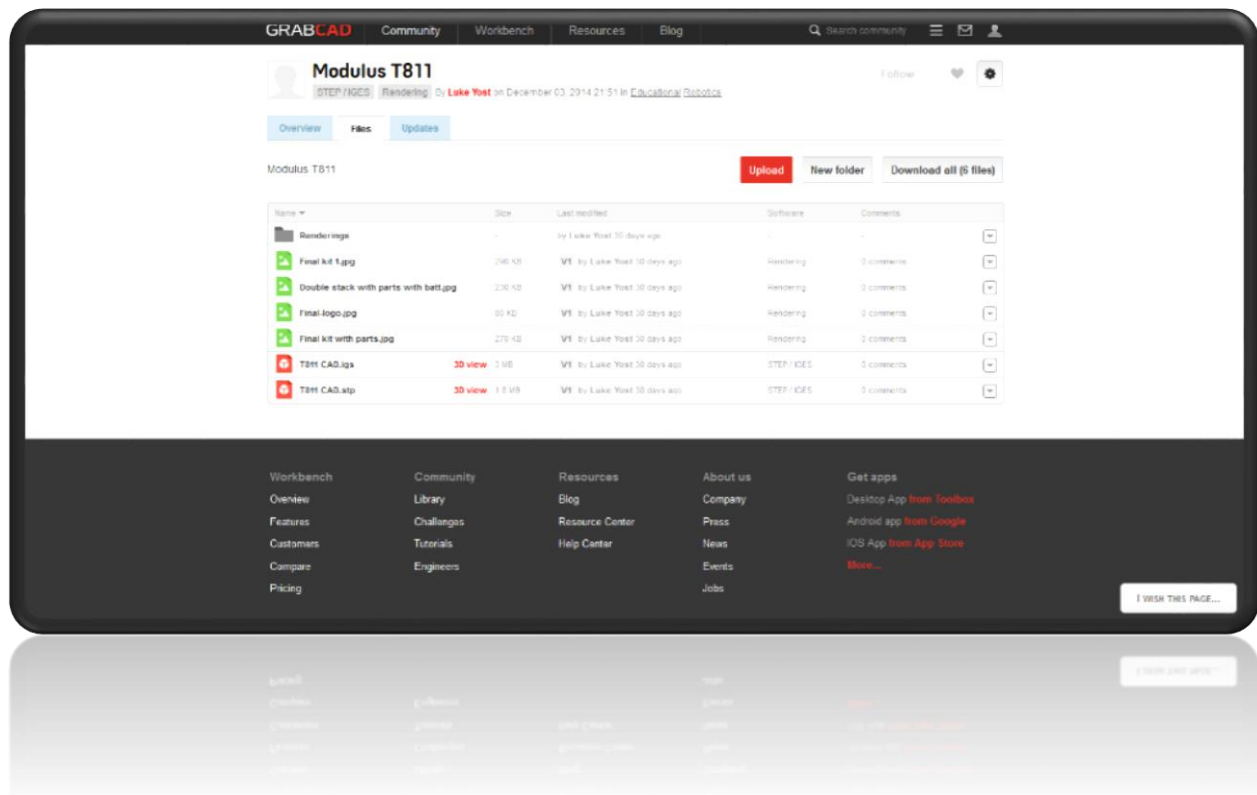2015

Modulus LLC

T811 Manual
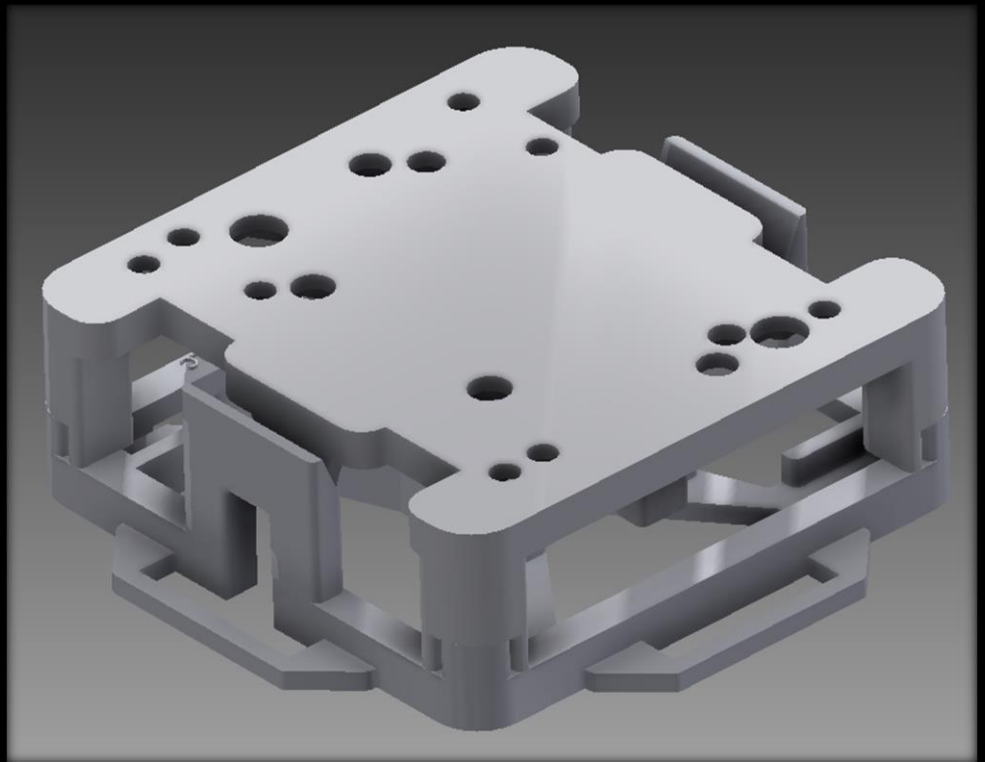
Outline

Thank you!

Thank you for ordering a T811 kit from Modulus! Good luck with you build and competitions. Let us know about your success!

CAD

CAD for the T811 and adaptor plates can be found at:

https://grabcad.com/library/modulus-t811-1


Before you "Board"

- Belt sander (or sanding head for the Dremel 200)
- Dremel 200 or handheld cutting tool for cutting clips off some of the mounts
- Base board material (lexan, wood, pegboard, etc.) (suggestion: ¼ inch thick perforated polycarbonate)
- Bolts for Cells: ½ inch long #10-24 bolts with 10-24 lock nuts
  *10-32 work just as well but you need 10-32 lock nuts (different thread count)
  **Cells were originally designed for use with 1/4x20 bolts. This works slightly better with perforated board alignment, but requires drilling out the center hole.

- Bolts for hardware. #6-32 machine screws (most commonly used with hardware), several #8 machine screws, several #10-32 machine screws, several ¼ inch machine screws, 4 #4-32 machine screws. Associated lock nuts.
- Plastic Glue that works with ABS plastic (very common plastic). ABS cement works as well.(Not required but some may prefer to glue certain mounts together)
- Wiring materials
- Anderson Powerpole Connectors (optional, but highly suggested for hardware swapping due to wiring modularity)

Step 1: Pre-Robot

Before you do anything with hardware or the robot, check your parts.

