.

7. The mould is then vented by sticking it with a fine stiff wire at numerous places (The vent holes should not reach the pattern by 15 to 20 mm as otherwise they may spoil the mould. Moreover, the metal may run in to the vent holes during pouring. These vent holes permit the escape of gases generated in the mould when the molten metal comes in contact with moist sand).

8. A small amount of loose sand is sprinkled over the mould and bottom board is placed on the top. The drag is rolled over, the moulding board is removed, and the upper surface is sprinkled with parting sand (The parting sand is used to prevent the joints between the halves of a mould from adhering to one another when the two parts of the moulding box are separated).

9. The cope section of the flask is then assembled.

10. Tapered wooden pegs to serve as sprue and riser are placed in proper position as shown in figure on the pattern which is riddled over with facing sand and then cope is filled with green sand.

11. The operation of filling, ramming and venting of the cope proceed in the same manner as in the drag.

12. A funnel shaped opening is scooped out at the top of the sprue to from the pouring basin.

13. Next the cope is lifted off and placed on a board with the parting line upward.

14. An iron bar is now pushed down to the pattern and rapped sideways .So as to loosen the pattern and prevents any sand from sticking to the pattern.

15. Next pattern is drawn out using draw spike.

16. Runners are cut in the cope according to the dimensions shown in fig.

17. Cut the gates in the drag according to the dimensions shown (Use Top Gating System).

18. If needed all the cavity edges are repaired.

19. Finally the mould is assembled, the cope being carefully placed on the drag so that the flask pins fit into the bushes.

20. The mould is then ready for pouring.

21. Molten metal (Aluminium) is prepared in the high frequency electrical induction furnace

22. Take the molten metal from crucible in to the ladle.

23. Pour the molten metal from the ladle into the pouring basin so that the molten metal will enter into the mould cavity through the sprue, runner and gate.

24. Allow the molten metal to solidify.

25. Then break the mould to obtain desired casting

PRECAUTIONS:

1. Care must be taken to have proper alignment of the pattern as well as moulding boxes
2. Sand should be rammed properly and evenly.
3. The pattern should be rapped gently and withdrawn carefully without damaging the mould cavity.
4. Care should be taken to avoid over cuts and corners.
5. Care should be taken while pouring the molten metal in to the cavity.

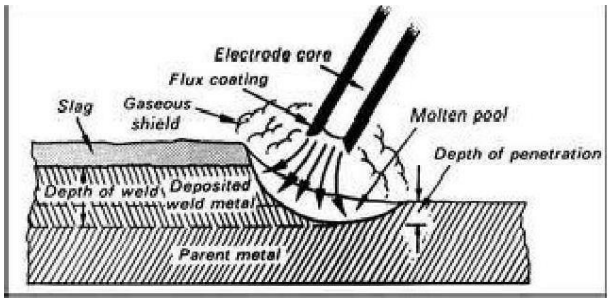
RESULT:

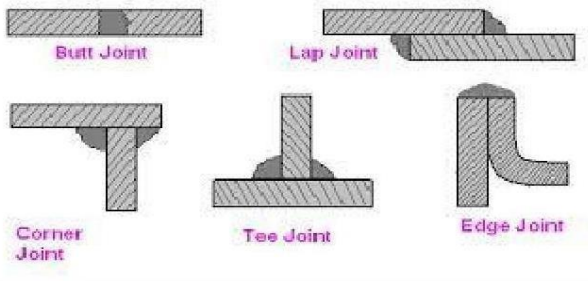
EXP: 4 TO PREPARE A BUTT JOINT WITH THE SPECIMENS BY ARC WELDING.

Aim: To prepare a butt joint with the specimens by Arc Welding.

Equipment and Material Required: D.C Welding machine, Bench vice, Tensile testing machine, M.S. Plates of 100x50x5(2), Metallurgical microscope.

Tools Required: Hack saw, Chipping hammer, wire brush, safety goggles, Hand gloves, Face shield, Files.





