

PROJECT LEAD THE WAY

**PLTW**

# Soldering & De-soldering

Digital Electronics

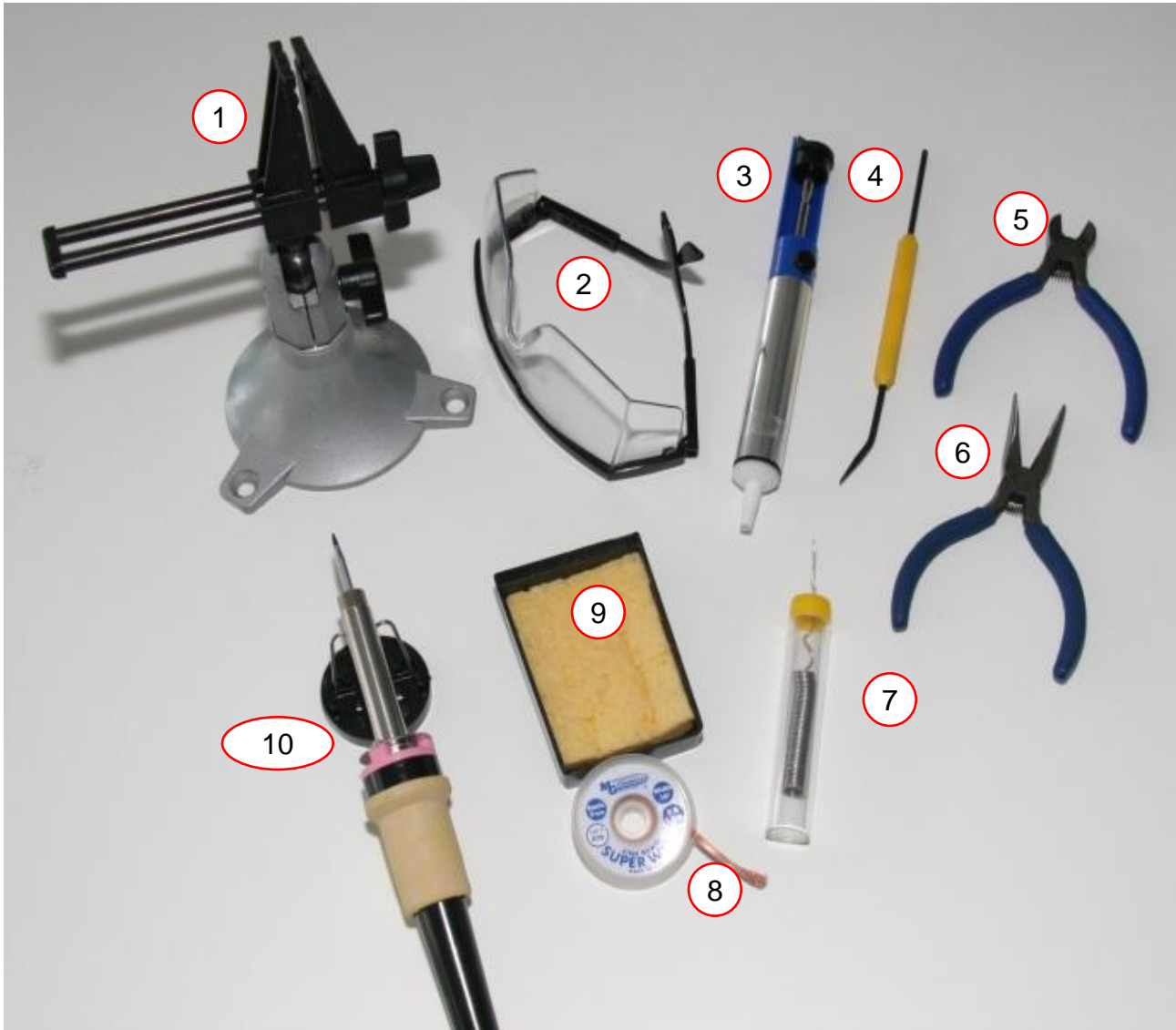
# Soldering & De-soldering

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This presentation will...

