

Brazing

Brazing is a welding process that allows the joining of similar or dissimilar metals by using a third metal with a lower melting point as the “glue.” In brazing, a thin film of filler metal is sucked into the joints by capillary action. In fact, the joint can be quite weak unless this filler metal is thin. The base metal (the metals you are attempting to join) is never actually melted as in conventional welding, but the base metal must reach the proper temperature to allow molecular bonding with the filler metal. (The filler metal is commonly bronze.) Brazing in the Product Realization Lab is done with an Oxy-Acetylene torch. You should read the document entitled “Oxy-Acetylene Welding’ - this document assumes you are familiar with oxy-acetylene welding. After reading through this, get a TA to check out your set up and help you the first time through.

Advantages of Brazing :

- It's easy to learn.
- You can join virtually any dissimilar metals.
- The bond line can be very neat in appearance.
- Joint strength is strong enough for most non-heavy-duty use applications.

Disadvantages of Brazing :

- A badly brazed joint looks similar to a good joint, and can have a VERY low strength.
- The metal used to bond the two parts may be different in color than the parts being bonded. This may or may not be a problem.
- Long-term effects of dissimilar metals in constant contact may need to be examined for special applications.
- Since the filler material (typically bronze) melts at a relatively low temperature, brazed parts may not be put in an environment which exceeds the melting point of the filler metal.

Materials Suitable for Brazing in the PRL:

Most steels

Brass

Copper

Iron

Bronze

Preparation for Brazing:

- 1) Assemble all of the materials needed to make the braze. This includes parts, oxy-acetylene torch, flux, solder, fixturing, handling tools, and safety equipment.
- 2) Clean the parts to remove any oil, rust, or other contaminants. Use a wire brush if needed to remove any rust.
- 3) Coat all surfaces of the parts being brazed with flux. This will help the solder make a good joint, and will also help protect the areas of the parts not being brazed by protecting them against oxidation from the flame.

- 4) Assemble and fixture the parts in place - the parts need to be stable for a good braze line. Ceramic bricks, vise grips, pliers, and clamps are available in a file cabinet in the welding room for fixturing.
- 5) If large surface areas are being bonded together, hammer a small piece of solder into a very thin sheet and place it between the faces being brazed. This will ensure that solder reaches all of the surface area. Be sure that the parts are firmly fixtured to keep the solder in place.
- 6) Prepare the nozzle and tanks as described in the oxy-acetylene handout.

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- 1) Light the flame as described in the oxy-acetylene handout
- 2) Adjust the flame as described in the oxy-acetylene handout.
- 3) Apply the flame to the parts. The goal is to heat the entire volume of both parts being brazed. Wash the flame over the surface of the part, and try to avoid overheating which may melt the surface.
- 4) Apply solder to the joint line. Don't apply flame directly to the solder - let the temperature of the parts melt the solder. Continue heating the parts until the solder melts and flows into the joint.
- 5) Add enough solder to ensure a good bond line. This takes a little practice.
- 6) Once you're done, turn off the flame. Close the oxygen pin valve first, and then the acetylene valve.
- 7) Shut down and clean up as described in the oxy-acetylene handout.

revision history :

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