PROCEDURE:

1. Given 2 M.S. plates are filled at an angle of 45^0 at 2 surfaces to be joined (V groove is formed)
2. Electrode is fixed to electrode holder.
3. Connections to be given such that electrode- negative and work piece positive.
4. Welding is to be done carefully for the half-length of the plates.
5. The work piece is to be cut into two halves by power hacksaw.
6. The beads are polished, etched with two percent natal solution and studied under the microscope whosemagnification factors 10X for the heat effected zone.
7. By gripping the beads b/w the jaws pf Tensile testing machine and load is applied until the work piecebreaks and the readings is to be noted.
8. The same procedure is repeated for the remaining half which is welded by reverse polarity and theresults are to be compared

PRECAUTIONS:

1. Edge preparation should be done very carefully.
2. Before welding ensure the surfaces are extremely clean.
3. While welding always use face shields or goggles.

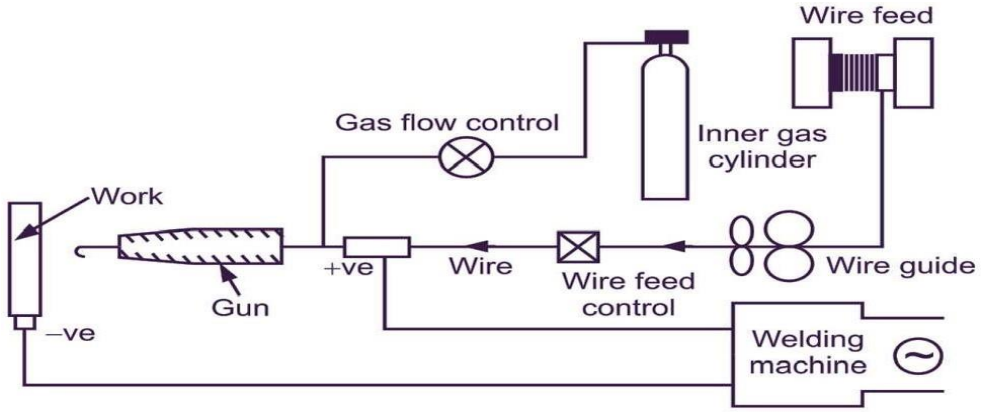
RESULT:

EXP: 5 TO PREPARE A BUTT JOINT WITH THE SPECIMENS BY GAS WELDING

Aim: To make butt - Welding using TIG welding equipment.

Equipment and Material Required: Inert gas (helium, argon) welding outfit, MS Sheets 150x50x5mm (2No)

Tools Required: Wire brush, hand gloves, and chipping hammer, spark lighter.



Procedure:

1. Inert gas valve on the torch is opened slightly and lightened with the help of a spark lighter.

2. The torch tip is to be positioned above the plates so that white cone is at a distance of 1.5mm to 3mm from the plates.

3. To rch is to be held at an angle of 30 to 45 degree to the horizontal plane.

4. Now filler rod is to be held at a distance of 10mm from the flame and 1.5 mm to 3 mm from the surface of the weld pool.

5. As the backward welding allows better penetration, back ward welding is to be used.

6. After the completion of welding, slag is to be removed by means of chipping hammer, wire brush.

Precautions:

1. Never look at the arc with the naked eye. Always use a shield while welding.
2. Always wear the safety hand gloves, apron and leather shoes.
3. Ensure proper insulation of the cables and check for openings.
4. Care is taken to avoid arc blow, which will cause serious defect in the weldment.
5. Ensure that torch movement is uniform.
6. See that the joints are extremely clean.

Result:

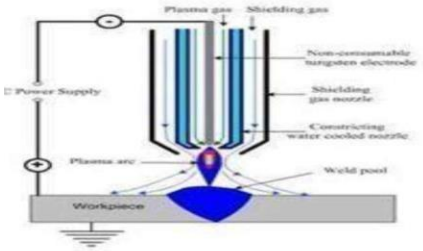
EXP: 6 TO PREPARE A SPECIMEN BY PLASMA WELDING OPERATION

Aim: To Join two given work pieces using plasma arc welding and Brazing andcut the given plate into two parts using plasma cutting.

