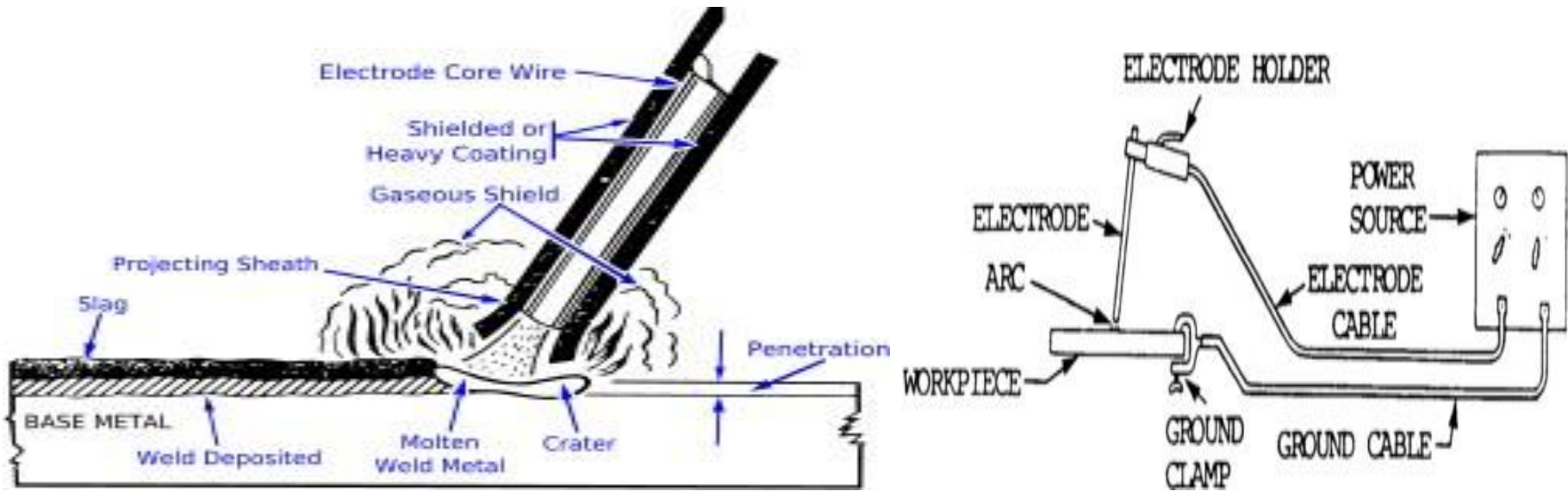


Workshop Concept

Welding

- **Arc Welding:** A welding power supply is used to create and maintain an electric arc between an electrode and the base material to melt metals at the welding point. In such welding processes the power supply could be AC or DC, the electrode could be consumable or non-consumable and a filler material may or may not be added.



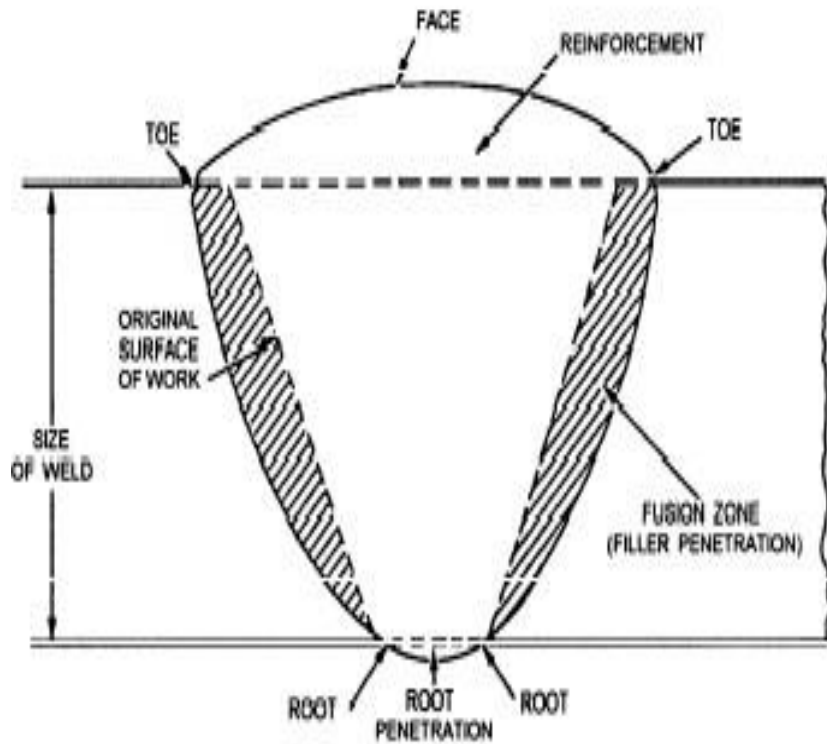
The most common types of arc welding

- **Shielded Metal Arc Welding (SMAW):** A process that uses a coated consumable electrode to lay the weld. As the electrode melts, the (flux) coating disintegrates, giving off shielding gases that protect the weld area from atmospheric gases and provides molten slag which covers the filler metal as it travels from the electrode to the weld pool. Once part of the weld pool, the slag floats to the surface and protects the weld from contamination as it solidifies.
- **Gas Metal Arc Welding (GMAW):** A process in which a continuous and consumable wire electrode and a shielding gas (*usually an argon and carbon dioxide mixture*) are fed through a welding gun.
- **Gas Tungsten Arc Welding (GTAW):** A process that uses a nonconsumable tungsten electrode to produce the weld. The weld area is protected from atmospheric contamination by a shielding gas, and a filler metal that is fed manually is usually used.

