Special Modules for Stress & CN

Lets hope this time they don’t break or starts shouting…

Shubham Gupta

02/16/2024

Continuous Glue Line Modules

Build with the motivation that they don’t shout when we try to cool them down…

Motivation

- Sometime in the past Ian suggested a method to solve CN issue. A different glue pattern underneath the flexes.
- On 14th December 2023, SCIPP showed that with continuous glue line under the Hybrid Flex removes Cold noise.

https://indico.cern.ch/event/1351565/contributions/5689688/subcontributions/453339/attachments/2772086/4830463/Long Glue Pattern and Swapped Resin Results.pdf

- This was a Short Strip module with False Blue (generally shows very high cold noise for all the modules including LS).
- So we decided to develop new stencils at LBNL for testing.
- Currently we did some mechanical tests on glass sensors with plastic cut out for hybrids.

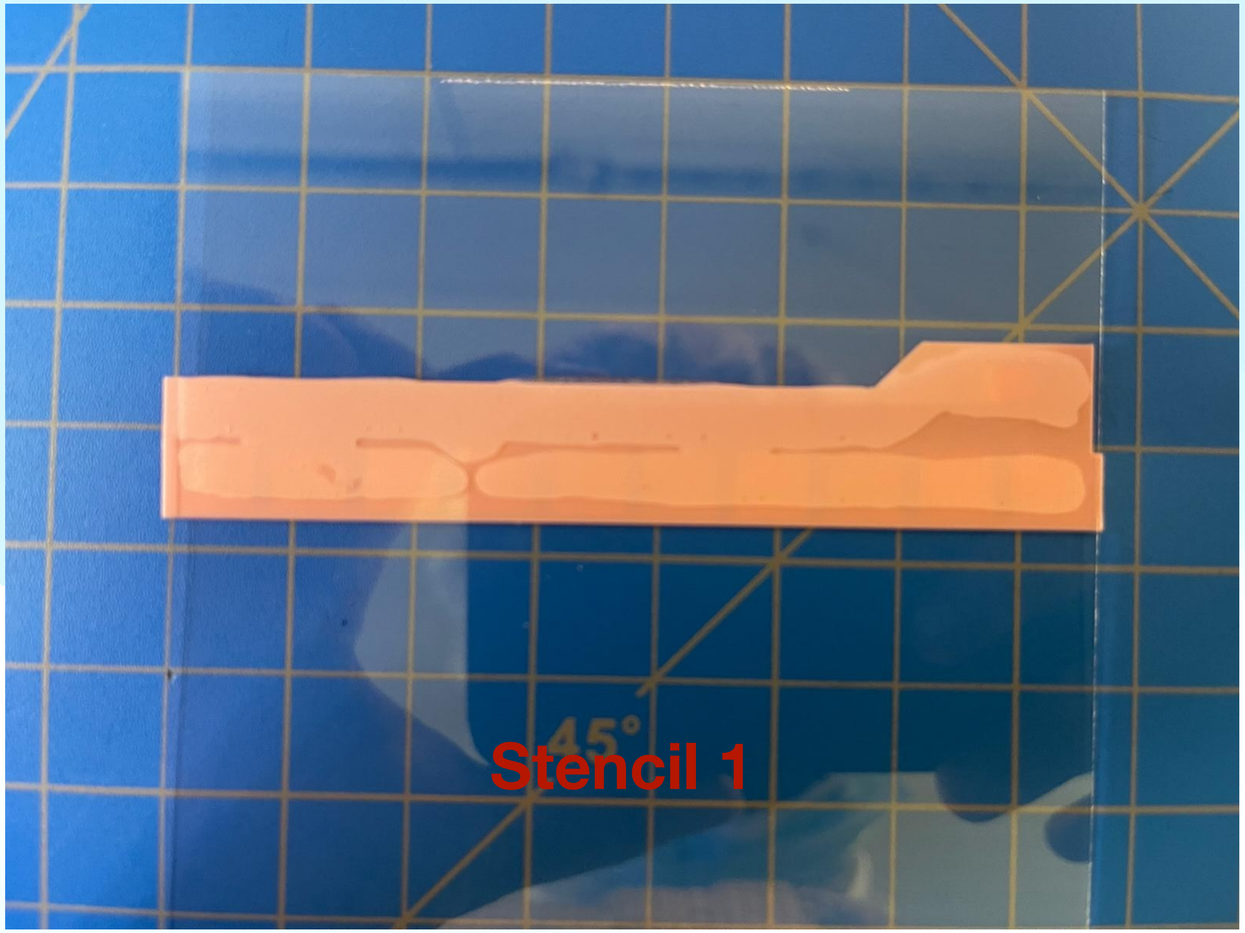
Stencils for Continuous Glue Pattern

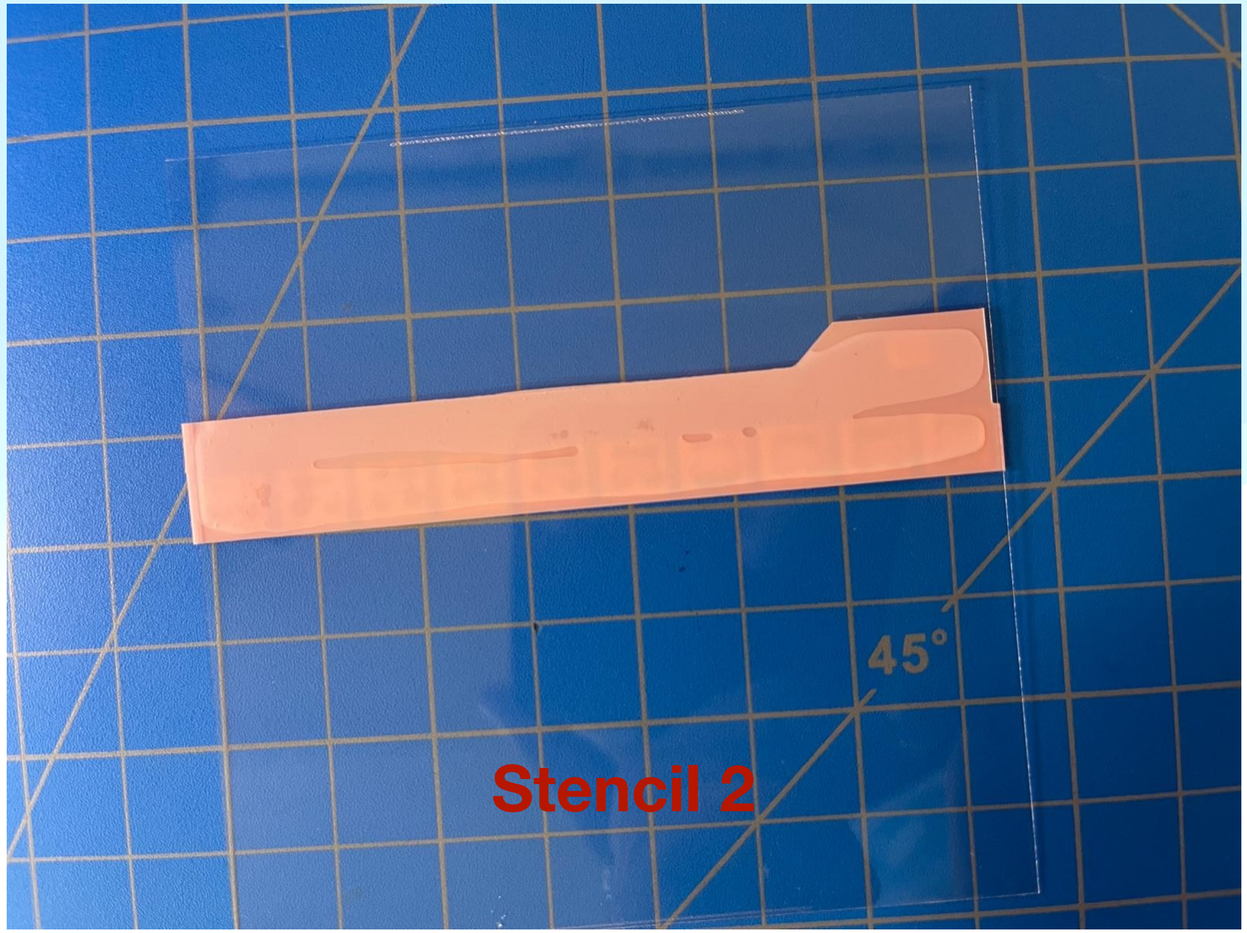
- Currently we have 2 stencils with continuous glue line.
- For Stencil 1, it is made according to what was suggested in the EDMS.
- For Stencil 2, the window under the HCC is made bigger for a better glue coverage.
- Total length for the windows is same as what we have for our old tools.

