A CASE FOR

Oxyacetylene Welding, Brazing, and Soldering in Welding Education

These skills are needed to build the next generation of welding professionals

BY SAMUEL CHANCE

Manufacturing environments today are about high speed and even higher volume. Welding and manufacturing facilities tend to focus on increased automation, productivity, and speed. Factories of the future focus on faster and cleaner welding processes, yet so many welding schools and community colleges continue to teach oxygen-acetylene (oxyacetylene) welding, soldering, and brazing as a core part of their weld training programs. Why? I will explain the reasoning behind this to make a case for why brazing, soldering, and oxyacetylene welding are foundational skills needed to build the next generation of welding professionals.

A New Generation of Welding Professionals

The need for additional welding professionals has grown immensely in the last couple of years. This can be attributed to several factors, one of which was the unprecedented event that rocked the world in March 2020. Unfortunately, COVID-19 had and continues to have a profound impact on the welding industry and on the manufacturing sector as a whole. Many skilled trade professionals who were close to retirement age understandably chose to retire early, and the pipeline of new welders entering the workforce was interrupted by social distancing and virtual learning. Welding is among the few skills that cannot be learned behind the screen of a laptop. It is an art that must be forged through practice and perseverance in the heat and sweat of a welding booth. As such, the global pandemic caused a nearly two-year interruption to the training pipeline of new welding and joining professionals poised to enter the workforce.

According to the American Welding Society, the need for new welding professionals to enter the workforce in the United States by 2027 is projected to be more than 360,000 (see lead photo and Ref. 1). This number is even more staggering when put into perspective. As of 2023, there are roughly 770,000 active welding professionals within the United States. This means that there is a projected need to replace or grow the current welding workforce by nearly 47% in the next four years. Due to an explosive growth and increase in generational retirement, the manufacturing and welding industries have a demand for new welders that is very high. This growing opportunity opens the door for new skilled tradespeople who wish to pursue welding and joining as a career.

With such a high demand for new welding professionals and a large push for high-productivity welding processes, why do many welding programs still teach oxyacetylene welding, soldering, and brazing today?

Fig. 1 — Marie Chance demonstrating her first braze weld.

Brazing and Soldering in the Classroom

Many of the top welder training and education programs around the country still teach soldering and brazing as a part of their standard welding curriculum. Often, I hear hiring managers say things such as, “How does learning to

Fig. 2 — A Des Moines Area Community College (DMACC) student's first attempt at a 1F outside corner braze welding exercise.

solder help a welder produce acceptable welds during the GMAW [gas metal arc welding] or GTAW [gas tungsten arc welding] process?" or "Oxyacetylene welding is an archaic form of joining . . . nobody still uses it today." While this may, on the surface, seem like the case for some industries, I would contend that the skills formed when learning to solder, braze, braze weld, and oxyacetylene weld are foundational skills that lead to long-term success with any welding process — Fig. 1.

Learning to Read the Weld Pool

One of the most important skills that new welders first need to learn is how to read the weld pool. Reading the weld pool can inform the welder or operator a great deal on what the finished weld appearance and soundness will be. By reading the weld pool, the welder can determine what discontinuities and defects may be present, get a feel for the final profile of the finished weld bead, and determine if their travel speed is correct, just to name a few.

Weld pool behavior can be best seen at the low travel speeds of oxyacetylene and braze welding. In my welding lab, I prefer to start students off with a simple braze welding exercise consisting of a 0.187-in. mild steel outside corner joint and a flux-coated, low-fume bronze filler rod (Refs. 2, 3). As my students work to braze weld this simple weldment, they learn important building skills, such as how to manipulate the torch for ideal heat control and how to manually add filler material to the weld pool. Learning to watch the weld pool, identify its behaviors, and make the needed adjustments during this relatively slow and forgiving exercise provides immensely valuable experiential knowledge for later learning additional welding and joining processes.

Knowledge in Action

Armed with the knowledge and skill of how to read the weld pool and a deeper understanding of heat control, new welding students can apply this knowledge to each additional welding and joining processes they attempt to master. For example, the student who has first become disciplined in the art of oxyacetylene welding will be better equipped to make the small adjustments to arc length needed when learning to weld a 3G qualification plate with an E7018 electrode using the shielded metal arc welding process. This is because they understand that small adjustments can have a large impact on the finished weld. A new welder trying to learn the fundamentals of GMAW in the 2F position will not struggle to look beyond the nozzle at the actual weld pool if they have first become accustomed to reading the weld pool during earlier lab assignments of braze welding stainless steel T-joints — Fig. 2.

Training Tomorrow's Welding Experts

Lastly, I would like to point to the wealth of knowledge that oxyacetylene welding, soldering, and brazing provide to students wanting to master the art and science of joining. Brazing is one of the few joining technologies that, while relatively unchanged for many years, can join dissimilar metals. Teaching students about the challenges and rewards of brazing stainless steel to copper pipe endows them with some basic knowledge of joining metallurgy. Brazing and soldering also allow students to be exposed to the physics of capillary action. This foundational experience equips students with a higher-level of knowledge than just the basic how to of welding and joining.

At face value, teaching skills like torch brazing, welding, and soldering may not seem relevant to a production welder who uses GMAW all day in an air-conditioned shop or a robot operator who programs a six-axis automated welding system. But providing new welders with a foundational knowledge of welding metallurgy, welding and joining physics, and the art of reading a weld pool is an investment in the future welding professionals that will build tomorrow's bridges, buildings, machines, and rockets. These new welders are the future of the welding industry, and oxyacetylene welding, brazing, and soldering provide unique lessons that help build and meet the growing need for welding and skilled trade professionals and experts. This is why many top-tier welder training curriculums still start with oxyacetylene welding, brazing, and soldering in today's modern world. It is not called a skilled trade for nothing. WJ

References

1. American Welding Society. 2021. *weldingworkforcedata.com*.

2. American Welding Society. AWS A5.8M/A5.8, *Specification for Filler Metals for Brazing and Braze Welding*.

3. Harris® RBCuZn-C low-fuming bronze brazing alloy.

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