Welding Basics

by Leland Stone

Working on an apartment not long ago, my helper managed to back the truck over about 6 feet of wrought iron fence. The truck was fine, but the fence was a mangled mess. Though I'd been trained as a welder, I lacked good portable equipment, and a run to the rental yard was out of the question that busy day. So we hired a welder to come out, and $300 later, the fence was repaired.

This is just one example of the many times as a remodeling contractor I've needed an arc-welder on site. A welder's not a piece of equipment I need every day, but when I do, it's indispensable. Fortunately, small 115-volt welders are now available for less than $400. These small rigs work quite well for limited production work.

An arc welder uses electric current to heat the "weld zone," fusing the base metal (the piece you're welding) with extra metal from an "electrode" (a rod or wire). To concentrate the heat in the weld zone, the electrode is isolated from the surrounding air with a shielding gas. This gas is produced as the flux in the core of the electrode dissolves.

Weld Pak. To meet my occasional welding needs, I eventually bought a portable, wire-feed unit — the Lincoln Weld Pak 100. This model cost me about $370 from the Northern catalog. I've had very good results with this small welder, and it's light enough to haul around easily in my truck.

To set up the machine, you first load a coil of electrode wire (about the size of a roll of tie wire) into a panel on the side of the box. The wire feeds through rollers up to a tube that runs to the welding gun. The machine is now ready to weld. A trigger on the gun draws current from the box. The other controls include an on/off switch, a knob to regulate the wire speed, and another knob to control the amperage, or "heat."

Welding 101. The amperage and wire speed you'll need depends on the material you're welding. The basic rule of thumb is *Thicker metal = faster feed + higher heat; thinner metal = slower feed + lower heat* By trial and error, you'll develop a "feel" for setting these variables.

To get started, kick up the heat one notch for every 1/16 inch in material thickness, and set the feed rate at about "2." Attach the ground clamp to your workpiece, and keep the gun clear until you're ready to weld.

Turn on the machine. As it powers up with a dull humming sound, bring the tip of the welding gun to within about 1/4 inch of the workpiece. Lower your hood or faceplate, and squeeze the trigger. There will be a blaze of light and sparks (wear leather gloves!), accompanied by a steady "zapping" noise. Maintain the gun at a constant height and guide it along the weld. Move in a direction that feels comfortable to you, and slant the tip of the gun into the weld. The "bead" should flow from the gun like the vapor trail from a jet.

The goal is to produce an evenly rippled bead about the width of the gun tip. The entire length of the bead should be the same height, and will be covered with "slag," a cinderlike coating on the bead that flakes off easily.

Practice, practice, practice. To get these results takes time. But even sloppy welds can be a valuable learning experience. Does the bead wander all over the place? Try bracing your welding hand on your other arm. Is it lumpy and badly formed? Crank up the heat, or move more slowly along the weld. Is it too skinny? Try increasing the wire speed. Keep working at it, trying different combinations of heat, speed, and gun positions.

Sometimes, no matter how steady you work and regardless of the heat, the metal just won't weld. Contamination may be the problem. Welding works best on smooth, bare metal. Grind away any coatings, oil, grease, and grit.

The kind of metal you're working with will affect the weld, too. You're limited to a pretty narrow band of alloys, known as "mild steel" and designated "A36." Mild steel is only one member of a very large family. Tool steel — the stuff your hammer head is made from — may look the same, but reacts quite differently. The same goes for cast iron and stainless steel. To determine whether a metal is suitable for welding, use a magnet *and* a file on the workpiece. If either one fails to have an effect on the metal, don't try welding it. ■

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LINCOLN ELECTRIC

A small 100-amp welder will meet the occasional needs of many small contractors. This Lincoln Weld Pak costs about $370.

Sources of Supply

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216/481-8100

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