



# **Industrial Technology Virtual Learning**

## **Advanced Metals/Do-It-Yourself Welder Guide**

**April 28, 2020**



## Do-It-Yourself Welder Guide: April 28, 2020

### **Objective/Learning Target:**

Following this PowerPoint students will know the three most common types of welders. The lesson provides objective, informative and practical information in buying a welder.

# Bell Ringer

See if you can Match the following Welding Processes

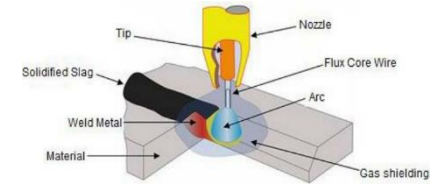
MIG \_\_\_\_\_

TIG \_\_\_\_\_

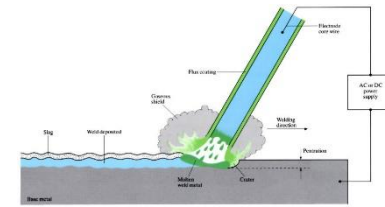
Arc \_\_\_\_\_

Flux Core \_\_\_\_\_

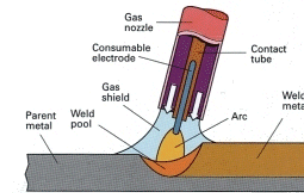
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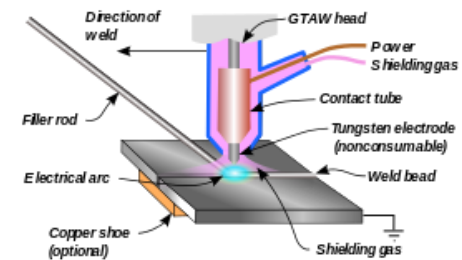
B.



C.



D.



# Do-It-Yourself Welder Guide

Someday you might want to have a welder in your garage or workshop. Welders are a great piece of equipment to have and today they are very economically priced so that the average Do-It-Yourselfer can afford one.

What kind do you buy?

The following is a guide to help you figure out what type of welder is right for you and the type welding that you want to perform.

# Getting Started

- Unfortunately, there is no single welding process suitable for all applications, so let's begin with an overview of the basic processes and highlight the capabilities and advantages of each. This will help match a process to your specific needs.
- If you're a beginner, this section will give you a better understanding of the types of welders available, how each performs and the degree of welding skill required to operate each.
- Matching your needs and welding skills with a process is critical before moving on to discuss specific welder model options.

# Overview of the Welding Process

**Welding** is a fabrication or sculptural process that joins materials, usually metals, by using high heat to melt the parts together and allowing them to cool, causing fusion. The three most common types of welding are;

- MIG
- TIG
- Arc/Stick/Rod
- Flux Core Arc

Each process has its own benefits and limitations and is better suited to certain applications. There's no "one size fits all" approach.

