

Intro to Soldering

Thursday, January 20, 2011 7-9pm

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Metrix Create:Space

Basics of Soldering

(That's solder, with an L)

Solder(ing)

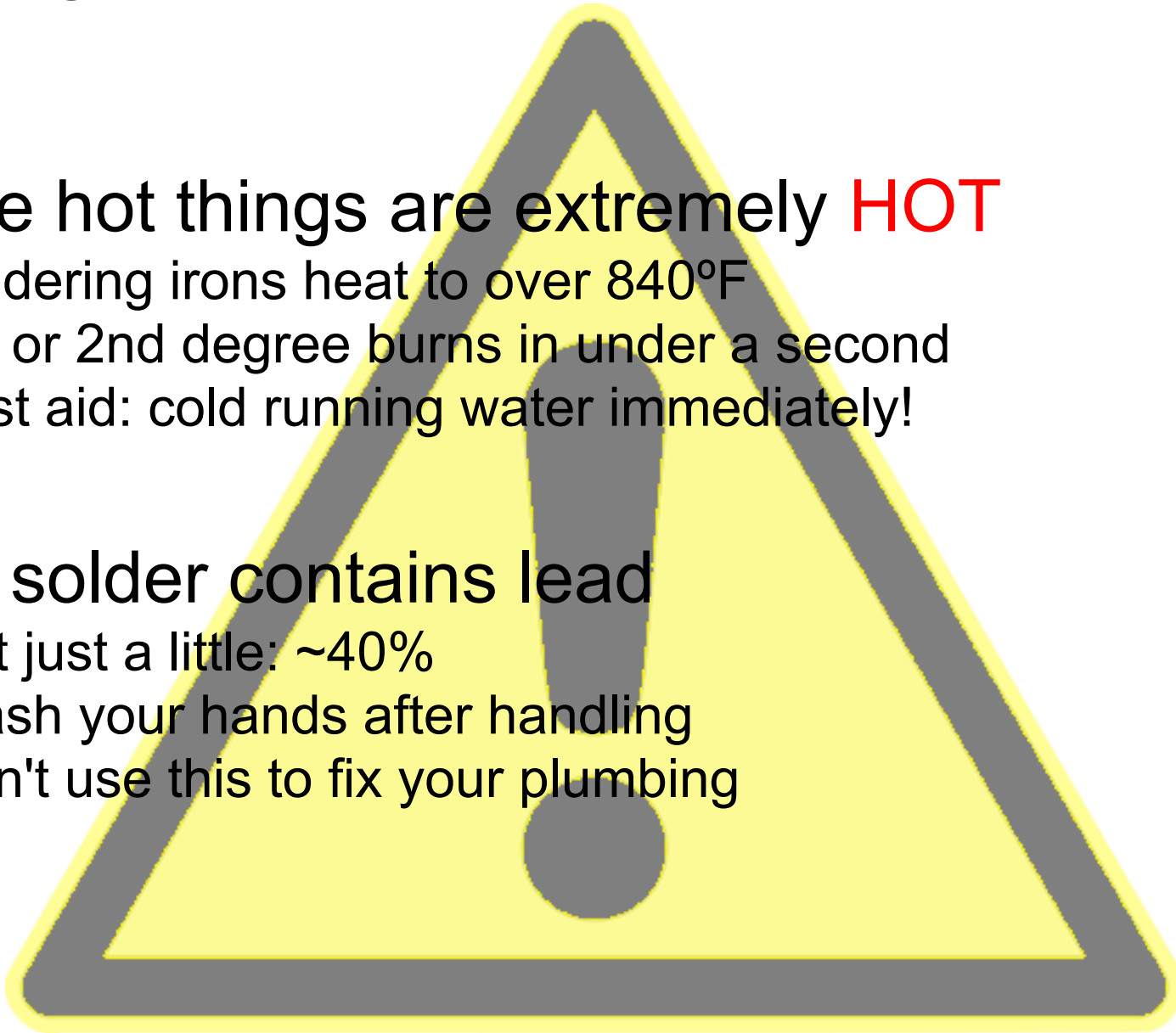
Solder: a fusible metal alloy with a melting point or melting range of 90 to 450 degrees Celsius (190 to 840 °F).

