

# Soldering

Soldering is a process in which two or more metal items are joined together by melting and flowing a filler metal (solder) into the joint, the filler metal having a lower melting point than the adjoining metal. Soldering differs from welding in that soldering does not involve melting the work pieces.

A temperature controlled soldering station



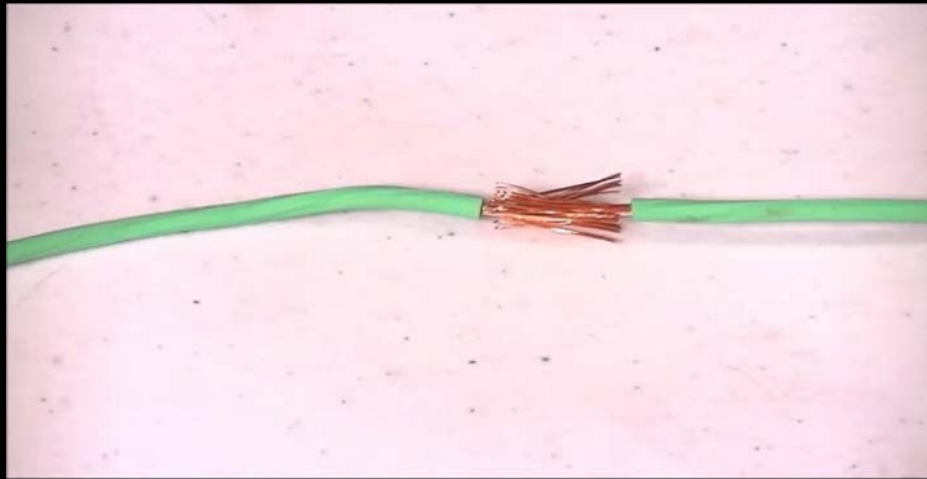


The solder we use in electronics work is rosin core solder. The typical composition is 60% tin and 40% lead with a inner cavity filled with rosin flux. The flux flow out of the solder and forms a coating over the soldering are that prevents oxidation and helps the solder stick.

Strip Wires remove the shielding to expose the copper wire

Done here with an automatic wire stripper





Twist wires together

Step 1  
Clean the soldering tip on a damp sponge

You can not do this often enough.

The solder oxidizes rapidly, the sponge removes the excess solder and oxidation. A clean tip is essential.



### Soldering technique

Use the soldering iron to heat up the wire, then add solder to the junction between iron and wire, when the wire is sufficiently heated, the solder will fill the wires like a sponge.



Spring steel wire can be soldered in almost the same way. The steel should be rubbed down with some fine sandpaper so that the solder sticks well.



Washers can also be soldered easily.

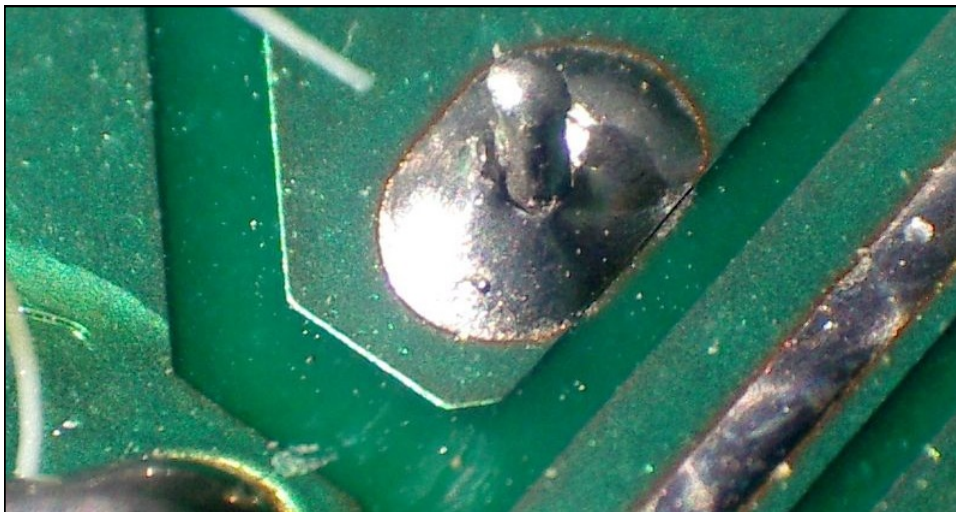


You can even solder to the motor housing if you do it quickly. If you linger too long it could damage the motor.



Soldering wires to a circuit board. Circuit boards have pads around the holes for wires, these are pre-tinned so that solder sticks to them very well.

The goal here is to heat the pad and wire quickly and fill completely with solder. Best rule of thumb is to try and get you soldering done in no more than 5 seconds per joint. Holding the heat on the pad for too long can damage components or delaminate the circuit board.



