

Master MIG Welding

By Darrell Smith
Farm Journal Editor

If you're looking for versatility and speed when it comes to repairs and fabrications, then MIG (metal inert gas) welding may do the trick.

When MIG welding, a continuous, consumable wire electrode and a shielding gas are fed through a welding gun. Many manufacturers prefer MIG welding because it is easier to execute, it produces a cleaner weld and it requires less cleanup than stick welding. It also offers better control when working with thin metals.



A MIG welder is not limited to inside jobs. Although wind can blow away the shielding gas, the same welder can be used outdoors by switching to a hollow electrode wire filled with a flux compound and reversing polarity of the welder. The process is called flux-cored arc welding.

“If you haven’t welded before, start with MIG,” says Chris Roehl, product manager for Miller Electric Manufacturing Company. “MIG is easier to master, and you can essentially do the same jobs as with a stick welder.

“With stick welding, when striking the arc, it’s easy for the electrode to get stuck to the workpiece, creating a frustration factor,” Roehl explains. “And, with stick, you have to stop and change the rods. With MIG, you weld with a continuously fed wire. You just pull the trigger [and guide the tip along the joint to be welded].”

“With a MIG welder, there’s no slag to chip,” says Brian Harlan, a Bunker Hill, Ind., farmer who won a trip to attend the Welding University hosted by Farm Journal and Miller. “When you finish welding, you’re ready to paint.”

Roehl adds, “Once you learn to operate your MIG welder, it’s just a matter of practicing.” He offers these tips to help you get off to a fast start and perhaps avoid a few beginner mistakes.

Get comfortable with your new welder before you use it. Read the owner’s manual and watch the training CDs.

Before you tackle a repair or fabrication job, think about your safety. “Be conscious of your surroundings,” Roehl says. “Don’t weld near combustible materials or on a wet floor. Wear a shop coat or welding sleeves, safety glasses, a welding helmet and close-toed shoes.”

Before tackling a repair, practice making a few welds with material of similar thickness. As you practice, teach yourself what makes a poor weld, as well as a good one. “Make a weld that looks good, and then change a variable and see how it affects the weld,” Roehl says.

Start each welding job by cleaning the base material that you plan to weld with a wire brush or grinding disk. “If the work surface isn’t clean, or if your work clamp is connected to rusty or painted material, you may have trouble starting an arc,” Roehl says. “It’s the same as having a corroded post on your car battery.”



Set your welding gas at 25 to 30 cubic foot-hours. “Setting the gas too low results in a porous weld,” Roehl says.

Get close to your work. “Don’t weld from the cheap seats,” Roehl advises. “Find a comfortable position so you can see the joint you are welding and the end of the wire.”

Set your “stickout”—the length of wire protruding from the welding gun’s contact tube—from 1/4" to 3/8". Changing the stickout—varying the distance from the contact tip to the workpiece—causes voltage to vary and change the shape of the weld bead.

“Beginners have a tendency to hold the gun too far away from the material they are welding,” Roehl says. “That results from not getting close enough to see the joint they are welding.”

Use both hands to steady the gun. To control the size of the weld bead, keep the wire directed at the leading edge of the weld pool. The rate of travel speed influences the bead’s shape and quality.

Your weld bead only needs to be as wide as the thinnest part of your base metal. A bead that is too wide may be caused by a travel speed that is too slow—a common mistake of beginning welders. Slow travel speed may also result in excessive heat, which may cause the base metal to warp.

Learn about shielding gases. Start welding with 75% argon and 25% carbon dioxide. “This gas mix produces a smoother weld with less spatter,” Roehl explains. “It also gives a consistent arc start.”

The 75% argon and 25% carbon dioxide gas work well for welding thinner steels. If using 100% carbon dioxide to penetrate steel—which provides better penetration on steel than mixed gas—be aware that it produces more spatter than 75% argon and 25% carbon. If you weld aluminum, only use argon. For stainless steel, use a triple mix of 90% helium, 7.5% argon and 2.5% carbon dioxide.

Types of wire. Use the correct wire type for the base metal you are welding—stainless-steel wire for stainless steel, aluminum wire for aluminum and steel wire for steel. For steel, the most common type of wire is ER70S-6. It has more oxidizers and is particularly good for welding on dirty or rusty steel.

Use smaller diameter wire to weld thinner metals. Always store your wire in a clean, dry place to avoid picking up contaminants that lead to poor welds.

Practice welding in various positions—flat, horizontal, overhead and vertical. All require slightly different techniques. For the best control of your bead, keep the wire directed at the leading edge of the weld pool.

Use your ears, as well as your eyes. “A smooth, sizzling-bacon sound indicates

you’re doing things correctly,” Roehl says. “Loud popping could mean the gun is too far away from the joint being welded or the wire feed speed needs to be turned up.”

Diagram 4: Welding Wire Thickness Chart

MATERIAL THICKNESS	RECOMMENDED WIRE SIZES						
	MIG SOLID WIRE				GASLESS FLUX-CORED WIRE		
	.024"	.030"	.035"	.045"	.030"	.035"	.045"
24 Gauge (.025)	█						
22 Gauge (.031)	█	█			█		
20 Gauge (.037)	█	█	█		█	█	
18 Gauge (.050)	█	█	█	█	█	█	
16 Gauge (.063)		█	█	█	█	█	█
14 Gauge (.078)		█	█	█	█	█	█
1/8" (.125)		█	█	█	█	█	█
3/16" (.188)			█	█	█	█	█
1/4" (.25)			█	█	█	█	█
5/16" (.313)			█	█	█	█	█
3/8" (.375)			█	█	█	█	█
1/2" (.5)			█	█	█	█	█

Multi-pass welding or a beveled joint design may be required on material thickness 3/16" and greater depending on your welding machine's amperage capability.

Thanks to modern technology it's easier than ever to master MIG welding, as well as other types of welding. For instance, Miller's [Millermatic® 252](#) welder, Roehl says, can weld up to 1/2"-thick metal in a single pass. It features digital meters for fine-tuning weld parameter settings, and it is easy to switch between using a MIG gun for steel and a spool gun for aluminum.

If you're shopping for your first MIG welder, look for solid construction, Roehl advises. A cast-aluminum drive roll assembly, rather than plastic, will hold up better under hard use. Another consideration is the length of the gun cable. A longer cable, 15' or more, gives more working range.

Couple these tips with practice to hone your MIG welding skills—and before long, you'll master the art and achieve the versatility and speed you were looking for when it comes to repairs and fabrications.

This article originally appeared in the November 2007 issue of Farm Journal Magazine