Soldering: the act of melting solder to join metallic surfaces



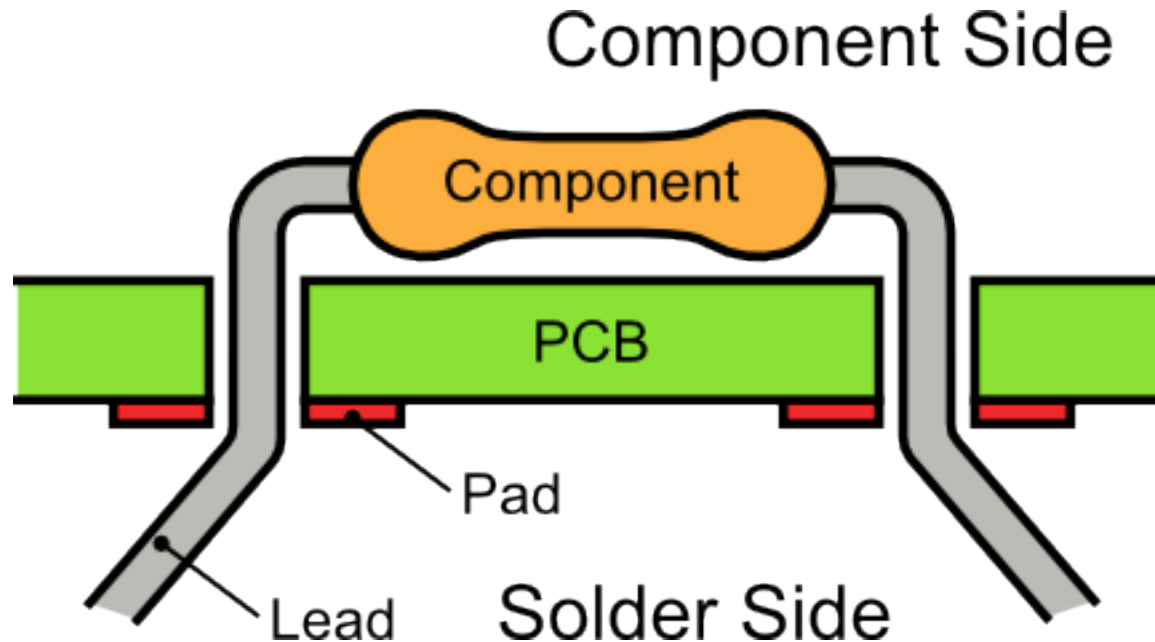
Warnings

- These hot things are extremely **HOT**
 - Soldering irons heat to over 840°F
 - 1st or 2nd degree burns in under a second
 - First aid: cold running water immediately!
- Most solder contains lead
 - Not just a little: ~40%
 - Wash your hands after handling
 - Don't use this to fix your plumbing



Thru-hole soldering

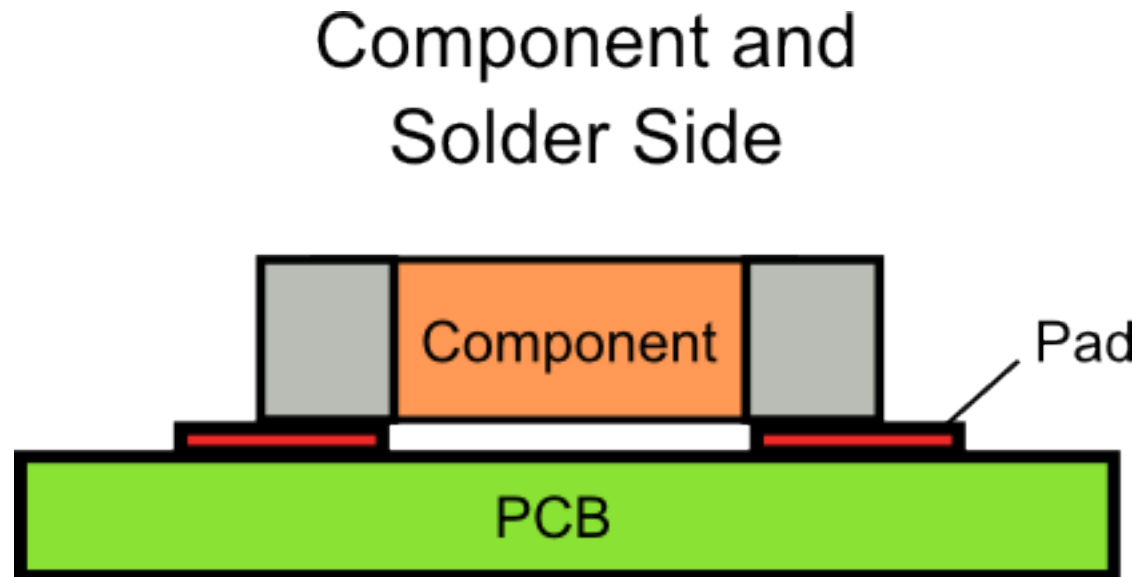
- Traditional soldering
- Parts on top of board
- Part leads pass through the board
- Solder joints on bottom of board