- Review the tools needed to solder and de-solder electronic components.
- Demonstrate how to *tin* a soldering iron tip.
- Demonstrate the soldering process.
- Show the characteristics of a good solder connection.
- Review classic soldering mistakes.
- Demonstrate the de-soldering process.

# Soldering Tools



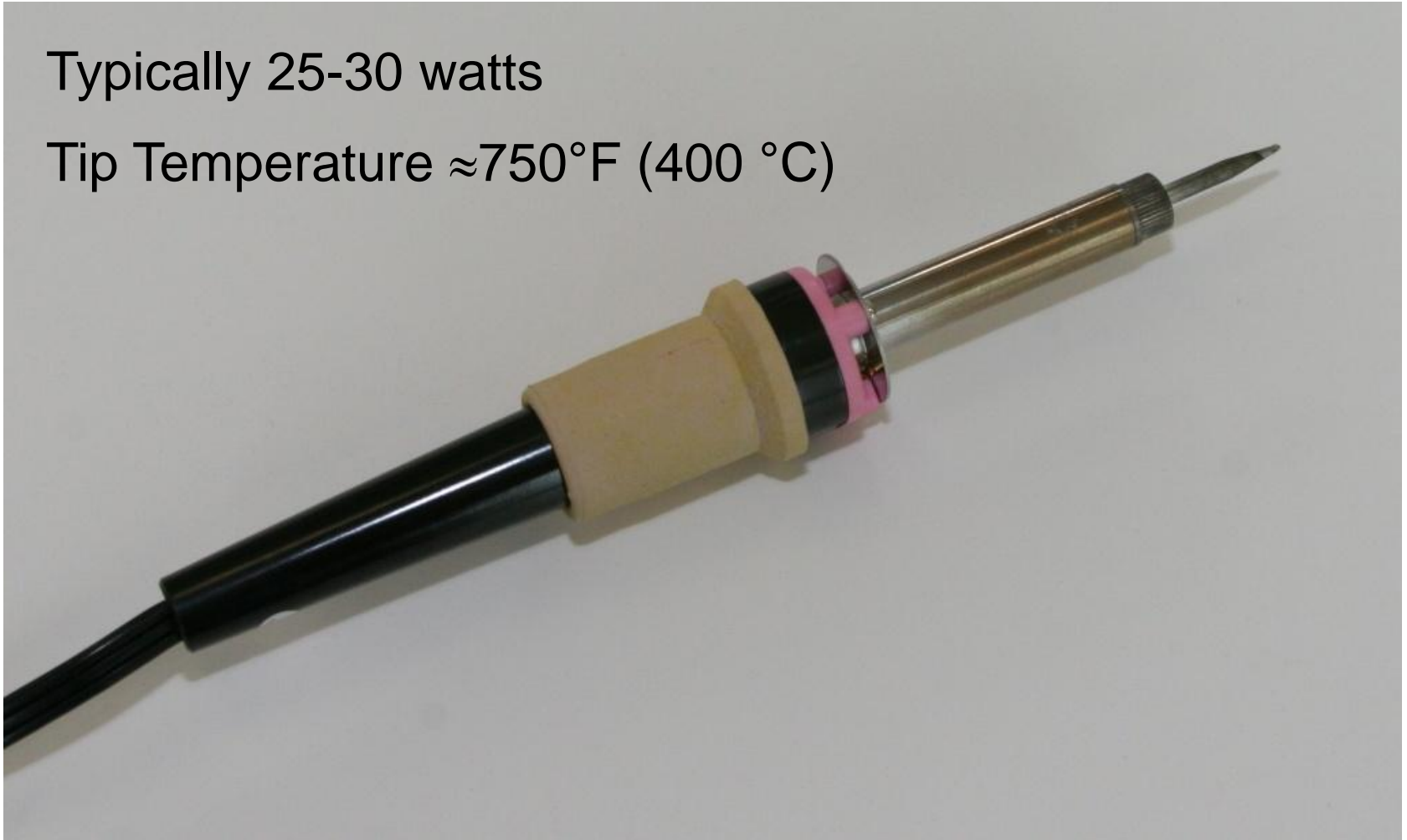
- 1) Vise
- 2) Safety glasses
- 3) Solder sucker
- 4) Solder tool
- 5) Diagonal cutters
- 6) Needle nose pliers
- 7) Solder
- 8) Solder wick
- 9) Damp sponge
- 10) Soldering iron

