

18/11/21

Assignment - 3

Q.1 What are the various types of drilling machines? Explain radial drilling machine in detail.

→ Various types of drilling machines are:

- ① Radial drilling machine
- ② Upright drilling machine
- ③ Automatic drilling machine
- ④ Multiple spindle drilling machine
- ⑤ Deep hole drilling machine.
- ⑥ Multi spindle drilling machine.

* Radial Drilling Machine

- It is an industrial product and specially designed and manufactured for large and heavy work items.
- Designed to perform drilling action on any specified plan and position without moving the work item.
- The column of this machine with the help of the arm facilitates the work item by adjusting its position in upwards and downwards directions.
- Working: A rotating edge is attached to column. The drill head is on this radial arm, in bow

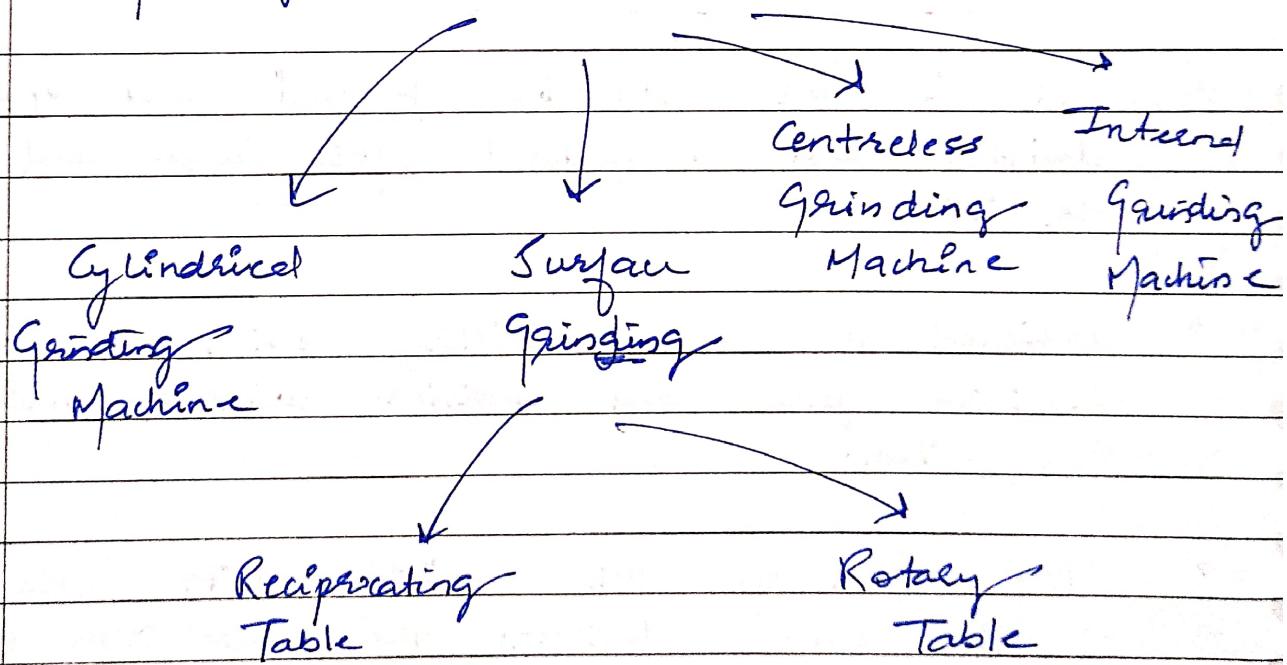
which has the drill bits and applies a force on the work item to create a hole and remove excess material.

