TIG Welding Seminar Training

**Basic Information**

The materials for the TIG welding seminar are locked in Lockers #10 and #11. **Locker #10** has all of the gloves **(ALL PAIRS ARE NOW LABELED! Make sure not to give out the “NO AL” gloves for the seminar! Keep pairs together with the binder clip!)**, TIG torch parts, extra tungsten (all types and sizes), steel coupons for the first part, some aluminum samples, the torch holders, the plates for welding on, stainless steel brushes, and steel + aluminum filler rod. **Locker #11** has ONLY extra aluminum samples. If the two steel drawers/buckets in Locker #10 are not full, have staff members fill the buckets beforehand from either Locker #10 or Locker #11. The seminar container now ONLY CONTAINS THE FOLLOWING:

* 3/32 Gold Tungsten
  + **USE THE TUNGSTEN located in a small tube and bag in the aluminum box FIRST!**
  + This tungsten will work on steel with a point and aluminum with a ball
* The plastic containers for each welder will now **ONLY** contain the following:
  + 1 #7 gas nozzle
  + 1 3/32 Collet
  + 1 3/32 Collet Body
  + 1 Back cap
* Pliers
* Torch Holders
* Brushes

**The First Day: Steel**

**Objective:**

* Orient the students to the facilities
* Give an overview of machines and settings for each weld type
* Teach students how to setup TIG welders (they need to demonstrate understanding)
* Teach, demonstrate and have students successfully complete the following welds in steel:
  + Fusion
    - Butt weld
    - Lap Weld
  + With Filler Metal
    - Butt weld
    - Lap Weld
    - Fillet Weld

**Before Class:**

Make sure that the ventilation is off before the seminar. If someone is using the welding lab before you, TURN OFF THE VENTILATION ASAP. You don’t want to be shouting over that fan for three hours. Unlock all the welders. Move the table out to the center(ish) of the room and set up the tables. Make sure the following is at each seat: torch holder, plastic container with torch components, tungsten, filler metal, TIG gloves and welding blanks.

**Start of Class**

* Introduce yourself as the instructor and any experience you have
* Show where the safety supplies are located
  + First aid kit is on the wall above the door release
  + Ventilation Switch is on the wall in B1052
  + Fire extinguisher is by the door
  + Eye wash is located by the set of doors by the precision table in B1051
  + Emergency shower is in the hallway by the canoe
  + Take the time to explain clothing to them now (refresher)
    - NO SYNTHETIC MATERIALS IN THE LAB (this means NO windpants OR LEGGINGS!)
    - Make sure pants are not excessively full of holes or tattered.
    - Closed toed shoes that cover all of the foot (No flats)
    - Warn them that the ventilated toe box on athletic shoes will probably allow sparks to come through
    - Safety glasses must be worn underneath the welding helmet
    - Welding jackets are required in the lab. No welding in long sleeve shirts
    - Welding gloves are required and “Mechanix” gloves are not a viable alternative
    - Suggest to button all the way to the collar and keep your sleeves buttoned and inside the gloves

**TIG Welder Overview/ Parts:**

* Show the power source
  + Amperage
    - 1 amp for each .001”
  + AC Balance
    - Set to 2 for DC
  + Postflow
    - Set to the size of the tungsten (3/32” or around 18 seconds)
  + Polarity
    - ALWAYS DCEN for steel/stainless
    - NEVER SWITCH polarity under load
    - AC is for aluminum/magnesium (which we never do)
  + High Frequency
    - START for DC
    - Off for Stick welding
    - Continuous for AC
  + Amperage Control
    - Remote
  + Crater time
    - Off
  + Output/Contactor
    - Remote
  + Arc Control
    - Off
* Show the foot pedal and explain how it works
  + Like an accelerator pedal on a car
* Disassemble the TIG torch and explain the different parts
  + Torch body
  + Collet Body
  + Collet
  + Gas Cap
  + Back Cap
  + Reassemble torch
    - Now is a good time to explain stickout
      * The tungsten extension should be no greater than the inside diameter of the gas cup.
* Tank pressure
  + Make sure the center of the ball is on the 20
  + Make sure the scale is reading ARGON SFCH
* Tungsten
  + Explain the gold band around the tungsten
  + Don’t have to go super in-depth about different types of Tungsten in this seminar but can help them understand if you choose to do so.
  + Show them how to grind tungsten
    - Make sure you grind it lengthwise
    - SPIN IT as you grind

Now it is time to begin welding. Demonstrate each one of these techniques for them before letting them work on their own.

**The Second Day: Aluminum**

**Objective:**

* Review weld settings for Aluminum
* Demonstrate and have students successfully complete the following welds in steel:
  + With Filler Metal
    - Butt weld
    - Lap Weld
    - Fillet Weld

**Before Class**

Today just move the table and place the plates and torch holders at each station. Remember to unlock the welders. Don’t forget the copper plates. Lay out the tungsten, collet, collet body, and gas cap at each machine but let each student assemble their torches. Before class it’s a good idea to mess with the knobs and switches on the machines to make sure that they actually get practice to set the machine up properly each time. Cut about 6 full lengths of filler rod in half for each station.

**Start of Class**

Machine setup is priority on this day. Make sure to set the machines to AC current. Make sure the high frequency is set to “continuous” on all the welders. AC balance should be set to “balanced” as well. Users can adjust that later as they see fit for penetration/cleaning action.

* Talk about and demonstrate balling the tungsten and cleaning the work piece with a stainless steel brush. *Let users know that they don’t need to grind the tungsten anymore – they can just put a new ball on the end of the tungsten*.
  + Some users of GOLD tungsten find it easier to grind and then ball. But it is personal preference
* Demonstrate welds with Aluminum and discuss difficulties most beginners have (maintaining weld puddle)

For the majority of today, students make beads and welds with filler metal. If students seem to be struggling with this, have them forgo filler metal to focus on fundamentals. Lap weld and butt weld should be done today preferably with filler metal. In order to pass welding 2, they need to make a successful fillet weld on aluminum with filler metal.