SMT soldering

SMT: Surface Mount Technology

- Modern technique
- Parts and solder on one same side

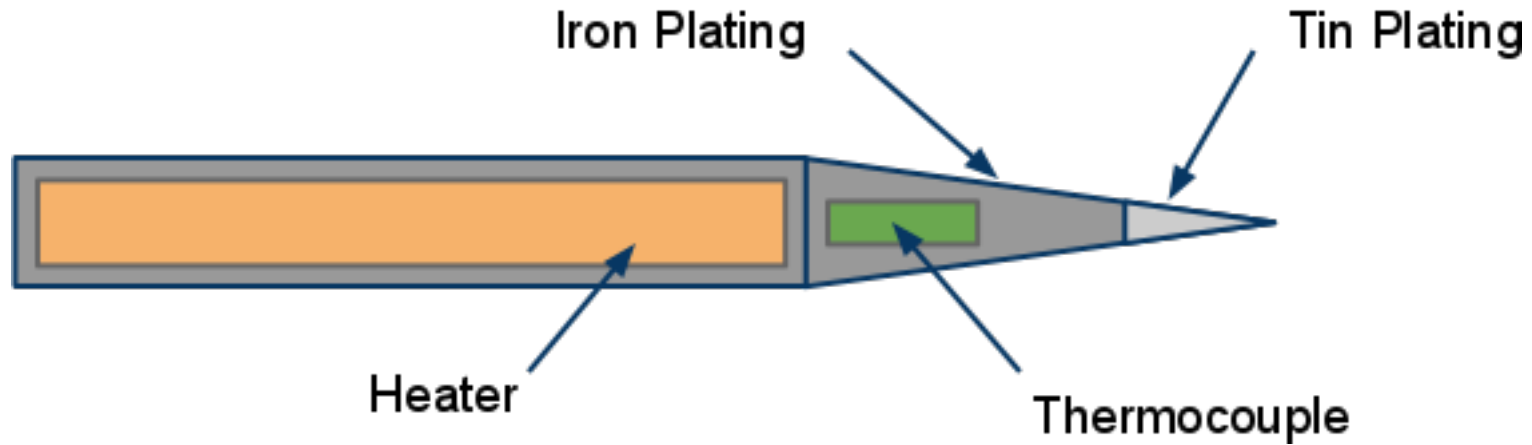


Basic tools

- Iron with stand or Soldering Station
- Solder
- Flux
- Tip cleaner
- Solder wick

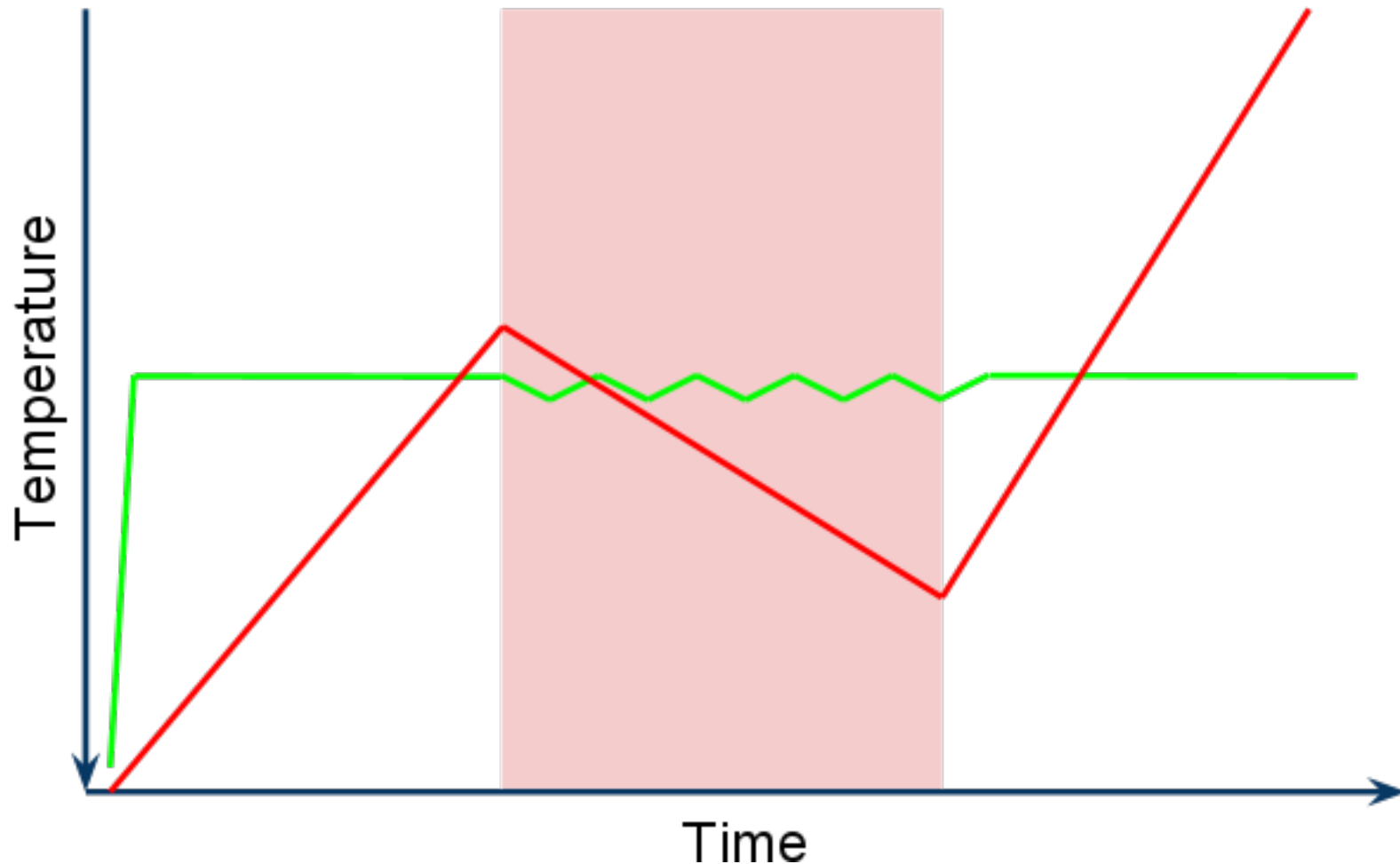
How an iron works

- Iron plated copper
- Heating element
- Thermocouple (optional- in temperature controlled irons)



