Module Assembly and Attachment at LBNL

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for

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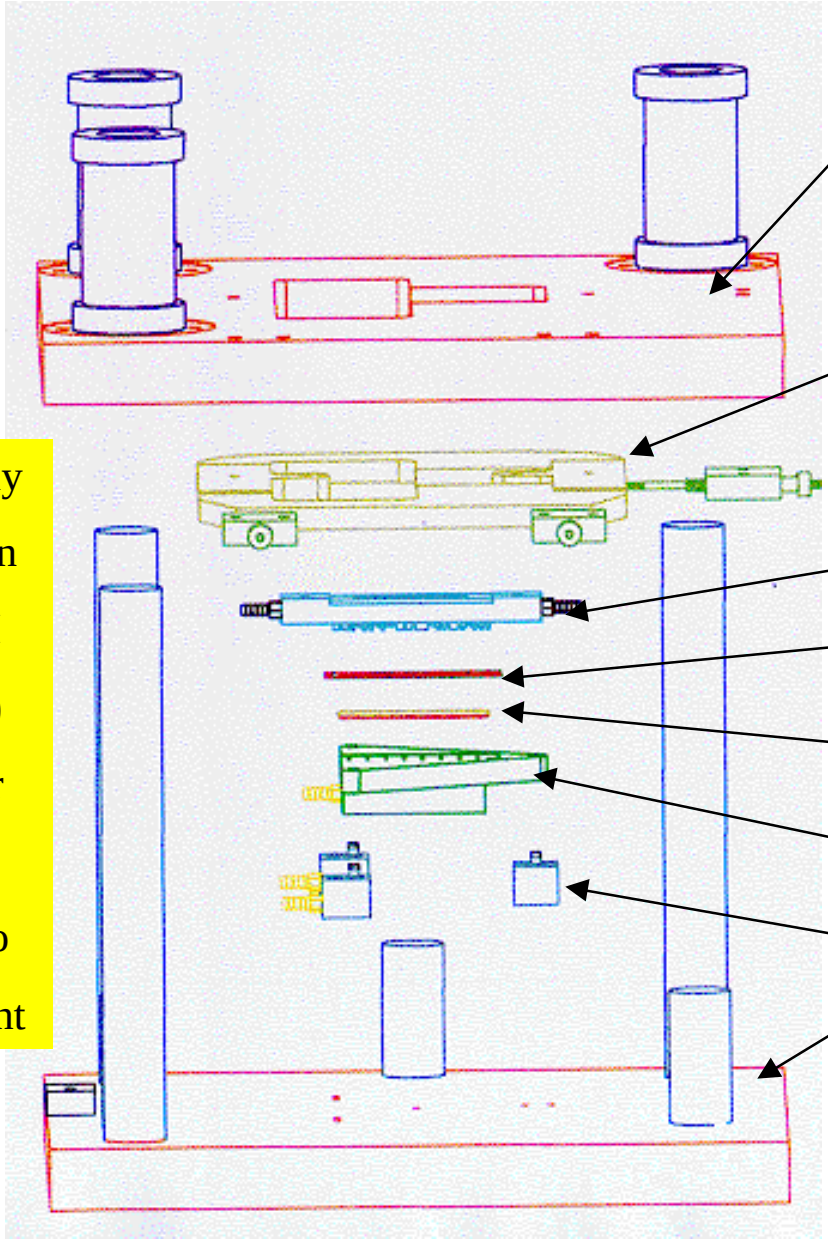
Overview

- Tooling with common features for mounting hybrids to bare modules and for mounting assembled modules to disk sectors.
- Hybrids to bare modules - http://www-atlas.lbl.gov/~goozen/assdethyb.html
- Modules to sectors - http://www-atlas.lbl.gov/~goozen/sector.html
- Assembly sequence, concept drawings and detailed drawings are or will be at these URLs and will be updated.
- Some of the tooling exists already.
- Expect to have all prototype tooling for both hybrid->module and module->sector by mid-May.
- There will be two sets of each and a spare of each.
- Will give brief introduction here but suggest small party go to Fred's lab and discuss in detail.
- Reminder that this is prototype tooling and procedures to be used to really understand how this will be done in production.