Apparatus required:

Plasma Arc Welding System

Material Required: MS flat 50x50x10 mm –3 Nos



Plasma Welding

Procedure:

1. The edge of the given material is prepared to the required V-shape using grinding machine
2. The machine is set to the required parameters (For Welding).
3. Place the two work pieces on the table with required position as shown in figure.
4. The work pieces are kept in the required position and tack welding is performed on the work pieces.
5. First run of welding is done to fill the gap and penetration of the weldment by holding the electrode at about 700 and filler rod at 300and move the electrode to another end uniformly.
6. Second run of welding is done with proper weaving and uniform movement so that a uniform weld bead will be obtained.
7. The scale formed is chipped with chipping hammer.
8. Filing is done to remove any spatter around the weld.
9. The machine is set to the required parameters (For Cutting)

Precautions:

1. Never look at the arc with the naked eye. Always use a shield while welding.
2. Always wear the safety hand gloves, apron and leather shoes.
3. Ensure proper insulation of the cables and check for openings.
4. Care is taken to avoid arc blow, which will cause serious defect in the weldment

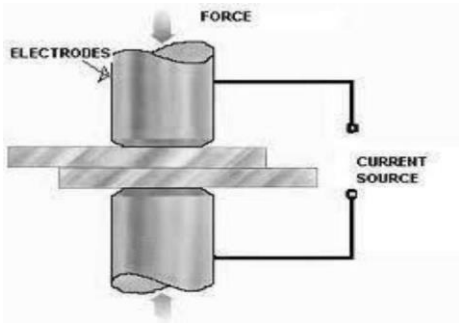
Result:

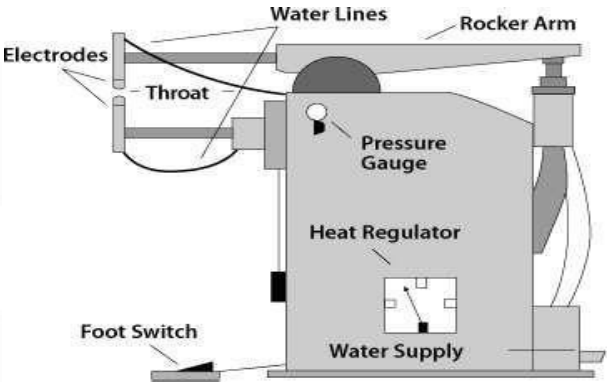
EXP: 7 TO PREPARE A SPECIMEN BY SPOT WELDING OPERATION

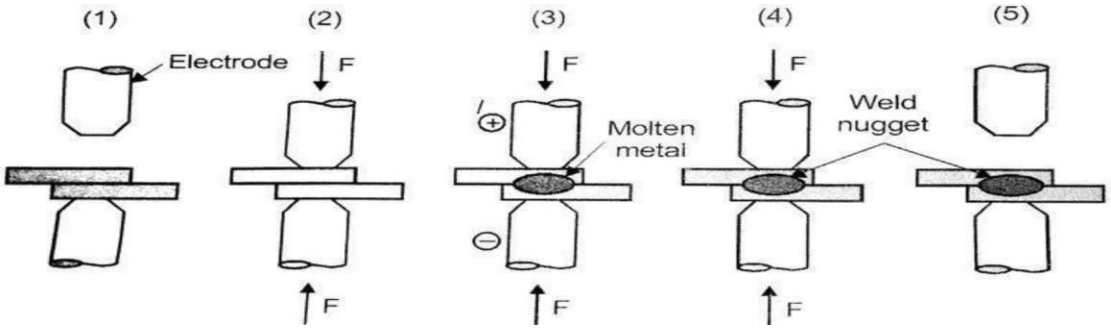
Aim: To spot welding process on two sheet metal pieces.

Equipment: Spot welding machine

Material required: Two metal pieces of size 4”x2”







PROCESS OF SPOT WELDING

Description of the Equipment:

A typical resistance spot welding machine essentially consists of two electrodes, out of which one is fixed. The other electrode is fixed to a rocker arm (to provide mechanical advantage) for transmitting mechanical force from a pneumatic cylinder. This is simplest type of arrangement. The other possibility is that of a pneumatic or hydraulic cylinder being directly connected to the electrode without any rocker arm.

For welding large assemblies such as car bodies, portable spot welding machines are used.

Here the electrode holder and the pneumatic pressurizing system is present in the form of a portable assembly which is taken to the place, where the spot is to be made. The electric current, compressed air and the cooling water needed for the electrodes is supplied through cable and hoses from the main welding machine to the portabe unit.