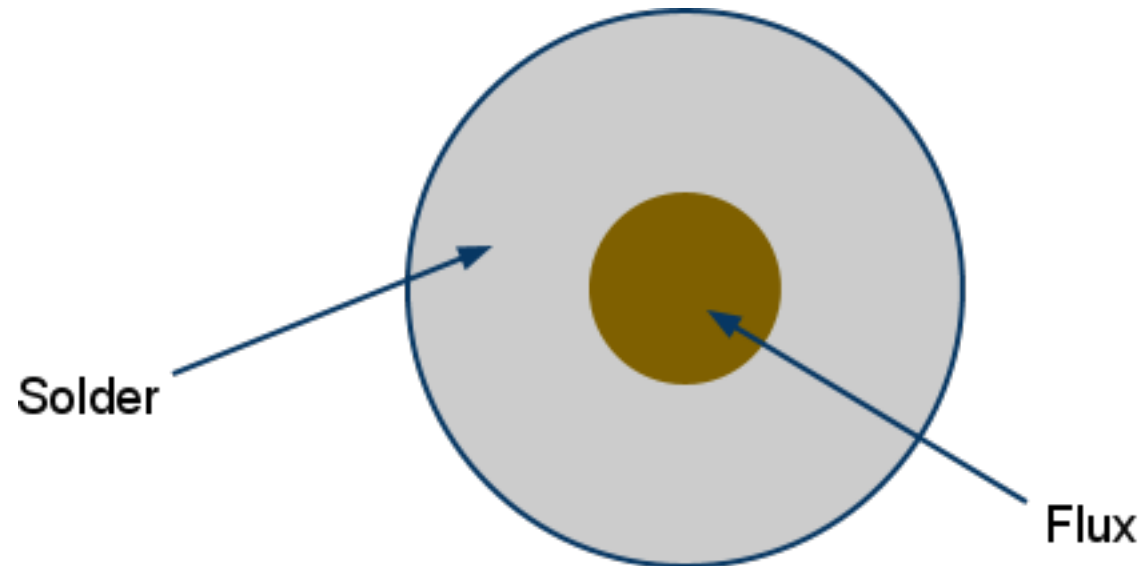
Iron Wattage and Temperature Control

- Wattage controls heating rate, not temperature
- Having a knob does not mean temperature control



Solder

- Tin/Lead Alloy
- 60/40 typical
- Melting point $\sim 190^{\circ}\text{C}$
- Flux Core



Lead Free Solder

Lead-Free Solder

- Mandated by RoHS (Restriction of Hazardous Substances)
 - as of 2006 in the EU
- Tin/Silver/Copper Alloy: most common lead-free option
 - Melting point $\sim 217^{\circ}\text{C}$

Differences from Leaded Solder

- Metal alloys and melting temperatures
- Tin Whiskers much faster with lead-free
- Safety

What is this flux stuff anyway?

- Cleans by removing oxidization
- Creates oxygen free environment
- Improves wetting characteristics
- Mild acid
- Relatively safe
- Directly breathing the smoke undesirable in the long term
- Only use flux made for electronics
- No-clean vs. water soluble