Hybrid to Bare Module



Removable top plate with guides.

Adjustment adapter for holding flex vacuum chuck.

Flex vacuum chuck.

Flex hybrid

Bare module

Vacuum chuck for bare module

Air jacks for applying load

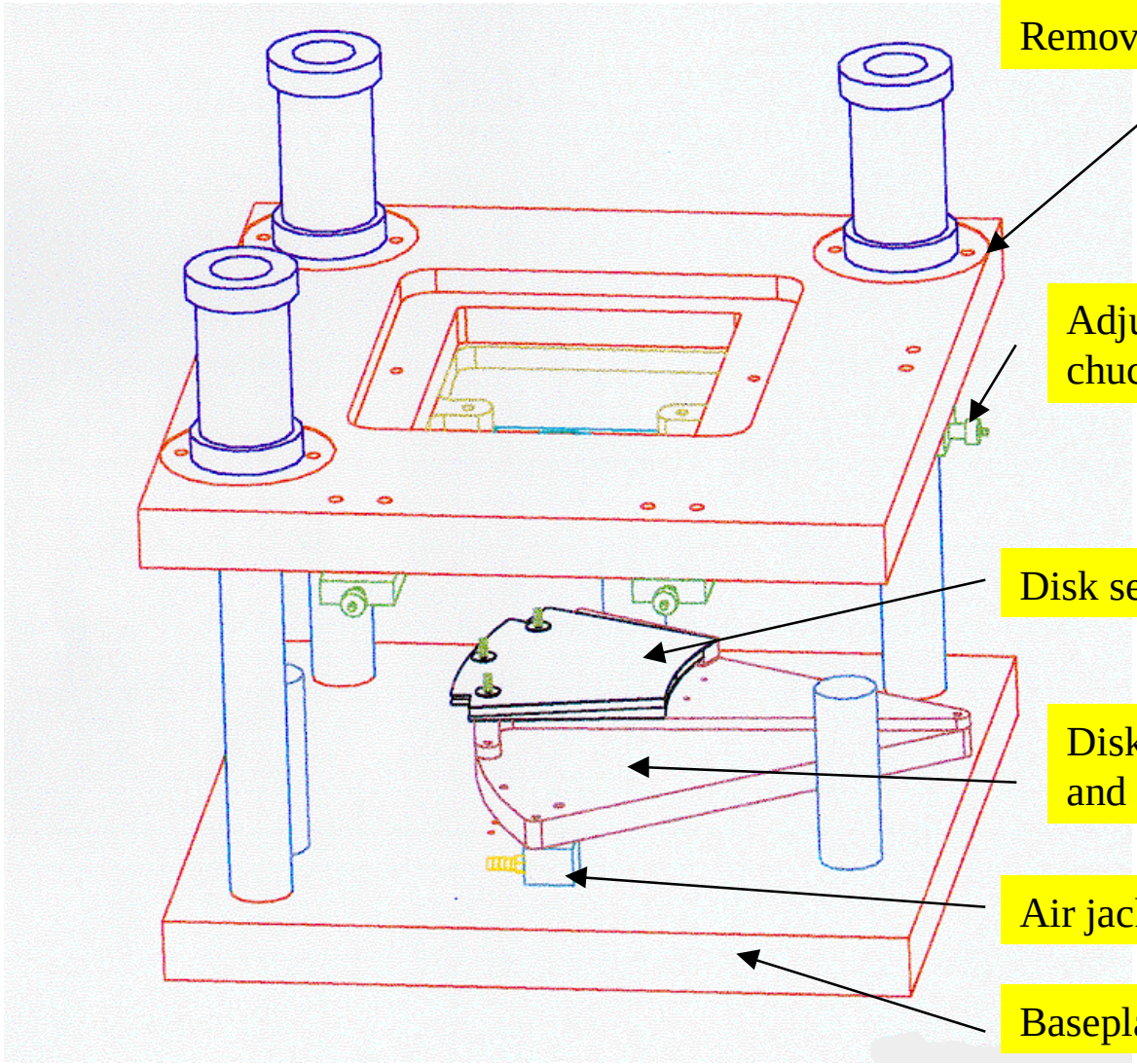
Baseplate and guide rods

Entire assembly is sized to fit in optical CMM (SmartScope) or using other microscopy (not shown) to check alignment

