Circuit Design Process 1

- Objective - What do you want to build?
- Constraints & Specification:
  - cost
  - size
  - power consumption
  - operating conditions

Circuit Design Process 2

- Design
  - Component
  - Calculations (Theory)
  - Computer Simulation
    - MultiSim
    - ORCAD
    - PSpice

Circuit Design Process 3

- Testing the Real Circuit
  - Protoboard, PC Board, PCB
  - Debug (easier during this stage)
  - Redesign, modify as needed
**Circuit Design Process 4**

- PCB Design
  - Schematic -> PCB
  - Layout
  - Routing
  - Error Checking

**Design Process 5**

- PCB Manufacturing/Assembly
  - Send design to PCB manufacturer
  - Higher quantity => lower unit price

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**Hand Soldering**

- Cheap and convenient
- Soldering Iron ($10-$300)
- Low maintenance cost
- Not as consistence.

**Soldering**

- Turning on the Soldering Iron
  - Keep iron tip clear of obstacles
    - Iron tip can get to 500ºF
  - Set temperature ~375ºF
  - Add water to sponge
  - Wait until the tip gets hot
- Hard to explain how to solder.
**Making a Connection**

- Pick up and hold the iron like a pencil.
- Hold the solder with your other hand.
- Touch the tip of the iron to the component lead and pad for 2 seconds to preheat.
- Touch the solder to the preheated lead and pad. Solder should start to flow.
- The joint should be cone shaped and shiny.
- Cut the excess lead from the component.

**Common Mistakes**

- Using too much or too little Solder
- Iron tip is not kept clean (use the sponge)
- Burning the component (ICs)
- Cold Joint
  - Moving the component before it cools
  - Will result in inconsistent and weak connection

**Soldering Safety**

- Don’t touch the tip
- Put the iron back in its stand after use
- Work in a well ventilated area
- Remember to turn OFF the soldering iron after use
- Wash your hands after soldering