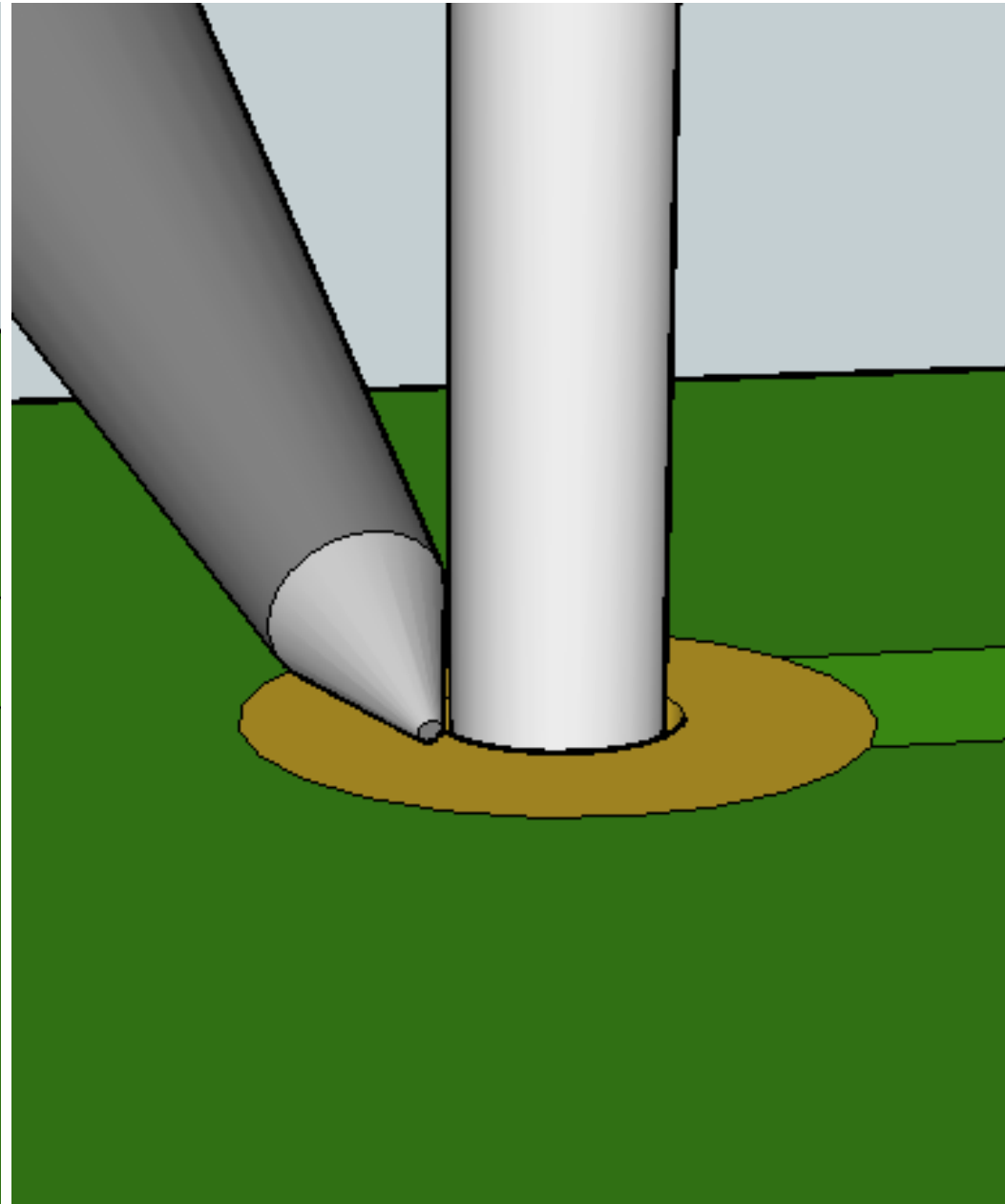
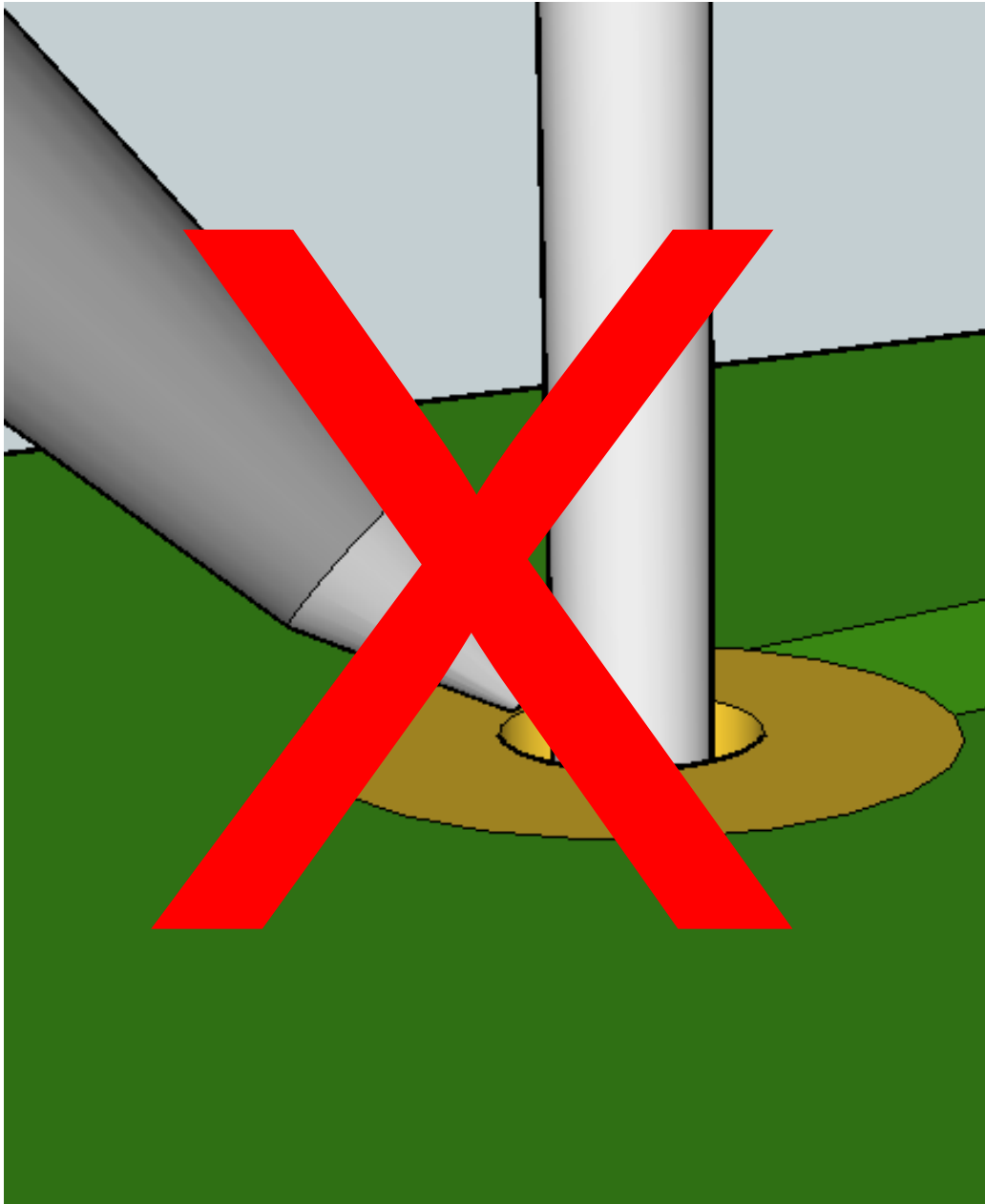
Practical Soldering