1. Make sure you received the number of parts you ordered.
2.
3. Check the edges of all the parts, especially the cells. Early run parts have excess material at the corners due to the injection process. It is non critical to remove the excess material, but it makes laying the Cell's out in a grid much easier. The best tool for this is a Dremel 200 with a sanding head. A belt sander works well too. It is also possible to carve off the material with a knife.
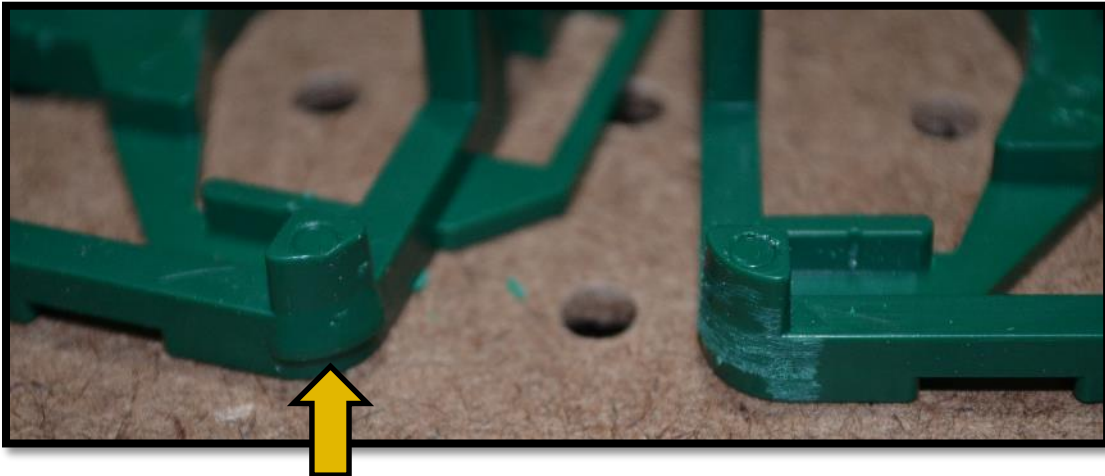
*This should only take a few minutes to fix and is a great opportunity for a new student to learn how to use the sanding tools. If this is found to be time consuming, start painting your mounts during this to be more time efficient.

Step 2: Paint (Optional)
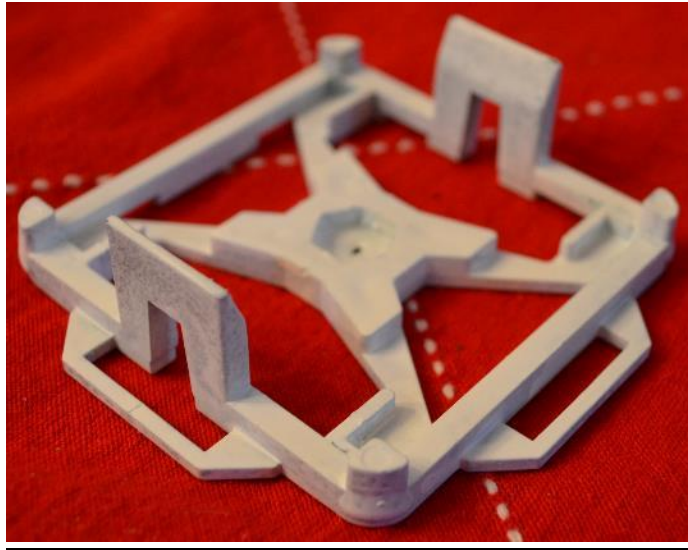
Most kits will come in a homogeneous color of either natural or black. Color variance is due to plastic availability during run orders. Unless these parts are being used on a practice bot….paint them! It's a great project to learn how to paint plastic parts.

- Be sure to not add too much paint especially near holes and powerpole slots
- Parts are made with ABS plastic, so "plastic" compatible spray paint should work fine.
- Paint with team colors! Send pictures of your painted parts to 811modulus@gmail.com and we'll put them on our site.

Step 3: Bolting Hardware to Mounts

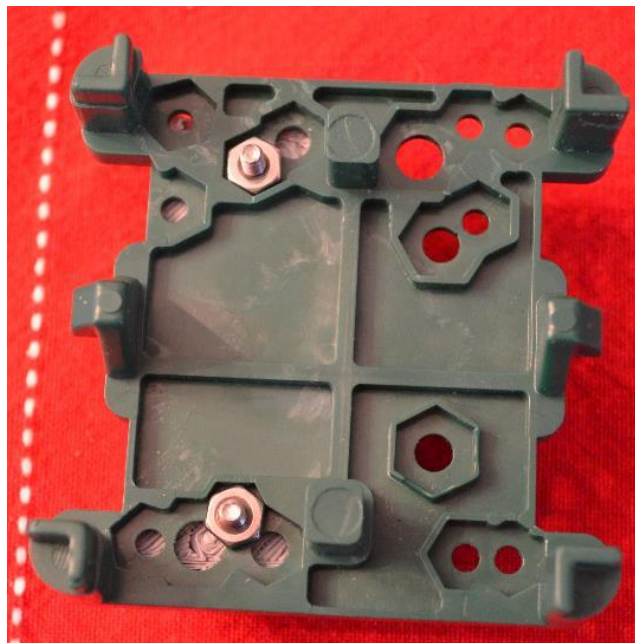**Step 4 can be done concurrently. If there are extra hands available, split up the workload.