Possible Assembly Sequence

- Remove complete hybrid from storage box and place on bare module vacuum chuck, position to module reference edges with spacers and apply vacuum, remove spacers.
- Place upper plate with hybrid vacuum chuck attached on lower plate assembly. This will place hybrid vacuum chuck a few hundred microns above hybrid. Apply air to jacks to lift hybrid to it's chuck, apply vacuum to hybrid chuck and remove vacuum from module chuck then remove air from jacks.
- With vacuum on hybrid chuck remove upper plate assembly.
- Place module on module chuck and position to reference edges and apply vacuum.
- Place upper plate with hybrid back on assembly and apply air to jacks. Inspect alignment with microscope, remove air and move hybrid with adjusters as needed.
- Remove air from jacks and remove upper plate with vacuum connected to glue machine and apply glue.
- Replace upper plate on assembly and recheck alignment before applying air to jacks to bring hybrid with glue in contact with bare module.
- Cure and recheck alignment.

Module to Sector



Removable top plate with guides.

Adjustment adapter for vacuum chuck holding assembled module

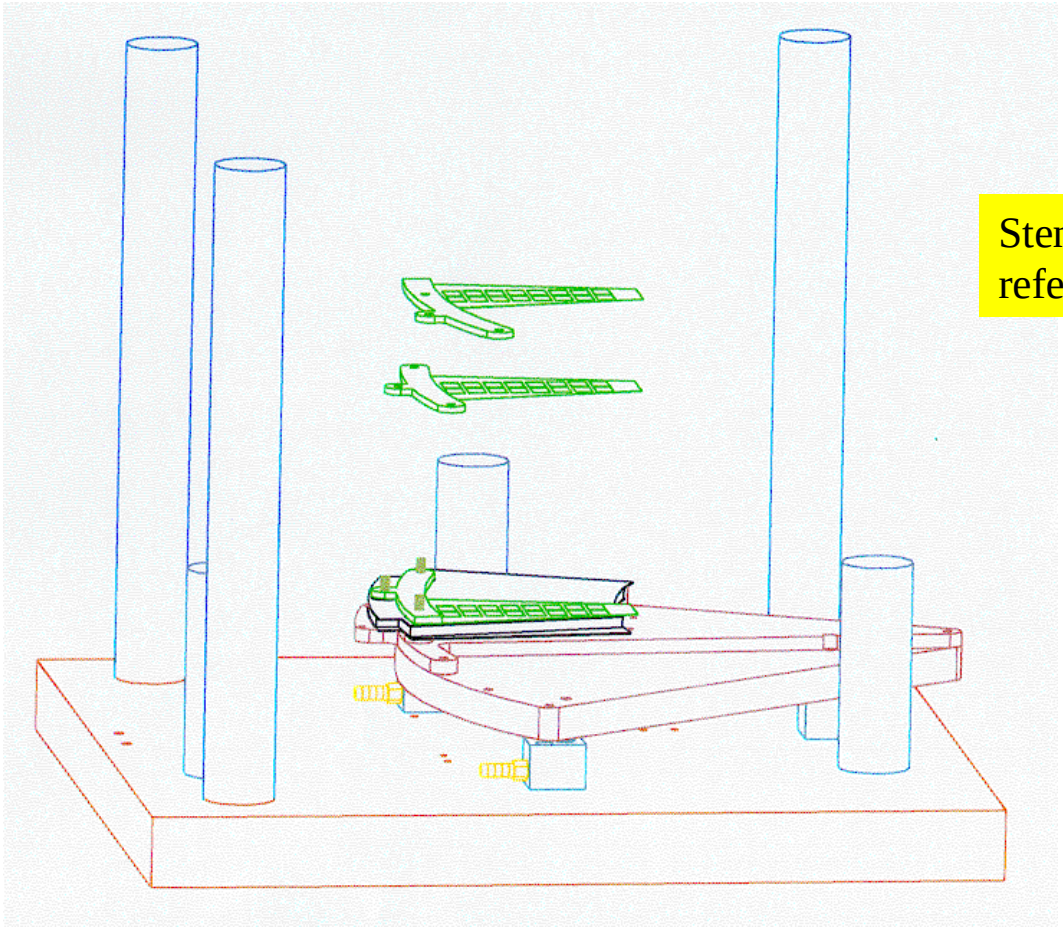
Disk sector.