(How to stick one metal thing to another)

Proper prep: Make it easy on yourself

- Tin the tip
- Ditch the sponge
- Clean the board

Make good contact



The Rules

1. Heat the joint
2. Melt solder with the joint
3. Don't reuse solder
4. Keep the tip clean
5. Don't overheat parts or board

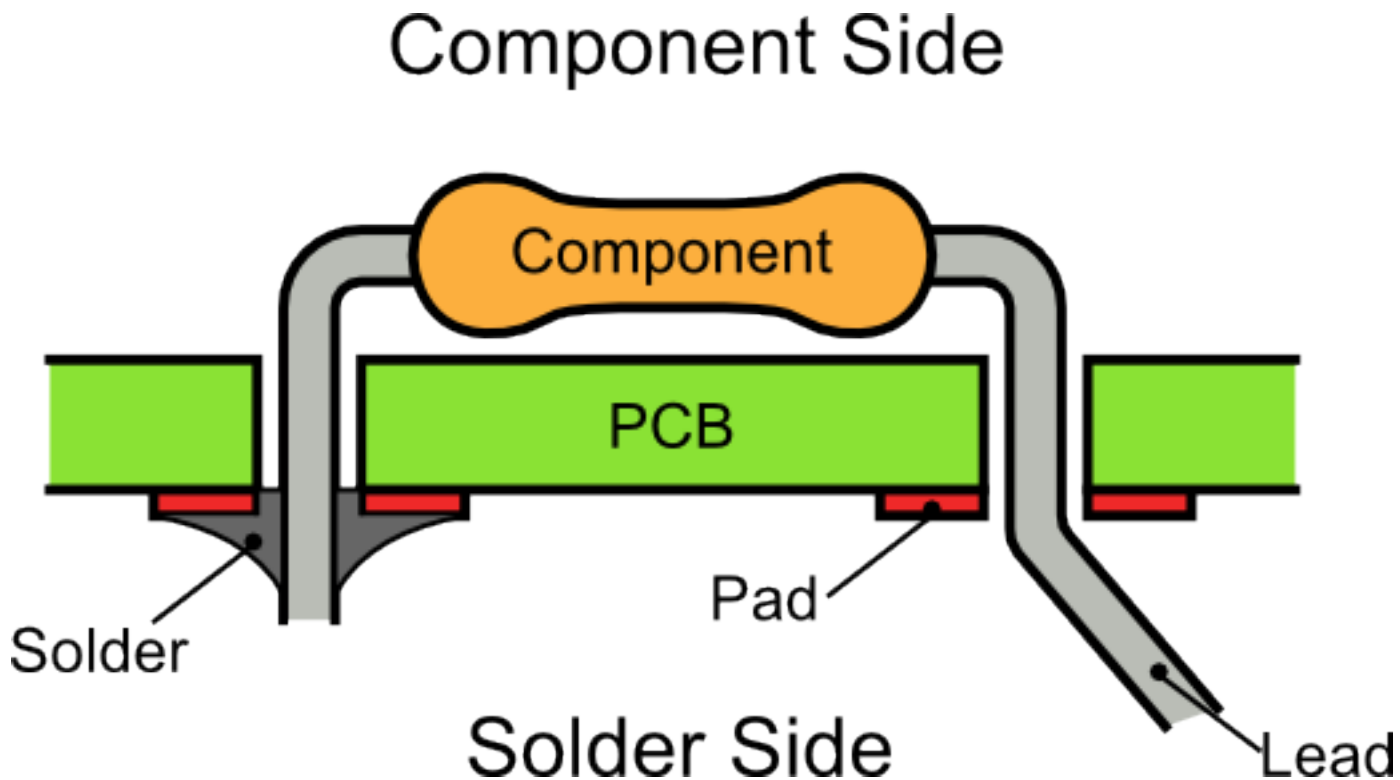
Mechanical advantage

Make stronger connections by twisting, bending, etc.

Don't rely on solder for a mechanical connection!

Not too much...

