



UNIT V

TIG WELDING

Basic Civil and Mechanical Engineering

KARTHICK B

ASSISTANT PROFESSOR / MECHANICAL ENGG



GAS TUNGSTEN ARC WELDING (GTAW) OR TIG (TUNGSTEN INERT GAS WELDING)

- "An arc welding process that produces coalescence of metals by heating them with an electric arc between a **tungsten electrode (non-consumable)** and the work piece. Shielding is obtained from an **externally supplied shielding gas**. Pressure may or may not be used, and **filler metal** may or may not be used"

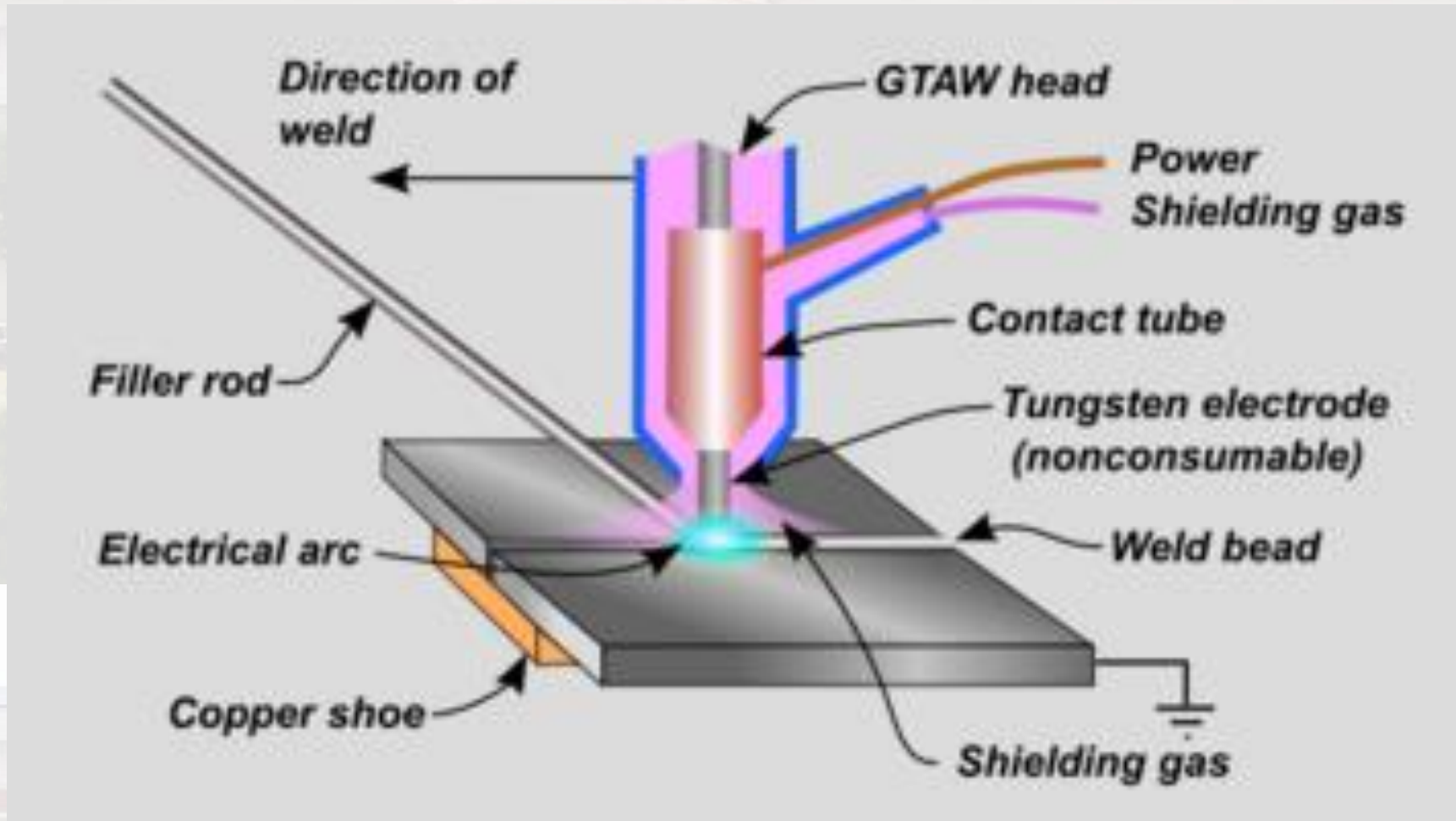


TIG (TUNGSTEN INERT GAS WELDING)

- Non-consumable arc process
- W or W-alloy electrode
- Shielding from inert gas fed through the GTAW torch
- Filler metal is mostly added in the form of rods / wires
- Backing plates are used