# MIG Welding / Gas Metal Arc Welding (GMAW)

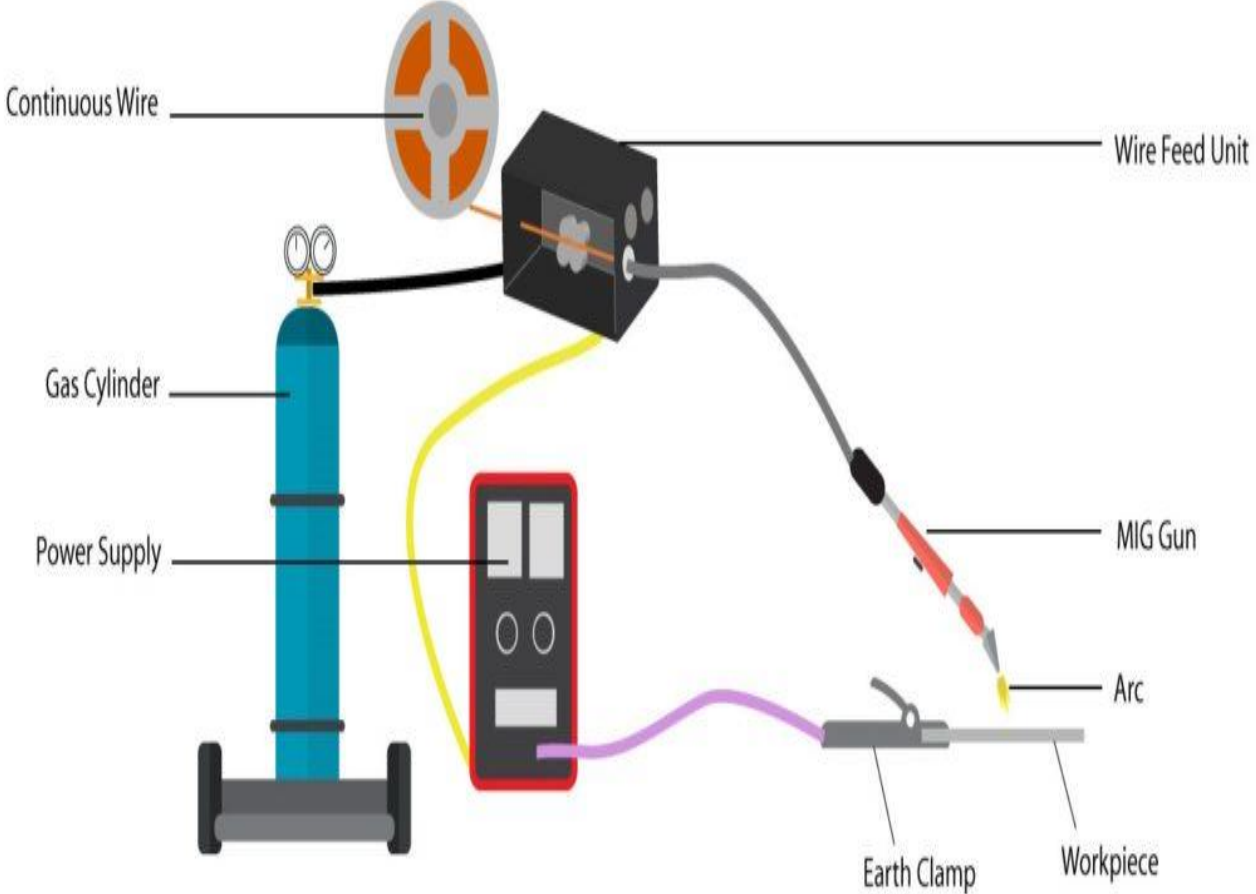
**MIG Welders** use a wire welding electrode on a spool that is fed automatically at a constant pre-selected speed. The arc, created by an electrical current between the base metal and the wire, melts the wire and joins it with the base, producing a high-strength weld with great appearance and little need for cleaning. MIG welding is clean, easy and can be used on thin or thicker plate metals.

**Flux-Cored Arc Welding (FCAW)** is a wire-feed process similar to MIG welding, but differs in that self-shielded flux-cored welding does not require a shielding gas. Instead, flux-cored wire is used to shield the arc from contamination. This is a simple, efficient and effective welding approach.

The process is widely used in construction because of its high welding speed and portability.

Both MIG and Flux-Cored Welding are easy to learn and can create extremely clean welds on steel, aluminum and stainless. Both processes have the capability to weld materials as thin as 26-gauge.

