Labook: December 4th 2019

The freezer has been having a hard time. Something about switching it to generator power meant that one of the freezer's pumps went down so the freezer started warming up. However, by the following day it seemed to be set back to -35 deg. C. It couldn't much colder but it was stable. At 5pm on Monday it was ay -35 deg. C. However, when we got in at 6:15 am it had risen to -11. Matt and I bought 50 lb of dry ice and moved the glue into a 2 cubic foot ice chest with the dry ice. The vendor recommended defrosting the freezer to reset the pump after a power cycle didn't help. We let the freezer warm up and then Matt powered it up again. By this morning it was back to -52 deg. C. However, we still don;t know what about it being switched over to generator caused it to fail.
This highlights various issues:

- We need temperature monitoring.
- We need to understand what happened to freezer
- We need a backup storage option.
- We need to factor this into the risk matrix and factor it into whether we want to glue this way.

With the above in mind, I ran the glue both yesterday after we moved it to the ice chest, and this morning. The notes below are from this morning:

I've decided to run 3 mass tests and attempt to run the snowflake single-chip pattern. Aidan shared some of his notes with me yesterday so I now know some of the settings. He's told me the following:

<u>Singles:</u>
File_2019Aug29_quad1.cpd
File_2019Aug29_quad2.cpd
File_2019Aug29_triplet.cpd

the 7.5 psi was set for the quad pattern
i was using 4 psi for the singles

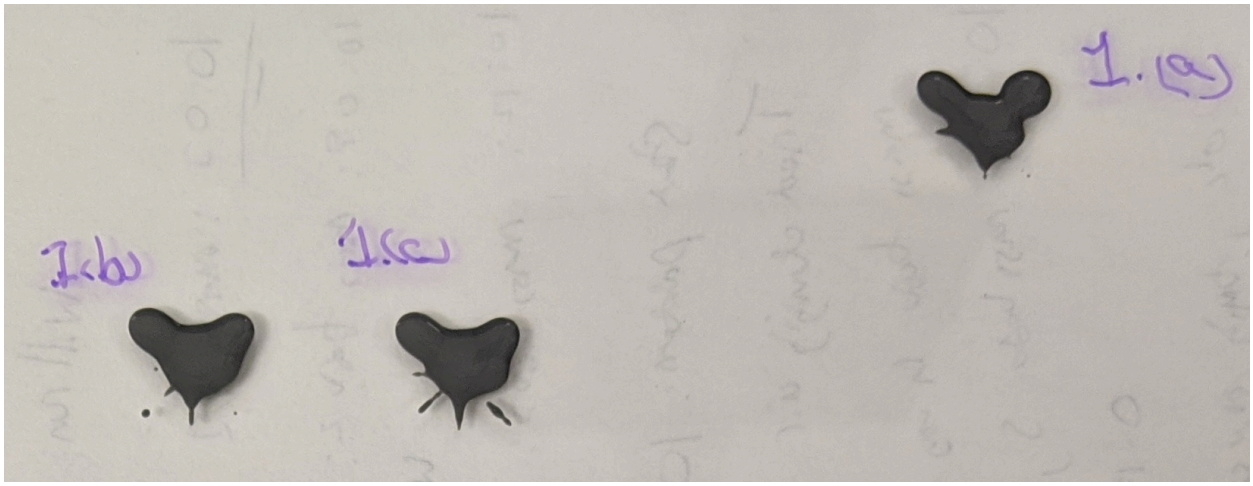
Something I've noticed is that of the 3 presets saved to the EFD, none of them have pressure of 4 psi. I'm going to try starting from the preset 3:

- 7 PSI,
- 7.5 H20 for vacuum,
- 1 second air pulse.

I also switched out the stringe tip with the correct 16 gauge, 1/4 " blunt end tip (charcoal).

