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Team F: ADD_IN

Teammates: Nikhil Baheti, Dan Berman and Astha Prasad

ILR07

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I - Individual progress

My goals this week were to set up the new printer and test it, test the new nozzle and heat block Dan machines and set up the formal testing process for future parts.

1.1 - Setting up the new printer:

This took little time as the printer needed very few assemblies. I was happily surprised to see how different, and improved, this new version 'Makergear M2 V4' is compared to the one we had. The smaller heater and heat block inspired a redesign of our ADD_IN heat block to be similar. Also the extruder mount is made of metal and much sturdier than the 3D printed part in the old version. After setting up the printer I ran a few test prints to make sure everything was in working order.

1.2 - Setting up the formal testing process:

For this part I started a spreadsheet with columns representing all the parameters that can possibly affect the print quality in our software. Figure 1.2 represents the first rows of the sheet.

#	Date	Part description	Setup used description	Material	Layer height	Perimeters	Fill density	Fill pattern	Raft layers #

Speed %	Extruder temperature	Bed Temperature	Z offset	Retraction	Insertion layer?	Result description	Picture

Figure 1.2: Testing spread sheet

I also created a Dropbox folder to store the numbered G-code used for the testing, to easily enable repeatability of each experiment.

After doing that I started using the new printer for standard (not ADD_IN specific) testing, such as figuring out the surfaces on which the filament has good adhesion. This was done on the new printer as it was shipped since we wanted to test general properties of 3D printing, and on the old one we were doing mechanical and firmware updates. This testing is done by taping small sheets of different materials that might constitute COTS items, such as aluminum, fiberglass, plastic and PBC substrate. Then I print a small cube on the surface and test the

adhesion to the surface. I will improve this test by designing a part that has a hook on top to connect with a spring scale and measure the maximum normal stress.

1.3 - Testing the new hot ends:

This part was the most challenging. After the machining I mounted the heat block shown in figure 1.3 and started testing it, and after a few seconds started clogging at the heat block level. After excluding some other possibilities, such as air gaps, I realized the clogging was due to a small misalignment in the heat block between the threaded hole for the barrel and the one for the nozzle, which impeded the flow of filament. So I will resume testing after resolving this issue. The other hot end designed by Dan was able to extrude, although I did not conduct testing on the printer yet because it was not ready to be mounted at this time.
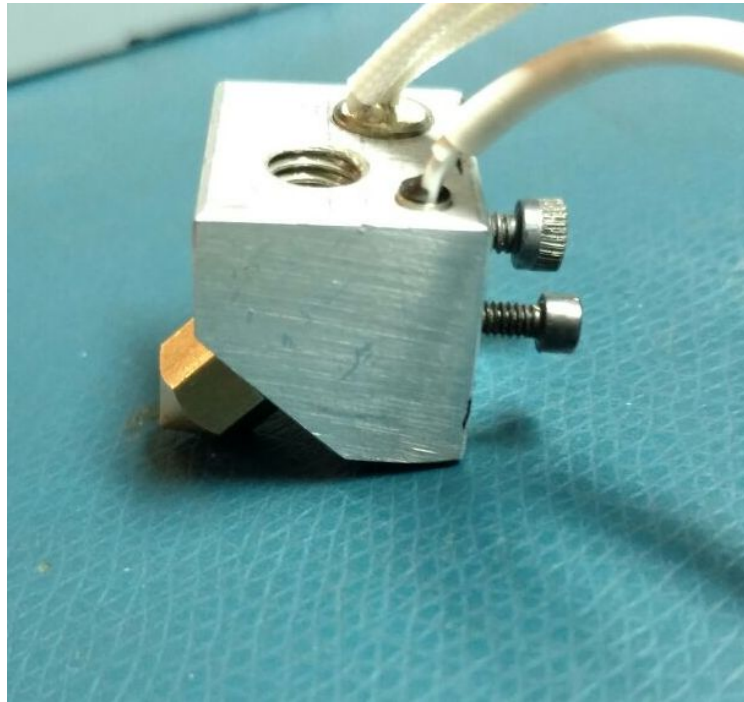

Figure 1.3 New heat block

II - Challenges

The challenges that I encountered this week were mostly related to mounting and un-mounting the hot end, and figuring out the clogging issue. Since after each clogging and the hot end needs to be hot for un-mounting then the filament cleaned in an acetone bath before retrying. It was also not possible to test printing while rotating because of issues with the firmware that we are working on.

III - Teamwork

These past two weeks, Dan and Astha worked on the GUI for the software. Nikhil was debugging the firmware and also Dan machined the new nozzle, the barrel and heat block.

IV - Future Plans

Our future plans are to fix the issues we currently have, I will be woroking on the mechanical ones and Nikhil the firmware issues, we will then resume the testing process. And Dan and Astha will be doing improvements on the software and path planning algorithms.