Parts

- Base
- Column
- Radial Head Arm
- Drill Head
- Spindle

Q. 2. List different types of grinding machines and list any one in detail.

ans. Grinding Machines can be divided as

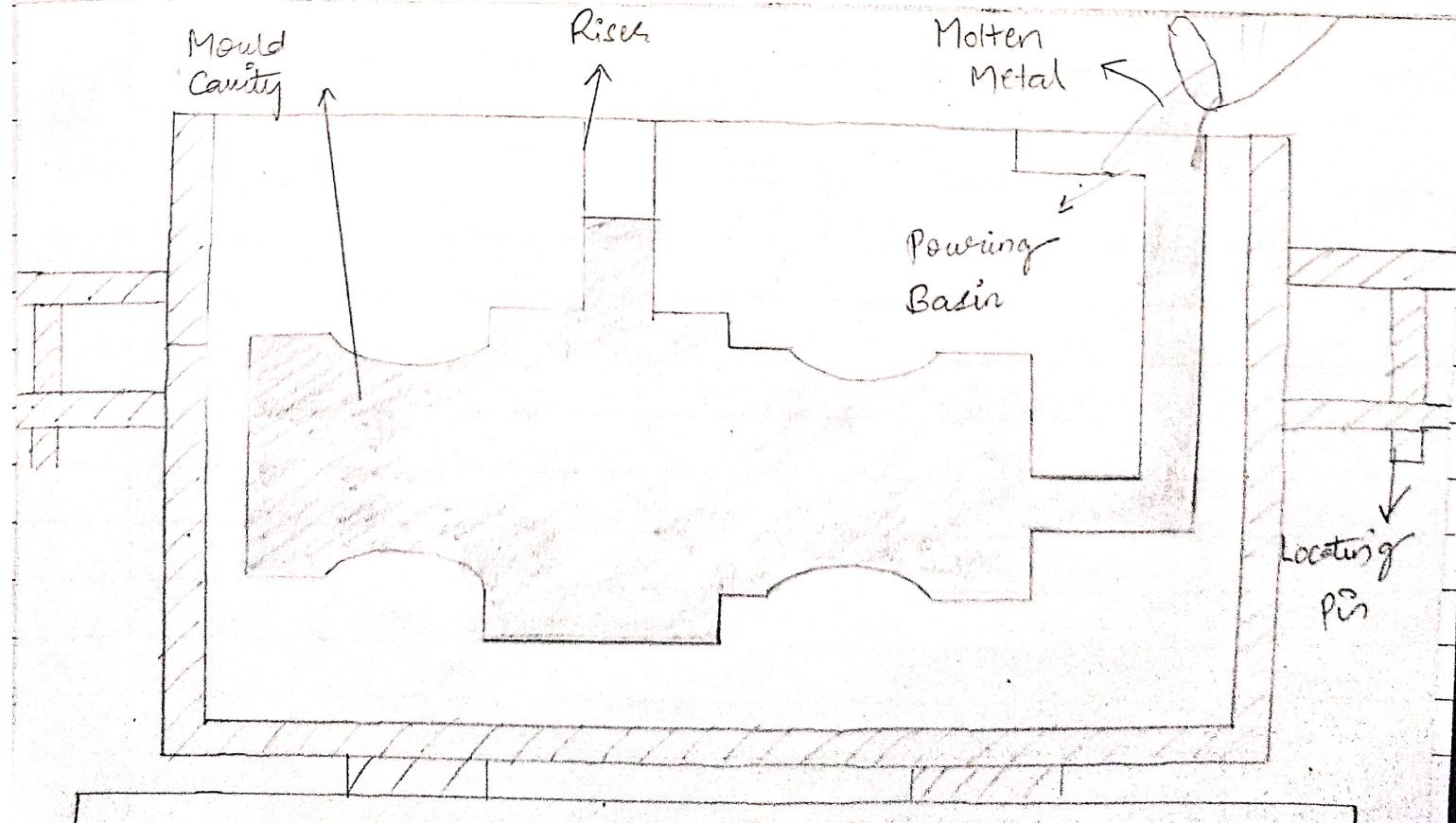


Cylindrical Grinding Machine: They are employed to slice or cut very precise and subtle finishes on materials like aluminium, carbide, steel etc.

- They are used to work on cylindrical surfaces rods or other cylindrical work pieces.
- The cylinder lays in the middle of two centers and turns in one direction whereas the grinding wheel approaches from the other direction.
- Working is similar to lathe machine, but uses a grinding wheel instead of cutting tools that a lathe machine uses.

Q. 3. Describe with a neat sketch construction and working of casting process.

Ans Casting is the process in which the parts of desired shape are produced by pouring the molten metal or alloy into a cavity and then allowing the metal to cool or solidify.



→ Working -

(1) Pattern Forming: Selecting the shape that we want to cast. It is done with a dummy material.

(2) Core Forming:

If cast requires some internal feature like a hole or a pipe, then we need to make the core from high purity sand.

(3) Molding:

Mold is created with sand or metal with high thermal strength and durability. The pattern is used to make the mold.

(4) Melting and Pouring

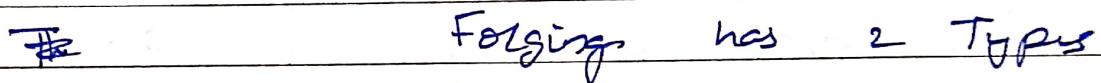
Metals are melted in a crucible and then poured in the mold where they can solidify and take the desired shape.