Stencil 1

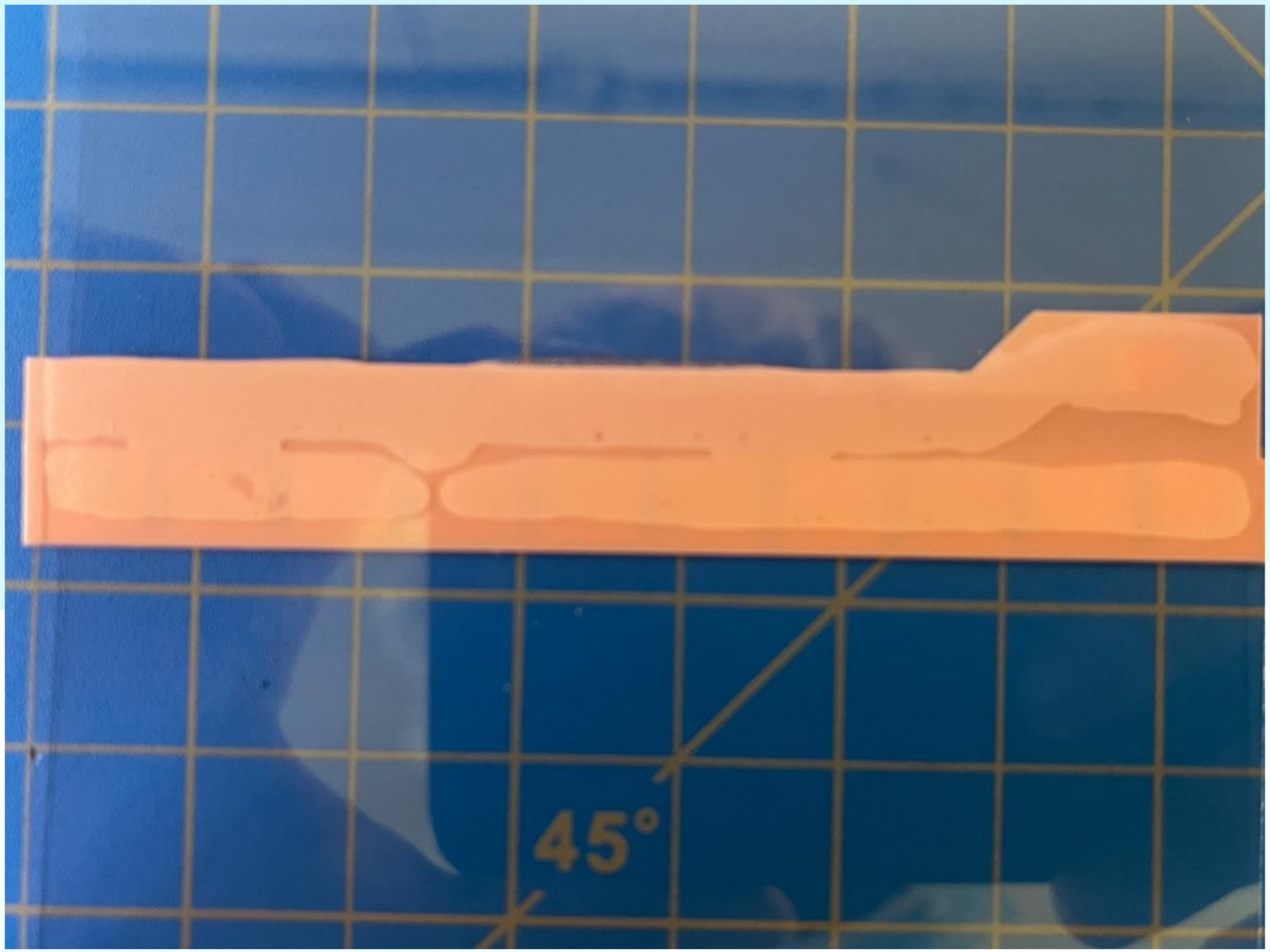
Stencil 2

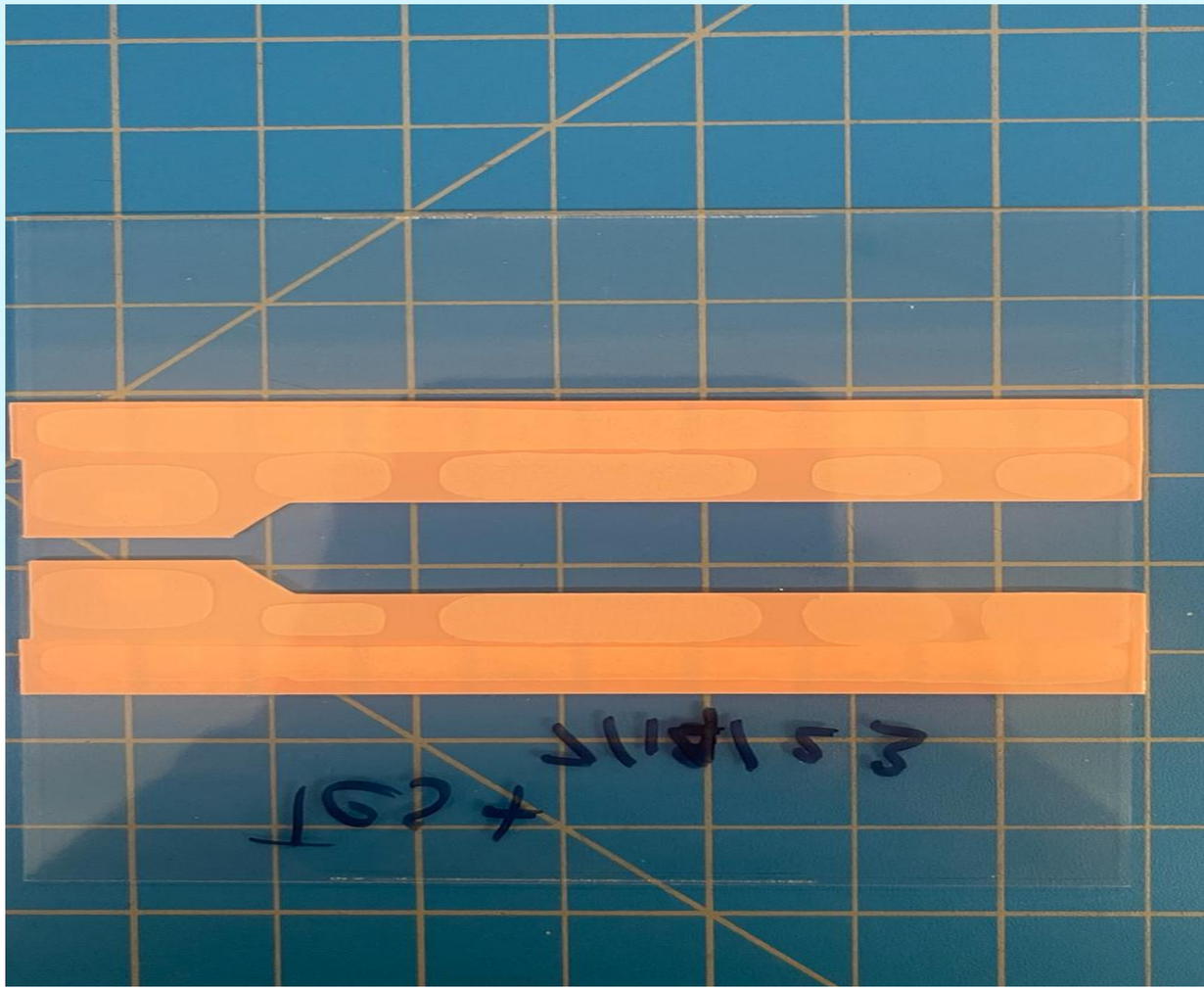
Glue Coverage





- Stencil 1 has less glue coverage and more air pockets under the flex.
- Stencil 2 provides a better coverage of glue.