In spot welding, a satisfactory weld is obtained when a proper current density (A/Sq mm) is maintained. The current density depends on the contact area between the electrode and the work piece. With the continuous use, if the tip becomes upset and the contact area increases, the current density will be lowered and consequently the weld is obtained over a large area. This would not but able to melt the metal and hence there would be no proper fusion.

A resistance-welding schedule is the sequence of events that normally take place in each of the welds. The events are the squeeze time is the time required for the electrodes to align and clamp the two work pieces together under them and provides the necessary electrical contact.

The weld time is the time of the current flow through the work pieces till they are heated to the melting temperature.

The hold time is the time when the pressure is to be maintained on the molten metal without the electric current. During this time, the pieces are to be forge welded.

The off time is time during which, the pressure on the electrode is taken off so that the plates can be positioned for the next spot. The off time is not normally specified for simple spot welding, but only whena series of spots are to be made in a predetermined pitch.

PROCEDURE:

1. Switch on the machine and set the current in the machine to 2 Ampere
2. Set the timer to two seconds
3. Over lap the two metal pieces to the requires size and place them between the two electrodes.
4. Apply pressure by foot on the lever such that two electrodes come into contact if the over

lapped metals.

5. After 2 seconds remove the pressure on the lever slowly.
6. Now the joint is ready for use.
7. Repeat the same procedure at various amperes
8. Test the strength of the joints using universal testing machine.

PRECAUTIONS:

1. Ensure that the electrodes should not be touched.
2. Don'ttouch the welded potion by hand immediately after the welding is done.

Result:

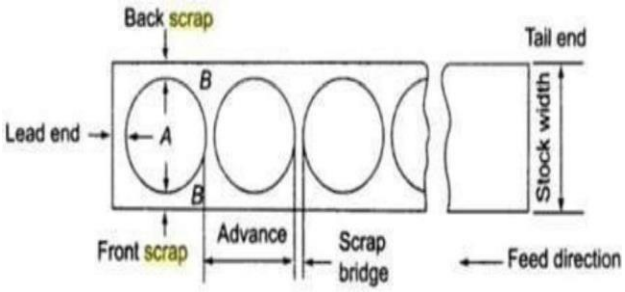
EXP:8 TO PERFORM BLANKING AND PIERCING OPERATION.

Aim: To perform blanking & piercing operation and study of simple, compound and progressive press tool.

EQUIPMENT AND TOOLS REQUIRED:

- Power press machine
- Punches
- Steel Rule

MATERIAL REQUIRED:



Specimen of mild steel 250 X 12 X 2mm

PROCEDURE:

- Take a steel of strip of given dimension and punch the holes
- Place the strip is available slot in the machine
- Punch holes on each side by pressing the lever
- After completing on one side report the same on other side

PRECAUTIONS:

- Care is taken while handling the rotating parts
- Check that lubrication is done properly

RESULT:

EXP:9 TO PERFORM DEEP DRAWING AND EXTRUSION OPERATION.

Aim: To perform deep drawing and extrusion operation using Hydraulic press.

Equipment: Hydraulic Press, Compound Die, Progressive Die, Deep-Drawing Die.

Raw Material: Mild Steel

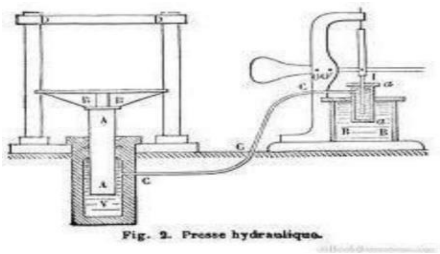


Fig. 2. Presse hydraulique.

Description of the equipment: Presses are classified in various ways. They may be classified according to

i. Source of power
ii. Method of actuation of the rams (slides)
iii. Number of slides
iv. Types of frames
v. The type of work for which the press has been designed.

SOURCE OF POWER:

Two kinds of sources of power supply to the ram: Mechanical and hydraulic.

Mechanical presses, the energy of flywheel is utilized which is transmitted to the work piece by gears, cranks, eccentrics or levers.