# Soldering Iron

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Typically 25-30 watts

Tip Temperature  $\approx 750^{\circ}\text{F}$  ( $400^{\circ}\text{C}$ )



# Solder

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- Solder is an alloy of tin and lead.
- The solder used for electronics is frequently called 60/40 solder because it is made of 63% tin and 37% lead.
- 60/40 solder melts at 361° F.
- Lead-free solder: As of July 1st, 2006, European laws mandated that new electronics be entirely lead-free. As of yet, no such laws exist in the United States.

# Soldering Iron Care & Maintenance

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Un-Tinned



- A soldering iron must be coated with a thin coat of solder. This will allow for the transfer of heat to the work piece.
- This procedure is called tinning.
- The tip must be kept coated with a shiny layer of solder by occasional wiping and applying solder directly to the tip.

Tinned



# Tinning Process

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Apply Solder to Soldering Iron Tip



Roll Tip on Damp Sponge



Properly Tinned Soldering Iron Tip

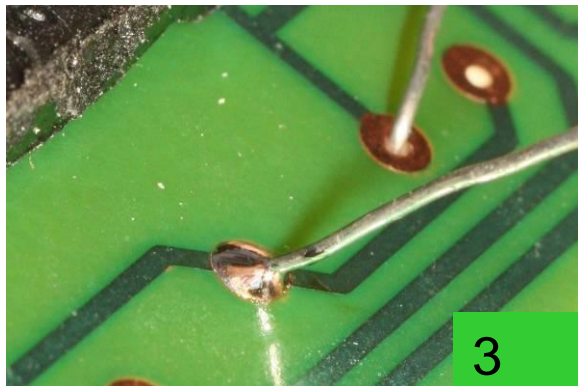


# Solder Process



Heat both items at the same time by applying the soldering iron to the copper pad and the component lead.

Continue heating and apply a few millimeters of solder. Remove the iron and allow the solder joint to cool naturally.