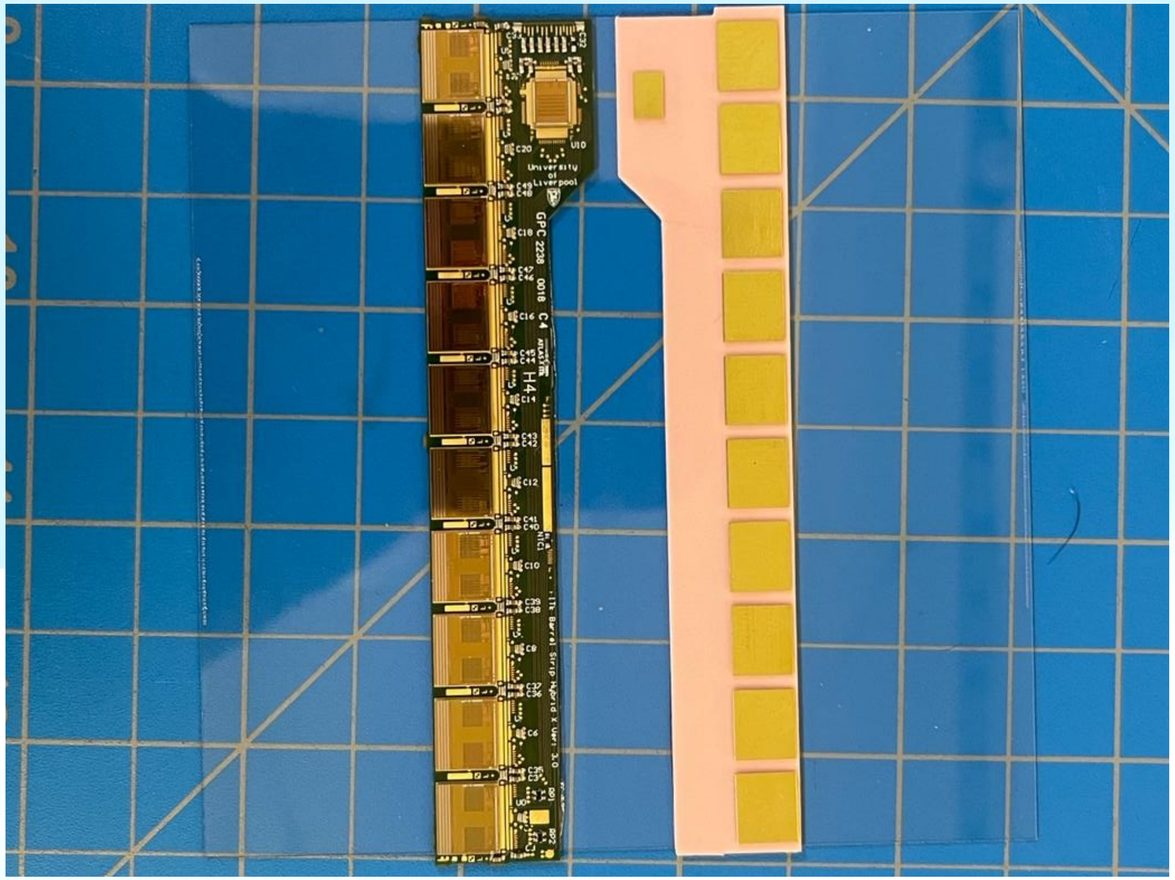


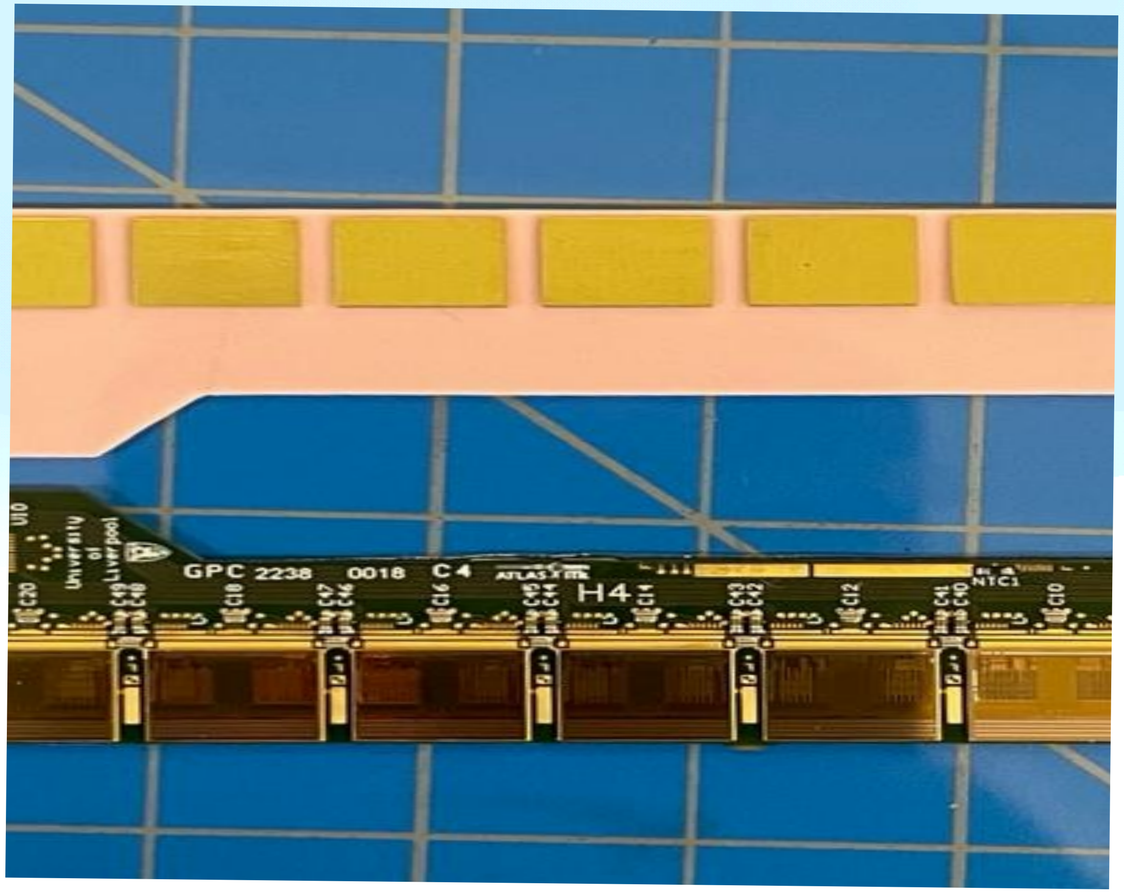


Glue Coverage with New Stencil (1)

