Trouble Shooting Oxy-Fuel Problems: Heating & Cutting (Part 2 of 2)

Problems with oxy-fuel equipment are under 1 of 3 categories. One, flashbacks, (2) heating problems or/and (3) cutting problems.

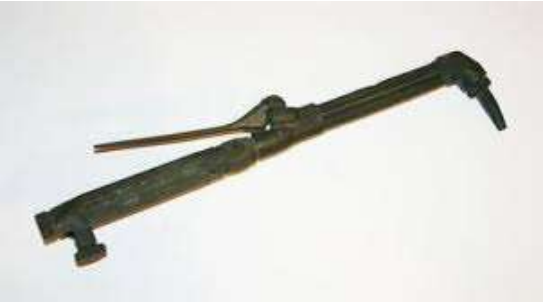
Our last article dealt with the flashbacks in torches. This is Part 2 of 2, dealing with heating and cutting problems.

The proper and easiest way to solving heating and cutting problems is getting your gas supplier involved. (Believe it or not, it's their responsibility to help you solve this problem. If they don't, then it's time to switch gas suppliers.). Your gas supplier has more contacts, resources, and experience then you. However, if the above doesn't happen, here's what we do.

When solving these problems, we're examining the whole setup: torch, hose, flash back arrestors, regulators and the fuel gases. If that reveals nothing, then we examine each part of the setup. We're looking for a part that's not doing its job.

Here are some of the things we check for.

Equipment



First, identify who's the manufacturer of your equipment. This is essential because every manufacturer makes their equipment unique; the parts are as different as Toyota versus Ford. Once you identify the manufacturer, solving problems becomes much easier.

But what do you do when there are no names on the equipment?

One, look at the back end of a cutting tip; the seats of the tip. You can identify the manufacturers by the seats on the cutting tips.

Figure 1 Airco Cutting Tip

Figure 2 Harris Cutting Tip

Two, use the internet to compare your equipment with the main manufacturers. The main manufacturers are Smith, Harris, Concoa (Air Liquide) and Victor.

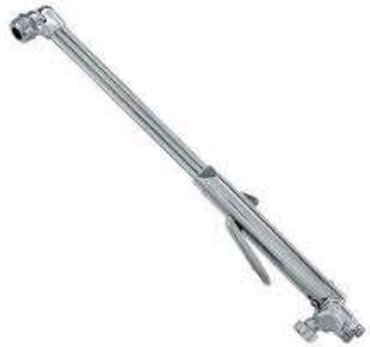


Figure 3 Smith Cutting Torch

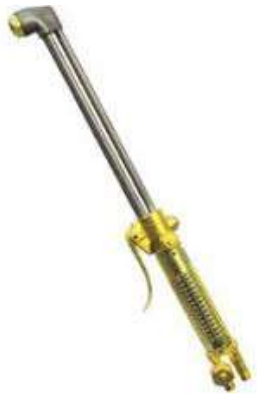


Figure 4 Concoa Cutting Torch

Figure 5 Victor Cutting Torch

Once you've identified the manufacturer, from their website, find out what model it is. (Torches have distinctive marks: number of tubes, where the handle is, type of valves, etc.).

When you know the model, then use the manufacturer's website for finding its capability. Each piece of equipment is made for certain scenarios. Check the specs: does it meet your needs?

Flashback Arrestors

Check the torch to see if only one set of flash back arrestors are attached. Some manufacturers build the arrestors into the torch. So, an error can happen, when the user isn't aware of this and adds another set of arrestors to the torch. The extra arrestors are going to be restricting the flow of gases.

Figure 6 Victor Welding Handle with Built In Flash-Back Arrestors

Lacking proper gas flow creates subpar performance in the tips (heating or cutting). And more importantly, it can become a safety issue. Certain tips require large volumes of gas. If they don't get it, the tip becomes very hot and starts to self-destruct.

If you're needing large flows of gas, then check your arrestor's flow capabilities. If the arrestors are restricting the flow, then you're going to need to replace them with high flow arrestors. But, before you do any replacing, talk to the tech department of the manufacturer.

Regulators

Regulators aren't usually a problem. When they are the problem, it usually means the regulator is being asked to do more than it was designed for.