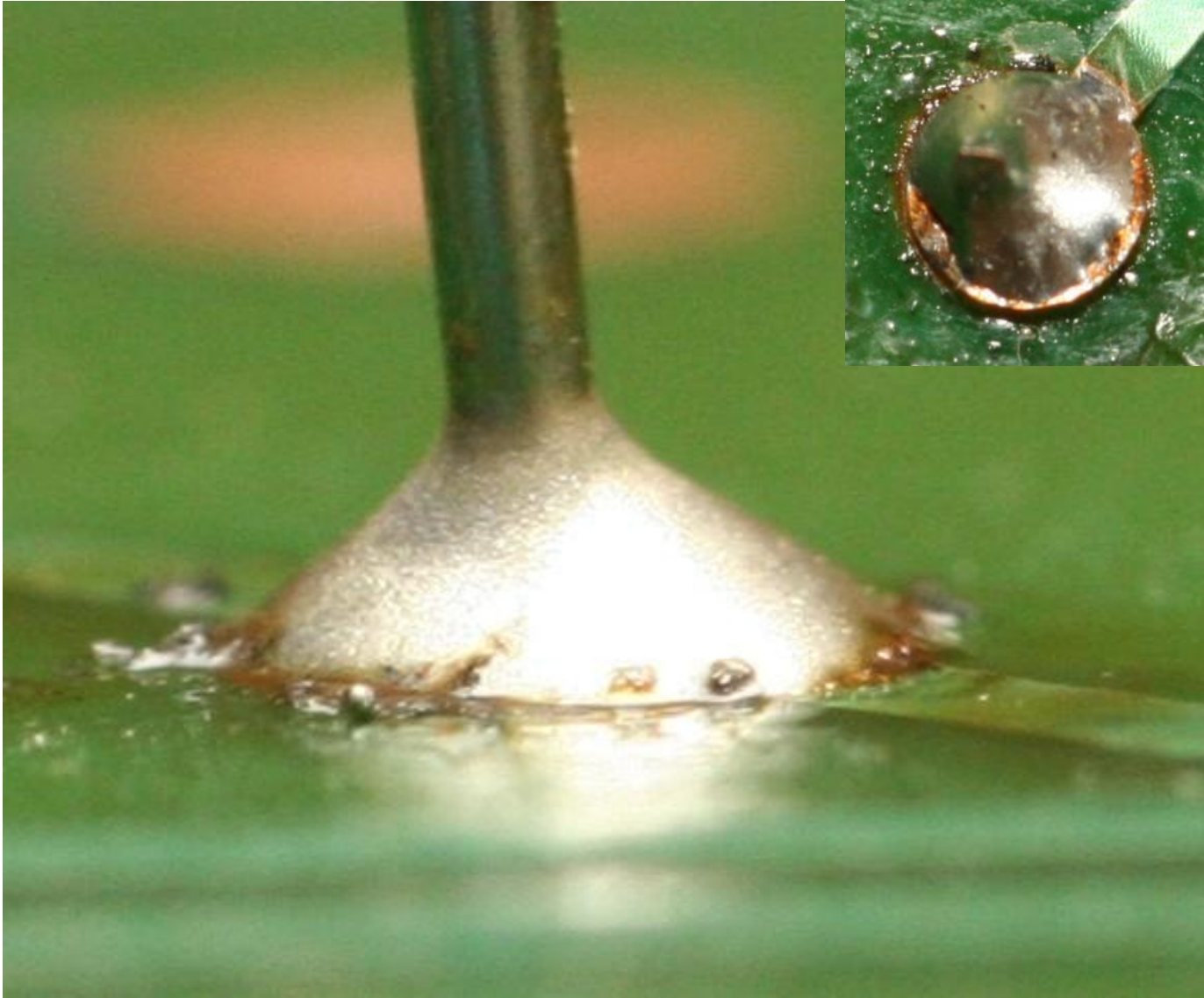


It only takes a second or two to make the perfect joint, which should appear shiny.



# A Good Solder Joint

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- Smooth
- Bright
- Shiny
- Clean
- Concave fillet