Disk sector baseplate(two types - 9 and 11 sector disks)

Air jacks for applying load

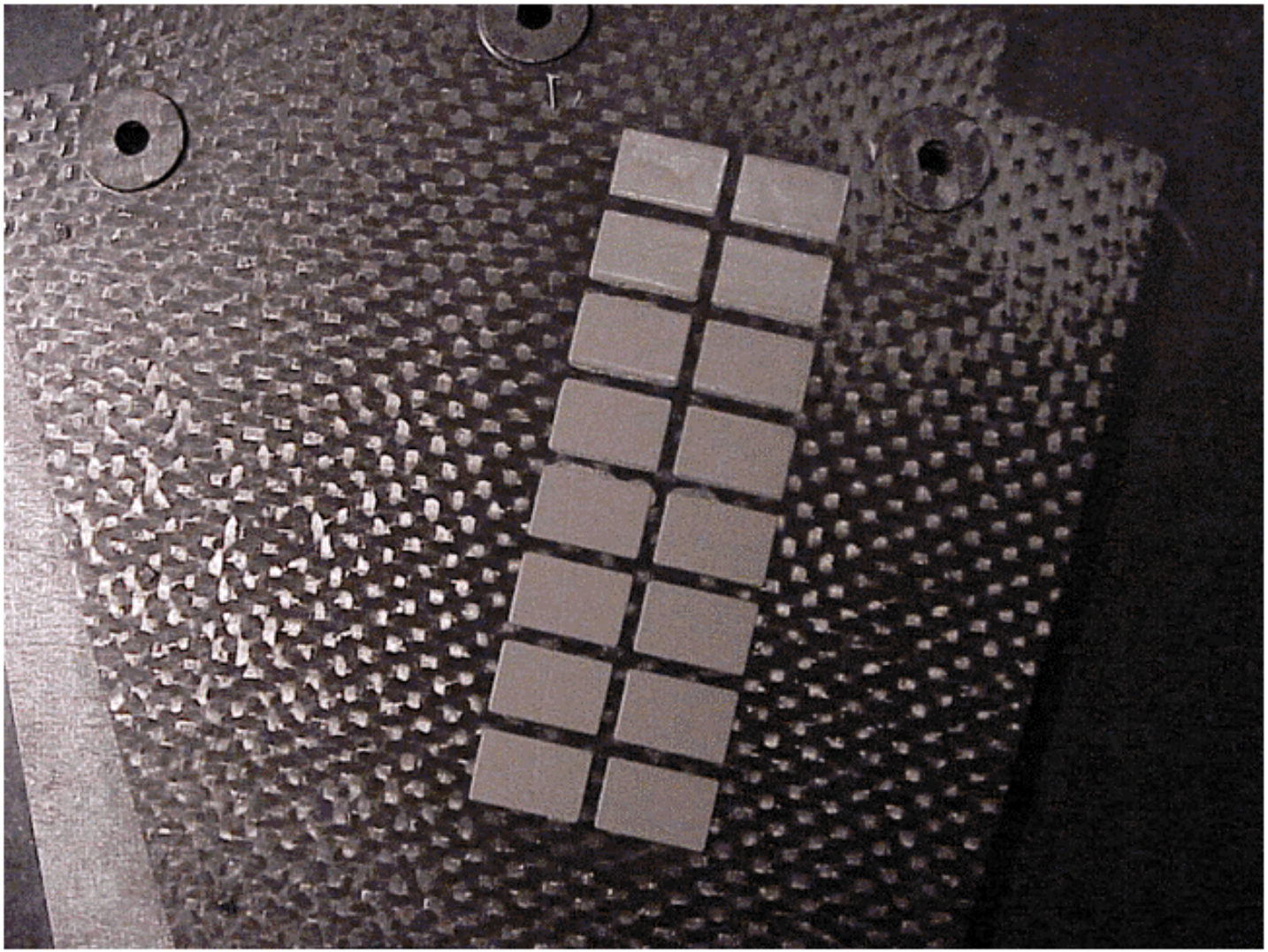
Baseplate and guide rods

Stencil on CGL7018

