



Portable cutting and welding with alcohol and water

No shielding gases are required

By Dan Davis, Editor-in-Chief

When a major explosion occurred at Carbide Industries' Louisville, Ky., plant on March 21, metal fabricators may have taken notice of the catastrophe, but probably didn't give it much more thought. That changed several days later.

FIGURE 1 Although the Multiplaz 3500 torch is different from typical welding equipment in that it requires a mixture of water and alcohol to help generate its plasma flame, welders still rely on the same skills they always have practiced to lay down a good bead.

Because the plant was a major producer of calcium carbide, which is used in the generation of acetylene gas, and it was going to be out of commission for the foreseeable future, some distributors started notifying metal fabricators about the possibility of a major acetylene shortage. Some metal fabricators were warned of potential price increases, forcing them to absorb the extra costs or investigate cheaper alternatives to acetylene.

The fear of a major shortage seems to have subsided. Carbide Industries beefed up its production of calcium carbide at its smaller plant in Pryor, Okla., to cover some of the shortfall, and distributors made arrangements to source acetylene from foreign manufacturers.

For many, the concern about the dearth of acetylene is more of a memory than a current worry. The supply appears to be there for now. However, inflation fears raise the chance that the cost of acetylene could increase dramatically in the near future.

That's what Patricia Lewis-Hansen, CEO, Multiplaz LLC, hopes metal fabricators realize. She represents a company that is distributing the Multiplaz 3500 power source that requires a tailored mix of alcohol and water to help generate a plasma flame for welding and requires only water to generate a cutting flame. No gases are required for either application.

"So you start saving from the moment you buy it because you are not buying those gases. With this product, you are using 8 oz., which is half alcohol and half water, and you are welding for 20 to 30 minutes," Lewis-Hansen said.

She added that this technology has been used in Europe for nine years and in Asia for six years. The plasma technology originated in Russia and now is being produced commercially in China.

How does it work? If the operator wants to use the equipment for welding, he or she unscrews a cap on the torch and, using a plastic syringe, fills it with a prescribed mix of alcohol and water. (Adjusting the water-alcohol mixture makes it possible to tailor the plasma flame for varying metals.) When the solution runs out of the nozzle, the torch is ready for welding.

The fluid, influenced by an electric arc, creates a plasma flame capable of



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reaching 14,400 degrees F. Although welding with this device does not totally replicate the welding capabilities of a gas metal arc welding (GMAW) torch with argon as a shielding gas, for example, Multiplaz's researchers believe it is possible to weld most jobs in which a nonoxidizing or protective atmosphere is necessary.

The company also notes that the vapors at the periphery of the plasma jet remain chemically unchanged during welding. This provides some shielding of the joining process and eliminates potentially toxic fumes to which the welder might be exposed.

"Certainly the green aspect of this [equipment] and the health and safety aspect are important," Lewis-Hansen said.

The power source has two modes. Mode 1 is for gas welding, brazing, and soldering. Mode 2 is used to accomplish GMAW, gas tungsten arc welding, and shielded metal arc welding processes (see **Figure 1**). As with those welding processes, welders need the appropriate welding wire and electrodes.

"I'm not going to say that we are going to go head-to-head with MIG, where you are spool-feeding wire. That's fast. We're not there yet," Lewis-Hansen said. "However, if you want a good, solid weld, and you don't have to do so many parts per minute or per half-hour, you are fine with this equipment."

If the torch is to be used for cutting (see **Figure 2**), it's reservoir is filled with tap water. Once again, the water's interaction with the electric arc creates a plasma flame.

Lewis-Hansen said the plasma flame can cut steel up to 0.375 in. thick and get a "nice, clean cut." She added that it also can "clean-sever" steel up to 0.5625 in. thick, which means that multiple passes of the torch are required and the resulting edge won't be cosmetically appealing.

The company recommends that a metal fabricator use two torches with the Multiplaz 3500—one for welding and one for cutting—because of the different fluid requirements. The torches weigh about 2 lbs. each.

The power source could appeal to those that require portability in their equipment. The unit weighs less than

25 lbs. and measures 15 by 7.5 by 5.5 in. It can run on 110 or 220 V.

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FIGURE 2 The equipment's plasma flame can cut up to 0.375-in.-thick plate and still deliver a clean cut.

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