Soldering

Everything you always wanted to know about soldering but were afraid to ask.

By:
David M. Thibodeau

Topics

- Copper
- Solder
- Fluxes
- Irons
- How to solder
Definition

A joining process wherein coalescence is produced by heating, generally below 800 deg. F, and by using a non-ferrous filler metal that has a melting point below that of the base metal.

Good things about Copper

- Good conductor of electricity
- Plentiful and cheap
- It has the ability to fuse into or alloy with solder, under certain controlled conditions.
Bad things about Copper

- Heat tends to make it brittle
- It oxidizes rapidly forming an invisible film similar to rust on iron.
- The application of heat accelerates this oxidation.

Solder

- 60% Tin and 40% Lead. (60/40)
- Sometimes 63/37 is used.
- Becomes liquid at 360 degrees F.
**Note:**

- Pure Lead melts at 621 deg.
- Pure Tin melts at 450 deg.
- 60/40 alloy melts at 360 deg.
- Now you know the rest of the story!

**Definition: Tinning (wetting)**

- When molten solder leaves a continuous, permanent film on the metal surface.
**Definition: Flux**

- Soldering flux is a liquid, solid or gaseous material which, when heated, is capable of promoting or accelerating the wetting of metals with solder.

**The Purpose of Flux**

- Is to remove and exclude oxides and other impurities from the joint being soldered.
- Lowers the surface tension of molten solder so the solder will flow readily and adhere to the metal.
- Flux is NOT a cleaning agent, it will just remove tarnishes and film and prevent re-oxidation when the copper is heated.
Note:

* Soldering flux is often manufactured into the core of solder.
* Acid Flux is used for plumbing, DO NOT USE!!
* Use Rosin type of flux.

Types of Soldering Irons

* Electrode Tip Resistance
* Self Contained heating element
Soldering Iron Tip Types

- Copper
- Copper Alloys
- Impregnated copper (Alum. Diffusion)
- Metal clad copper tips (Iron, nickel, etc.)

Soldering Iron Tip Sizes and Shapes

- There are various sizes and shapes available. The tip chosen will depend on the job at hand.
Care of your Soldering Iron

- Keep soldering tip well tinned and clean
- Clean it with a quick swipe on a wet sponge
- Then tin the iron with fresh solder.
- Always keep fresh solder on the iron when not in use.

So How Do I Solder?

- You simultaneously heat the junction of the two metals involved to a temperature hot enough to melt solder and fuse with the solder.
So how do I know when it is hot enough?

By having the Iron heat up the work (the metals) and then have the work heat up the solder until it melts.

So what melts the solder?

THE WORK!
The other Secret?

- To get good at soldering takes practice!

Solder Joints

- Should look clean and shiny!
- You should see the outline of the component under the solder, use enough solder but not too much.
- DO NOT leave any flux in the joint.
- Do not move the joint before the solder cools
- A cold solder joint has a gray mushy appearance.