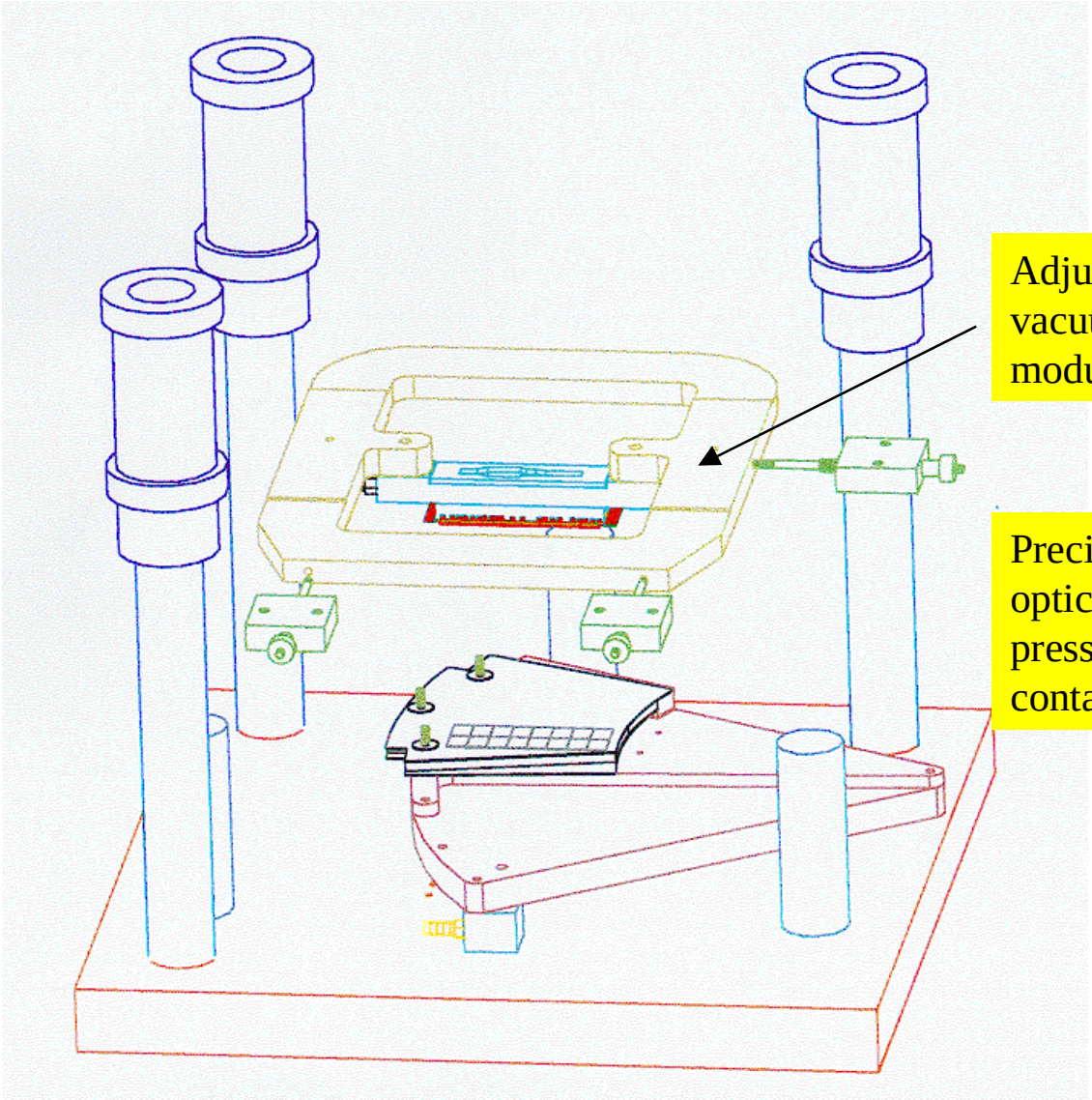


Stencils for each module location referenced to sector by precision pins.

Example of Application to Sector



Mount Assembled Module



Adjustment adapter holding vacuum