# Introduction to Welding

Welding is a common process for joining metals using a large variety of applications. Welding occurs in several locations, from outdoors settings on rural farms and construction sites to inside locations, such as factories and job shops. Welding processes are fairly simple to understand, and basic techniques can be learned quickly.Welding is the joining of metals at a molecular level. A weld is a homogeneous bond between two or more pieces of metal, where the strength of the welded joint exceeds the strength of the base pieces of metal.

At the simplest level, welding involves the use of four components: the metals, a heat source, filler metal, and some kind of shield from the air. The metals are heated to their melting point while being shielded from the air, and then a filler metal is added to the heated area to produce a single piece of metal. It can be performed with or without filler metal and with or without pressure.

There are several types of welding that are used today. Gas Metal Arc Welding (GMAW) or MIG, Gas Tungsten Arc Welding (GTAW) or TIG, Flux Core Arc Welding, and Stick Welding are the most common found types in industrial environments.

## Common Terms

There is a large vocabulary of specific welding terms. Knowing these terms is essential to learning about welding as well as understanding how to weld.

### Arc Burn

Arc burn is a metallurgical notch caused by ground clamps or striking an arc on the base metal at any point other than the weld groove or immediate area that will be covered with the weld cap.

### Base Metal

The base metal is the metal that is to be welded or cut. It is commonly referred to as the workpiece.

### Butt Weld

A butt weld is a joint between two workpieces that are aligned on the same plane.

### Cover Pass

The cover pass finishes the welded joint. It is higher than the adjacent surface and overlaps the groove.

### Filler Pass

The filler pass follows the hot pass and fills the weld groove flush, or almost flush, with the surface of the workpieces.

### Fillet Weld

A fillet weld is the joining of two workpieces with triangular cross-sections at approximately 90 degrees.

### Heat-Affected Zone

The heat-affected zone is the area of metal near the weld metal that was not melted during welding, but did experience changes in its mechanical properties and/or microstructure due to the heat applied.

### Hot Pass

The hot pass is the pass immediately following the stringer pass.

### Joint

The hot pass is the pass immediately following the stringer pass.

### Plug Weld

Plug welding is filling a hole or gap in one piece with weld or filling a hole and attaching the piece with the hole to the surface of another base piece.

**Polarity**

Polarity is the manner in which the electrode holder and workpiece connect to the electrical supply. This can be either direct current electrode negative, or DCEN, meaning straight polarity or direct current electrode positive, or DCEP, meaning reverse polarity.

**Spot Weld**

Spot welding is the process in which the weld pieces are pressed together with pressure, then a current is passed through them in a small spot and the two pieces are melted together at that location. Spot welding can be performed on metals from 0.5 to 3 mm.

**Stringer or Root Bead**

The stringer pass, or root bead, is the first pass in the weld. It is typically made without any weaving motion.

**Weld Groove**

Weld groove refers to a V- or U-shaped groove created by the beveling of the workpiece edges that will be joined.

**Weld Metal**

The weld metal is the portion of the base metal that is melted during the welding process.

**Weld Pass**

A weld pass is a single progression of welding along the joint. After a complete pass, it is referred to as a weld bead.

**Welding Electrode**

In arc welding, the electrode is used to pass current through the workpiece to fuse the two pieces together.

**Introduction to Welding Questions**

1) What is welding?

2) How strong is a finished weld supposed to be?

3) Name 4 components involved in welding.

4) Name the 4 most common types of welding used today.

5) What is the difference between a butt weld and a plug weld?