# Bad Solder Connections

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Too Much Solder



Too Little Solder



# Bad Solder Connections

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Cold Solder Joint



Not Soldered





# Bad Solder Connections

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Solder Bridge



Lifted Trace/Pad

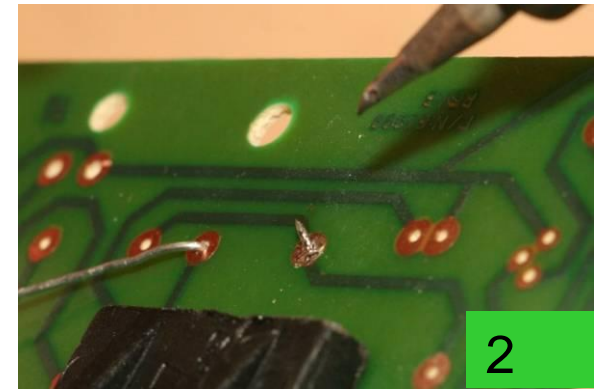


# De-Solder Process: *Solder Sucker*

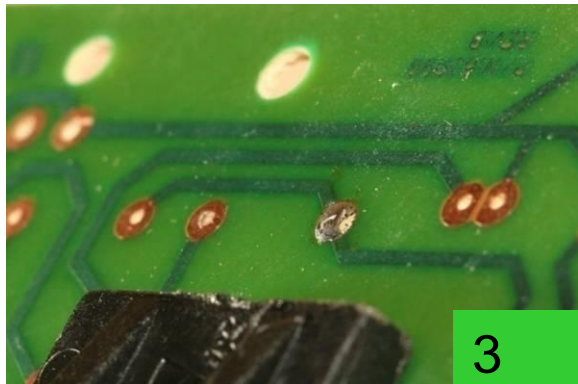


Apply heat to the connection to be de-soldered. When the solder melts, trigger the solder sucker.

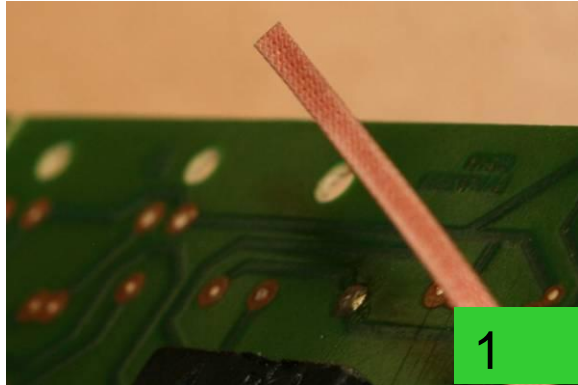
Repeat de-soldering as needed until all solder is removed. Remove soldering iron & solder sucker from area.



Remove component lead.

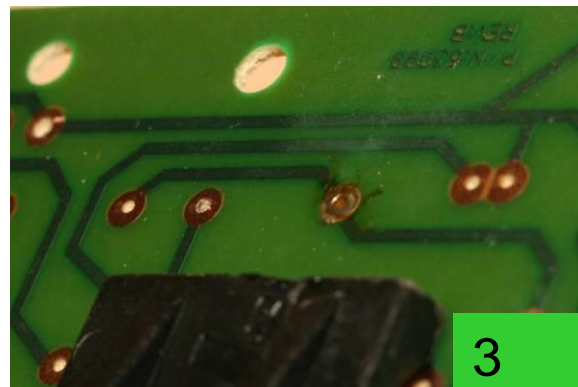


# De-Solder Process: *Solder Wick*



Solder wick is finely braided copper that is used to *wick away* excess solder from a de-soldered connection.

Apply the solder wick and soldering iron to the de-soldered connection. The solder wick will draw the excess solder off of the PCB pad.



De-soldered PCB pad

# Soldering Safety

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- Wear safety glasses when soldering. This includes all individuals in the vicinity of someone who is soldering.
- Place soldering iron in an approved holder when not in use. The iron is hot and can cause burns.
- Place the soldering iron so that the cord does not get caught up in your arms or on others.
- Ensure access to proper ventilation.
- Verify that the type of solder is safe to use in your working environment.
- Secure the components to be soldered before beginning the soldering process.



# Soldering Safety

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- Provide plenty of space to work.
- Use a properly-sized point for the soldering job to be completed.
- Verify that the tip on the soldering iron has a sharp point and has not been damaged in any way.
- Check the power cord for burned or melted sections that show bare wires. Label those cords DO NOT USE and ask the instructor to repair or replace.
- Do not to touch molten solder - it is hot!
- Make sure that the solder strand is long enough to keep fingers away from the hot iron.

# Soldering Safety

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- Tie back long hair and remove or tuck loose clothing.
- Use heat sinks for heat-sensitive parts. Provide sufficient cooling time before removing parts.
- Do not flick solder off of the iron. Flicking can cause solder to spray and hit skin or eyes.
- Hold the scrap end when cutting excess leads so that the scrap lead is not thrown into the air.
- Cut leads evenly with wire cutters.
- Make sure that leads do not short across other traces or leads.
- Thoroughly wash your hands after handling solder.