

# PENANG SANGAM HIGH SCHOOL

P.O.BOX 44, RAKIRAKI

## LESSON NOTES-24

School: PENANG SANGAM HIGH

Year/Level: 11

Subject: APPLIED TECHNOLOGY

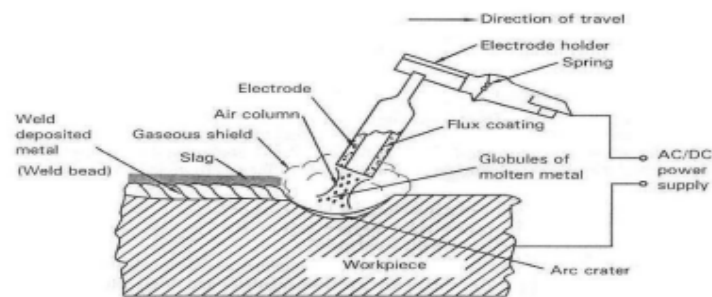
Strand	AT 11.6: APPLIED ENGINEERING
Sub Strand	AT6.2 WELDING, SHEET METAL AND FABRICATION
Content Learning Outcome	AT11.6.2.1 Demonstrate knowledge on safety, materials, tools and processes and develop practical skills in electric welding.

### WELDING AND FABRICATION

Welding is the process of permanently joining two or more metal parts, by melting both materials. The molten materials quickly cool, and the two metals are permanently bonded. When welding other considerations must be made such as the thickness of the material welded, spacing of welds, centre of weld to edge and the heat requirement.

#### Manual Metal Arc Welding (MAW) OR Flux Shielded Metal Arc Welding (FSMAW)

Manual Metal Arc Welding (MAW) OR Flux Shielded Metal Arc Welding (FSMAW) Flux shielded metal arc welding (FSMAW) also known as 'manual' metal arc welding (MAW) is a group of arc welding process in which the work pieces are joined by the heat obtained from an electric arc struck between a flux coated consumable electrode and the work piece. The flux coated on the electrode serves as a shielding gas to prevent atmospheric contamination of molten metal.



Flux Shielded Metal Arc Welding

## **Description and Operation of Manual Metal Arc Welding**

An electrode holder which holds the electrode firmly forms one pole of the electric circuit while the work piece to be welded forms the other pole. Either AC (Alternating Current) or DC (Direct Current) can be used to supply the required current for welding.

The electrode used in this process is a metallic wire which is made of the same material or nearly the same chemical composition as that of the work piece material. The electrode acts as a 'Filler metal' to supply the additional material to fill the gap between the two work pieces. The metallic wire is coated with a flux material, calcium fluoride, cellulose and iron powder. The flux gives off gases as it decomposes to prevent weld contamination, to form slag, improve arc stability and weld quality.

The high heat at the tip of the arc melts the work piece metal forming a small molten metal pool. At the same time, the tip of the electrode also melts. The molten metal of the electrode is transferred into the molten metal of the work piece in the form of globules of molten metal.

- The deposited metal fills the joint and bonds the joint to form a single piece of metal.
- The electrode is moved along the surface to be welded to complete the joint.
- The arc is extinguished by increasing the arc length by widening the gap between the work piece and the electrode.

## **Advantages of Manual Metal Arc Welding**

- Process is simple and inexpensive. Hence, suitable for shop jobs and field work.
- The process dominates other welding processes in maintenance and repair industry.
- Used to weld ferrous and a few non-ferrous metals like aluminum, nickel, copper alloys etc.
- Eliminates skilled labour.

## **Disadvantages of Manual Metal Arc Welding**

- Weld times, are rather slow, since the consumable electrode must be frequently replaced.
- Weld spatter, poor fusion, Shallow penetration and cracking are a few major problems associated with the process. However, by proper welding practice, they can be minimized.

## **SHORT ANSWER QUESTIONS**

1. Explain the term welding and fabrication.

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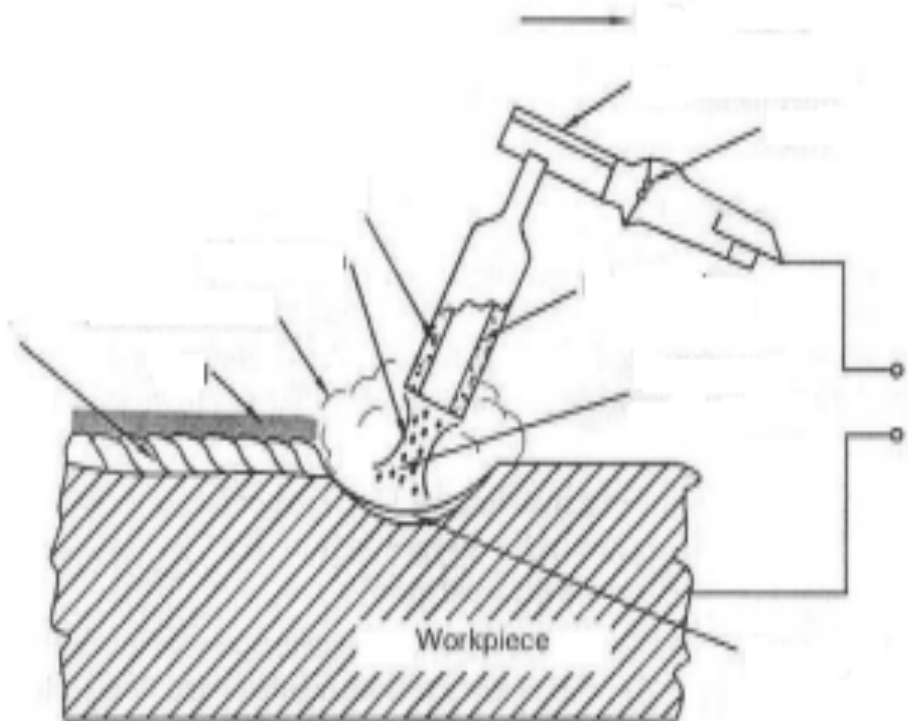
2. List two advantage of manual metal arc welding.

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3. Label the diagram given below.



**THE END**