

Building Models in Brass Using Soldering Techniques

by
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Soldering is joining two metals together using a low melting point metal filler called solder.

What is Solder?

- Solder is a low melting point metal alloy traditionally made up of a ratio of tin and lead.
- 63/37: melts at 183 °C (361 °F) (eutectic: the only mixture that melts at a point, instead of over a range) - mostly used for electronics.
- 60/40: melts between 183–190 °C (361–374 °F)
- 50/50: melts between 185–215 °C (365–419 °F)
- Lead-free solder alloys melt around 250 °C (482 °F), depending on their composition.
- Experience has shown that Lead-free is difficult to use effectively for modelling purposes.

Types of Solder

Solid Core and Rosin Core

Flux

- Flux is a substance which is used to prevent oxidation of the base and filler materials.
- It also is a wetting agent which reduces the surface tension of the molten solder allowing it to flow better into the parts.
- Rosin Flux is generally non-corrosive in electronic solder.
- Acid Flux can be used for modeling but must be thoroughly cleaned from the joint.
- Flux can come as a paste or as a liquid

Heat Sources

- External Heat from Contact – irons/guns, good for tinning and soldering thin sheet metal.
- External from Non-Contact - open flame, good for large castings going onto a boiler. Don't use directly on sheet metal.
- Internal/External from Electrical Contact – resistance, Uses low voltage but High Wattage to create heat where the electrodes are attached or touch the surface. Good for localized high heat necessary for fine parts.

Other Tools

- Solder Wick, Holder, Sponge to Clean Tip and Clamps
- Solder sucker.

Basic Steps

1. Make sure both surfaces are clean, free of oxidization, oil or any impurities. Rubbing alcohol is good to remove oil. You may have to use fine grit finishing paper or a wire wheel to remove any oxide.
2. Usually it's a good idea to tin each surface before attaching. Tinning is applying a thin layer of solder to the surfaces of the metal that you want to join.
3. Apply Flux to area or surfaces that you want to solder.
4. Shape parts to fit well. Solder can fill joints but you don't want to rely on it.
5. If possible, clamp pieces together before soldering.
6. If necessary, apply heat sinks to contain the spread of heat. Typical heat sinks that I use are wet Q-Tips® , Bounty® wet paper towels, damp rags, forceps, clamps and pliers.
7. Apply heat and let cool. Try not to move the parts until the solder has hardened. If you move the parts before the solder cools sufficiently, the joint will look crystalline and will be weak. If the solder is shiny, the joint is good.
8. Timing is important. Eventually you will get a feel for how long you should apply heat for whatever heat source you are using.
9. Remove any excess solder using removal tools like a solder sucker or wire braid.
10. Practicing on scraps is a good idea if you are a novice but most model railroaders have already done wiring so they do have some experience.