Most hardware components use #6 bolts. The power distribution boards and spike power relays are designed to use #10 bolts. The power switch uses ¼ inch bolts.

The following pictures show the proper bolt locations for each hardware type.
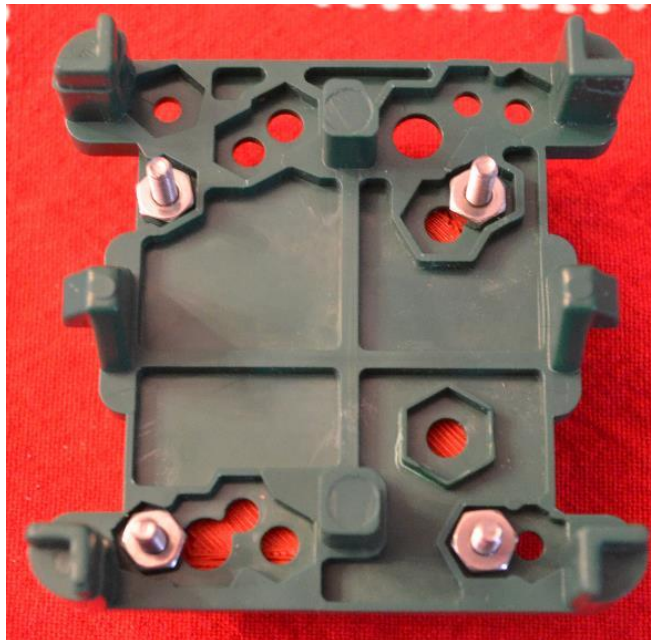
Talon 2014:
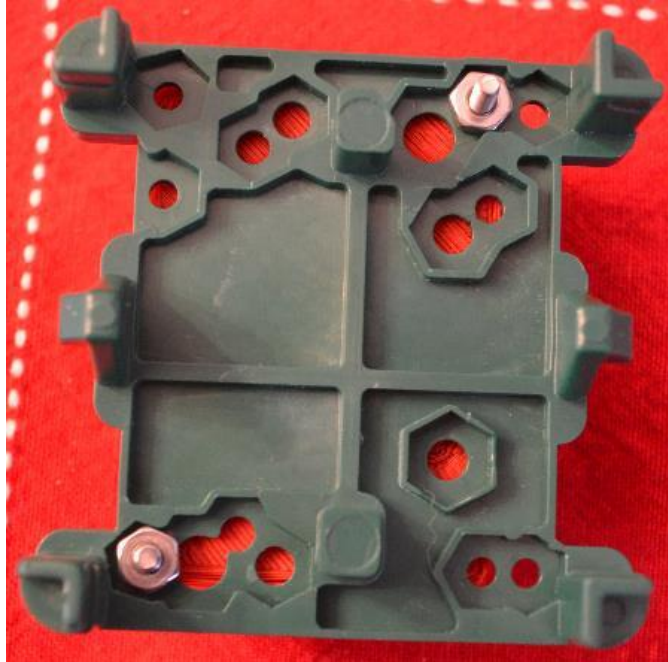
Talon SRX and Victor SP:

