

Essential Hand Tools

I strongly recommend that you look up FIRST Team 180s white paper "Guide to Hand Tools" on Chief Delphi (<http://www.chiefdelphi.com>). See also the tools section in "Some information for Silicon Valley Rookie Teams."

The most important tool is safety glasses. They must be worn *without exception* when working with tools. A couple of pairs of gloves are also essential

- Mechanical Tools** (For the basic wrenches, sockets & screwdrivers, buy Sears Craftsman if you can & don't buy their Companion brand)
- Tool boxes & plastic parts cases. For everyday work, nothing beats a rolling tool chest. Tools can stay organized and easy to find. For competitions, you may want some tool boxes with handles. As your supply of screws, nuts, & electronics parts grows, it's best to get plastic parts boxes with latching covers. Some people use small bins, but we find that they tend to spill when you take them to competitions.
 - Combination wrenches, both US & metric
 - Socket sets, 3/8" & 1/4" drives, US & metric. You don't need 1/2 in drive sockets
 - Screwdrivers - All sizes and types. Two or three of the more common types.
 - Pliers, larger needlenose, diagonal, lineman's, ViseGrip, and Channellock
 - Hex Key (Allen) Wrenches, US & Metric (Get the 'L' shaped ones, the folding sets are awkward for regular use.)
 - Cordless drill, drill bits, driver bits, & extra batteries. It seems unlikely that you can get by without at least one cordless drill.
 - Deburring Tool
 - Ball Peen Hammer
 - Deadblow hammer, or at least a cheap rubber mallet
 - Hacksaw
 - Tape Measure (a 25 ft. tape at least)

- Ruler & yardstick
- Sheet metal snips (tin-snips) the ones with the loop handles. Aviation snips (the 3 different versions that cut left, right, and straight) are nice but not immediately necessary
- Square, combination or fixed.
- Metal Files & file card
- Drift punches
- C-Clamps & bar clamps
- PVC cutter
- Miterbox
- Utility knife (of course, you'll have to make sure school rules allow them, but it's hard to get along without one. Sears makes Handi-cut pliers that work well on rubber tubing.)



Carpentry Tools (especially for building field elements & the shipping crate)

- Handsaw
- Circular saw
- Scroll saw
- Claw Hammer
- Carpenter's Square
- Level

Electrical

- Wire Cutters, small ones for close work
- Small needle-nose pliers
- Wire Strippers



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- Crimp Tools for quick disconnects (McMaster #69555K62 or equivalent).
- 25 Watt, pencil-style soldering iron. The temperature controlled version is nice, but not always necessary

Extras (Not necessary at first, but over time, you'll want to acquire them)

- Step drill for making sheet metal holes
- Drill Press
- Miter Saw or better, a chop saw, including a blade that can cut aluminum
- Band saw (w/ several extra blades on hand for cutting aluminum)
- Table Saw
- Milling Machine (CNC or manual)
- Metal Lathe