# MIG Welding



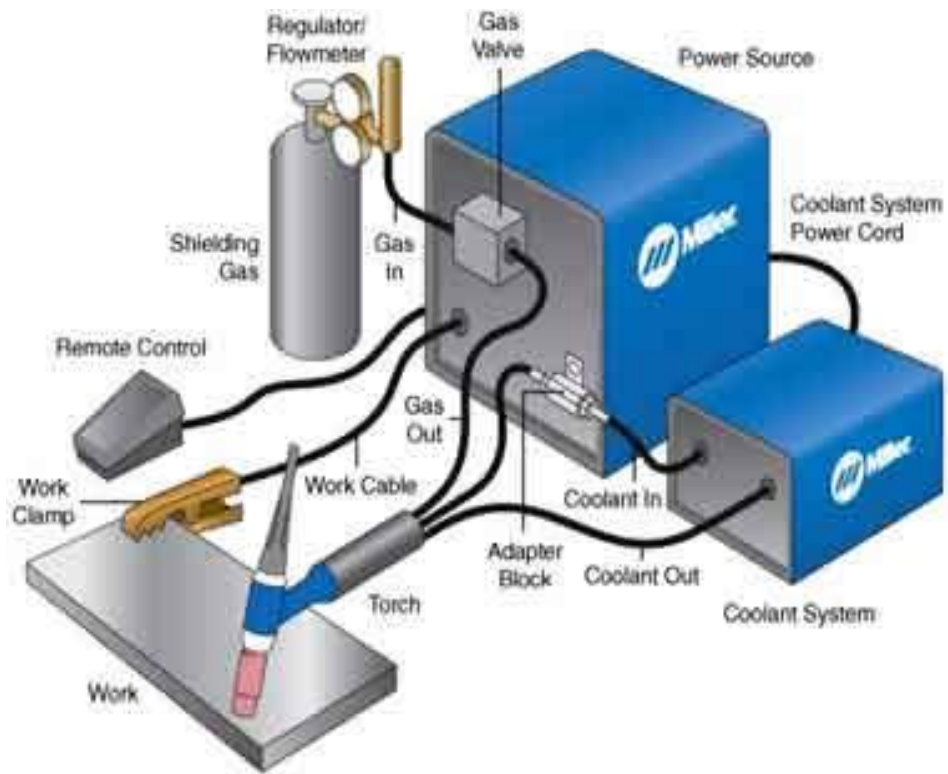


# TIG Welding / Gas Tungsten Arc Welding (GTAW)

**TIG Welding** is an arc welding process that uses a non-consumable tungsten electrode to produce the weld. The weld area is protected from atmospheric contamination by a shielding gas (usually argon) and a filler metal, though some welds, known as autogenous welds, do not require it. A constant-current welding power supply produces energy that is conducted across the arc through a column of highly ionized gas and metal vapors known as plasma.

TIG Welding is most commonly used to weld thin sections of alloy steel, stainless steel and nonferrous metals such as aluminum, magnesium and copper alloys. The process grants the operator greater control over the weld than other welding processes, allowing for strong, high-quality welds. TIG welding is comparatively more complex and difficult to master than other processes and is significantly slower.

# TIG Welding

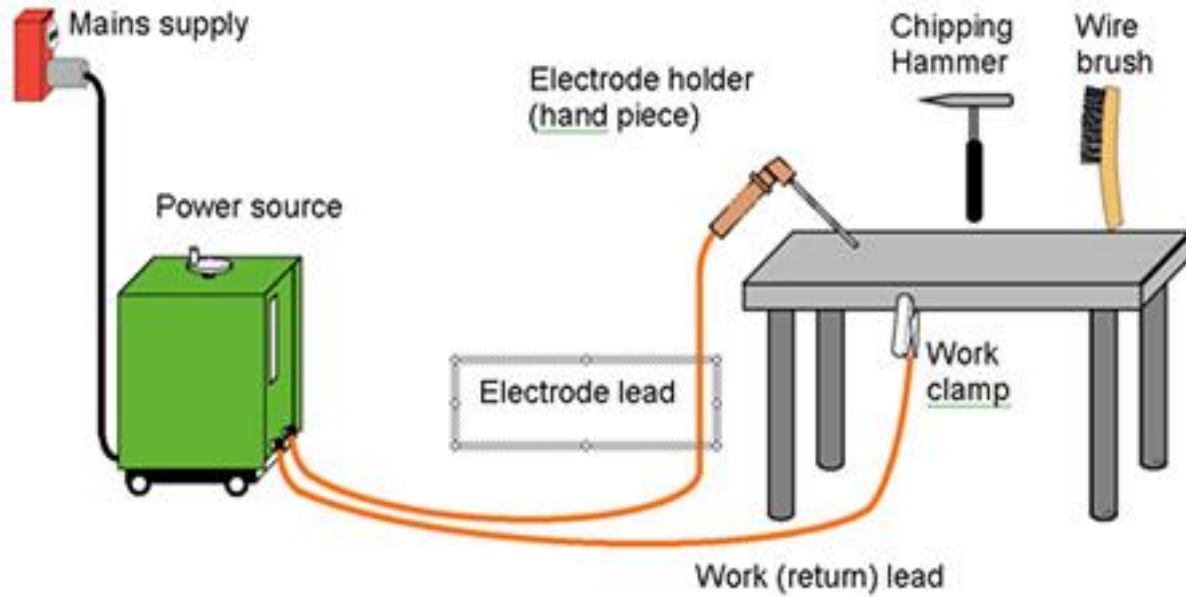


# Arc/Stick Welding

**Arc/Stick/Rod Welding (Shielded Metal Arc Welding)** for many years has been the most popular method for most home-shop welding needs. This process uses an electric current flowing from a gap between the metal and the welding stick, also known as an arc-welding electrode. Stick welding is an effective method for welding most alloys or joints and can be used indoors and outdoors or in drafty areas. It's also the most economical welding method and provides the ability to create an effective bond on rusty or dirty metals.

