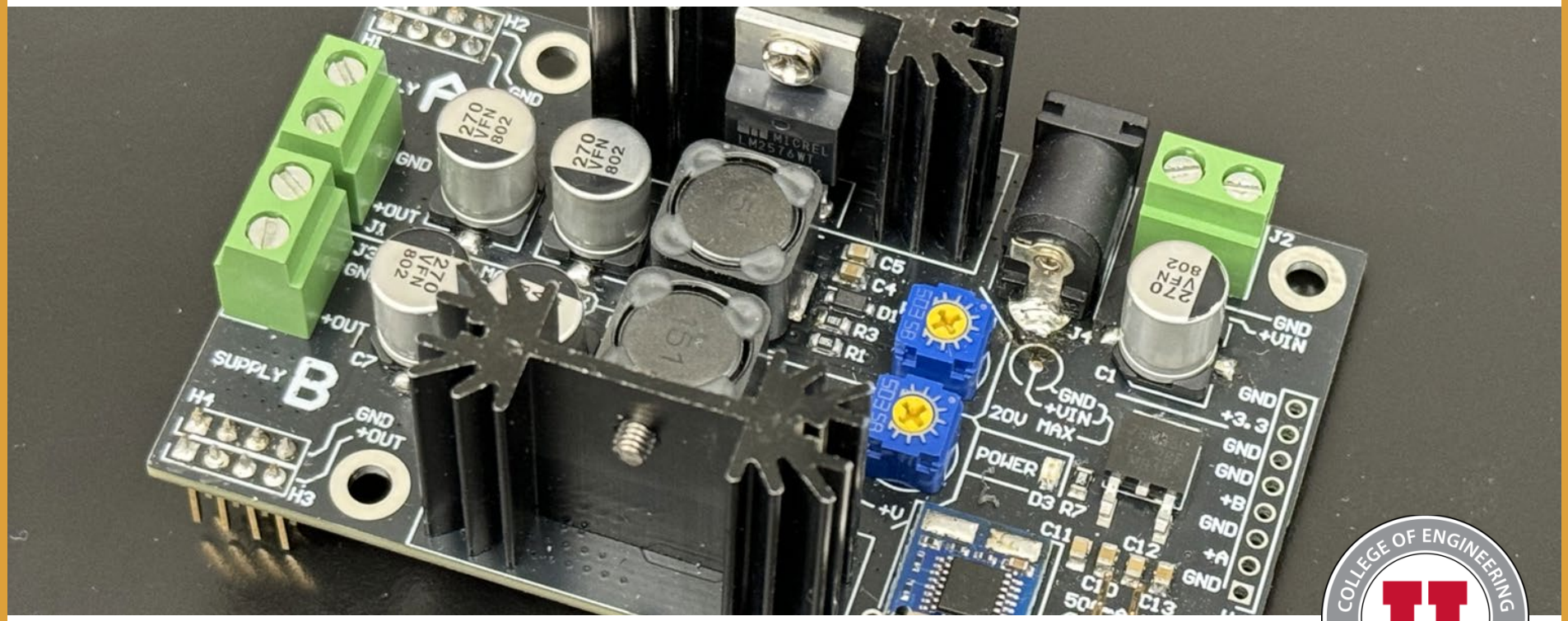
IEEE x FSAE Altium Workshop Week 6: Introduction to Soldering



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Soldering Overview

- Soldering is simply attaching two metal surfaces with a filler metal (solder)
  - Provides both electrical and mechanical connection
- Typically, soldering is performed with a hot iron or hot air
  - Irons are typically used for through-hole components or large SMDs
  - Hot air is typically used for SMDs
- The choice to use hot air or an iron is highly situation-dependent
  - Iron applies local heat
  - Hot air heats a large area

