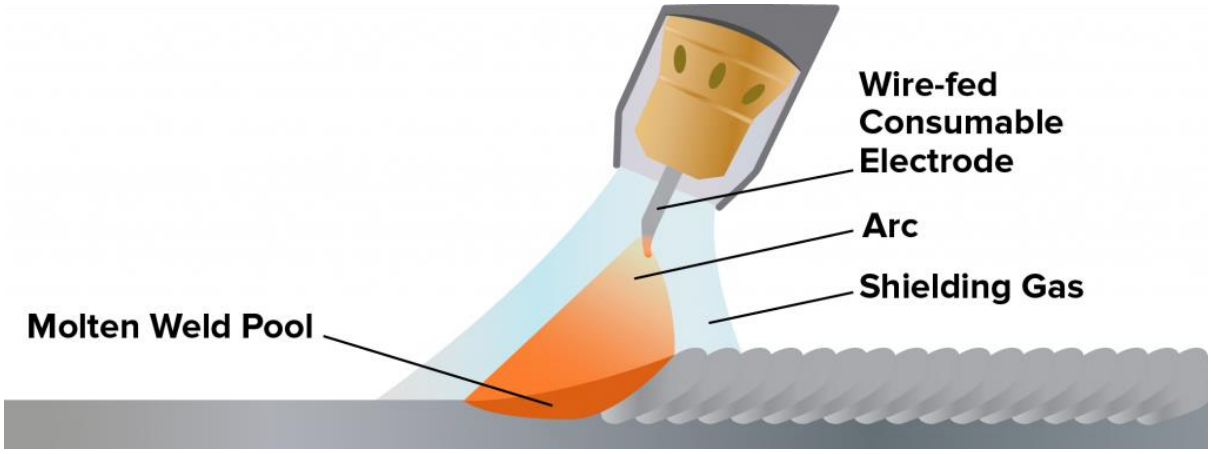
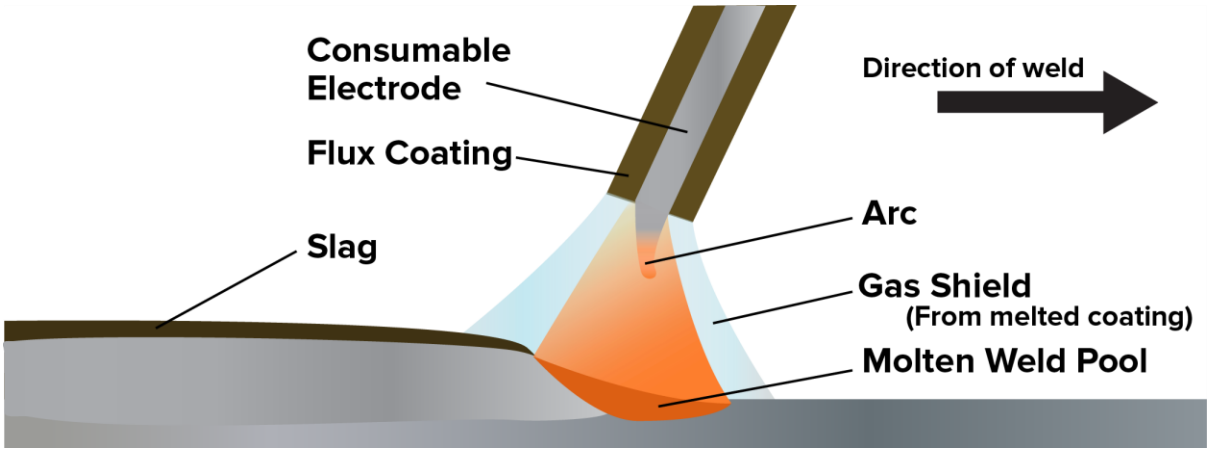
Electric Welding Processes

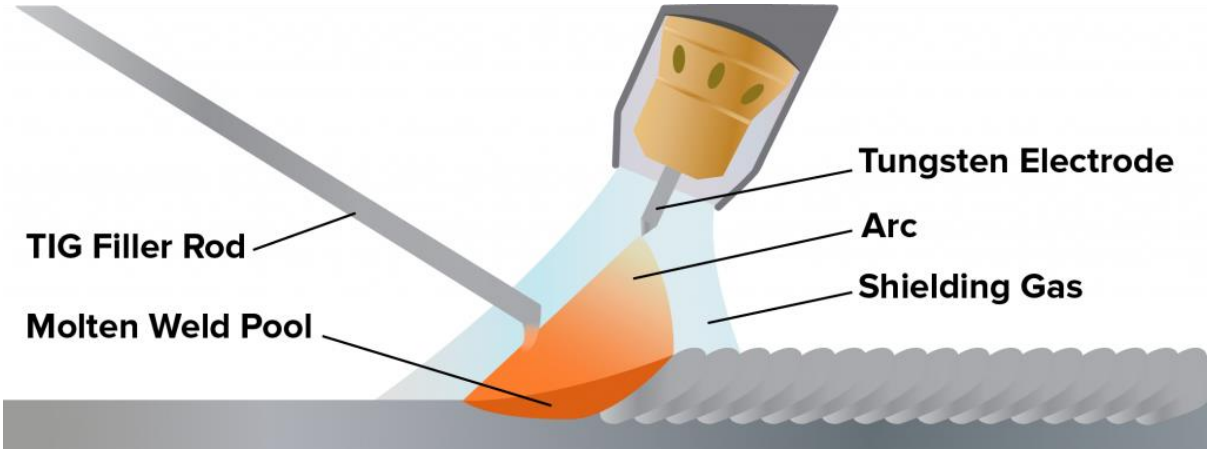
1. MIG – Metal Inert Gas is best categorised as fast, very strong with reasonable presentation. Typically used in 90% of modern welding manufacturing as it uses continuous wire that feeds from a large roll. It passes through a copper electrode with a surrounding shroud that directs a cover gas such as Argon/Co2 mix or pure Argon for Aluminium. This process is also available in gasless wire but it tends to lack presentation. MIG is suitable for welding Steel, Stainless steel and Aluminium. MIG can be tailored to specific needs or difficult welding positions with specialised Rutile wire.



