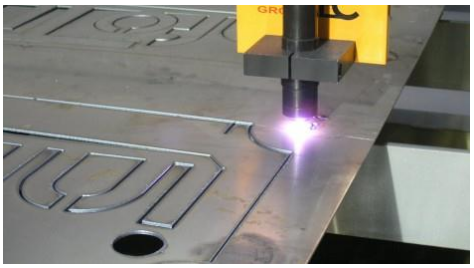
PLASMA ARC WELDING



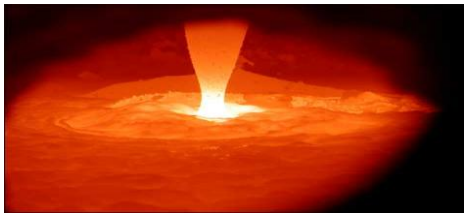
The plasma cutting system is a technology developed in 1954 to cut steel and other metals using a plasma torch.

This technology is useful to cut any conductive metal, especially structural steel, stainless steel and non-ferrous metals than oxyfuel cannot work. You can cut aluminum, stainless steel, copper, brass and any conductive metal.

The plasma is a state of matter consisting of free electrons and ionized atoms interacting with each other with a high electromagnetic conduction and high energy density, normally maintained by elevated temperatures over 30,000 ° C.

The concept of a plasma cutting involves applying heat to raise the temperature of the material to cut in a targeted area above 30,000°C, causing the gas to ionize, converting it in plasma by electromagnetic conduction.

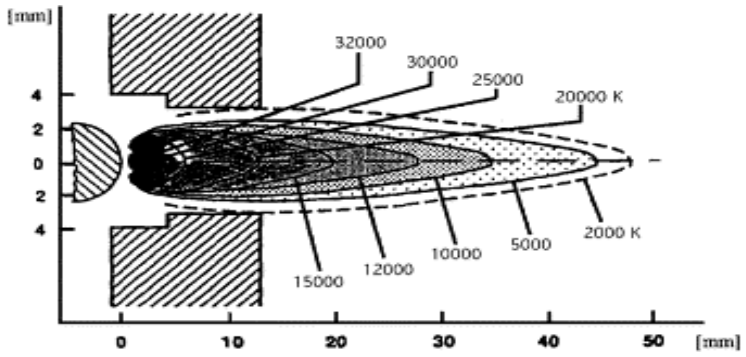
This is accomplished by forming an extremely small electric arc with a large amount of energy is concentrated ionized section of the torch nozzle, producing a highly compact heat in the cutting area.



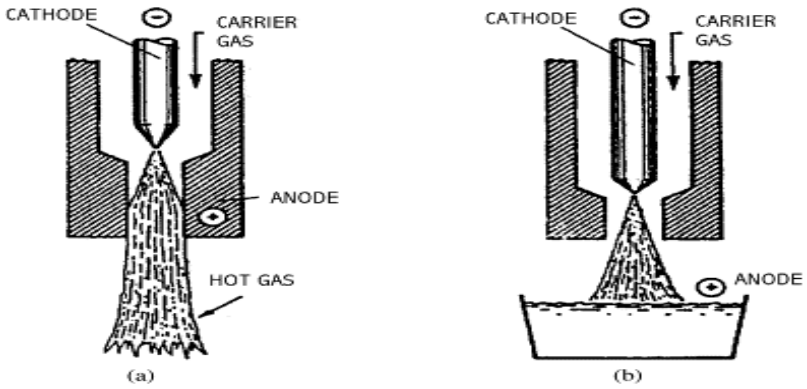
Plasma cutters send pressurized gas such as nitrogen, argon or oxygen through a tiny channel.

In the center of this channel, there is a negatively charged electrode. When applying electricity to the negative electrode and touch the tip of the metal, the connection creates a circuit. A powerful spark is generated between the electrode and the metal.