Glue Coverage with Old Stencil

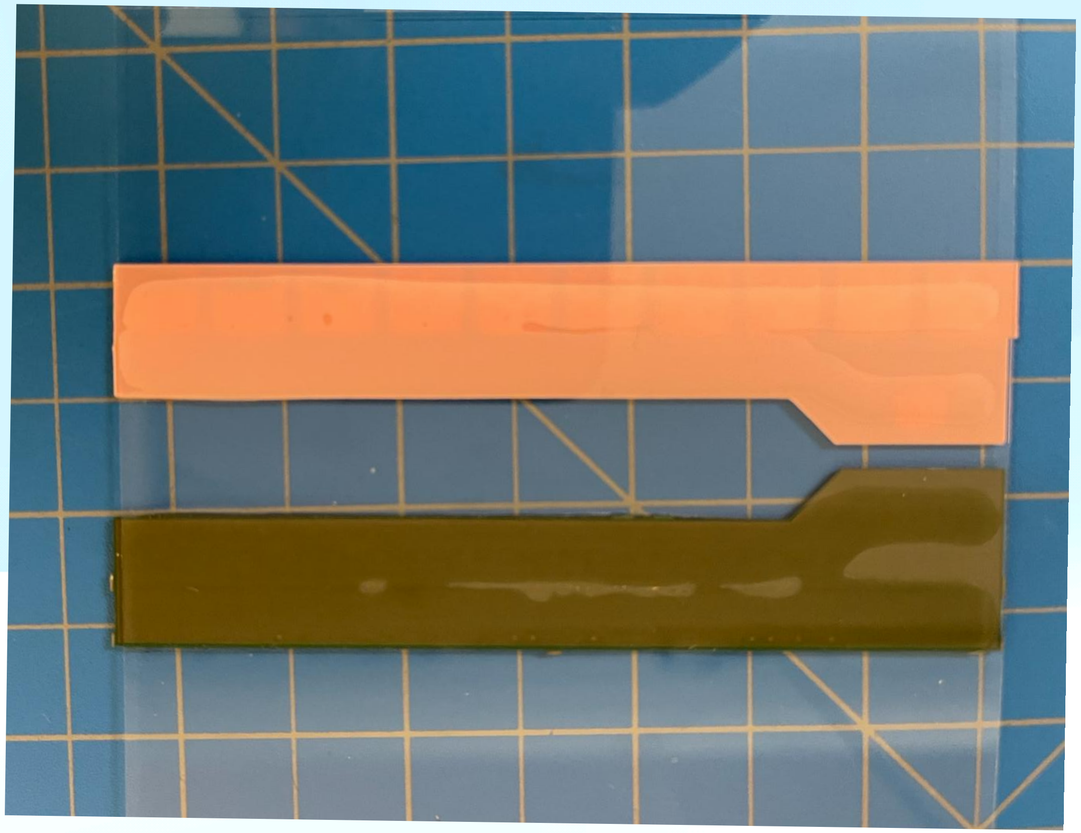
Module with Stencil 1

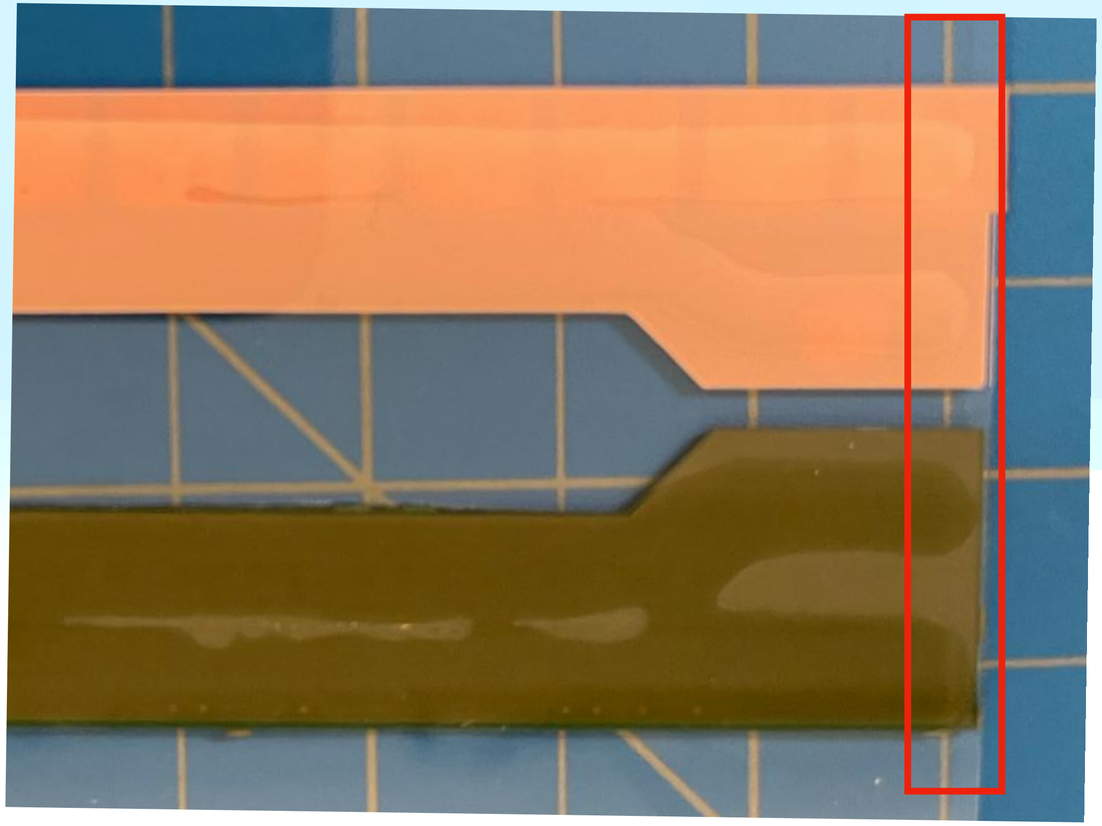




- Due to higher glue mass it was decided to move with stencil 1.
- We build a glass sensor to see the glue spread under a real hybrid.

Glue Spread





- Both the dummy and a real hybrids has almost similar glue spread (which is a good sign).