2. MMA - Metal Metal Arc or commonly known as Stick Welding which is predominantly used in home welding machines and light industry where very small and light weight welding machines are needed at heights or in confined spaces. Many different alloy rods are available but they are all coated in flux. The welding rods are consumed fairly quickly during welding yet this type of welding has very low running cost as it does not require gas bottle rental. The welding rods can be stored for a decade in a moisture free environment. Materials that can be welded are Steel, Stainless steel, Cast iron and Aluminium. A major drawback of stick welding is it can look atrocious once the slag is chipped off the weld.

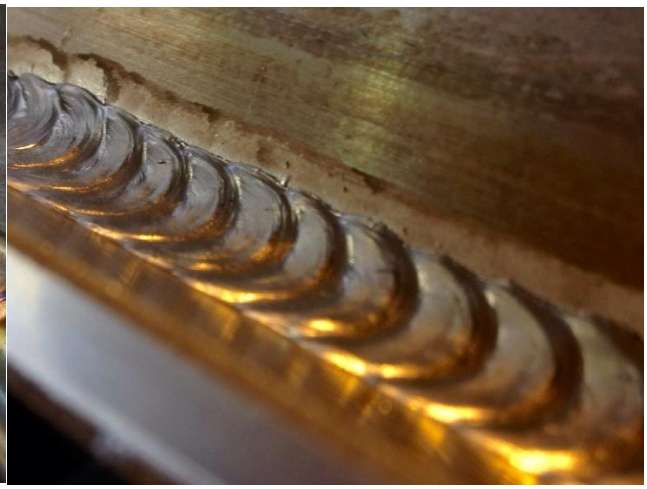


3. TIG – Tungsten Inert Gas is a much slower specialised process that uses a hand held torch with a Tungsten electrode that is not consumed during the welding process. It takes considerable skill as the operator needs to perform three different tasks simultaneously. For example, a foot pedal controls the amperage while one hand feeds filler wire and the other hand must maintain the TIG torch about 4mm from the job. TIG is capable of incredibly fine welds that are high in strength with great presentation. The TIG process can weld a large variety of materials using a large variety of filler wires or it can be used without filler wire for fusion welding where parent metals are melted together. A skilled operator could produce a fusion weld down to about 1mm wide or weld up a Coke can using the pulse TIG function. DC current is used for welding Steel and Stainless Steel, AC current must be used for welding Aluminium. The addition of Helium instead of Argon as a cover gas will yield incredible results.
   Modern TIG's use a High frequency/voltage to start the arc which can be hazardous to operators. Caution must be taken as the arc is capable of jumping a 25mm gap and can burn up to a 5 mm deep hole in the operator's skin.



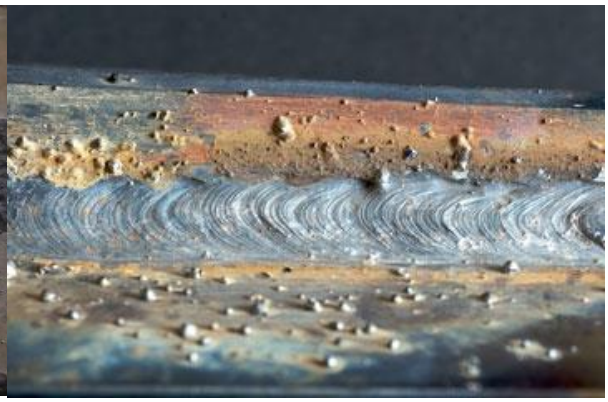
Weld Comparison

TIG Welding

MIG Welding


Stick Welding

Tips for TIG Welding Aluminium

- **You must use a Zirconiated Tungsten electrode (has a white end)**
- **You must use AC current, either High Frequency or normal scratch start**
- **You must form a ball on the electrode by altering the balance on the control panel so a greater portion of time is spent in (+) to melt the tungsten**
- **You must not use abrasives like flap wheels or sanding machines on surfaces to be welded. This impregnates grit into the surface, a file should be used to break corners.**
- **A Stainless Steel wire brush that has never been contaminated can be used to clean material before and after welding.**
- **Fine Steel Wool and pink hand soap will clean all oxides off the surface**
- **Do not touch material in area to be welded with hands once clean**
- **Do not use a contaminated gas shroud**
- **Keep the filler wire close to the arc so the Argon gas stops the wire oxidising when you remove it from the weld pool.**
- **Do not draw on the material with a permanent marker. Even if you clean it off it will flare up as you get close with the arc.**
- **If your weld pool gets contaminated more heat will never solve the problem, stop and grind it out with a Tungsten carbide Burr in a Dremel. Never use a grinding wheel on Aluminium that your intent to weld.**
- **If the material is heavy and you wish to preheat it with an Oxy Torch, first set it to a Carburising flame and coat the Aluminium in black soot, then resume with a neutral flame and the soot will disappear at about 204 degrees C which is ideal.**