The inert gas that passes through the electric arc at high speeds, will ionize conforming a very hot plasma flow directly at 6 km per second with over 16,000 ° C

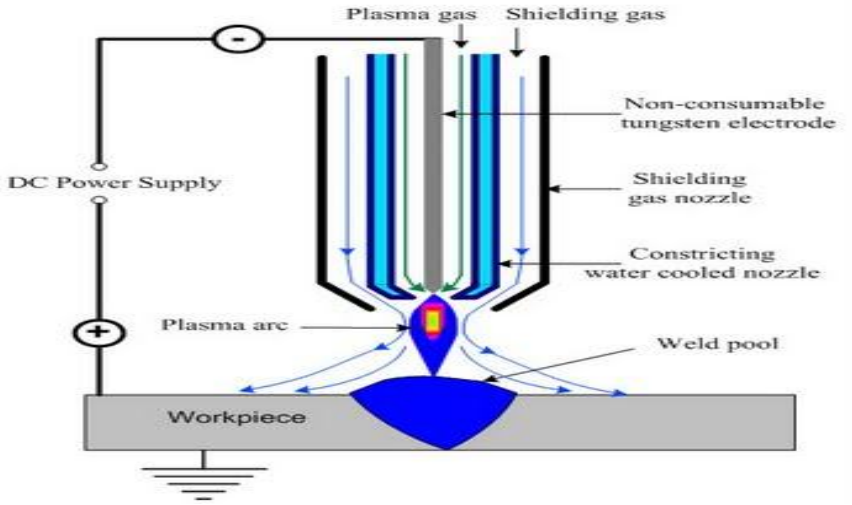


In plasma, the energy begins to break down the gas molecules and the atoms which begin to separate from their electrons, which move quickly and causing the collision with other electrons and ions, releasing a vast amounts of energy.



When plasma contacts the surface of the material to cut, it will penetrate it, melt and eject the loose material.

Plasma conducts electricity. The arc creation cycle is continuous as long as there is energy in the electrode and plasma maintain contact with the material being cut to establish an electric circuit.



To ensure the contact, protect the cut from oxidation and regulate the nature of plasma, the nozzle cutter has secondary channels which release a constant flow of inert gas around the cutting area at pressures that control the plasma radius.

The quality of the plasma produced is a function of the density (pressure), temperature, and the power of the torch.

Plasma cuts materials efficiently thin (0.5 mm) and thick (up to 160 mm or 6 inches), but if the piece is too small, it will be deformed due to the high temperatures of the process.

The plasma cutting system comprises:

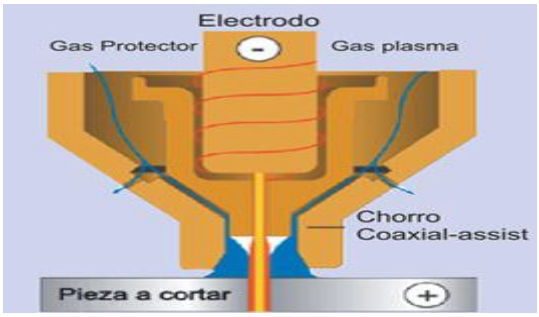
* A ‘high frequency generator powered by electricity, ”

* “Gas to generate the heating flame that will ionize” (argon, hydrogen, air or nitrogen), although it is generally used nitrogen.

* An “electrode”

* A ‘torch’ (made of tungsten, hafnium, zirconium depending on the gas)

*The workpiece



The variables in the process will be the “gases used”, the “flow rate and pressure of gases,” the various nozzles, cutting speed and intensity of the arc.

There are two types of direct current torches: the “transferred” (an electrode is out, usually the material being worked, allowing arcing at a greater distance) and the

“non-transferred” (where the electrodes are inside the body of the torch, creating the arc within it, thus there can be up to 50% efficiency for losses of electric energy to heat).

Temperature increases significantly with increasing gas flow rate or reducing the nozzle size at maximum.

Plasma cutting emits ultraviolet radiation which requires eye protection, a changing room and adequate ventilation and avoid the presence of flammable materials in the vicinity.

Plasma cutting has a higher cutting speed in common thicknesses which are less than 25 mm (less than 1 inch) with up to 70 inches per minute with smooth cuts and less slag than oxyfuel.

Source: http://www.artinaid.com/2013/04/plasma-arc-welding/