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Key Tips & Techniques for Taking Care of Solder Iron Tips



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Tip Construction

- Copper Core
- Iron Plating
- Nickel plating over the Iron
- Chrome plating over the nickel
- Tin over Chrome plating



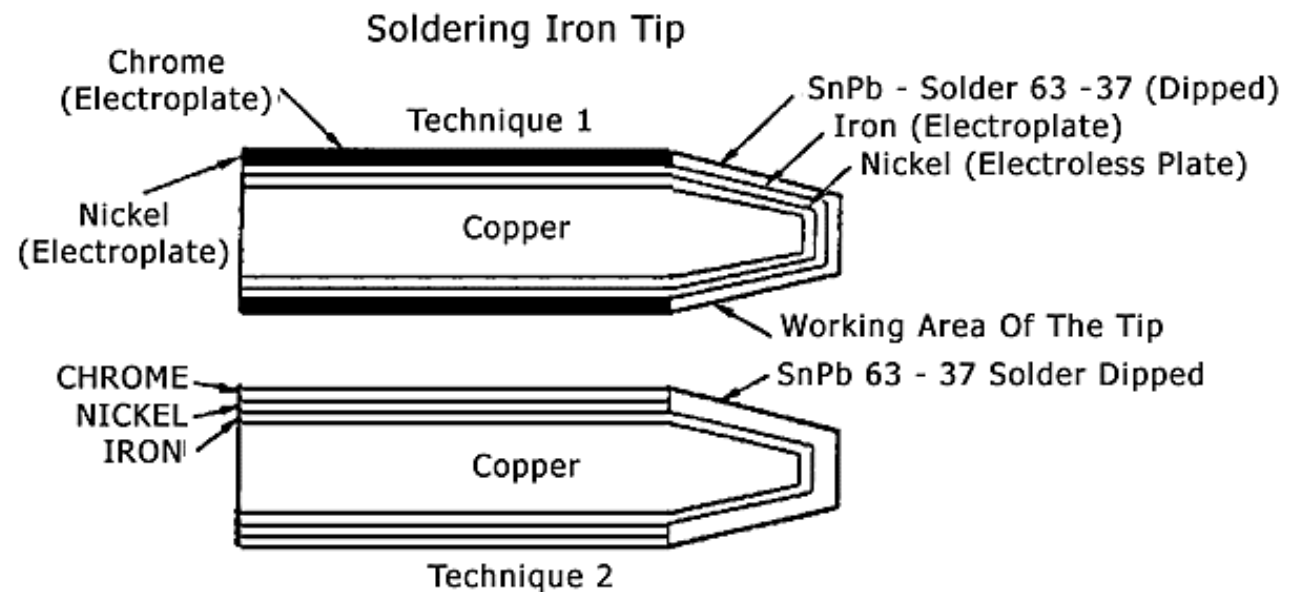
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What is in a Solder Iron Tip?



<http://www.coopertools.com>

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Causes of Tip Failures

- Stress on plating causing cracks in plating
- Oxidation and corrosion
- Dewetting
- Excessive heat, wear and tear
- Lead-Free Solders, Dissolution
- Improper tinning
- Improper usage



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Solder Iron Tip Dewetting

Is the most common form of tip failure

- Caused by:
 - oxidation of the tip plating
 - Use of very small solder wire.
- Solder will ball up on a dewetted tip
- Heat transfer is also impacted with a dewetted tip



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Tip Care Practices To Prevent and Reduce Dewetting

- Turn system off when not in use
- Use lowest tip temperature possible.
- Keep tips tinned at all times when not in use
- Use of larger diameter solder to tin the tip
- Use a brass wool or a clean sponge



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Tip Care Practices To Prevent and Reduce Cracking and Wear

- Use largest tip possible
- Keep tip tinned and use large flux core solder wire to tin the tip
- Don't apply pressure during the soldering operation
- Use the tip only for soldering
- Tin the tip to create a heat bridge
- Use brass wool or a clean moist (damp) sponge

CL6210 Brass Wool

Very effective cleaning method. It leaves a small layer of solder on the tip to prevent oxidation between cleaning and reworking





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Tip Care Practices To Prevent and Reduce Corrosion

- Use lowest flux activity possible
- Use sulfur free sponges
- Use only clean sponges
- Always tin the tip with cored solder when shutting down for the night
- When the iron is in its holder the tip should not touch any metal portion of the holder



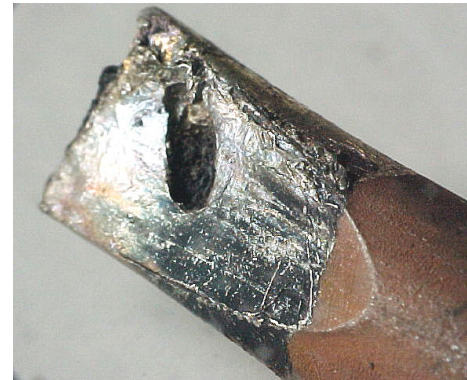
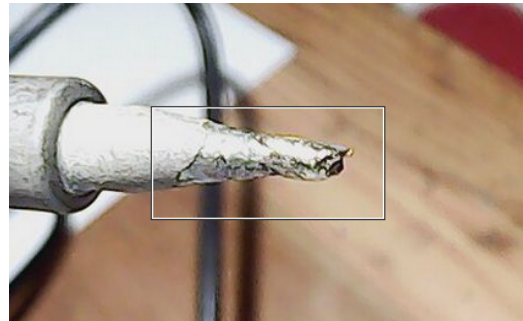
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What go Wrong with a Tip?