The flywheel rotates freely on the crankshaft and is driven from an electric motor through gears or v- belts. The motors runs continuously and stores energy in the flywheel. When the operator presses a foot treadle or actuates a button, the clutch gets engages and the flywheel is connected to the crankshaft. (Driveshaft). Starts rotating and the stored up energy in the flywheel is transmitted to the ram on its downward stroke. The clutch to engage and disengaged the flywheel to the drive shaft can be; a Jaw clutch and the air operated clutch or an electromagnetic clutch. In manually operated mechanical presses, the clutch is disengaged to each cycle. But in automatic presses in which the metal strip is fed to the die automatically, there is no need of single stroke clutch. Disengaging mechanism and the ram moves up

and down continuously. These presses can be classified as plain and geared press, the flywheel is carried on a auxiliary shaft which is connected to the main shaft. Through one or more gear reduction, depending upon size and energy needed. In this arrangement, the flywheel stores considerably more energy than the plain as its speed is higher than the main drive shaft.

In Hydraulic press, the ram is actuated by oil pressure on a piston in a cylinder.

Mechanical presses have following advantages over the hydraulic presses.

1. Run faster
2. Lower maintenance cost
3. Lower capital cost.

PROCEDURE:

1. Set the compound die or progressive die or deep drawing die in the required position.
2. Switch on the motor to start the machine.
3. Pass the MS sheet in to the progressive die/compound die. In case of deep drawing
4. Apply injection pressure using direction control valve.
5. The plunger punches the sheet into the mosquito coil stand/washer lid shape.
6. Release injection pressure.
7. Take out the finished product from the die.

PRECAUTIONS:

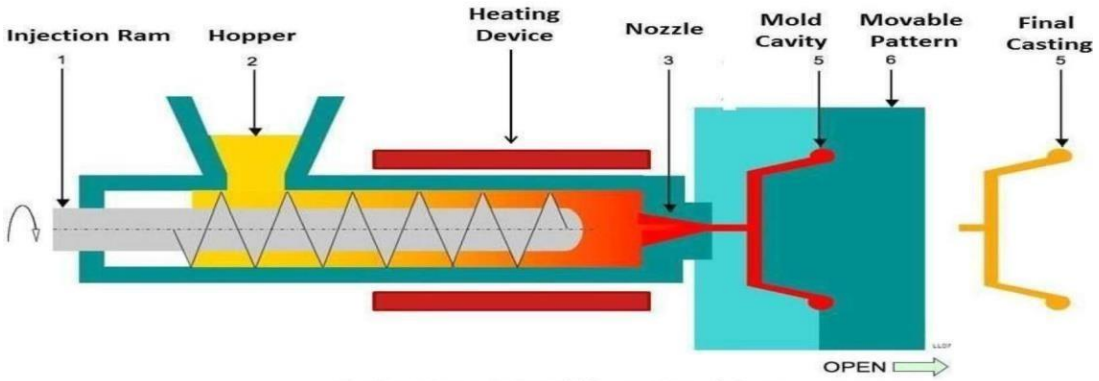
1. Do not apply too high injection pressure
2. Proper lubrication must be done between moving parts of die and press
3. Operate the hydraulic press carefully.

Result:

EXP 10: TO PREPARE A PRODUCT USING INJECTIONMOULDING/BLOWMOULDING MACHINE.

Aim: To Prepare a Plastic product using Injection Moulding machine

Equipment: Injection moulding machine.



Injection Moulding Machine

Material Required: High grade poly ethylene

Description of the Equipment

Hydraulic Plastic Injection Moulding machine, Model JIM-1HD has been designed for moulding variety components up to 45 Gms capacity in polystyrene. The machine is robustly built to ensure consistent highquality and volume production of precision components. Operator fatigue due to injection process is completely eliminated by use of hydraulic power for both the injection and releases operations.

Locking Unit: This locking made by Hydraulic Cylinder.

Injection Unit: Injection Unit consists of two guide rods, nuts, top and bottom plates with injection cylinder and barrel. Injection cylinder is designed to develop 3 Tons load. Barrel diameter 30mm is attached with the machine as standard.

Hydraulics: Hydraulic pump is driven by 3 HP Induction motor for a rated delivery of 14 lp, at 1440 Rpm and at 80kg/cm^2. The maximum pressure in the hydraulic system is present in our works and is not to be altered. The oil tank capacity is 60 liters. All hydraulic system manufacturers safety precautions are provided to hydraulic system by using section strainer, which will prevent the contamination entering into the system.