- We do have enough space on right that the glue doesn’t go over the guard ring.

Flipped Hybrid Modules

What do you think, will this crack???

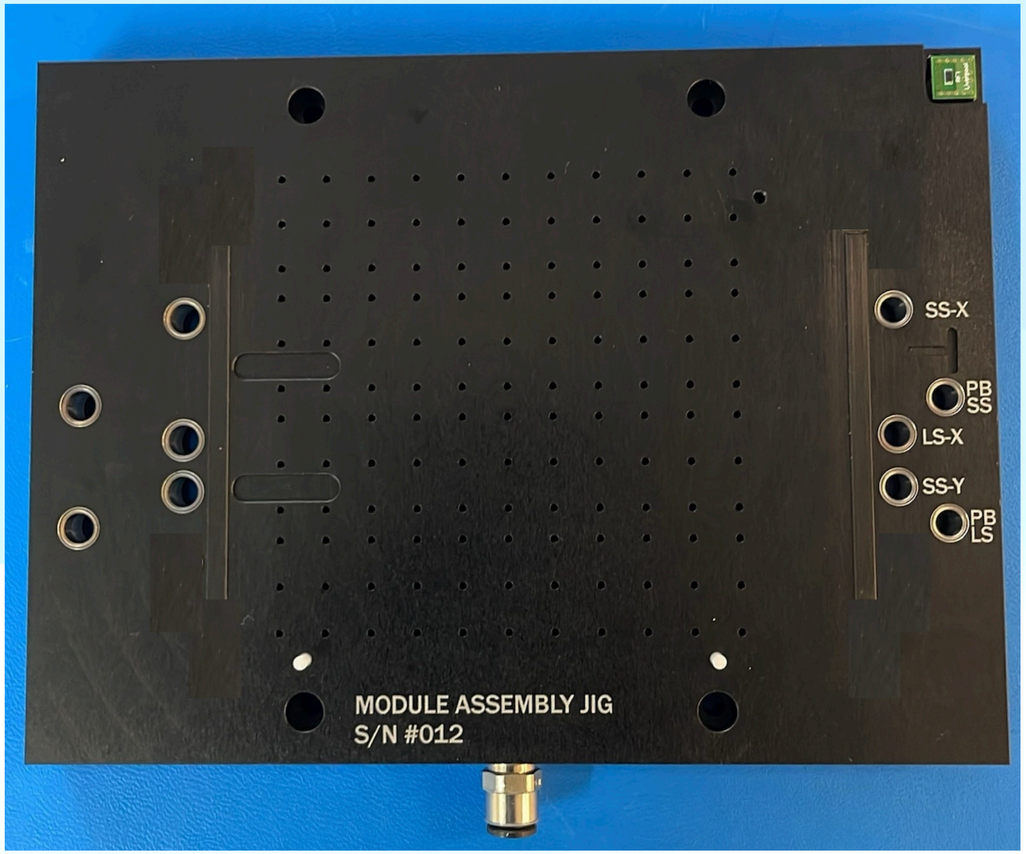
Motivation

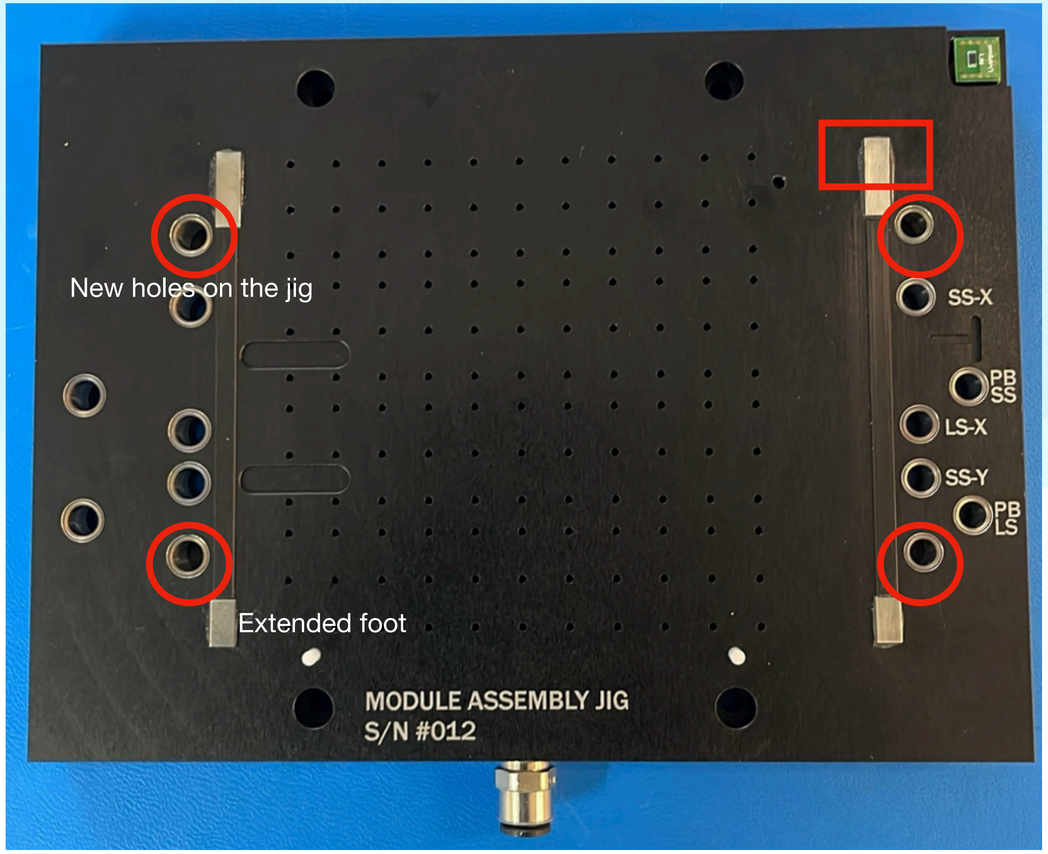
- Last year somewhere during September or so we started seeing cracks on our modules.

