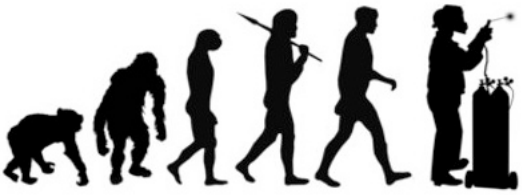
WELDING GUIDE



Welding, in general, is simple. Two pieces of metal are placed near each other and when the edges are melted with enough heat and/or compression, the molten metal will flow together and form a single, solid piece of metal.

In the MCAD 3D Shops we primarily use gas metal arc welding commonly termed MIG (metal, inert gas). It uses a wire-feeding gun that feeds wire at an adjustable speed and sprays an argon-based shielding gas over the weld puddle to protect it from atmospheric contamination. And this is what you will be using.

For special materials and projects or metals other than steel we use oxy-acetylene welding and TIG (tungsten, inert gas) welding. We also have the capacity for forge welding, which blacksmiths use to join iron and steel by heating and hammering.

DRESSING APPROPRIATELY FOR WORKING IN THE METAL SHOP

- Long sleeve shirt, and cuff-less pants, made of cotton. Do not wear synthetic materials, such as polyester, or rayon. These fabrics will quickly burn INTO your skin. Hot sparks or metal can lodge in rolled up sleeves, cuffs, pockets, and collars. Button up and cover up, leaving shirts untucked!
- A long sleeved welding jacket is available in the shop, although you could also wear a heavy cotton flannel or sweatshirt.
- Hair tied back, up, and away. A hat or bandana is a good idea.
- No dangling jewelry.
- Leather boots/shoes or closed equally durable shoes that completely cover your feet.
- Cotton socks.
- Leather or cotton gloves.
- Safety glasses.
- Welding helmet.
- Respirator or dust mask when grinding.
- No headphones.
- Keep all combustibles at a safe distance (no lighters, matches in your pockets).
- Avoid wet areas and keep hands and clothing dry.
- The stuff listed above is really not negotiable. When coming into the shop to weld, you MUST follow these rules. Don't worry--we don't care how you look as long as you are dressed for safety.
- Plan to get at least a little dirty and be ok with it.

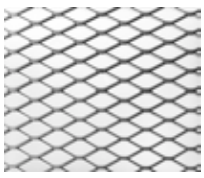
PROPER AND NECESSARY TOOLS/MATERIALS FOR METAL WORK

- Steel (if ever using found materials you must get approval from shop staff).
- Needle nose pliers for cutting the welding wire.
- Sharpie, or soapstone.
- Layout and measuring tools.

- Vice clamps, magnets, and bricks to help position the work.
- Abrasives for finishing (grinding welds and giving surface effects)

BUYING STEEL
The Art Cellar sells * ¼" rods and and *18 gauge sheets of steel--appropriate to your project. Pay at the store and bring your receipt to the 3D Shop staff to receive the material. Here are some other forms of steel available at local steel suppliers. (see "MCAD 3D Suppliers" handout on Blackboard) Label with tape and store sheets on our class shelving with rods in the upright bin nearby.

The Most Common Forms Of Mild Steel:

<table>
<tr><td colspan="4">LINEAR STEEL: Comes in 10'-20'length</td></tr>
<tr><td>*ROD
  </td><td>SQUARE STOCK
  </td><td>FLAT BAR
  </td><td>ANGLE IRON
  </td></tr>
<tr><td>CHANNEL
  </td><td>RE-BAR
  </td><td>SQUARE TUBE
  </td><td>PIPE
  </td></tr>
<tr><td colspan="4">SHEET STEEL</td></tr>
<tr><td>*SHEET-under ¼"
  </td><td>PLATE-over ¼"
  </td><td>FLOOR OR TREAD PLATE
  </td><td>EXPANDED METAL
  </td></tr>
</table>

WELDING

The MIG welder is EASY to use.

First TURN ON the welder in the lower right hand corner of the machine.

Make sure the gas tank is OPEN and has a pressure (left side gauge) between 15-20:

For welding 18 gauge sheet metal to 18 gauge sheet metal set the WIRE SPEED and VOLTAGE to:

Blue Light should be on.

WIRE SPEED: .030

VOLTAGE: 4

For welding ¼ rod to ¼” rod set the WIRE SPEED and VOLTAGE to:

Blue Light should be on.

WIRE SPEED:
.030

VOLTAGE:
10

For welding ¼” rod to 18 gauge sheet metal The WIRE SPEED stays at .030 and the VOLTAGE should be some where between the two pictures above-- around 7-9 or 14 gauge.

Good welds are smooth and consistent. If you are encountering problems achieving the proper looking weld or any other weirdness, you should ask the shop staff to look over your settings and technique.