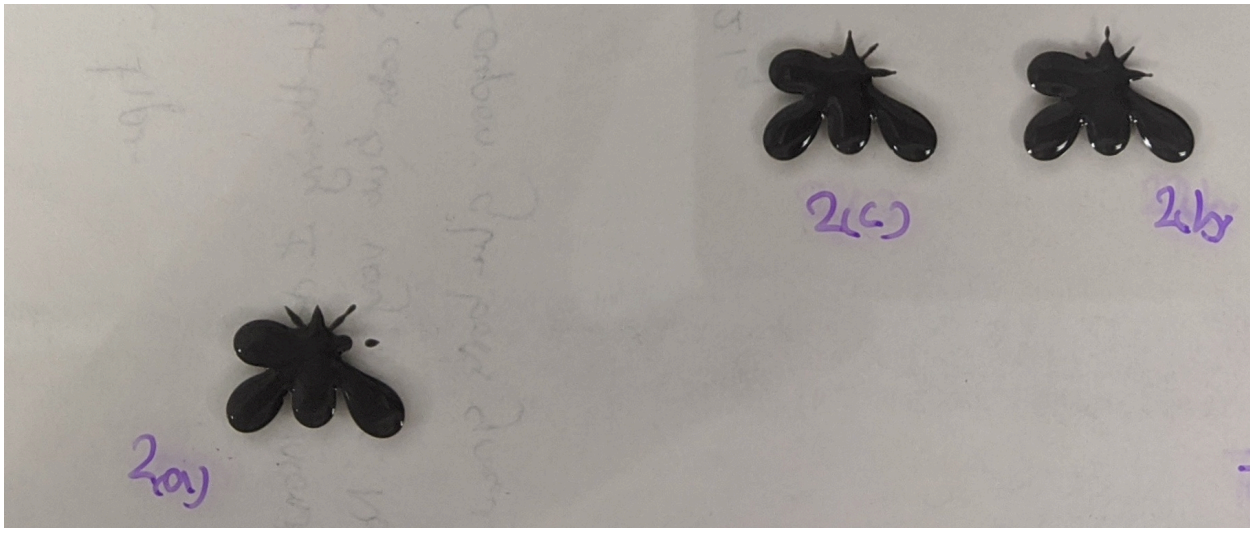
Notes

- Took out tube AH3 @ 9:53 AM, color looks pretty even, before defrosting. Set up and placed in robot to defrost for 10 min.
- After thawing it I do see some inconsistencies in color but very minor. No streaks. Pushing some of the glue into a cup shows it to be very smooth and with a consistent color.
- 10:03 - Mass test 1 is 0.117g. Aidan was seeing 0.15g, so either this is more viscous or the settings are off. Going to try the star pattern anyway, it only runs 3 cells at a time. See below:



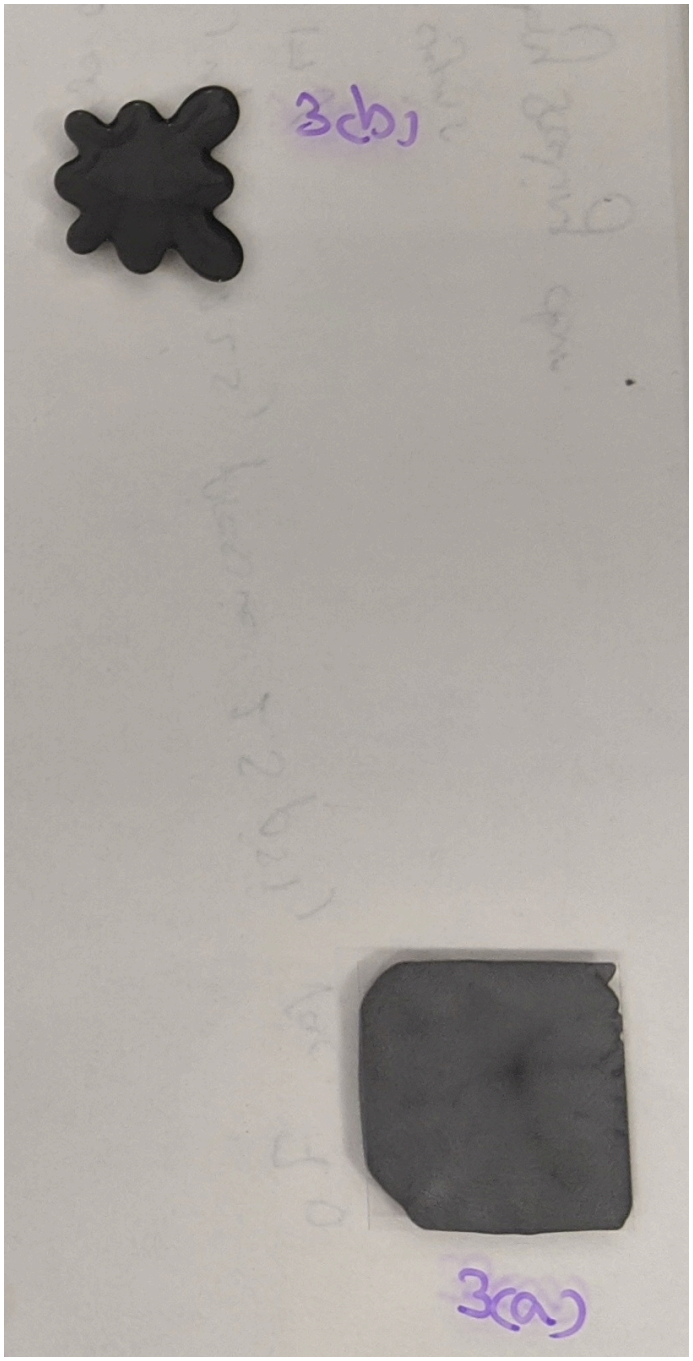
I also recorded a video of this and the results are fairly interesting. Whilst the pressure seems good (based on the size and shape of the starting points of the star pattern), the time the air is on for seems wrong. The glue essentially seems much less runny than when Aidan did this and so needs the air to be on for longer. It might also be that the vacuum is too strong, but I don't want to vary too many pars at once.

- Going to increase pressure to 7 psi, from 4, just to check I didn't misunderstand Aidan's message.
- 10:09 - Mass test #2 w/ pressure @ 7 psi, vac @ 7.5 H20, duration @ 1 second = 0.21g — too much!
- 10:12 - Mass test #3 w/ pressure @ 5 psi, vac @ 7.5 H20, duration @ 1 second = 0.15 g - perfect!
- 10:14 - Trying to rerun star pattern to see if the new pressure settings help:



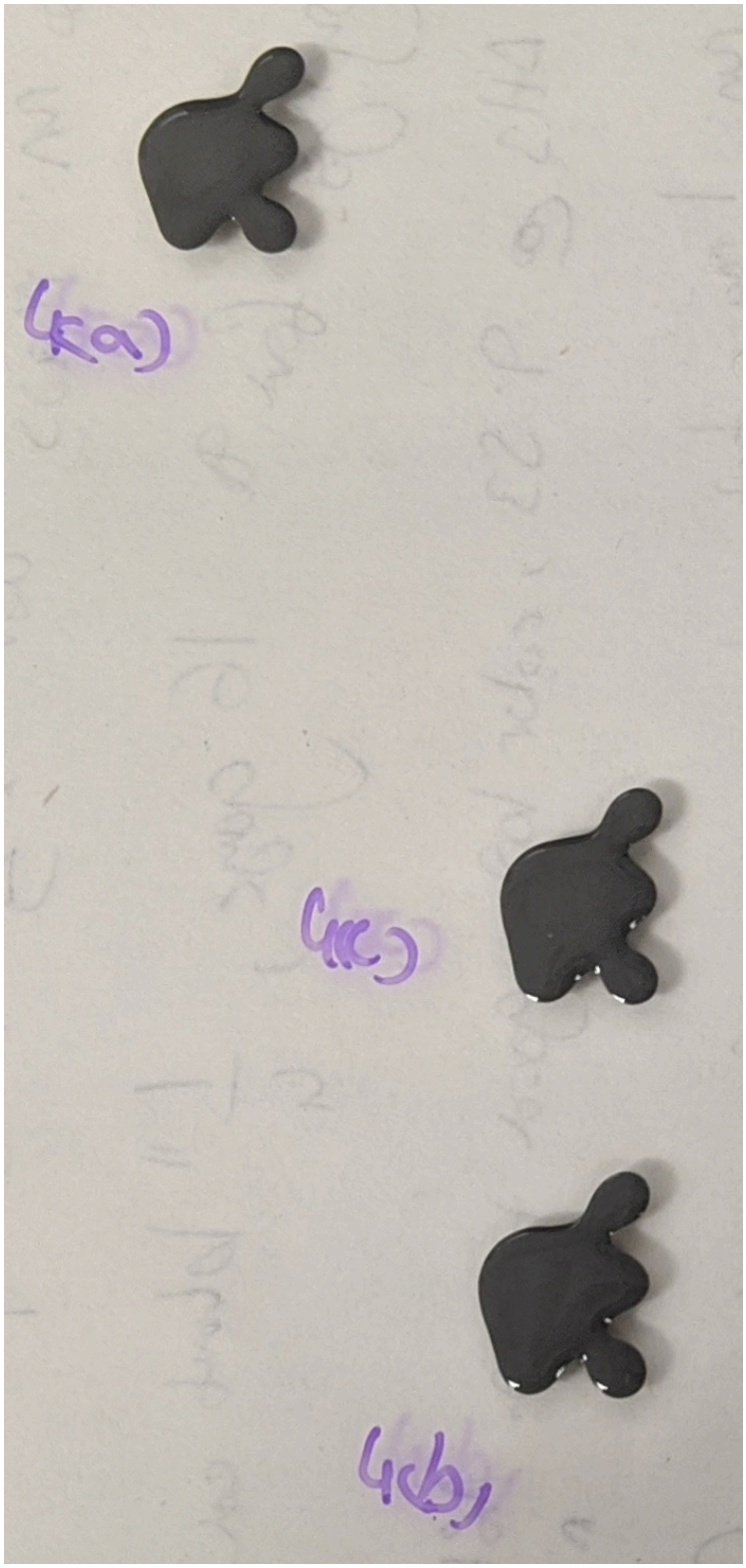
This actually looks much better for the starting points, but the end points are still being cut off… If the pressure is fine, maybe the compressed air is just not blowing the glue for long enough? I'm now going to tru change the air blowing to 2 seconds from one.

- 10:20 - Mass test #3 w/ pressure @ 5 psi, vac @ 7.5 H20, duration @ 2 second = 0.31g (basically double, which makes sense to me!). It's too much glue now but I'm curious if it fixes the pattern shape.
- 10:23 - Ran star pattern #3, see below:



So this is very interesting. The pattern is definitely better but it looks like the ends are still not correct, does the air need to be on for even longer? Matt & I placed a slide on by hand (I placed it, he handled the vacuum) and it's clearly way too much glue. So, what I think I'll do next is increase the time to 2.25 seconds, but drop the pressure a little to get the mass down.

- 10:30 - Mass test #4 w/ pressure @ 2.5 psi, vac @ 7.5 H20, duration @ 2.25 second = 0.17g, ok! Let's try this with the pattern:

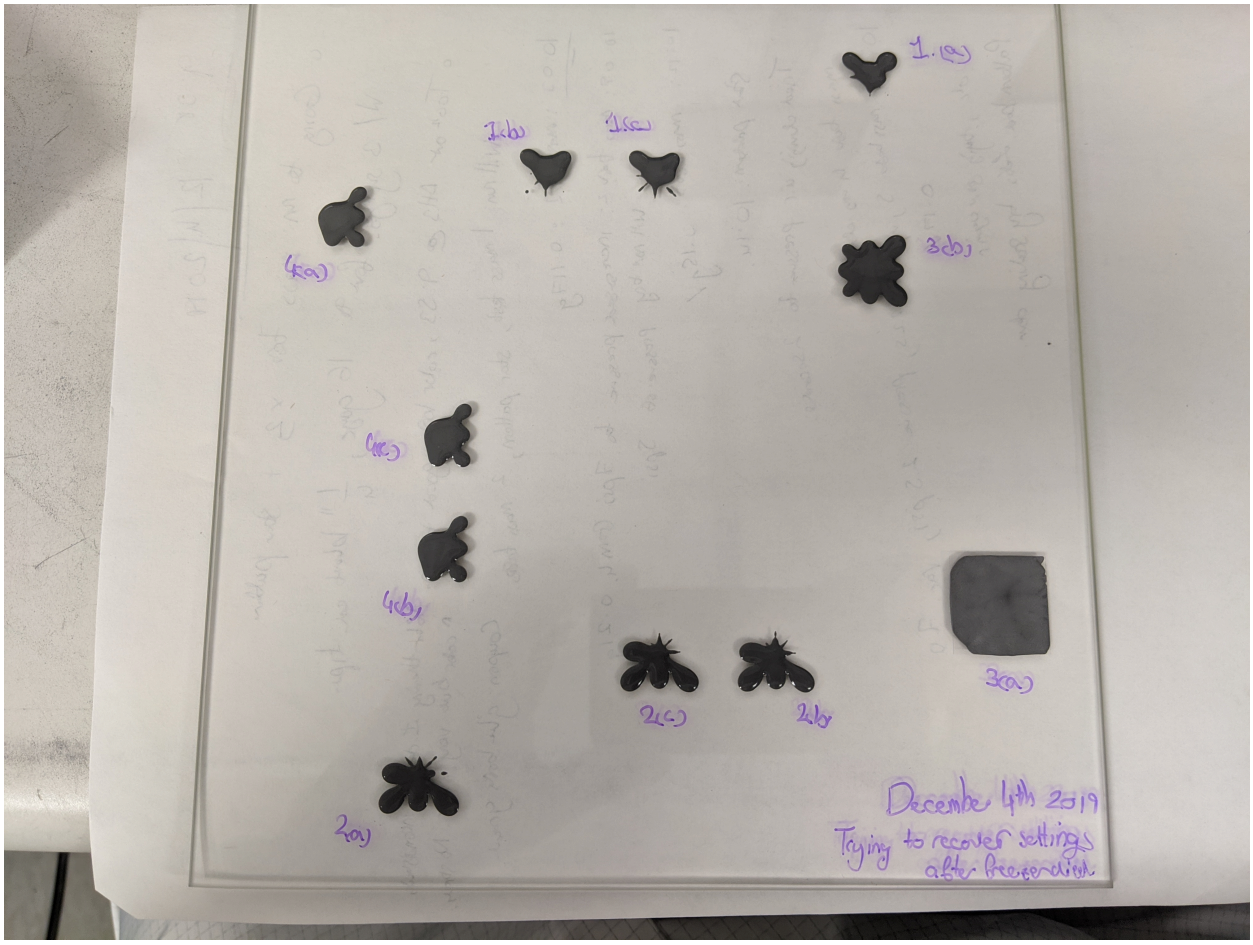

(4a)
(4c)
(4b)

Haha, no this didn't work as I expected it to either. There is clearly a delicate balance between pressure and air duration here that Aidan must have perfected. I need his input. I've now run out of space on this glass sheet and can't run more tests without either changing the program (that I don't understand properly), or getting a new glass block (don't really want to do that, might no be enough glue usable). So I'll stop here for today.

In general:

1. The glue, as of this morning, is still working and seems to be of a similar consistency to how I remember it when we made the starlets.
2. The glue was well mixed, with only minor streaks. There were no bubbles evident and the thread of glue coming from the syringe was continuous, with no breaks.
3. I clearly need more explicit instructions about the paramterization Aidan figured out to manage air pressure, vacuum, and duration of air puffs.

Final shot of sheet below:


1.(a)
1.(b)
1.(c)
3(b)
4(a)
4(c)
4(b)
3(a)
2(c)
2(b)
2(a)
December 4th 2019
Trying to recover settings
after freezedrying.