chuck that holds assembled module.

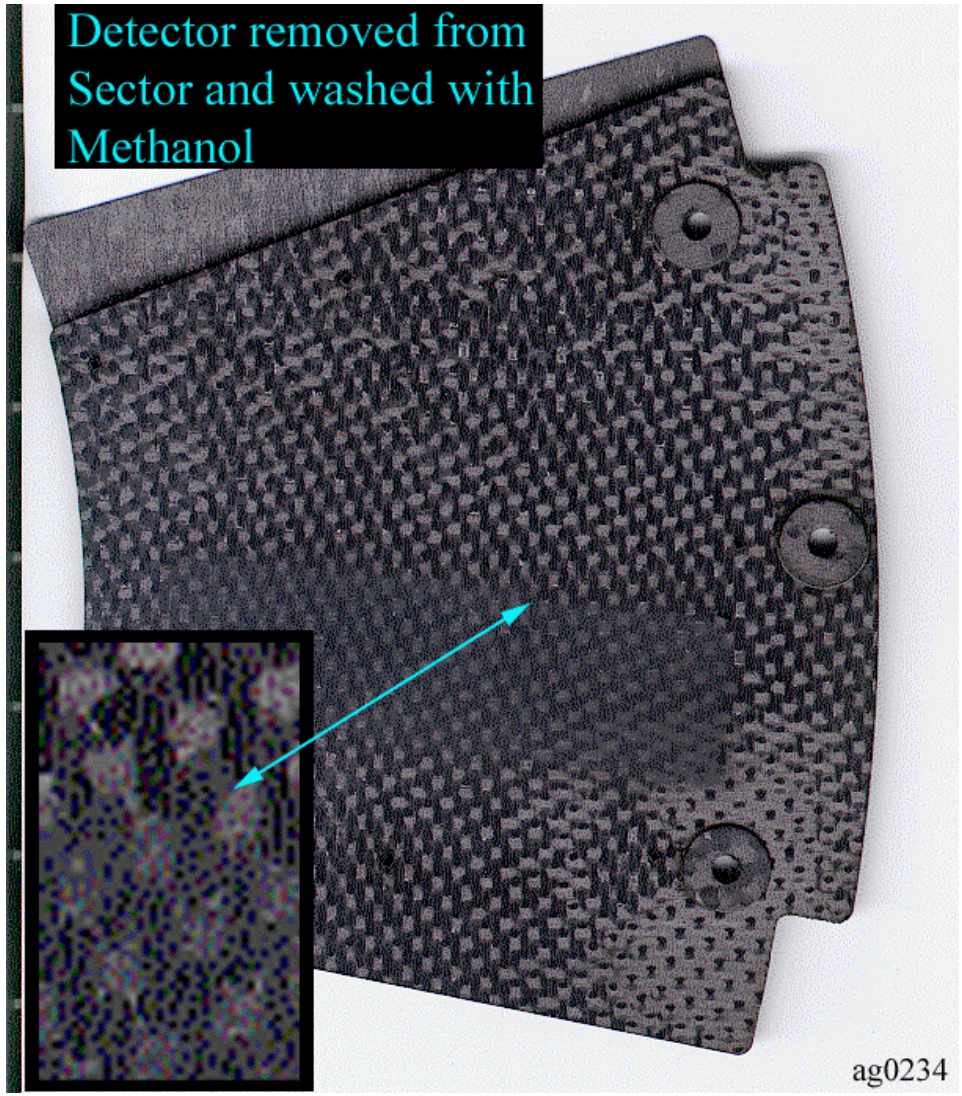
Precision alignment done using optical CMM before applying pressure to jacks to bring sector in contact with module.