  Anne's Slide from Annual Meeting

- During the ITk week, Carl proposed a new module (SS).
- In this module we shift our X-Y hybrids to a different location. Now it looks like we flipped the hybrids.
- We simulated this and showed that it should reduce the stress on the sensors by 40%. Following this we started developing new tools to build a prototype.
- Finally starting last week, we build 2 prototypes to see what challenges we will face in case we plan on proceeding with it.

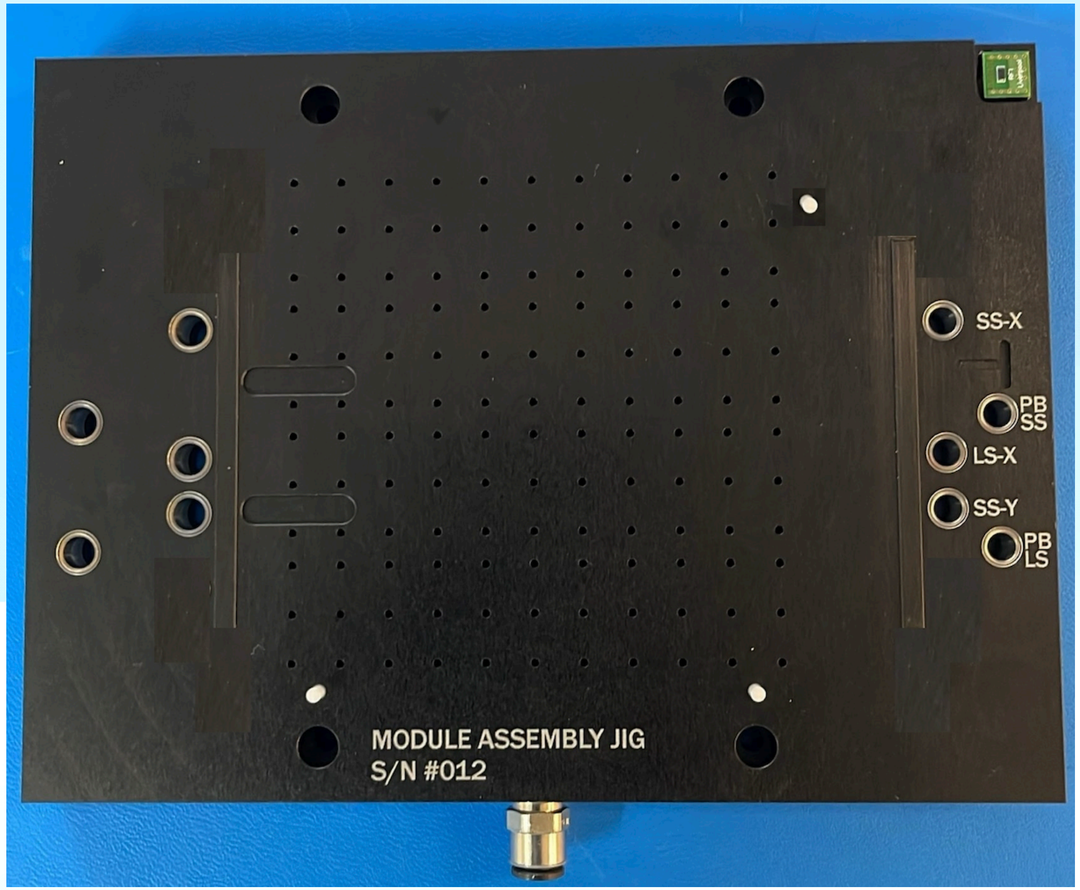
Modifications done on the Assembly Jigs

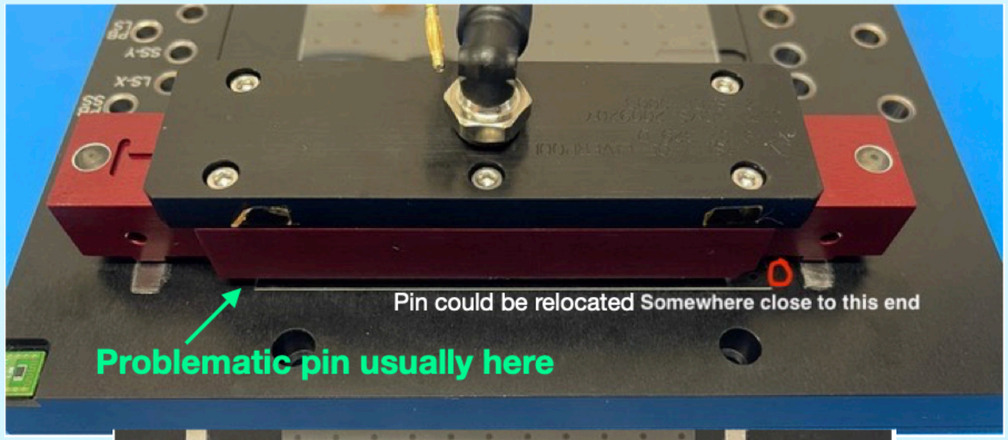


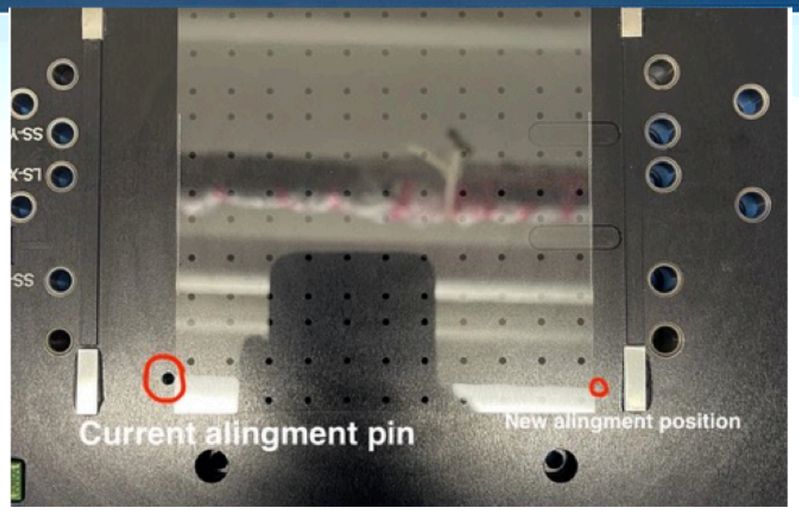


- We had to add four more holes (2 on each side) as we plan on shifting the hybrids by a distance of 48.4mm.
- For this we needed extended foot to rest the pick up tools.

