

Future Welders, please read the following in order to be prepared for class:

\$70 supply fee (cash or check) due to instructor on first day of class

Personal Safety Requirements:

Leather or suede shoes or **boots**

Leather or suede **gloves**. These can be a specialty MIG welding gloves or a pair of gardening gloves. It is better to have your gloves a bit tight than loose. I do have a pile of abandoned and mismatched gloves that you may borrow from. The stereotypical thick leather gauntlet type welding gloves generally used in stick welding or Oxygen/ Acetylene cutting and welding are not necessary and in fact get in your way - don't bring 'em.

Please wear **long pants**, not cut offs or frayed hems, not cuffs

Long sleeve shirt & jacket or sweatshirt for warmth is needed

All outer clothing should be leather or a heavy woven **natural fabric** such as cotton canvas, denim or a heavy cotton duck) or tightly woven wool. T-shirt weight knit cotton or wool fabric does not give you spark protection, however

sweat-shirt weight cotton is fine, a heavy knit sweater is could be OK....kind of depends on if the knit is tight enough.... Sparks tend to bounce off natural fabrics.....but can melt into nylon, polyester etc. and you have to wait as they cool down but are still melted to your clothes....right next to your skin....ouch! Old clothing is good, sparks may damage your clothes and metal can be greasy
The studio is unheated and not air-conditioned: dress appropriately!..... it can be very cold or very hot.
Long hair should be tied back

Reading Glasses can be important, this is close up work. If you need them for small print bring them to class
progressive lenses can be visually confusing for some people so a bifocal or single magnification lens is ideal.

Food & Water;

Bring a water bottle, as I don't have running water to drink. Bring food for lunch / dinner break. We will take a quick 15 minute sustenance break. I have a microwave and there may be room in the fridge.

Directions:

Studio Steel is in a large blue-green warehouse 2 miles south of downtown Seattle at the corner of South Spokane Street and E. Marginal Way S. (it is directly under the West Seattle Bridge and two blocks west of 1st Ave. S.)

Entry on Spokane Street. The address is 3600 E. Marginal Way South, Seattle, WA 98134. Your best bet is to look up directions on the web as it is often confusing for students the first time. There is free parking under the West Seattle Bridge just North of the loading dock. Studio Steel is located in the large teal (darkish blue green) wooden warehouse at the corner of E Marginal & Spokane St. The studio entrance and parking are on Spokane St. Walk thru the chain link fence into the loading dock, and continue straight back to the open doorway.....you have arrived.

Mimi Riley (206) 650-0235

Beginning Welding Class Handout

Remember: Hot metal burns, sharp metal cuts, bright light hurts eye

- Welding hood: always have your hood on when watching welding
- “Fire in the hole!” Give a shout to alert others around you, give them a moment to turn away
- Use pliers to pick up metal after you weld on it – stays hot for a while
- Wear safety glasses when filing or sawing
- Wear leather gloves or pliers when handling the metal (until you are sure it is no longer hot)
- Even hacksawing can heat up metal – be careful

MIG WELDING: HOW DOES IT WORK?

Two byproducts of electricity are heat and light, MIG welding uses the heat of electricity to melt two pieces of metal together. Your welding machine uses a transformer to lower and raise the amperage of the electricity coming out of your household 110v outlet, changing the amperage changes the amount of

heat. The tip of the welder (not the large shielding cup) is where the electricity comes out. The wire that you weld with is called an electrode. When you pull the trigger on the gun the electricity is waiting to go somewhere (kind of like your home outlets have electricity waiting to go into an appliance). When you touch the nozzle on the welder to the metal and pull the trigger electricity flows and arcs (sparks) from the wire sticking out of the gun tip to the metal, and continues thru the metal pieces you are welding to the ground clamp and back to the machine. When you hook on the ground clamp, a complete path is made

for the electricity to travel through – you have made a circuit. Without a complete circuit electricity will not flow.

This would be a messy, ugly process if it weren't for shielding gas. The metal burns, melts and sputters – almost boils and forms gas pockets when it mixes with air and all its impurities. A weld without shielding gas is porous, we want a solid strong weld – not one with holes throughout. Shielding gas provides inert environment for the metal to melt in, which means the metal won't take in impurities from the atmosphere – it displaces the air around the weld puddle, and the metal melts into a solid weld.

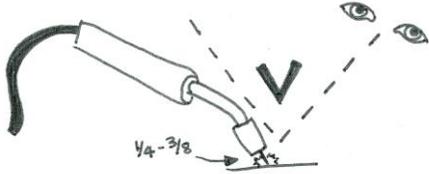
Will I get shocked? No, you won't, as long as you don't put your hand between the nozzle and the metal – you won't do that (it would be like taking out a pen and paper to write and putting your hand between the pen and the paper). You may have heard that electricity follows the path of least resistance. Metal is highly conductive, the electricity has a much easier time flowing thru the metal than your hand. You can even rest your bare hand on bare metal without danger of shock, however be safe and wear gloves to protect yourself from the heat of welding.