However, this method is limited to metals no thinner than 18-gauge, requires frequent rod changing, emits significant spatter and requires that welds be cleaned upon completion. Stick welding is also more difficult to learn and use, particularly the ability to strike and maintain an arc. Arc welders are available in AC, DC or AC/DC, with AC being the most economical. It's used for welding thicker metals of 1/16 inch or greater. These machines are a good choice for farmers, hobbyists and home maintenance chores.

# Arc/Stick/Rod Welding



The diagram below summarizes each welding process. Consider these factors in deciding which process might be best for your general needs.

### **MIG Welding**

- Easiest process to learn
- High welding speeds possible
- Better control on thinner metals
- Cleaner welds possible with no slag to clean
- Same equipment can be used for Flux-Cored Welding

### **TIG Welding**

- Provides highest quality, precise welds
- Highly aesthetic weld beads
- Allows adjustment of heat input while welding by use of a foot control

### **Flux-Cored Welding**

- Works as well as Stick on dirty or rusty material
- Out-of-position welding
- Deep penetration for welding thick sections
- Increased metal deposition rate
- More forgiving when welding on dirty or rusty metal

### **Arc/Stick Welding**

- Better suited for windy, outdoor conditions
- More forgiving when welding on dirty or rusty metal
- Works well on thicker materials

# What process best fits your needs?

Identify the types of welding projects and materials you will weld most of the time. Are you creating metal sculptures? Do you intend to restore an old muscle car in your garage? Does the motorcycle you bought years ago require some fabrication? Maybe you need to do basic repair on farm equipment.

## Possible Projects

## Average Material Thickness

Auto body

3/16-inch or less

Trailer frames and fencing

1/4-inch to 5/16-inch

Farm, ranch and landscape

5/16-inch to 3/8-inch

Thick structural components

Over 3/8-inch

Bicycles, lawnmowers or tube frames

1/16-inch

Boats, cars and motorcycles

1/16-inch to 1/8-inch

Hunting stands and utility trailers

1/16-inch to 1/8-inch

General to heavy repair

3/16-inch to 1/4-inch

Taking the time up front to identify the projects that will occupy the biggest percentage of your welding activity will help you determine the specific thickness of metal you will likely weld most often — and ultimately help you select the most suitable welder.

Time to get a bit more specific. Let's take a look at what welding process you can use for each metal type. Keep in mind that many of these materials are also processed using varying combinations of two or more metals to reinforce strength and functionality.

Metal	Weld Process		
	MIG	Stick	TIG
Steel	X	X	X
Stainless Steel	X	X	X
Aluminum Alloys	X		X
Cast Iron		X	
Chromoly			X
Copper			X
Brass			X
Exotic Metals (Magnesium, Titanium, etc.)			X

# References

<https://www.millerwelds.com/resources/article-library/buying-your-first-welder-a-practical-informative-guide-for-doityourselfers>

<https://www.mmsonline.com/articles/selecting-the-right-welder>

<https://carnesmechanical.com/how-to-choose-the-right-welding-machine-for-you/>



# What Welder is Best for You?

- Activity

After reading this PowerPoint which Welder is best for you?

Which welder would you choose?

Write a short paragraph explaining why you selected the Welder that you did.

# Quick Quiz

# Question #One

1. Which welder uses a wire welding electrode on a spool that is fed automatically at a constant pre-selected speed.
  - A. TIG
  - B. Flux Core
  - C. MIG
  - D. Arc/Stick/Rod

Answer

**MIG**

## Question #Two

2. An arc welding process that uses a non-consumable tungsten electrode to produce the weld?

- A. TIG
- B. Flux Core
- C. MIG
- D. Arc/Stick/Rod

Answer

TIG

# Question #Three

3. The process that uses an electric current flowing from a gap between the metal and the welding stick (Rod)?

- A. TIG
- B. Flux Core
- C. MIG
- D. Arc/Stick/Rod

Answer

Arc/Stick/Rod



4. A wire-feed process similar to MIG welding, but differs because it does not require a shielding gas?

A. TIG

B. Flux Core

C. MIG

D. Arc/Stick/Rod

Answer

Flux Core

# Question # Five

5. Which welding operation best fits your welding needs?
- A. TIG
  - B. Flux Core
  - C. MIG
  - D. Arc/Stick/Rod