

General Information Regarding Welding Processes and Welder Selection for Newbie Hobbyists					
	GMAW (Gas Metal Arc Welding)	SMAW (Shielded Metal Arc Welding)	Gas welding	GTAW (Gas Tungsten Arc Welding)	Notes:
	MIG, FCAW, and Shielded FCAW	AC only and AC/DC	Oxy-acetylene	TIG (DC only and AC/DC)	
Level of Skill Required	Least Skill Required of the 4 welding methods mentioned.	Moderate Skill Required	Moderate to Difficult	Difficult: Most Skill Required	All methods will require practice for adequate penetration/fusion.
Generalization of costs for hobby level equipment (NEW)	110volt machines = \$100.00 - \$700.00 (HF Fluxcore only and MM140)	110volt machines = \$100.00 - \$200.00+. (Harbor Freight)	\$200.00 (small portable torch kit from NorthernTool) - \$800.00+ (Industrial Kit + Large Bottles + Cart)	DVI (110 volt and 220volt) = \$1700.00 (Miller Diversion (AC/DC))	Prices are merely generalizations with low pricing indicating Harbor Freight level equipment as the low end and Miller/Lincoln at the higher end. Note: Tig machines can be DC (mostly steel) or AC/DC (aluminum) This section is too broad a subject to be completely covered on an spreadsheet. More reading/research is needed. Used pricing can vary widely based on geographic area and age of equipment. Additional research is required.
	220volt machines = \$650 - \$2500.00 (HH187 and MM252)	220volt machines = \$250 - \$500.00+ (Lincoln AC225 and AC/DC 225/125)		220volt machines = \$250.00 - \$3000.00+ (Bare bones Harbor Freight DC only and Miller Syncrowave 250 (AC/DC))	
Typical metals welded by hobbyists	Carbon steel, Stainless steel, Aluminum	Carbon steel, Stainless steel, Aluminum, Other	Carbon steel, Stainless steel, Aluminum, Other	Carbon steel, Stainless steel, Aluminum, Other	<u>Generalization:</u> MIG/Fluxcore is least versatile as it relates to the types of metals that can be welded (typical MIG set up). Oxy-Acetylene and TIG offer the most versatility as it relates to the types of metals that can be "joined". The weldable metals listed tend to be the most commonly used materials BY HOBBYISTS. It is not an exhaustive list.
Amperage to thickness rule of thumb	1 amp per .001" thickness	Consult electrode manufacturer guidelines. Amperage will vary based on electrode type and diameter.	N/A	1 amp per .001" thickness	Consult owner's manual or welding manufacturer's website for more information.
Typical min/max thickness with 110 Volt supply	24 gauge - 3/16" (Miller 140)	18 gauge - 1/8" steel	No electricity needed. Min/Max thickness of weld and cut will depend on cutting and welding torch and tip size	24 gauge - 3/16" steel (Miller Diversion 180)	SMAW is the least capable (most difficult without burn through) process for thin metals. TIG is arguably the most capable process for welding thin metals. Thickness claims will vary based on manufacturer and size of the machine. Examples were obtained from manufacturer website. Multiple pass welds will allow greater thickness. More reading is required.
Typical min/max thickness with 220 Volt supply	22 gauge - 1/2" (Milleromatic 252)	16 gauge steel and up (multipass) (Lincoln AC 225)		30 gauge - 1/2" steel (Miller syncrowave 250)	
Ability to braze or solder with this process?	No	No	Yes	No	Oxy-acetylene is the most versatile single process (of the 4 processes discussed) when considering it's ability to solder/braze/weld and cut.
Ability to cut metal with this process?	No	Yes	Yes	No	
Additional Equipment Required to weld metals other than mild steel?	Spool gun or (Push/Pull gun: generally not used by hobbyists) needed for aluminum.	Various electrodes appropriate for the metal (and polarity) being welded	Various filler rods appropriate for the metal being soldered/brazed/welded.	Various filler rods appropriate for the metal being welded.	Additional reading is required.
Additional Equipment needed to get up and running beads?	Fluxcore (gasless) = None, MIG and Gas shielded fluxcore will require a tank and appropriate shielding gas. Regulators typically come with name brand MIG welders.	Some manufacturers may include a few different types of electrodes + chipping hammer.	Complete packages can be purchased OR all Oxy-acetylene equipment for may be purchased separately.	Tank, Flowmeter, Gas, Extra Tungstens, Various filler rods, Various gas cups/lens	Do not forget the additional costs of tank(s) purchase/rental and gas. LWS (Local Welding Supplier). More reading is required.
Consumables	Extra Tips, Wire type/size, gas	Various Electrode(s) types and sizes	Gas, Flux, Various Filler rods, Vairous Tips, Torches, etc.	Gas, Filler rods, Tungstens, Gas cups/lens, etc.	Usually purchased from a LWS. More reading is required.
Material prep? (cleanliness of metal)	Important (Metal prep is more important for MIG than gasless fluxcore)	Least important of all four welding methods mentioned based on electrode type and deoxidizers (flux coating)	Very Important	Very important	Better prep = better welds. <u>Best practice for all processes</u> is to remove all surface rust/paint/scale/etc. down to shiny bare metal. More reading is required.
PPE: Personal Protection Equipment	Welding helmet, welding gloves, Face shield, safety glasses, Welding clothing,	Welding helmet, welding gloves, Face shield, safety glasses, Welding clothing,	Welding/brazing goggles, welding gloves, Face shield, safety glasses, Welding clothing,	Welding helmet, welding gloves, Face shield, safety glasses, Welding clothing,	Additional PPE's may be required based on the environment one is welding in. Example: Fume extraction and/or respirator, etc., etc. Additional reading is required to ensure personal safety.
Niceties: Beneficial Equipment for welding and fabrication	Welding Table, Clamps (lots and lots), angle grinder(s), grinding wheels, wire cups, flap discs, Cutting equipment: Abrasive saw, Horizontal band saw, Reciprocating saw, Circular saw with abrasive blade, etc., etc. ad nauseam.	Welding Table, Clamps (lots and lots), angle grinder(s), grinding wheels, wire cups, flap discs, Cutting equipment: Abrasive saw, Horizontal band saw, Reciprocating saw, Circular saw with abrasive blade, etc., etc. ad nauseam.	Welding Table, Clamps (lots and lots), angle grinder(s), grinding wheels, wire cups, flap discs, Cutting equipment: Abrasive saw, Horizontal band saw, Reciprocating saw, Circular saw with abrasive blade, etc., etc. ad nauseam.	Welding Table, Clamps (lots and lots), angle grinder(s), grinding wheels, wire cups, flap discs, Cutting equipment: Abrasive saw, Horizontal band saw, Reciprocating saw, Circular saw with abrasive blade, etc., etc. ad nauseam.	There always seems to be another tool that you need.