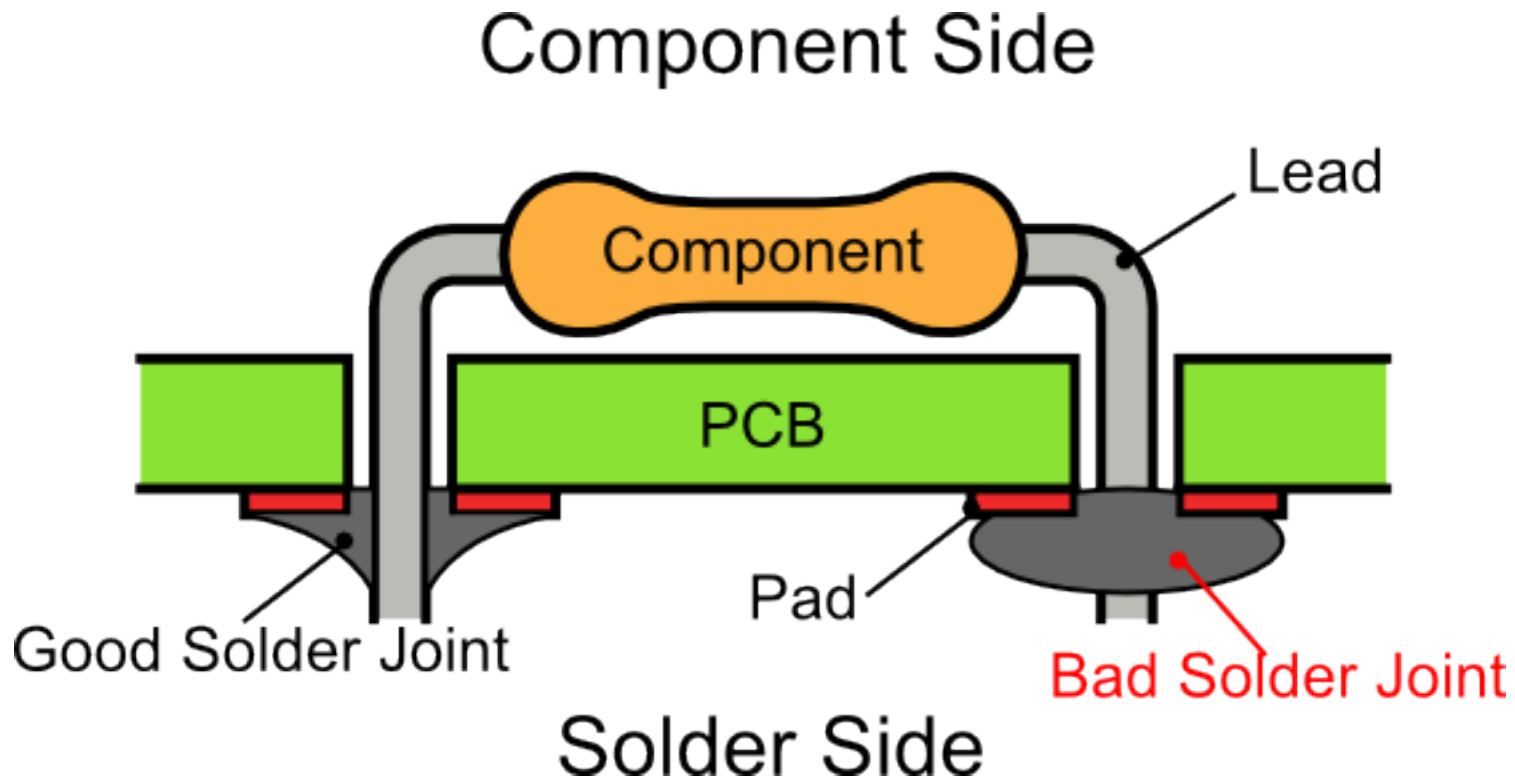
But not too little either. Use just enough solder to cover the pad and wick up the lead.



Cold solder joints

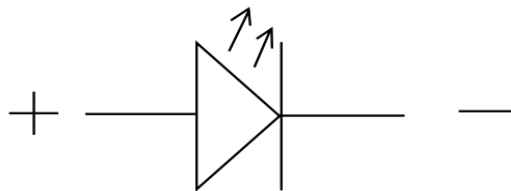
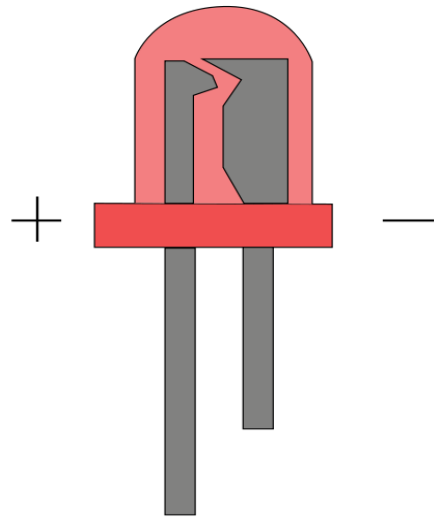
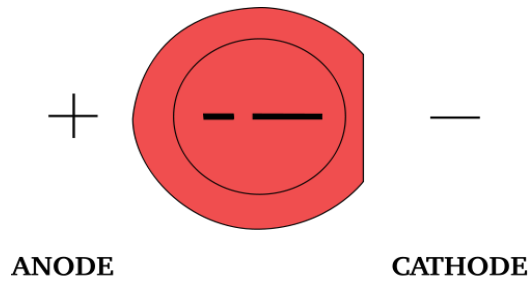
Caused by melting solder with iron, not joint. Parts are not hot enough for solder to wet them. The result is a joint that will fail.