Corrosion

Soldering Iron Tip Care by [ProvideYourOwn](http://ProvideYourOwn.com)



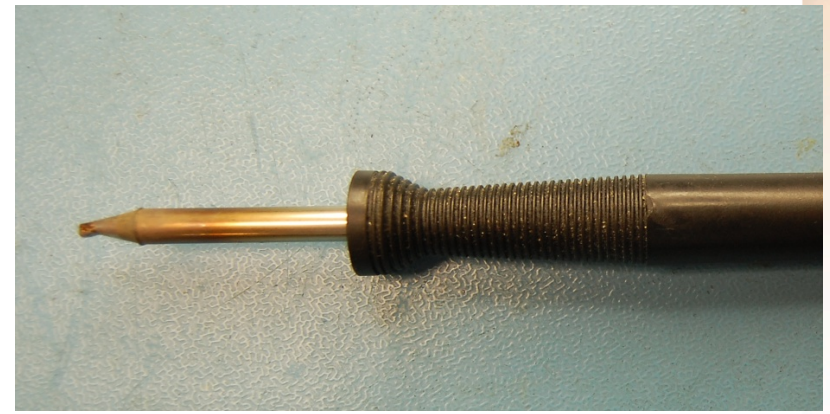
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Soldering Irons





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Hot Gas Soldering and Desoldering





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Hot Air Nozzles





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Manual Soldering Process

- The temperature profile is not consistent.
- The tip temperature may be set but is unknown.
- Often the tip is dewetted and not effectively transferring heat to the product.
- Solder volume is not consistent from joint to joint.



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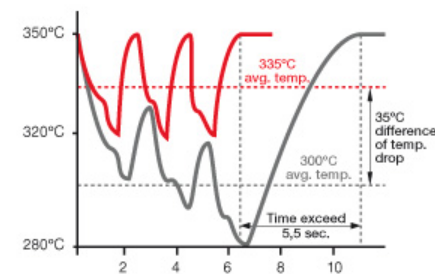
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Care in the Use of Solder Irons While Soldering Chip Components

- Watch the tip temperature, it should be between 650° to 750° F.
- Keep time to make solder joint as short as possible, 1 to 3 seconds.
- Care should be exercised to make sure pressure is not applied to one side of the device as the other is secure. The mechanical force will crack the capacitor.

Process for 3 solder joints



<http://www.jbctools.com/prolonging-tip-life-menu-5.html>

Adapted from the JBC website



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Let's Talk About Heat Energy

- One definition states:
 - Heat is a form of energy which transfers amount particles in a substance by means of kinetic energy of those particles. In other words, under kinetic theory, the heat is transferred by particles bouncing into each other.
- The particles of an item move around more and take up more space when heated, this is why things expand when heated

<http://physics.about.com/od/glossary/g/heat.htm>



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Let's Talk About Heat Energy

- So what Heat Energy?
 - It is a form of energy and is measured in Joules.
 - Example: under kinetic theory, the heat is transferred by particles bouncing into each other.¹
 - It is also called Thermal Energy
- Units of Heat
 - The international system of units (SI) is the Joule, also called Calorie (cal), and sometimes measured in BTU²

1. By [Andrew Zimmerman Jones](#), About.com Guide

2. <http://www.authorstream.com/Presentation/parker-60447-HEAT-ENERGY-Temperature-Heating-Cooling-cont-Conduction-as-Education-ppt-powerpoint/>



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Temperature vs. Heat

- Temperature of an item is how **HOT** it is and this is measured in °C or °F or °K.
- Temperature and heat are related but there not the **SAME.**
 - Example: A soldering iron is set at 600°F and is hotter than a flowing river at 40°F but the river has more joules of heat energy, sometimes defined as “Q”



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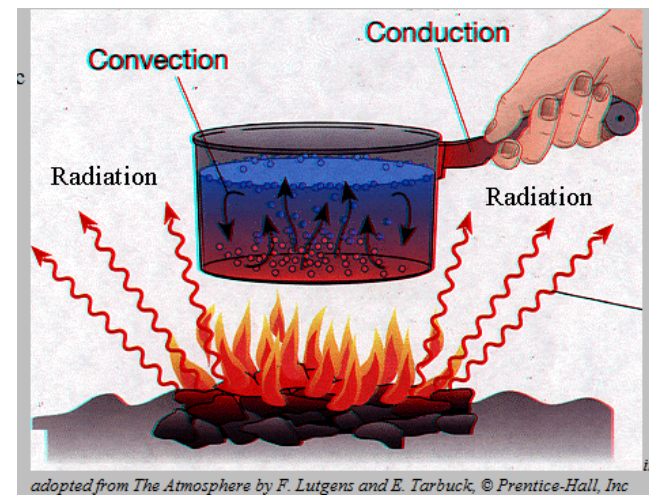
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Heat Energy Transfer

- Three methods of heat transfer
 - Conduction
 - Convection
 - Radiation





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Impact on Creating a Solder Joint

- Type of heat transfer in printed circuit board assembly
- Manual Soldering – Conduction
- Wave Soldering – Conduction
- Surface mount – Convection, Radiation





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Solder Wetting

- Why must solder wet the basis material?
 - To create an intermetallic between the Tin from the solder and the Copper from the board.
- Determined visually through observation of the flow of the molten metal
 - This is based upon the wetting angle.



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The Process

- The minimal amount of time is 1 to 2 seconds to heat up the materials and melt the solder.
- The molten solder then has to be allowed to spread over the entire area being soldered, either a terminal, plated through hole or surface mount component. This could take another second or so.
- Therefore the time to make a solder joint is between 2 to 5 seconds per joint.



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Conclusion

- Turn system off when not in use
- Use lowest tip temperature possible.
- Keep tips tinned at all times when not in use
- Use of larger diameter solder to tin the tip
- Use a brass wool or a clean sponge



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Thank You
Any Questions?



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Further Information

For questions regarding this webinar, please contact
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