Pneumatic Control Module:
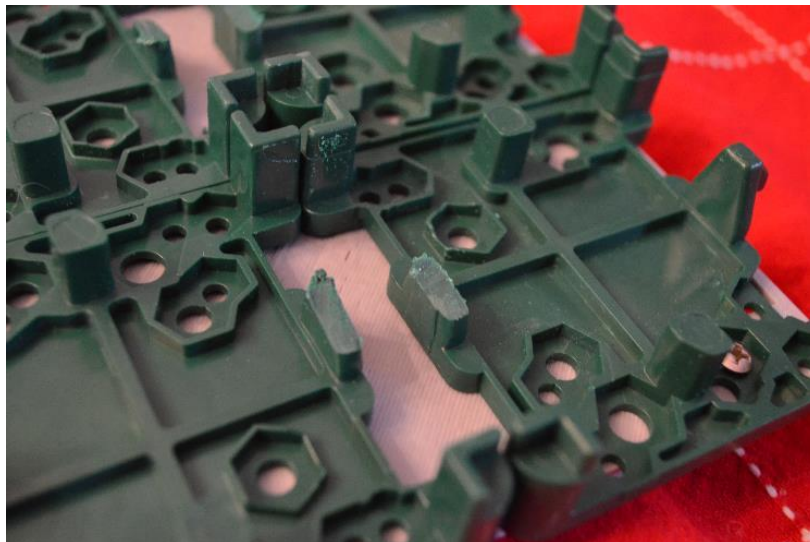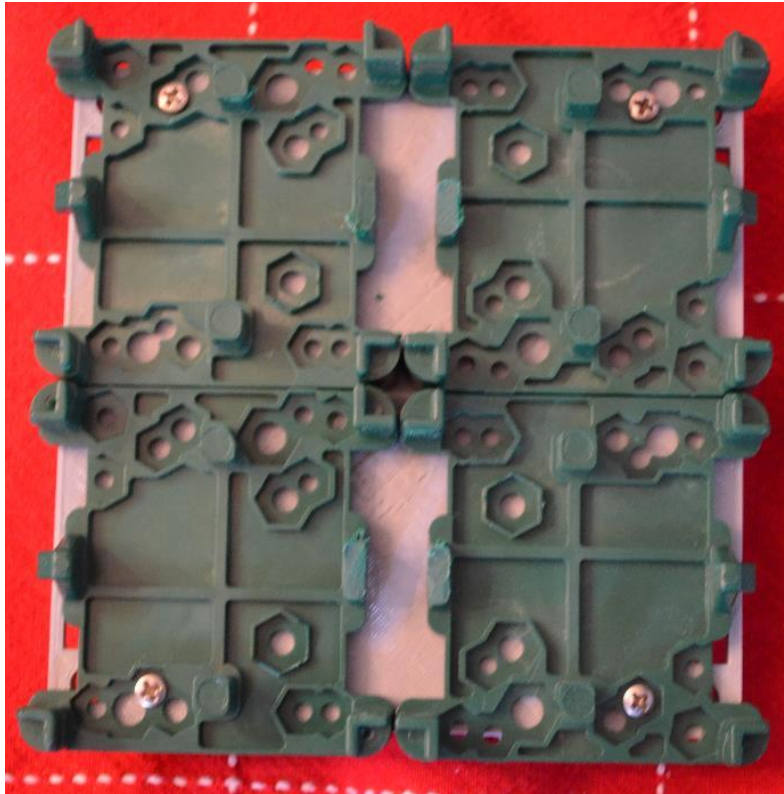

Voltage Control Module:

Spike Relay:

Power Switch:

RobRio:

*Note that the inner tabs are cut off. This was done with a Dremel 200. Cut before bolting to hardware. It is also strongly recommended to glue the mounts together (not to the rio) so that they do not rotate.
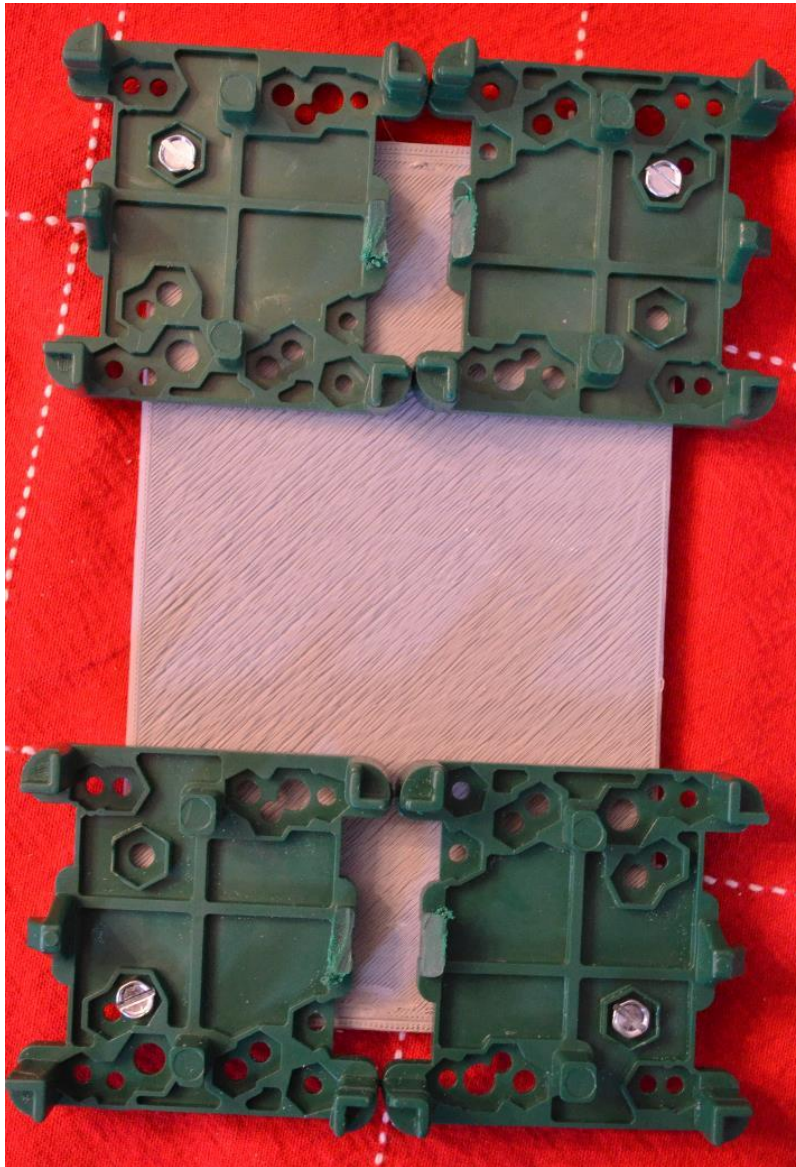
Power Distribution Panel 2015:

*Note that the inner tabs are cut off. This was done with a Dremel 200. Cut before bolting to hardware. It is also strongly recommended to glue the mounts together (not to the PDP) so that they do not rotate.


*The 3D printed model of the PDP was having some issues with alignment. It may be easier to use #6 bolts or sand the edges of the mounts.

Step 4: Board Planning

I. Plan the "Cell Landscape" on your robot.

- Will there be one large grid of cells or several clusters of cells?
- Will your board be double-sided with cells?
- Cut your control board pieces.
- Try to design the board placement on the robot for easy access or even quick attachment.
- Account for 1 inch height increase in board height
- CAD it!

Step 5: Cell Integration
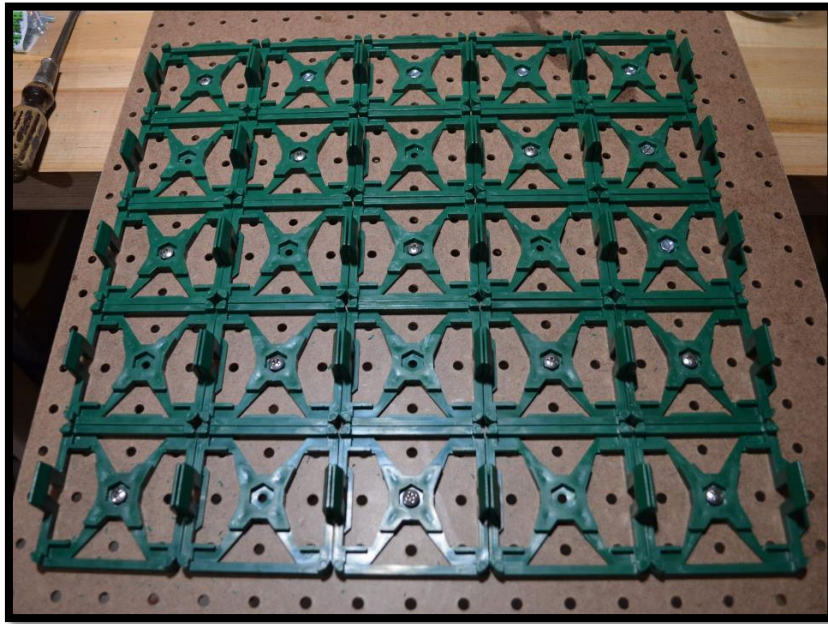
I. Start laying out cells on cut boards. Drill out holes for each cell on the robot (even if you don't plan to bolt down each cell, just in case). These holes should be spaced 3 inches on center.
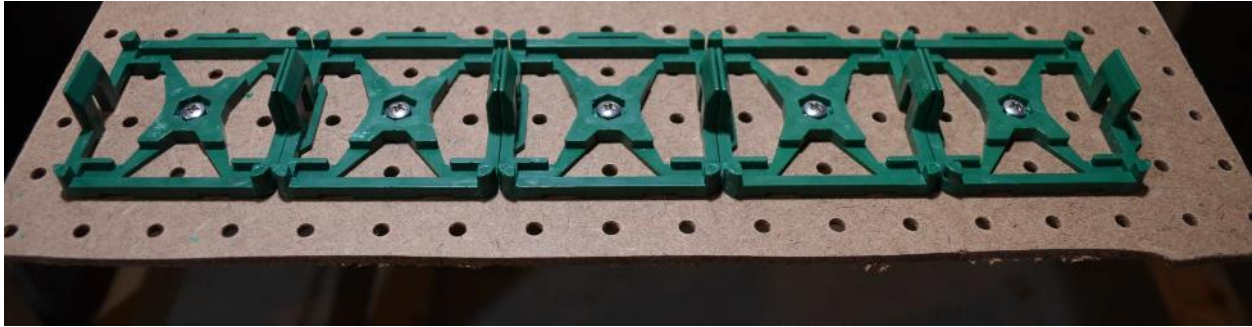
II.

Time to bolt! It is strongly suggested that you bolt each cell, but due to lip overlap it is not required.

Start with the lower left corner of your board. Have one tab extending right and forward.

Lay out a row of cells. You will have to bolt down the furthest right cell in each row. Bolt down at least every other cell in the row.

Continue adding rows in the same fashion.

Each cell in the last row will need to be bolted down. This is because the lips are not secured by other cells

At the end, the top row and right column of cells should be bolted down. Then at least 50% of the other cells should be bolted down.

III. Trimming!

If the exposed lips take up unnecessary space on your robot, feel free to cut them off. Just be careful about cutting near any wires or hardware.

Step 6: Hardware Layout

When Cells are adjacent to one another, the tabs become more difficult to access by hand. If you are unable to work the tabs by hand, a flat head screw driver is a very easy way to unclip mounts.

It is easier to bend the clip on the side of the cell without a lip. This is because the slots on the bottom make it easier to flex the plastic.

**Do not clip in mounts under the PDP. This space should be left for extra wires and those mounts should be used for spare motor controllers or other spares.

***Before clipping in hardware parts that use more than one mount (Power distribution panel/board or RoboRio), be sure that the extra internal hooks on the mount are cut off. If these parts are clipped in without removing the hooks, it will be extremely difficult to unclip the mounts. You may have to unbolt the hardware.

Other than that, clip in your hardware where it makes the most sense. Motor controllers near the power distribution panel. Power distribution panel near the battery and appropriately oriented, etc. Think about how the final wiring will work.

Step 7: Wire!

Anderson Powerpole connectors are great for modularity in wiring. Each cell can lock down two of these connectors and is great for use with motor controllers.

When planning wire paths and appropriate length, remember you have the sublevel where you can route wires or even bundle them (so that you don't have to cut them to the PERFECT length).

Wire Away! Keep it clean. Make the judges happy, mentors proud, and sponsors impressed.

Step 8: Pictures

Send us your pictures! Email them to 811modulus@gmail.com and we'll put them on our site and social media. Be sure to include your team number.

Contact Info

Any questions or concerns can be emailed to 811modulus@gmail.com.