Joints tend to be dull and bulging.



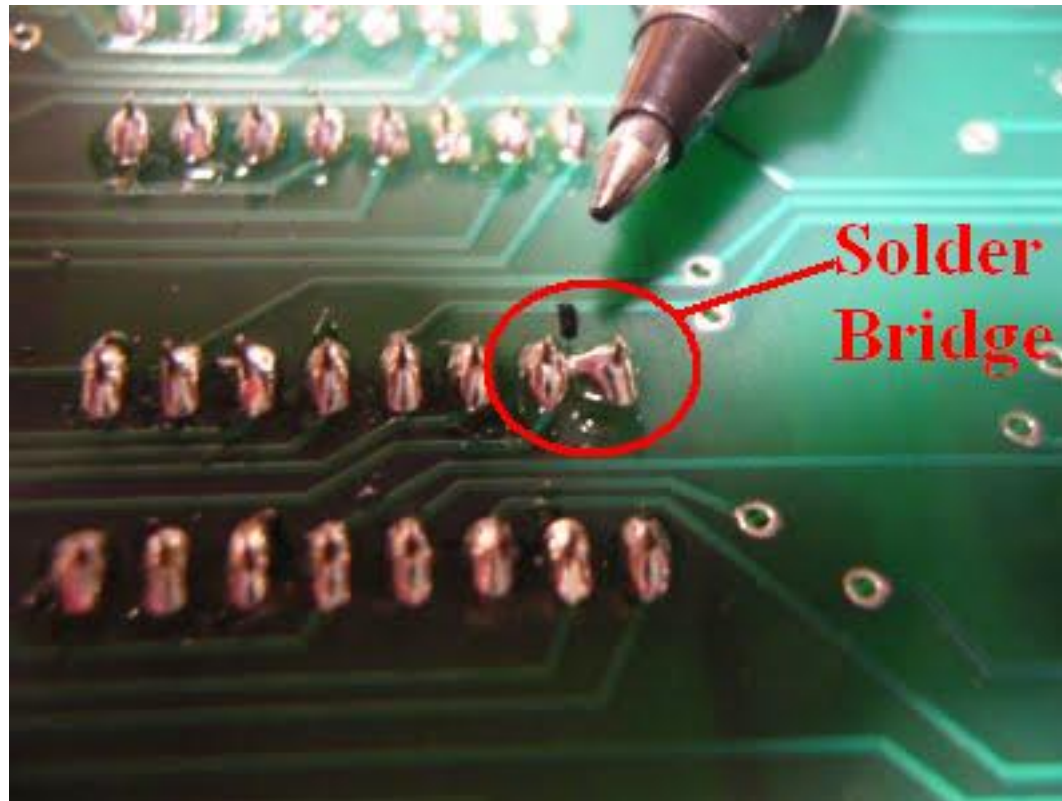
Check twice, solder once

Always check the polarity of the part before soldering



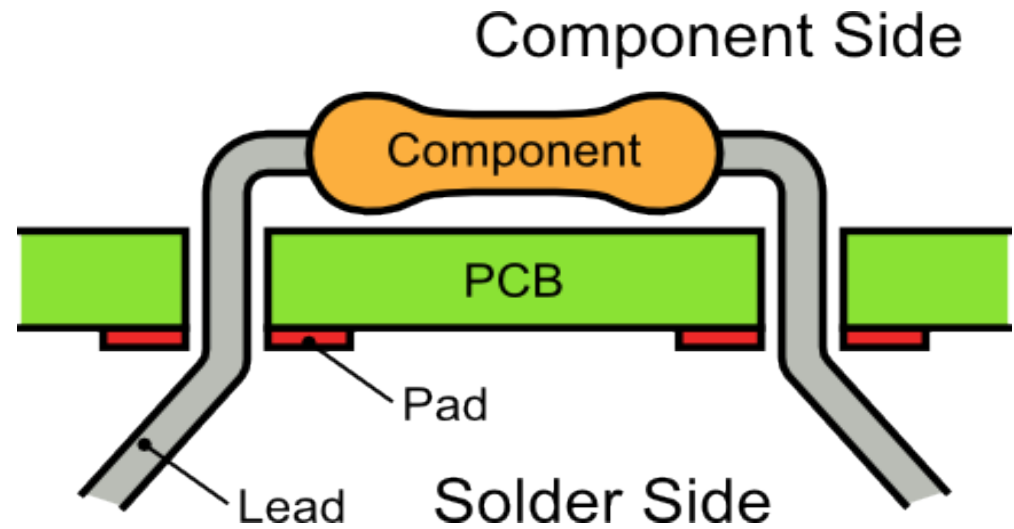
Solder bridges

- Made by pulling solder across a gap
- Good when you want one
- Bad when you don't



Iron in one hand, solder in another...

- Bent leads
- Start with short parts
- Third hand



Desoldering

- Solder wick
- Solder sucker
 - plunger type
 - bulb type
 - vacuum pump
- Add to remove
- See-saw
- Multi-lead components
- Traces lift easily!

Bliplace

<http://www.tanjent.com/doku.php?id=bliplace>