Possible Assembly Sequence

- Use fixture, lower plate with sector support
- Level sector support with air cylinder jacking screws
- Install sector on support
- Select and install CGL mask
- Screen on CGL and remove mask
- Pickup module assembly with vacuum chuck and connect to upper plate
- Place upper plate on lower plate assembly
- Vertical stops will hold detector 200 microns above CGL
- Place complete assembly in SmartScope
- Align datum with sector fiducials
- Adjust back-of-sensor fiducial position as needed with vacuum chuck plate adjusters
- Apply air to jacks to move sector up to module with known pressure.
- Re-check detector fiducial positions
- With pressure on, apply UV-epoxy and cure
- Remove vacuum from module chuck
- Remove air pressure from jacks
- Rotate sector support plate to next position and repeat

Module Removal

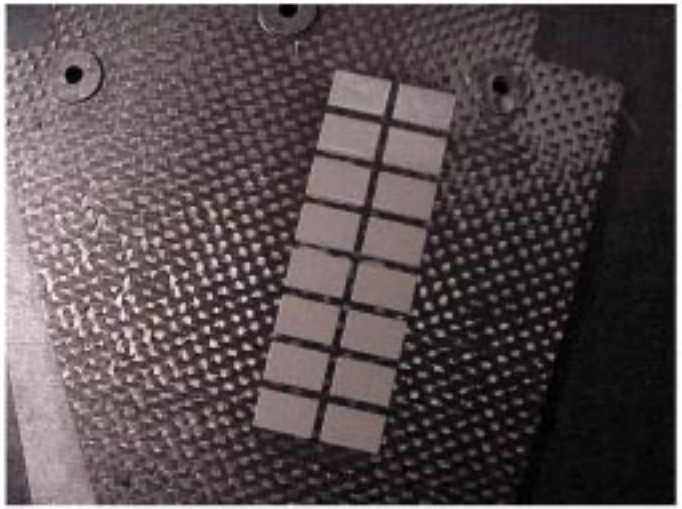
- Tests have started to understand module removal, a hard requirement.
- Need much more experience, but conclusion so far is that it will be possible to remove modules(including with UV tacks), wash off CGL and reapply and reattach module.
- But we need to test this multiple times.

