A Guide to MIG Welding Success

David Anderson, Manager, Hobart Welders, Appleton, WI

Whether your company wants to fabricate, modify or repair, investing in a welder and taking a welding course can provide an excellent return on investment. Many businesses have discovered that they can pay for a unit within two days. Additional good news is that you don't have to be a professional welder to achieve good results. You simply need a high-quality, versatile welder, know welding basics, and practice.

MIG welders that run off 115v power make an excellent unit for projects where a nice-looking weld bead is sought and when you don't want to invest a significant amount of money. Light industrial MIG welders are known for their versatility, better arc starts and wider sweet spots, the point where the wire feed speed is adjusted to produce the classic "sizzling bacon" sound that signifies a good arc.

Stay Small

MIG welders that run off 115v power typically have a top output of 135 amps and a 20% duty cycle rating, which is the number of minutes out of a 10-minute period an arc welding unit can operate at maximum output. While this may seem small, this type of light industrial MIG welds 24-gauge (0.8-4.8mm or 3/16-in.) mild steel.

You will benefit from a smaller wire if you weld infrequently or are inexperienced. A smaller wire is more forgiving since it deposits metal at a slower rate and gives an operator more time to react. Conversely, you have to move the gun a lot faster with a larger wire, which makes short welds more difficult. For best results, keep .023 or .025-inch diameter solid wire in your 115v MIG. A .030-inch solid wire may be needed for thicker steel, but not often.

Small-diameter wire has four key advantages:

&#149 Lower heat input minimizes the change of warping and burn-through on thinner metals.

&#149 Lower heat allows welding of thin metals, yet thicker materials can be welded with proper joint preparation and multiple passes.

&#149 The unit is less likely to exceed its duty cycle, so welding can be performed continuously.

&#149 It allows more control over the weld puddle.

Gas Mixes

When welding thinner stainless steel with solid wire, use a "tri-mix" shielding gas consisting of 90% helium/7.5% argon/2.5% CO_2 (or something close to this). A tri-mix gas creates a flatter bead, a bead with better color and less spatter. It's the best all-around mix for a small MIG unit.

For a shielding gas with mild steels, use one with high argon content, such as 75% argon/25% CO2 (commonly called 75/25 or C25). Argon carries less heat than pure CO2 and produces less spatter.
While you may be tempted to save a few dollars by welding stainless steel with C25 or mild steel with pure CO2, don't do it. Investing in the right gas mix will help you obtain the best results. It's a small investment compared to the cost and headache of rework or post-weld grinding.
For improved mobility, invest in a cart that provides a platform for the welder, a cylinder rack for the gas bottle and a tray underneath for cables. A 115v MIG on a wheeled cart lets you be more mobile without being cumbersome.

Flux-Cored Options

Flux-cored wire plays an important role in MRO applications, being used for jobs involving mild steel thicker than 3/32 inch. When flux-cored wire is used on thinner mild steel, the chance for warping or burn-through increases.
"Self-shielded" flux-cored wires do not require shielding gas. These particular wires work as well in windy conditions as a Stick rod and work well on dirty or rusty materials. Their lack of a gas cylinder improves portability.
For best results with small MIG welders, choose a .030-inch flux-cored wire. Stainless steel, gas-shielded flux cored wires are available, but come in wire diameters meant for machines with an output of 150 amps or more.

Prevent Warping

Welding any thin material often involves battling burn-through, warping, and excessive heat affected zones (HAZ). Stainless steel causes the most problems because it dissipates heat poorly. The following advice will improve MIG welding results on any thin metal:
&#149 Direct the arc at the middle of the weld puddle to insulate the base metal from the arc's full force. Normally, you would keep the arc on the leading edge where the weld puddle is thinnest to drive the arc into the work for more penetration.
&#149 Do not whip or weave the torch. The more time you keep the arc in an area, the hotter it becomes. Travel in a straight line and use the fastest travel speed possible that maintains adequate bead width.
&#149 Distribute the heat as evenly as possible using a skip welding technique. For example, start by making a one-inch weld, skip six inches and make another one-inch weld and so on. Place the next series of welds between the first ones (e.g., weld three inches from the first weld). If the metal warps or pulls to one side, increase the distance skipped between welds, weld on alternate sides of the joint weld or at the beginning, middle and end of the piece, then repeat the sequence.
&#149 Use a backing bar to dissipate heat from the weld area. A backing bar can be as simple as a metal bar clamped to the back of the weldment. Homemade versions of a water-cooled backing bar feature a water cooler circulating coolant

through PVC pipe touching the back of the bar.
&#149 Ensure tight fit-up. If the parts fail to touch for even 1/16 in., an edge could be created that may not support the heat of the arc. To avoid rework caused by burn-through, adhere to the old saying "measure twice, cut once."
&#149 Redesign the part with joints that can withstand more heat, such as substituting a lap weld for a butt joint.
&#149 Don't over-weld. Most people without formal training feel compelled to over-weld a joint for strength. In fact, the leg of the joint (the long side of the triangle) does not need to be any longer than the thinnest plate.
Welding is nothing but a tool, and experience with tools increases your proficiency. If you're not familiar with a machine or 100% confident in your parameter settings, practice welds on scrap metal to improve results on the real thing. For more details about welding or to ask a question, visit www.hobartwelders.com.