CLN™ of South Florida, Inc.

Manufacturers of CNC Equipment

www.CLNofSouthFlorida.com

Made in USA

Maintenance for your Plasma Torch

A good operator with well maintained plasma arc cutting equipment can save a shop countless hours of downtime and thousands of dollars in operating expenses. These savings can be garnered if companies learn how to avoid these 10 common mistakes.

1. Using consumables until they "blow"

Look in a used bucket and there will likely be parts that have been run to failure. Using severely worn consumables cannot only ruin a good piece of metal, it can cause expensive torch failures and unnecessary down time. Running the parts to failure is a pitfall that is easily avoided. There are several signs of worn consumable, and an experienced operator can often tell by an arc's sound or color or subtle changes in torch height that indicate parts wear.

However, the best way to judge the condition of the torch parts is to periodically check the cut edge quality of the metal and check the torch parts when the cut begins to deteriorate. Keep a record of the average parts life over time either in number of starts or arc-on time and develop guidelines for expected parts life based on the amperage, material, and thickness.

After the average parts life established, the operator will know when to check and replace the parts, which can prevent catastrophic failures.

2. Changing consumables

While some companies will look in its used parts bucket and find overused parts, other companies may look in their bucket and find still usable parts. It is a common and expensive practice to change out consumables too frequently. Operators need to know what to look for when changing out parts. If a nozzle is gouged on the inside or outside, or if the hole is worn out of round, it should be replaced. If not, the part may be reusable. To tell if an electrode is spent, check the pit in the electrode element (the element is the silver-colored insert held in the copper: hafnium for air and O2, tungsten for N2 or Ar-H2. Generally, the pit should not exceed 3/32” for air and O2 and 1/8” for N2 or Ar-H2. Gas swirlers should only be changed if a close examination reveals dirt or grease in the holes. Cracks, arc burns. Or excessive wear. Gas swirlers are often changed prematurely. The same holds true for shields, which should only be replaced if they show signs of physical damage. Often shields can be cleaned of metal spatter and reused.

Piercing too close to the plate is one of the biggest mistakes a plasma operator can make. Even one pierce too close can damage the torch and consumables.

3. Using the wrong parameters and parts

Consumable selection depends on the material and thickness being cut, the amperage and plasma gas used, and other cutting parameters. The operator/s manual will define the

consumables that are appropriate for various types of cutting. Using incorrect consumables can lead to shortened parts life and reduced cut quality.

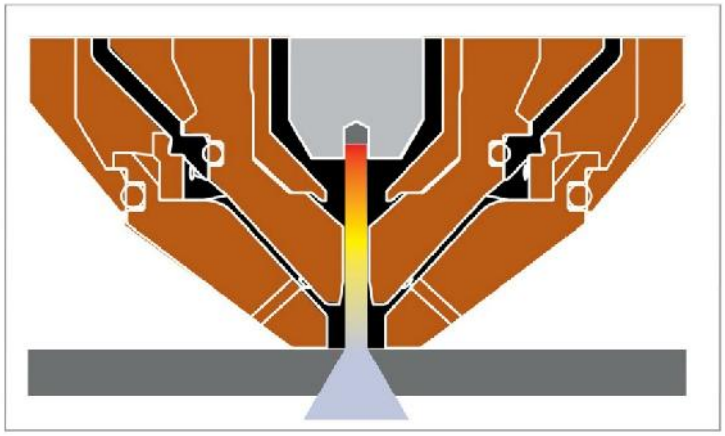
It is particularly important to run parts at the correct amperage. The best cut quality and parts life is usually achieved when the amperage is set to 95% of the nozzle's rating. If the amperage is too low, the cut will be sloppy; if amperage is too high, the nozzle life will be poor.

4. Assembling the torch incorrectly

The torch should be assembled so that the parts are aligned correctly and fit snugly together. This ensures good electrical contact and the correct flow of gas and coolant through the torch. When changing parts, keep consumables on a clean shop rag to prevent dirt or metal dust from contaminating the torch. Cleanliness during torch assembly is important and often neglected. When applying O-ring lube, use just enough to put a shine on the O-ring. Too much lubrication can cause clogging of the gas swirler and metal dust contamination in the torch. This can lead to uncontrolled arcing in the plasma chamber and ultimately torch failure. Grease should never be applied to torches as it can cause destructive arcing and burning within the torch.

5. Neglecting routine maintenance

Torches can last for months or even years with proper care. Torch threads must be kept clean and seating areas should be checked for contamination or mechanical damage. Any dirt, metal dust, or excess O-ring lubricant should be cleaned out of the torch. To clean the torch, use a cotton swab and electrical contact cleaner or hydrogen peroxide.