(5) Finishing

Techniques like Sanding, filing etc are used to finish the final product.

Q.4. Describe types of Forging Process and explain power forging. Differentiate hot and cold forging.

ans Forging is the process in which the desired shape and size is obtained through plastic deformation of metal under the action of externally applied force at high temperature.

Forging has 2 Types

Metal Drop Forging

Hand Forging.

 Power Forging:

When manual forging is done with the help of a power hammer by a worker, it can be termed as Power Forging.

A Power hammer is a mechanical forging hammer that uses non-muscular power to raise the hammer prior to striking and accelerate it onto the work being hammered.

 Cold Forging

- Done at room temperature
- Less Finishing is required
- Processes like rolling, drawing, pressing, spinning etc are used.

Hot Forging

- Performed at 1500°C
- More finishing needed
- Metal is malleable so easy to forge custom parts.

Q.6: List out different types of Advanced Manufacturing Process and explain any one in detail.

→ Some Advanced manufacturing Processes and techniques are:

- (1) Computer Technologies like (CAD, CAE, CAM)
- (2) High Performance Computing (HPC) for simulations, modelling, analysis.
- (3) Advanced Robotics and automation.
- (4) Industry 4.0 → using Big data to improve efficiency of manufacturing.
- (5) Wearable Technologies: To give easier and more 'hands on' access to data.
- (6) VR and AR.
- * VR - Virtual Reality and AR (Augmented Reality)

→ These Technologies make use of the fact that virtualisation of various environments is now possible with computer. They are very promising with what they can offer.

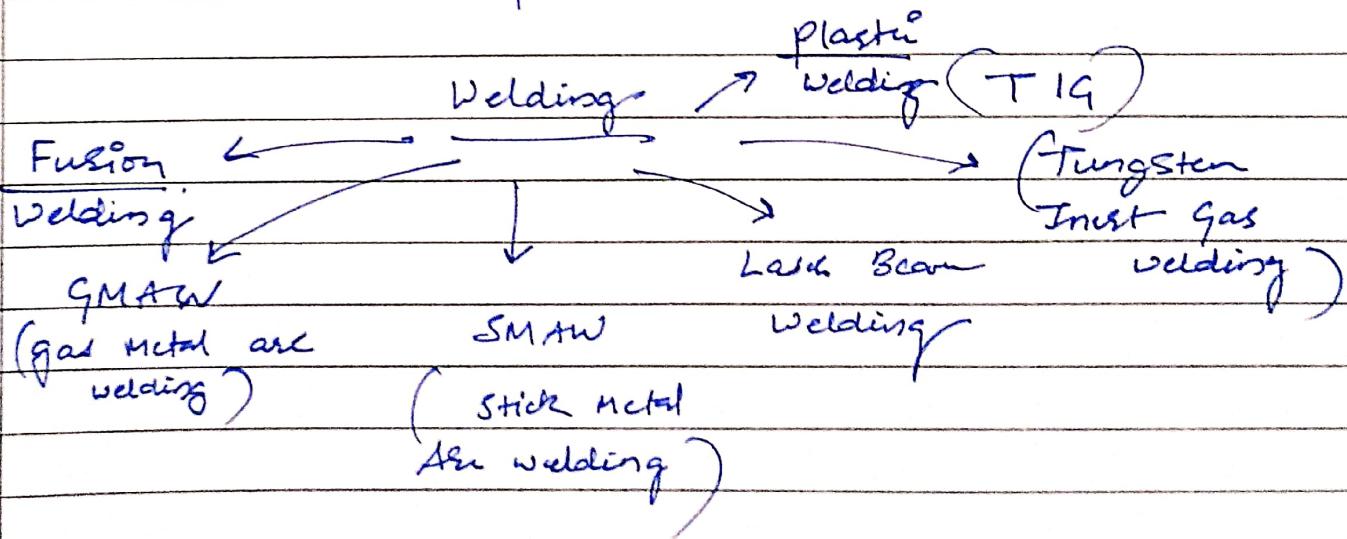
- (1) They can drastically improve trainings and testing more safely and in a controlled manner.

② Remote Maintenance: AR can allow complex, unsafe and complicated machinery maintenance work to be done by robots controlled from a remote location.

③ Promise Greater control: Both AR and VR can yield great efficiency, improved accuracy and more targeted and predictive maintenance.