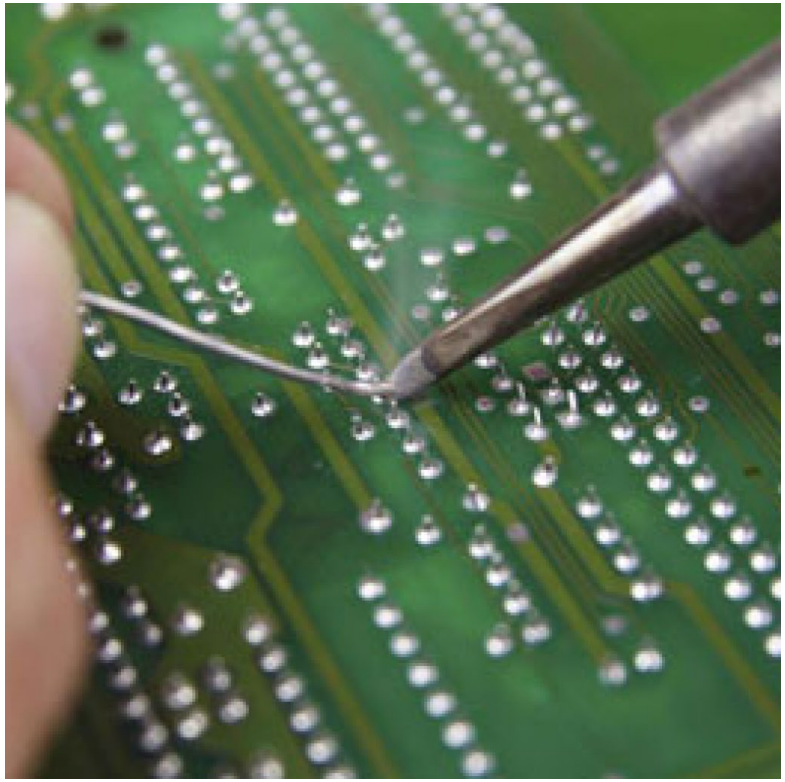


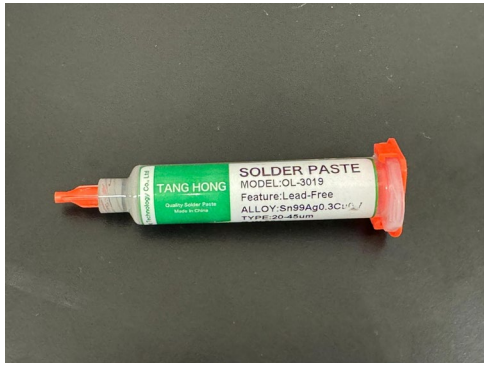
Image credit: RushPCB
https://rushpcb.com/what-is-a-solder-joint/

Solder types

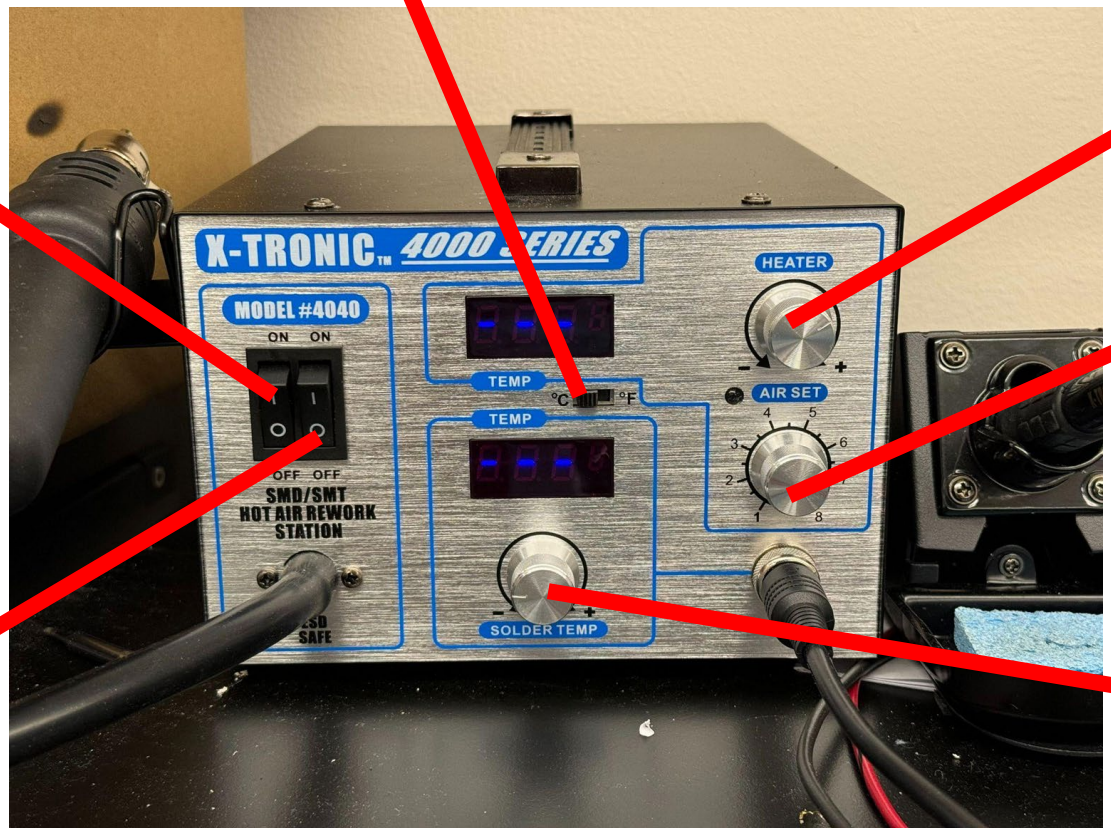
- Solder can have a variety of compositions
  - Can come as a spool (wire) or paste

- Pb (leaded) solder is very easy to use
  - Relatively low melting point (~183°C)
  - Flows very easily
  - Typically Sn 60% Pb 40%

- Pb-Free solder is a bit more difficult to work with
  - Typically used for RoHS compliance
  - Can be mostly tin (Sn 99% Cu 0.7% Ag 0.3%) or part Bi/In
  - Sn99 solder melts at ~217°C
  - Bi/In eutectics can melt as low as ~138/118°C



Solder Stations



Temperature unit

Hot air power switch

Hot air temperature

Hot air "strength"

Soldering iron power switch

Soldering iron temperature

Solder Stations

Temperature unit

Hot air "strength"

Hot air power switch

Multipurpose temperature adjustment

Soldering iron power switch

Important Notes

- NEVER touch tip of soldering iron or hot air gun while in use or shortly after use
- NEVER unplug hot air station while in use
  - Allow heating element to auto-cool when done
  - Turn off hot air with switch on front panel to auto-cool off
    - On 6000 series stations, gun will auto-cool off when placed back in holder
- Solder in a well-ventilated area
- Don’t leave soldering iron or hot air gun on and unattended
  - Leaving soldering iron on for extended periods can damage tip
- Clean and tin soldering iron tip regularly
  - Tin iron before powering off
- Keep temperatures reasonable
  - Start low, increase as needed
  - I typically solder Pb-free around 280-320°C

Questions?

Download Today's Project Files

- Navigate to the workshop GitHub and download today's files listed under **Week06**

https://github.com/AdrianSucahyo/IEEE-PCB-Workshop-Resources-2025