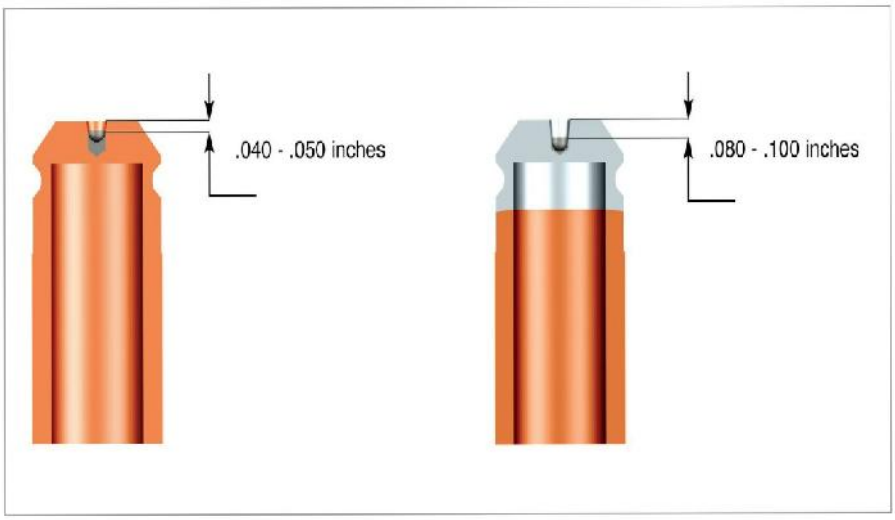
Standoff, the distance between the workpiece and the tip of the torch, is critical to both cut quality and parts life.

Even slight variations in torch height can affect the angularity of the cut surface. In this case, the torch is too close.

6. Not checking gas and coolant flow

The flow and pressure of gas and coolant should be checked every day. If the flow is insufficient, consumables will not be properly cooled, and the parts life will be reduced.

Inadequate flow of cooling water due to such issues as worn pumps, clogged filters and low coolant levels is a common cause of parts and torch failure. Constant gas pressure is important to maintaining the cutting arc. Excess gas pressure is a common cause of “hard starting” a situation in which the torch fails to initiate an arc when all other conditions for normal operation are correct. Too much gas pressure will also cause rapid deterioration of electrodes. Likewise, plasma gas must be kept clean to prevent short consumable and torch life. Compressed air system is especially prone to oil, moisture, and particulate contamination.



Changing out consumables too soon or not soon enough are two common mistakes. The rules for when to change out electrodes is: Standard all-copper electrodes should be change when the hafnium pit depth is between 0.040 and 0.050 in., while silver tipped electrodes can reach a pit depth between 0.080 and 0.100 in.

7. Piercing too low

Standoff, the distance between the workpiece and the tip of the torch, is critical to both cut quality and parts life. Even slight variations in torch height can affect the angularity of the cut surface. The height of the torch during piercing is particularly important.

One common error is to pierce too low. This causes molten metal to spatter the front of the nozzle and shield causing damage to the parts and subsequent cut quality problem. Arc “snuffing” can even occur if the torch pierces when touching the metal or drags along the surface while cutting. If the arc is snuffed, the electrode, nozzle, gas swirler, and sometimes the torch can be destroyed. Piercing at a height of 1.5-2 times the recommended cut height protects the torch and parts from damage.

8. Cutting speeds

Cutting too fast or slow can cause cut quality problems. If the speed is too slow, the cut pieces will develop “low speed dross” a large bubbly accumulation of dross along the bottom edge. Slow speeds may also cause a widening of the kerf and excessive amounts of top spatter. If the speed is too fast, the arc will lag backward in the kerf causing a beveled edge, a narrow kerf, and a small hard bead of dross along the bottom edge of the cut piece. High-speed dross is difficult to remove. Correct cutting speeds will produce

minimal dross, and the result will be a clean edge that needs little rework before the part takes the next step in the manufacturing process.

The electrode on the left shows that it is about ready to be changed out. Compare to the electrode on the right, in which the hafnium is completely gone.

9. Stretching the arc

Arc stretching can occur at the beginning and end of the cut if the arc has to stretch or deviate from a straight, perpendicular path, to find metal. Arc stretching can cause the arc to cut into the sidewall of the nozzle. When doing an edge start, the plasma arc should be started with the nozzle orifice directly centered over the edge of the work piece. This is important to remember in punch press/plasma operations where the arc is started off a punched hole. In this application, the arc should be started off the edge, not the center of the punched hole. Arc stretching can also occur at the end of the cut if the torch is programmed to run off the plate with the arc on, or if the "lead out" follows the kerf of previously cut metal. Timing of the arc-off signal and programming of the lead out can minimize this effect.

10. Crashing the torch

"Tip-ups" and crashes can irreparably damage a torch. Programming the shape cutting system to travel around, as opposed to over, cut parts can prevent torch collisions with the workpiece. Torch height sensors also offer protection from torch crashes by correcting for variations inn the material. However, voltage-regulated height controls can fail to protect the torch. For example, "torch driving" often occurs at the end of a cut if the torch follows the kerf for too long. (The torch height control dives too compensate for increased voltage as the arc stretches). Careful programming of the lead out and torch height control function can minimize this. Finally, breakaway torch mounting devices can help prevent damage to the torch if a collision does occur.