Additional Modifications Required

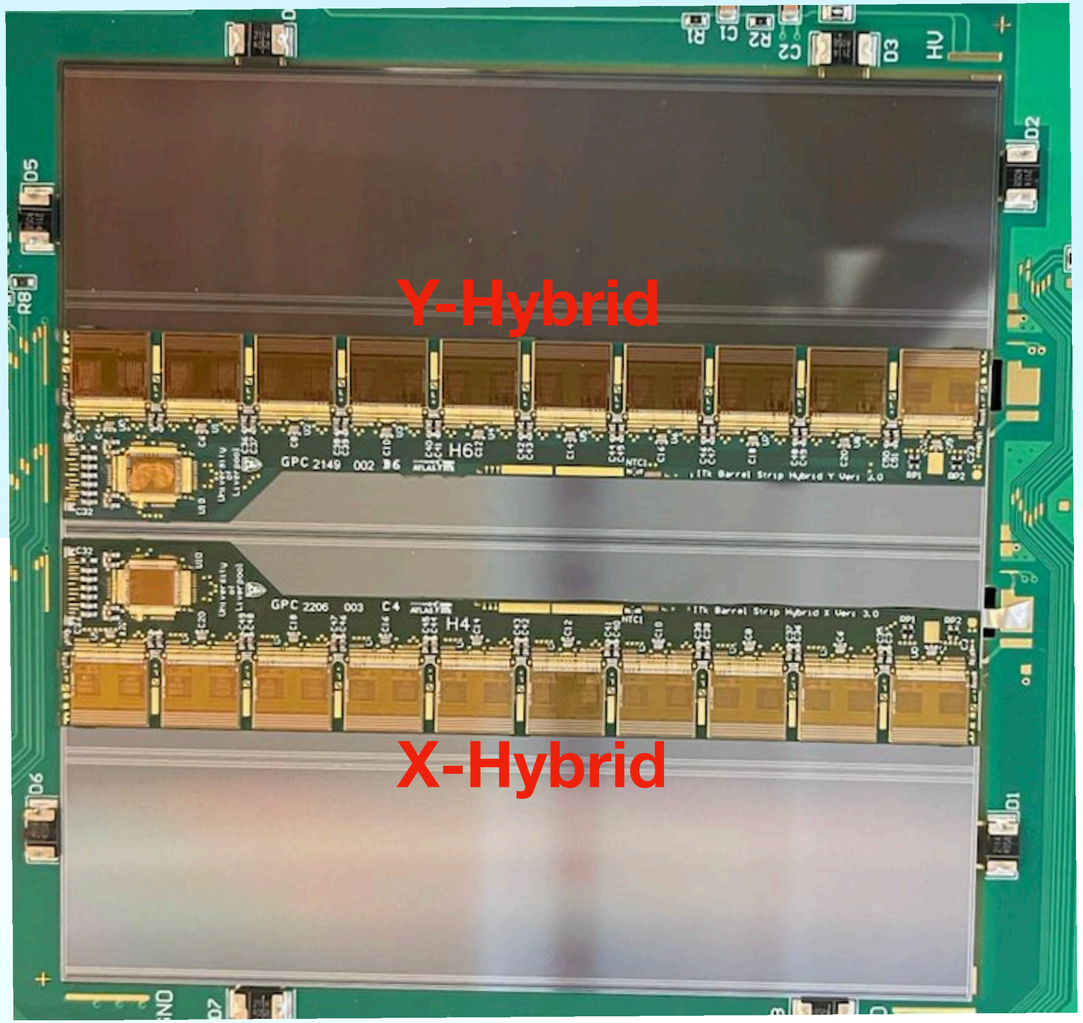


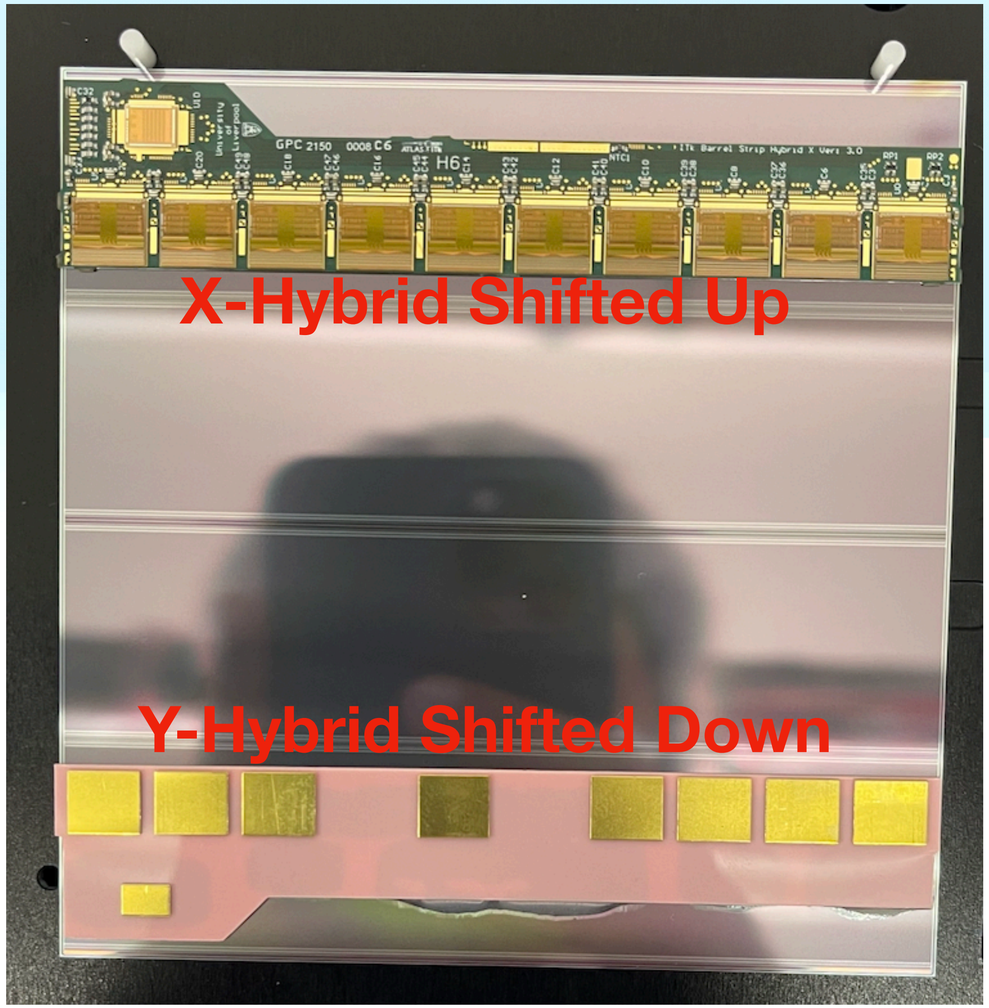




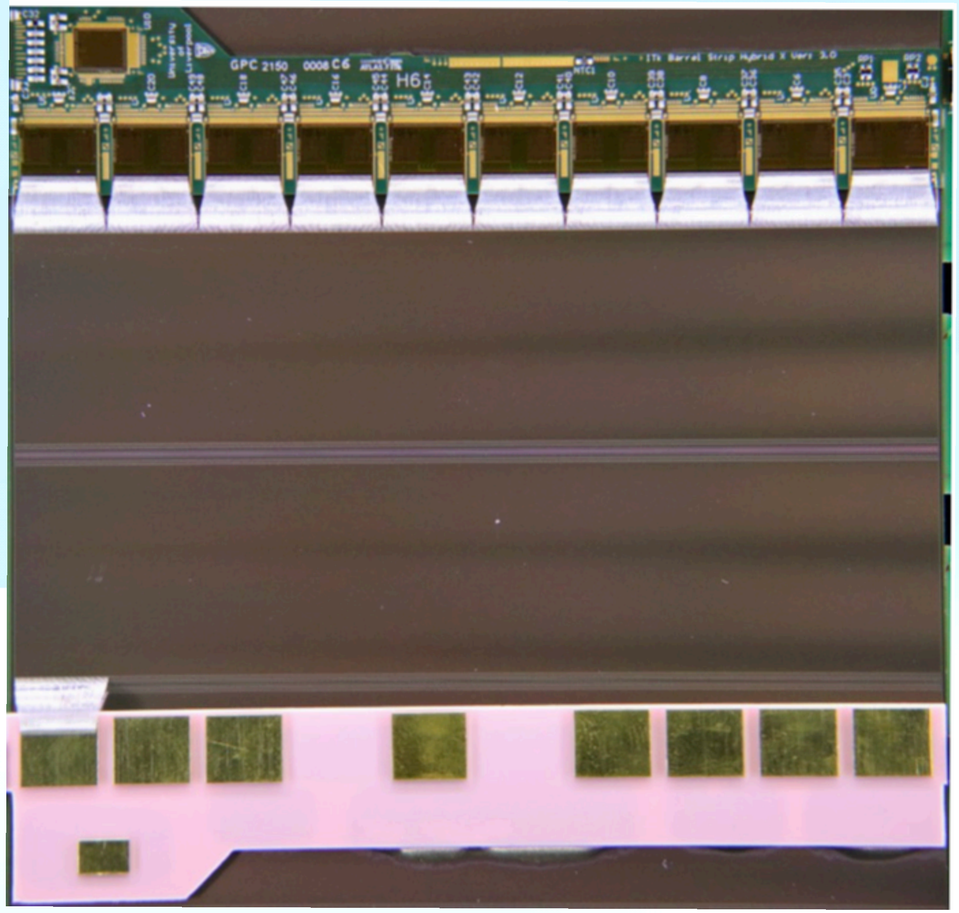
- With the current position of the alignment pins they come right under the tool which won’t allow us to use the tool properly.
- So we plan on shifting the pin on the other side.

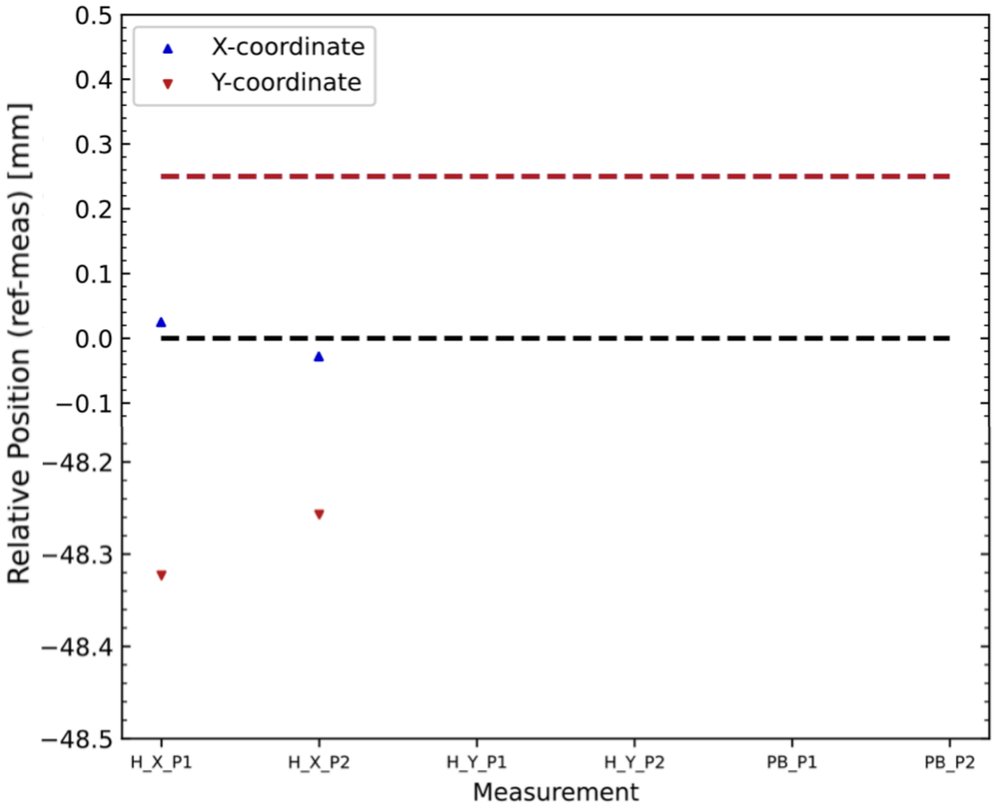
Comparison with our Regular SS Module





Final Product





- Managed to build a prototype with the current tools.
- The position looks pretty much accurate to what we wanted.
- We also managed to bond the chips on the sensors and according to Phat & Cristian (our techs) it wasn't too difficult to bond.

Summary

- So we have a lot of ideas to successfully build the Strip detector hopefully soon in future.
- With these two successful trials we plan on building real modules and test them in hope that things will look good.
- There is another variation of New/Weird/Popular/Special module roaming in the strips community. (Ask Anne about this)
- Somewhere along the line we hope to present a module which survives the CN test and the cracking issue…