By going to the manufacturer's website, you can determine whether the regulator is correct. Below is a sample that links to Harris's website on regulators.

https://www.harrisproductsgroup.com/en/specialty-gas-selector/Regulator-Selection.aspx

Hoses

Remember shorter hoses are always better. Your heating and/or cutting problems, may disappear with a shorter hose. We test repaired torches with a 10' hose. If the torch has problems on a short hose, the torch is the culprit. If a torch does well on the short hose but, poorly at the work site, it usually means the hose is the culprit.

If you must use long hoses, make sure you compensate for the pressure drop. What your gauge is reading at the cylinder, will not be the pressure at the torch end.

Long hoses, because of their length, can get damaged easily. The damaged hose is repaired with hose splicers. But just remember, every splicer put in the hose, will reduce the gas flow.

The best way to know the actual flow is measure the outflow at the end of the hose. You can do this by putting test gauges on the end of the hose. (Your gas supplier will have some or you can make them up yourself.)

Figure 7 Test Equipment for Measuring Pressure of Hose

Equipment manufacturers will tell you the required size of the hoses to properly run their equipment. (This can be found on their website) Some flow rates require 3/8" hose rather than the normal ¼".

Another thing to check for is if the hose is kinking at the handle of the torch: this restricts the flow of gases.

Fuel Gases

The 2 most common gases are acetylene and propane. But there are big differences that cannot be ignored.

Whatever fuel gas you chose, the equipment must be designed to burn that fuel gas. This includes the regulators, hose, torch and the tips. Below is an example of the difference between an acetylene and propane heating tip.

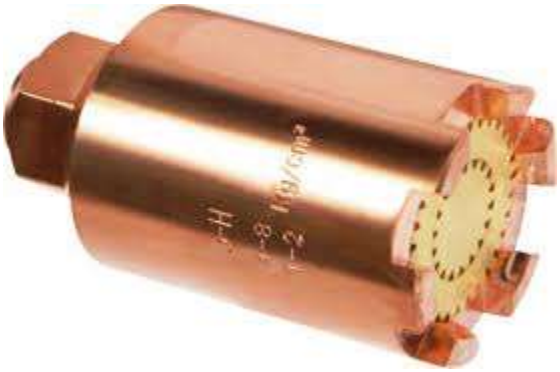


Figure 8 Propane Heating Head

Figure 9 Acetylene Heating Head

Heat Delivery:

- Propane = 2800C
- Acetylene = 3100 C

B.T.U.:

- Propane = 2498 BTU/ per cubic foot
- Acetylene = 1470 BTU/per cubic foot

Heating properties:

- Acetylene preheats the metal quicker; you can start cutting quicker
- Propane produces a higher amount of heat; allows you to cut thicker material more efficiently.

Oxygen use:
Propane uses more oxygen than acetylene

- Acetylene is 1.2 to 1 of oxygen
- Propane is 4.3 to 1 of oxygen

Safety:

Propane has a safety issue. When acetylene leaks, because its lighter than air, will rise in the air. Propane is heavier than air. When it leaks,

it will sink and concentrate – hence the safety issue.

Restrictions:
Acetylene has restrictions to how much can be drawn from a cylinder and under what pressure. It becomes unstable when the delivery is over 15 P.S.I.. You want to make sure that you don't draw more than 1/7 of the cylinder in 1 hour. If you go above that you'll be drawing acetone.

If you must use acetylene and will be withdrawing more than 1/7 of the cylinder, then you must manifold they cylinders. Below is a chart from Miller showing the crucial points of when you must manifold another cylinder.

Acetylene Cylinder Capacity (Cubic Feet)	Maximum Continuous Withdrawal Rate (1/7 Capacity)	Cylinder(s) needed to Operate Tips
304 - 330	43.4 - 47 SCFH	1
		2
		3
		4
130 - 135	18.5 - 19 SCFH	1
		2
100 - 111	14.3-15.9 SCFH	1
75	10.7 SCFH	1
60	8.6 SCFH	1
40	5.7 SCFH	1
10	1.4 SCFH	1

Figure 10 Miller's Chart for Manifolding Acetyelene Cylinders

In conclusion of this series, as we mentioned in our previous article, remember flashbacks are preventable by purging the lines before and after use of the torch.

And the big takeaway from this article should be to get good results in heating and cutting follow the manufacturer's recommendations. If you're not getting the results, examine and verify that each part of the setup works correctly. The main thing to avoid is jerry rigging solutions. Like taking off the regulators at the cylinders to get better gas flows. These kinds of solutions result in bad accidents.

If we can help, give us a call.

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