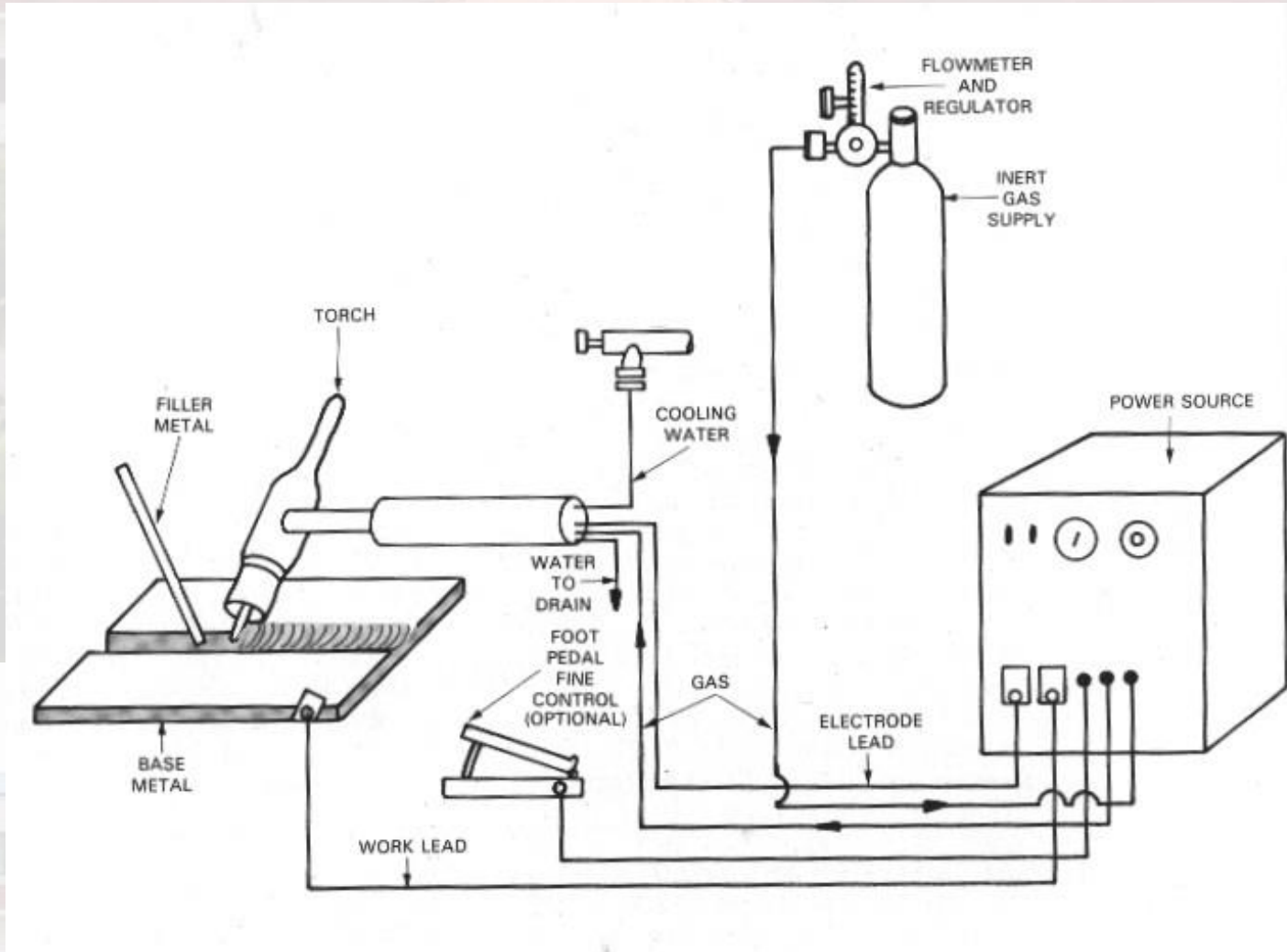


TIG (TUNGSTEN INERT GAS WELDING)





TIG (TUNGSTEN INERT GAS WELDING)





GTAW PROCESS

- The arc develops intense heat, approximately $6,100^{\circ}\text{C}$, which melts the surface of the base metal to form a molten pool.
- Filler metal is required to make the weld
 - Added manually—like brazing.
- For thicker materials an externally fed or cold filler rod is generally used.
- Filler metal is not added when thinner materials, edge joints, and flange joints can be welded. This is known as Autogenous welding.
- The filler metal is not transferred across the arc but melted by it.
- The arc area is protected from the atmosphere by the inert gas, which flow from the nozzle of the torch.
- Torch contributes only heat to the work piece



ADVANTAGES

- Excellent quality & precision
- Weld more kinds of metals and alloys.
 - Stainless steel, nickel alloys, titanium, aluminum, copper, brass
- Also can weld dissimilar metals to each other.
 - Copper to brass
 - Stainless steel to mild steel.
- Suitable for all positions
- Concentrated Arc
 - Pin point control of heat input to the workpiece.
- No Slag, No distortion
- No Sparks, Spatter or Noise
- No Smoke or Fumes



DISADVANTAGES

- Low filler metal deposition rate
- Slower travel speeds
- Need for Hand-Eye coordination
- Arc rays are brighter than other welding
- Need additional care to protect skin with proper clothes and welding lens
- Costly process



APPLICATIONS

- Aircraft industry
- Ship building
- Boiler and pressure vessel industries
- Root pass welding of pipes
- Nuclear industries
- Heat exchangers, Food processing



GTAW

Filler Materials

- Not required for thin sheets
- Added manually or automatically
- Rods or Wires

Joint Design

- Suitable for all welding positions

Deposition Rates

- Very low
- Not suited for welding thick materials



THANK YOU