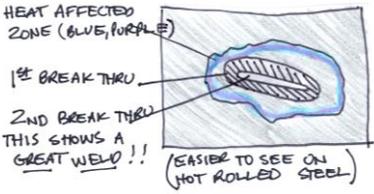
Welding Tips

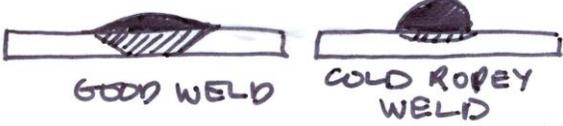
Look at the cheat sheet on the inside of your welder to get a general idea of the proper settings.

- Match the consumable copper screw on welding tip to wire size.
- Attach your ground clamp (to the work whenever possible).
- Land on the planet !!! (Stabilize your body and hands).
- Keep two hands on your gun at all times !!!
- Stick out length is 1/4" to 3/8". Touch the wire to your piece to start.
- Make a V so that you don't block your own view.
- Weld slowly. Keep wire length short (most common problem areas). Students constantly say that the wire is coming out too fast and therefore is too long, if it is too long you need to move the tip of the gun closer to the work, this will shorten the wire length.
- Weave back and forth to increase your chances of welding *both* pieces of metal.
- Stay in the puddle, a popping sound means you are too far away or too fast
- Good wire speed and amperage will produce a fairly low profile weld with a "scar" on the backside. You want to hear a sound like bacon frying.

- A tight fit between pieces is preferable, 1/16th of an inch or so. But you can certainly fill a gap.

 <p>PROPER GUN/EYE POSITION</p>	<p>Take the time to properly position your gun so that you can see the full stick out length of your welding wire (from tip of gun to metal you are welding). If you do not have a clear view with your hood up, you certainly won't see when your hood is down and its dark.</p>
--	---

<p>On thin pieces of metal it is easy to “read” the back side of your steel to determine if your weld has fully penetrated the metal. The 2nd break thru is often a bit shiny.</p>	
---	---

	<p>A weld bead that looks “ropey” and sits on top of the steel is not hot enough. The weld should look like it is growing out of the metal underneath, not just plopped on top of it.</p>
---	---

Troubleshooting

- If your weld has rolled over edges or does not hold: turn up the heat / or decrease the wire speed. The stick out length may be too long.
- If you feel the wire pushing back at you: turn down the wire speed, the wire should melt instantly.
- If you keep missing the weld joint: increase the width of your weave
- If the wire feeds erratically: straighten out your wire hose

- If the machine makes a strange humming noise and stops welding: clean out the tip and cup of the gun, the welder has ground itself out.
- If you are burning holes through the work piece: turn down your heat (voltage)
- If the wire is melted to the gun tip your stickout length was too short: Try shaking the wire feed hose, grabbing the melted ball of wire electrode with pliers, or as a last resort filing off the melted end of wire. If you cannot free the wire you must cut the wire off (do not let spool unravel) and unscrew the ruined tip and replace with a new one.

Where to Buy Steel

- Everett Steel: 3434 16th Ave. W. (in Ballard) 206-282-8694 has round tubing
- Metal Supermarkets: 22029 70th Ave. S. Kent 253-395-1835 will precision cut sheet for you
- Metal Shorts: 4101 W. Marginal Way S.W. 206-382-0305 has stainless steel
- Pacific Industrial Supply: 1231 S. Director St. 206-682-2100 has a “junk” yard attached with all kinds of strange and beautiful stuff to make metal art with. Bring your magnet to make sure it’s mild steel. Stay away from galvanized metal, the fumes could make you sick. You can weld painted metal, but you would want to scrape away the paint from the weld area, and you want a well ventilated area – you don’t want to breathe the stuff.
- Pacific Iron & Metal: 2230 4th Ave. S. 206-628-6237 has new and “used” steel, lots of fun to browse. Sheet metal is cut with a torch (ragged edge)

Where To Purchase Ornamental Steel

- Architectural Iron Designs, Inc. has a full catalog is on the web at www.archirondesign.com most items do not have a minimum order requirement. Their phone # is 1-800-542-2379
- King Architectural Metals at Kingmetals.com is also a great source for ornamental steel.

Where to Rent Equipment

- Central Welding: 5401 4th Ave. S. (206)-766-9353 and 841 N.W. 49th (206)-783-2283 These guys are the best! I have gotten much good advice from them. They have several locations. This is a good place to buy helmets, gloves and welders etc. Ask for your 15% student discount.
- Airgas: 4401 Airport Way S. 206-682-2880 This place just rents welders and plasma cutters

- You want to rent a 110 volt MIG welder and buy self-shielding wire to start. If you weld a lot you will probably want to buy a gas tank – over the long haul this is cheaper, a small tank will cost you about \$120. You can also rent plasma cutters from these shops. *Ask the rental shop to set up the MIG welder with the correct polarity for you to weld with self shielded wire, you want DCEN (electrode negative) for self shielded wire.*