Q.5. Classify Welding Processes. Explain Arc welding with a neat diagram.

→ Welding: It is a joining process used for various metals and their alloys. 2 or more pieces of metal are joined by application of either heat or pressure or both.



★ Arc Welding:

→ It is a fusion welding process in which welding heat is obtained from an electric arc between an electrode and the work piece.

- The temperature produced at the centre of the ore is $6000^{\circ} - 7000^{\circ}\text{C}$.
- In this, the base metal is melted by the temperature of the ore, forming a pool of molten metal.
- AC or DC is used to supply power.

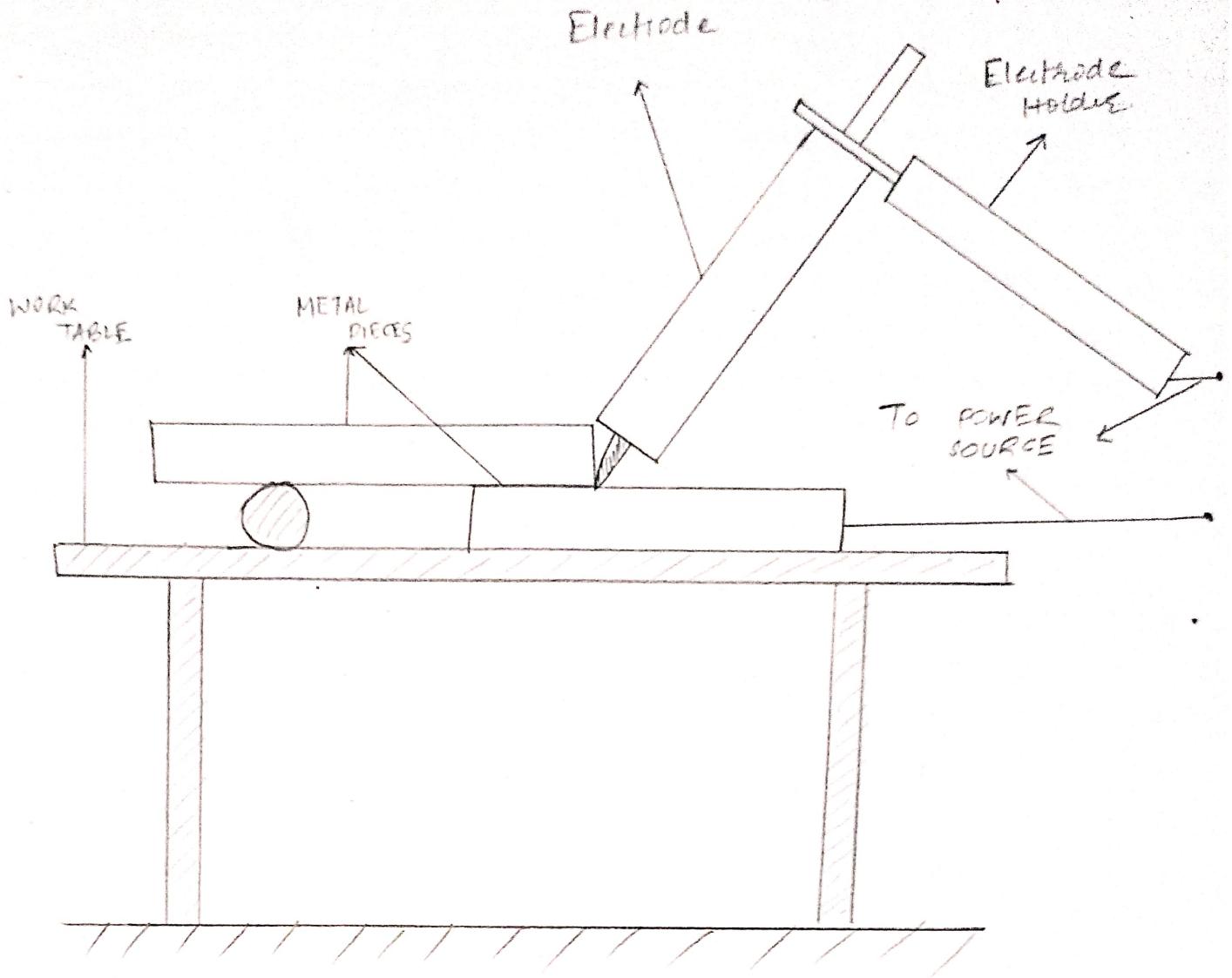


Fig: Arc welding Setup