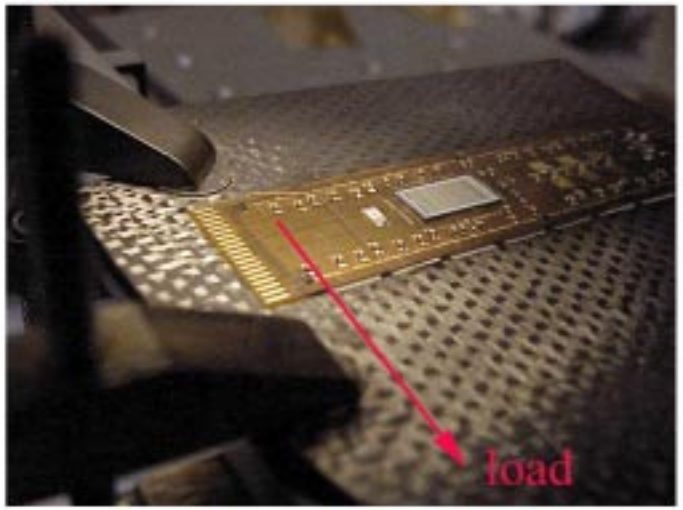


Critical Issues

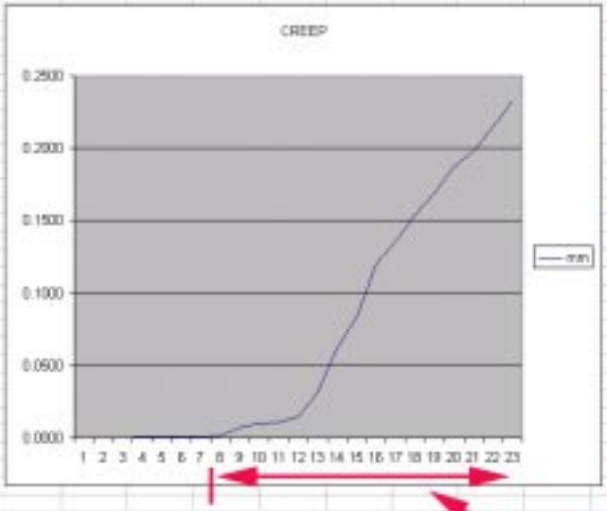
- There are many outstanding issues but most of them can only be addressed by practice assembly.
- Hybrid to module critical issues
  - Hybrid is NOT removable from bare module under current production plan.
  - Room temperature cure(although probably could get around this)
  - Flex hybrid needs enough open area and sufficient flatness to pick up with vacuum chuck. Not yet demonstrated this is possible with thin substrates.
- Module to sector critical issues
  - General issue of module attachment that will be discussed during meeting.
  - So far CGL7018 seems to satisfy requirements for disk sectors but CGL7018 requires(always the plan) additional hard support of module to sector - UV tacks otherwise it creeps easily(see next page).
  - In-situ pigtail connection and strain relief.

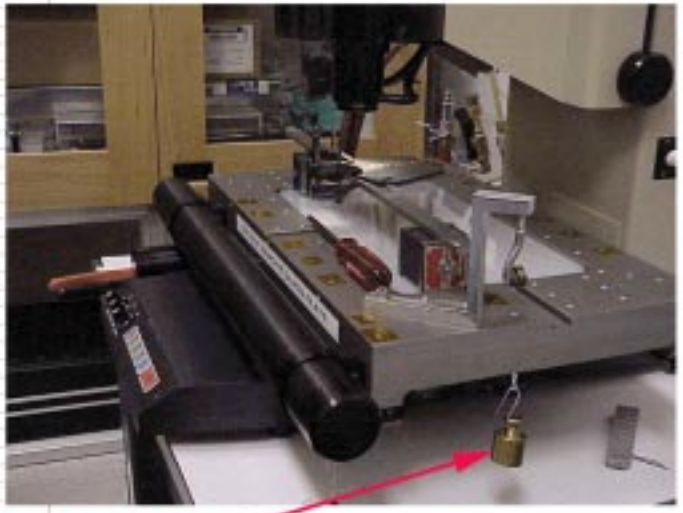
Creep Test (CGL 7018)
Cure 80 C / 16 hr





time	gm	mm
0	20	0.0000
5	20	0.0000
10	20	0.0000
15	20	0.0005
20	20	0.0005
25	50	0.0005
30	50	0.0010
35	50	0.0017
40	50	0.0070
45	50	0.0098
50	50	0.0105
55	50	0.0147
60	50	0.0310
65	50	0.0622
70	50	0.0833
75	50	0.1202
80	50	0.1360
85	50	0.1540
90	50	0.1680
95	50	0.1870
100	50	0.1980
105	50	0.2150
110	50	0.2330





50gm weight

Plan

- Complete tooling by mid-May.
- Glue robot(also used for SCT module assembly) to be ordered by end April. This will give more flexibility in glue pattern application, perhaps.
- Use tooling and procedures for applying heaters and any dummy silicon or modules to all new sectors.
- Will make separate chuck for apply heaters and anything else.
- If material other than CGL7018+UV tacks is found to be useful to explore, could try it also as long as it can be applied by stencil or perhaps by dispensing.
- Practice, practice practice