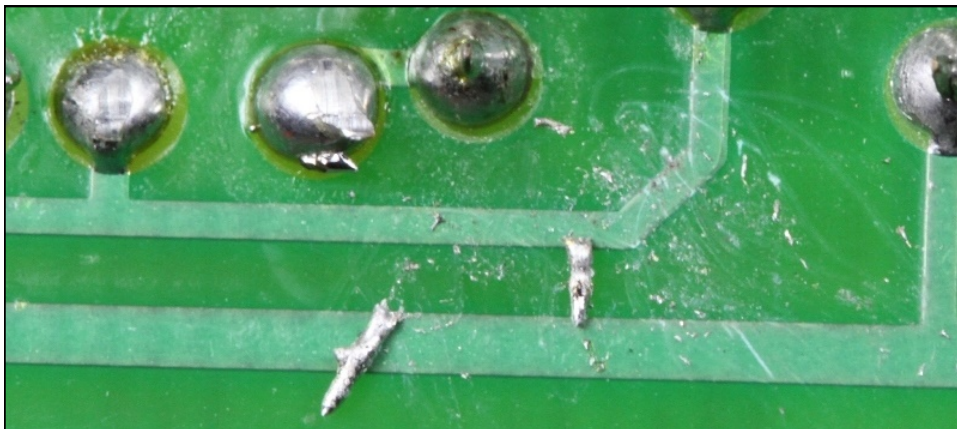
Some soldering errors

The cold joint- solder sticks to the pad or the wire but not both. Can work intermittently, which makes it hard to find.





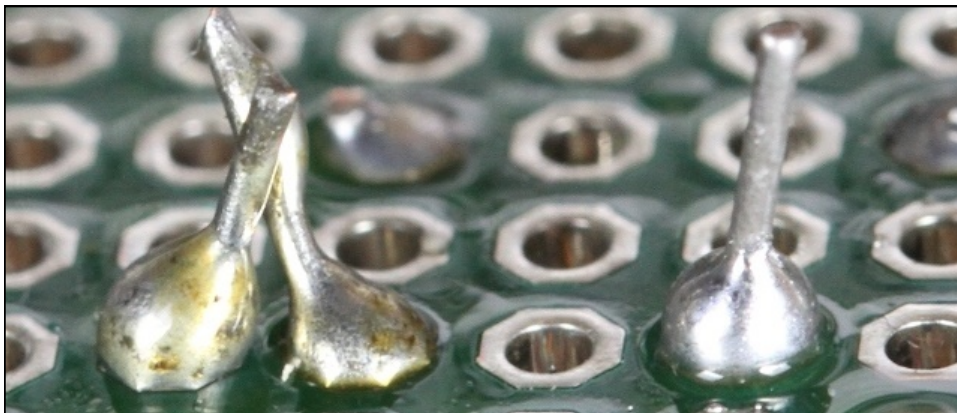
Lifted Pad- heating for too long can cause the printed circuit board to fall apart. A lifted pad means the component is not longer fastened in place and can move around and fail.



Stray blobs of solder- these are loosely glued to the board with rosin flux, they can come loose and short out the board.

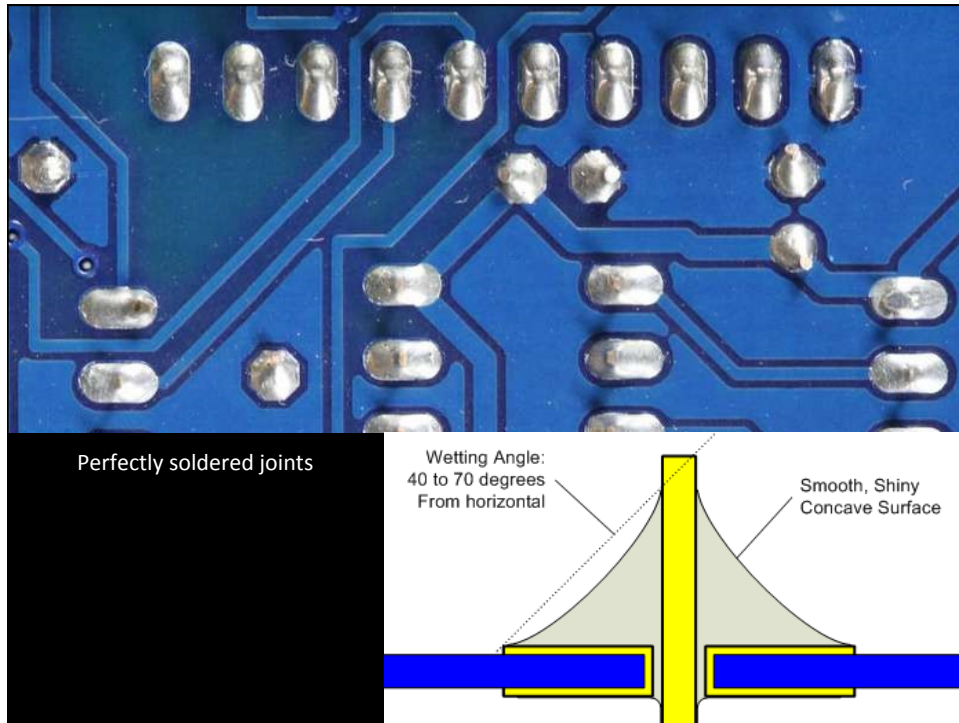


Solder bridge- solder bridges the space between 2 pads. Will unintended connections in the circuit. Easy to remove by getting the blob hot and tapping the circuit board to dislodge extra solder.



Untrimmed wires – make sure and cut these so that they cannot touch each other causing shorts.





### The drawbot circuit

A circuit is how we describe an electrical construction.

Power flows for its source (either a battery or a wall plug) through conductors(wires), through one or more devices and back into the source.

The condition of a circuit without a device (where the power wires are connected together -is called a short. This is a bad situation and will cause damage to wires, battery(or a popped fuse if you are at home).

With the batteries and motor supplied for your drawbot, the motor is hooked up to the battery pack by simply attaching one wire of the battery to one wire of the motor and then the second wire of the motor to the second wire of the battery pack. This completes the circuit and the motor should spin until the battery is discharged.