Oil Cooler: Oil cooler provided to keep the oil temperatures below 50^{0}c which will gives more life to hydraulic oil in continuous use.

Electricals: Electrical control panel with automatic blind temperature controller is fixed on the right hand side of the machine for clear viewing of the temperature and for easy to operate the switches. Designed with safety measure, which will protect the motor from over load.

Working Procedure

Injection moulding makes use of heat softening characteristics of thermo plastic materials. These materials soften when heated and re harden when cooled. No chemical change takes place when the material is heated or cool. For this reason the softening and re hardening cycle can be repeated any no. of times.

1. The granular moulding material is loaded hopper where it is metered out in a heating cylinder by a feeding device.
2. The exact amount of material is delivered to a cylinder, which is required to fill the mould completely.
3. Set the die in position Provide spacing plates if necessary. Clamping the Die using hydraulic operate ram.
4. Set the injection pressure by rotating (clockwise) the regulator knob to suit the requirement of moulding the container.
5. Switch on the heater. Set the required timings to the timers, for top and middle heater**.** Set the temperature by adjusting automatic temperature controller to control the bottom heater. Allow sufficient time to stabilizer. When temperature reached, operate the hand lever valve to inject the material.
6. Apply injection pressure on the heated material using plunger rod.
7. The injection ram pushes the material in to the heating cylinder and in doing so pushes a small amount of heated material out of the other end of the cylinder through the nozzle and screw bushing and into thecavity of closed mould.
8. The material is cooled in a rigid state in the mould.
9. Release the injection pressure. In clamp the Die using hydraulic operated ram.
10. The mould is then opened and piece I ejected out.

Result:

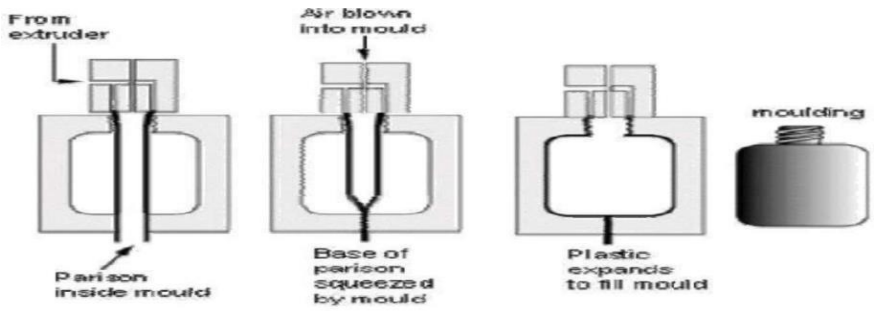
EXP 11: TO PREPARE A PRODUCT BY BLOW MOULDING MACHINE.

AIM: To prepare a bottle of 200ml using blow molding machine.

APPARATUS REQUIRED: Die, blow-molding equipment, air compressor.

MATERIALS REQUIRED: Plastic pellets

TOOLS REQUIRED: Blow Molding machine, grained plastic, Die (bottle shaped)



PROCEDURE:

1. Set the die in position. Adjust the guide rod nuts to suit die height. Align the tapered face of the die for sealing the parison while blowing also checks for the face opening and closing of the die.
2. Ensure minimum die height is 80mm. provide spacing plates if necessary.
3. Set the injection, release and blow pressure by rotating (clockwise) the regulator knob tosuit the requirement of moulding the container.
4. Feed correct quantity & quality of plastic material and switch on the power supply.
5. Switch on the heater.
6. Set the required timings controller to control the bottom heater.
7. Allow sufficient time to stabilizer.
8. When temperature reached, operate the hand lever valve.
9. Extrude the parison (Tubular form) to the required length and close the two die halves .Release the injection cylinder.
10. Operate the hand lever valve and blow the air so that the parison to form the shape of the container as designed in the die.
11. Allow the component to cool.

PRECAUTIONS

1. The material should not be heated rapidly.
2. The die should be placed exactly below the nozzle.
3. Proper temperature should be maintained while heating the plastic.

RESULT: