

This is an informal walkthrough / troubleshoot guide detailing how the author 3D printed parts, for any future students who might need this information. The author heavily recommends reading the entire document, including the 'what not to do' section at the bottom of this document.

These are the two thingiverse projects we used in order to create our quadrupedal robot.

<https://www.thingiverse.com/thing:4937631>

<https://www.thingiverse.com/thing:4559827>

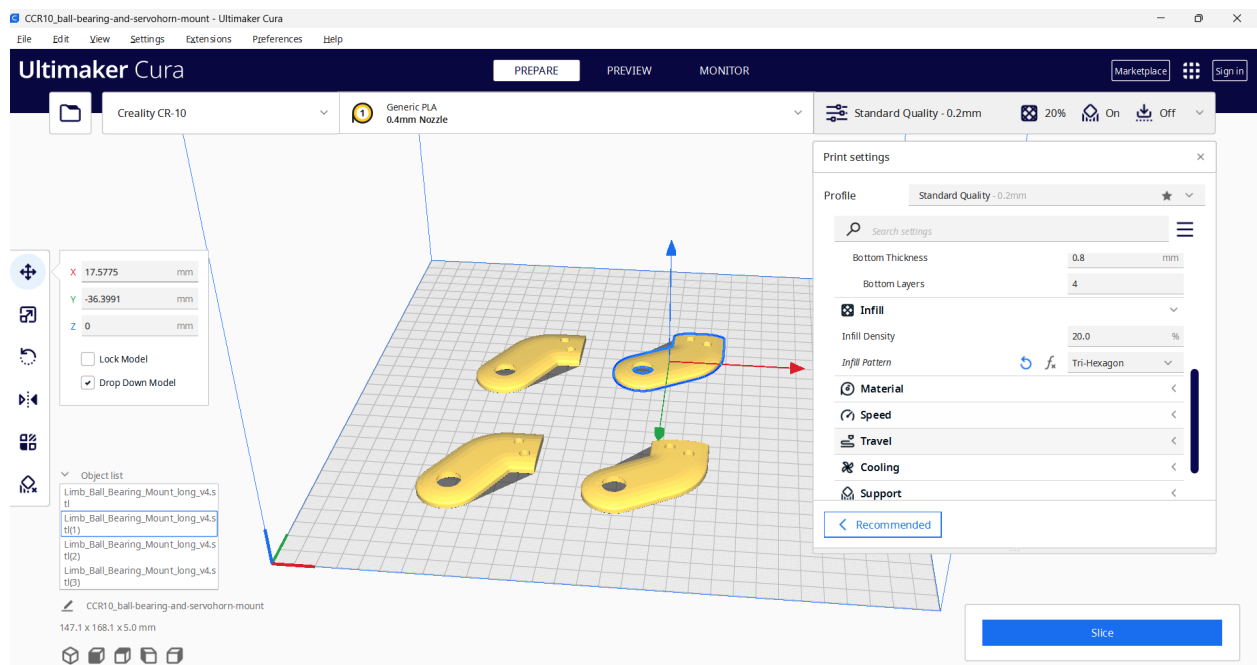
Please contact the professor Dr. Vargas at noe.vargas@utrgv.edu who is responsible for the Makerspace, where the 3D print lab is located. He will teach you about Makerspace printers, which print faster than Creality printers but are not as accurate/precise. We had to use Creality printers in order to get the parts in the correct geometries needed for this project.

Keep in mind shorts are not allowed in the Makerspace. Long-legged clothing only. No sandals, only footwear that covers your entire foot.

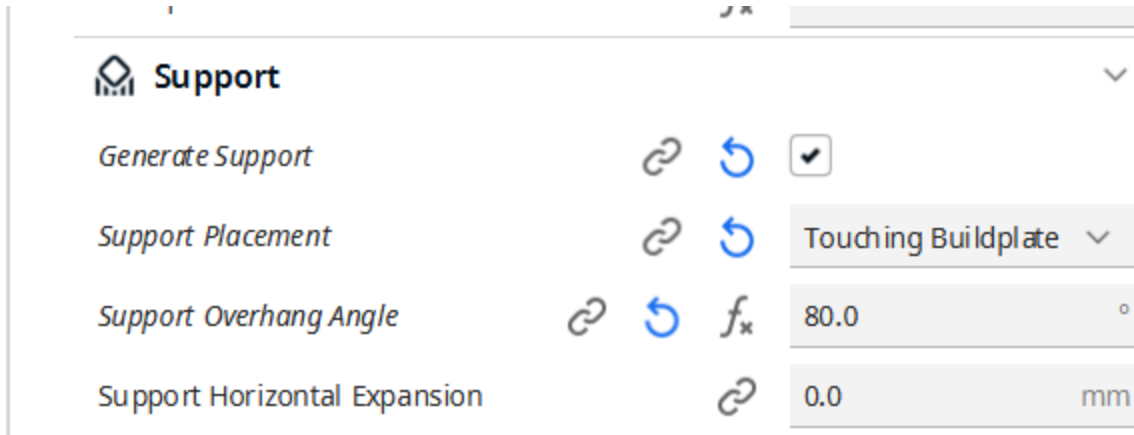
You should also learn how to use Creality on your own time. For the splicer, the author used Ultimaker Cura, which can be found here:

<https://ultimaker.com/software/ultimaker-cura>

Print settings for this splicer are located in the top right. The default infill is 20.0. The author recommends 70.0 for parts undergoing significant load/tension/potential breaking points. 100.0 infill is possible, but please reserve this only for the parts undergoing the most amount of stress and tension as 100.0 infill parts require a lot of filament. There is a larger difference in infill quality from 20 to 50 than 70 to 100.

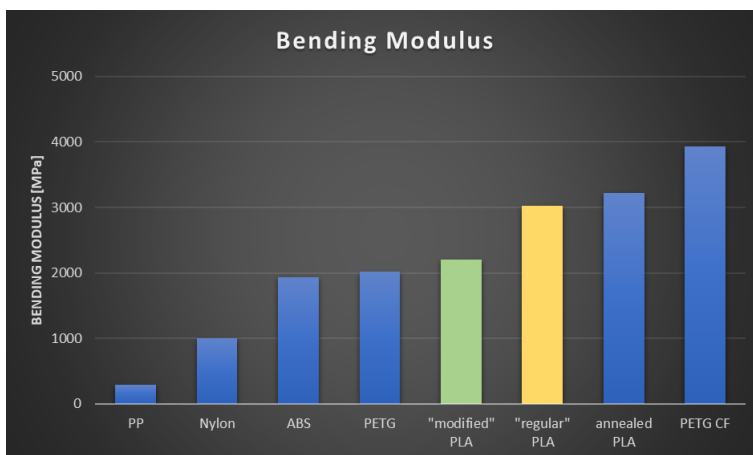


The higher the support overhead angle, the less supports will be printed. Less supports means you have an easier time removing supports. More supports means your print is more likely to be successful.



The Makerspace offers a variety of colors to print with, the author recommends just using whatever color is ready to go.

The Makerspace offers a variety of materials to print with, the author recommends TPU for any flexible parts and PLA otherwise. Other materials, like PETG are actually not as bend-resistant as PLA for this project.



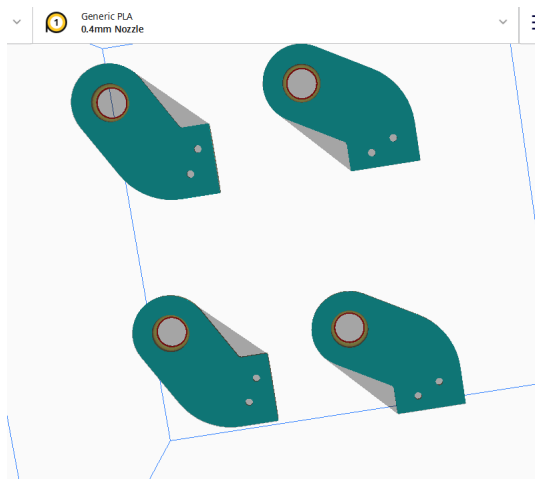
Please give this a quick read, where the above picture comes from.

<https://www.cnckitchen.com/blog/the-difference-of-pla-and-pla-tested-feat-polymaker>

Basically, the Bending Modulus is how much your material resists bending.

Please consult this bullet point list before each and every print:

- Make sure that 'raft' is selected in build plate adhesion, as this helps the Teaching Assistants more easily remove the part from the print plate.
- Make sure that the printing temperature and build plate temperature are set to whatever printer you are using. Most Creality printers use the same temperatures, but there is a significant difference between certain printers, like Creality vs Makerbot.
 - There is also a significant difference between materials. For example, TPU will need different settings from PLA.



- - Ensure that the bottom of each part is oriented correctly, we want as much of the part touching the build plate as possible.
- **ALWAYS CONSULT A TEACHING ASSISTANT BEFORE PRINTING!**
 - Specify desired printing material. Ask the assistant to check your settings.

After a print:

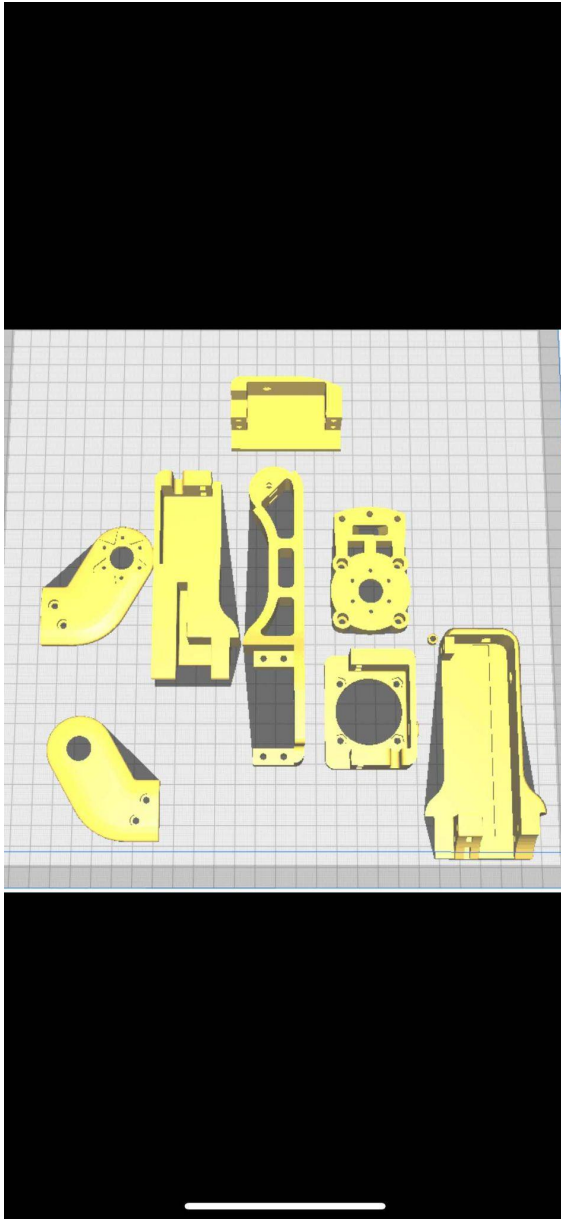
- Ask the Teaching Assistant to remove the parts from the print plate of a printer if you are unable to do so yourself.
- Ask the Teaching Assistant to remove any supports/rafts that are difficult for you to remove, it is better to ask an assistant than to accidentally break a part and have to waste time and filament reprinting.

What not to do:

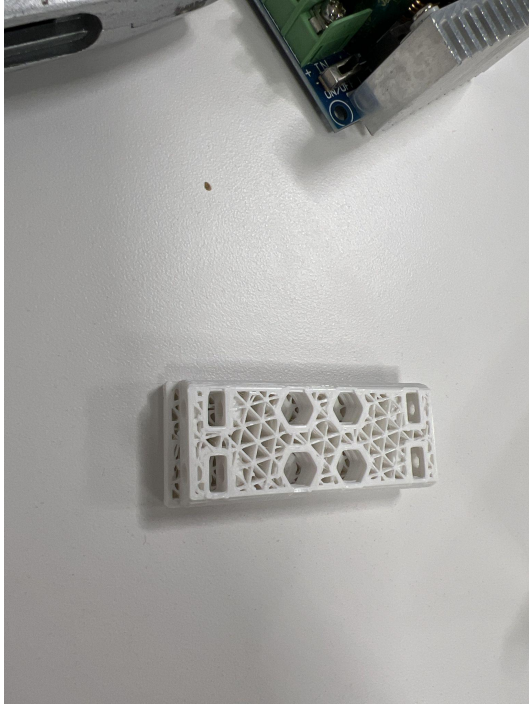
- Print a part that used the wrong material.



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- Printed using TPU not PLA.



- This is a bad print destined to fail. Too many complex parts all at once. Parts are too close together. For more complex parts, 4-5 on a single print board is the maximum, and spread out more evenly than this example.



- Try to avoid grouping large and small items together. In the thingiverse files, there is a `Shoulder_Joint_Ball_Bearing_Pin_.stl` file that is smaller than other parts. The author tried printing this part alongside much larger parts. Since this pin was finished printing on the print board earlier than the other parts, it cooled down, and then fell off and messed up one of the axis on the printer. The Teaching Assistants had to spend hours fixing the printer afterwards. Group larger parts together, and smaller parts together. For the pin specifically, please try printing these separately.

Finally, sometimes you'll have leftover parts. For example, this next part isn't necessarily printed wrong, but we wanted this part printed again with a higher infill because we had to drill/insert screws. Just keep these parts around for backup use.