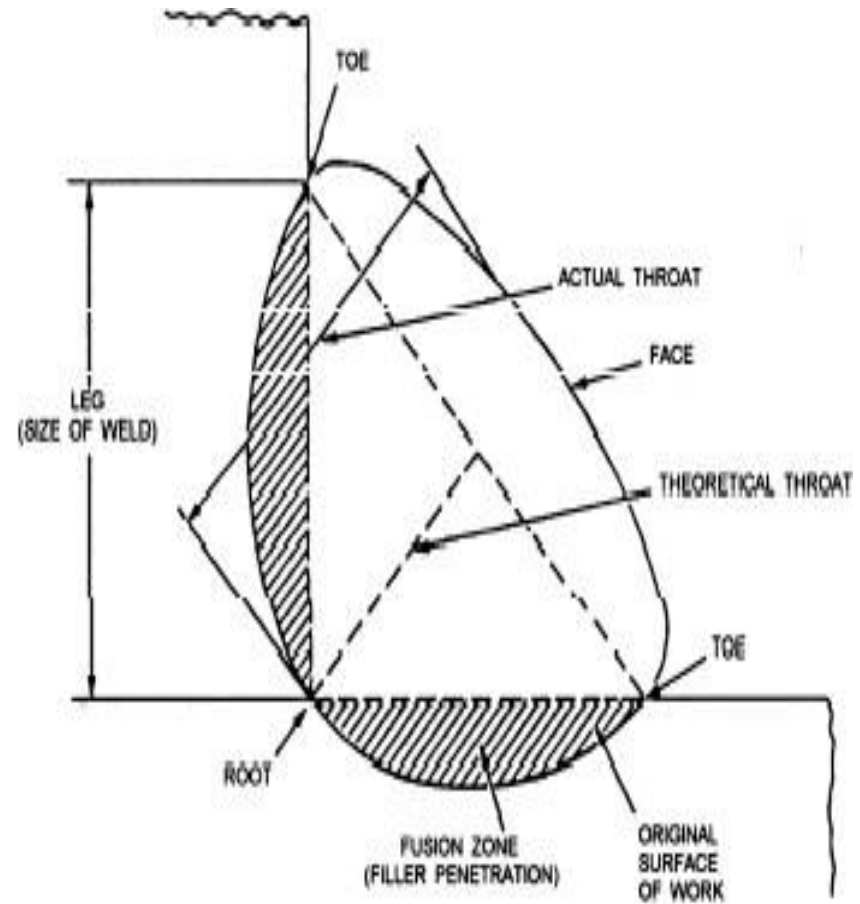
Welding Terminology

- **Filler Material:** When welding two pieces of metal together, we often have to leave a space between the joint. The material that is added to fill this space during the welding process is known as the filler material (or filler metal).
- **Electrode:** In electric-arc welding, the term electrode refers to the component that conducts the current from the electrode holder to the metal being welded. Electrodes are classified into two groups: consumable and non-consumable.
- **Consumable electrodes** not only provide a path for the current but they also supply filler metal to the joint. An example is the electrode used in shielded metal-arc welding.
- **Non-consumable electrodes** are only used as a conductor for the electrical current, such as in gas tungsten arc welding. The filler metal for gas tungsten arc welding is a hand fed consumable welding rod.
- **Flux:** Before performing any welding process, the base metal must be cleaned from impurities such as oxides (rust). Unless these oxides are removed by using a proper flux. The term flux refers to a material used to dissolve oxides and release trapped gases and slag (impurities) from the base metal such that the filler metal and the base metal can be fused together. Fluxes come in the form of a paste, powder, or liquid. Different types of fluxes are available and the selection of appropriate flux is usually based on the type of welding and the type of the base metal.

Parts of Welds



A. GROOVE WELD



B. FILLET WELD

Weld reinforcement is a term used to describe weld metal in excess of the metal necessary to fill a joint. The reinforcement needs to be grinded in some cases depending on the intended use of the joint.

Face is the exposed surface of a weld on the side from which the weld was made.

Toe is the junction between the face of the weld and the base metal.

The **root** of a weld includes the points at which the back of the weld intersects the base metal surfaces.

In a **fillet weld**, the **leg** is the portion of the weld from the toe to the root.

In a **fillet weld**, the **throat** is the distance from the root to a point on the face of the weld along a line perpendicular to the face of the weld.

Theoretically, the face forms a straight line between the toes.

The **size** of a **fillet weld** refers to the length of the legs of the weld. The two legs are assumed to be equal in size unless otherwise specified.

