Notes from Pixel Mechanics Meeting
June 6, 2001

Present: Anderssen, McCormack, Wirth, Goozen, Gilchriese, Hartman, Weber, Ryan, Jones, Wise

1. Sector drawing status

The revised sector models have been place in interlink and progress made on tooling drawings by Jon, Dave, Eric and Neal. Plan to complete all drawings for PRR, but emphasis will be given to assembly drawings first, then finishing details of tooling in case there are delays.

2. Sector materials

There are potential problems with the C-C plates from Allcomp. Plates have undergone CVD. To do this they were cut into round sections and the remainder(practical detail required by the vendor). The round cutouts are 0.021-0.025" thick after CVD and inspection by Allcomp indicates worries about how well the CVD worked in the fiber matrix. The outer sections are about 0.021". All plates were <0.018" thick before CVD(0.018" is our max thickness spec). The plates are now undergoing the heat treatment process and will be done about June 15. Steps to follow are not clear and close interaction with Allcomp (eg. a visit) may be needed around then. There is risk of delay at least but we will know more in about 10 days. Status of tube order will be followed up by Jon. Tubes were due to arrive by now.

3. Sector ABS

ABS as created by Eric is at http://www-physics.lbl.gov/~ericcan/Disk_Sectors/Sector_ABS_and_associated_Drawings.pdf. Status of this in EDMS is not clear and will be discussed tomorrow with Marco.

4. PRR/CDR document status

Here is list with local responsibilities
PRR for Disk Sectors
Disk Sector Requirements - Final draft exists(Gil)
Local Supports Interfaces - nothing since FDR. Needs considerable revision. (Eric, Gil)
QC/QA document - pieces exist, but not in Word template. (Gil, Jon)
Schedule - detailed exists, needs to be updated to make it accord with reality. Gil, Mike Barry

CDR
Ring requirements - Gil, Bill
Global support requirements - Gil, Bill
PST requirements - obsolete draft exists(Gil, Eric, Neal)
Pixel interfaces - not completely clear what should be covered in this. Eric had proposal, need to discuss with Marco.
Global schedule - US schedule as basis, add staves and shells, modify(Gil, Mike)

5. Sector thermal QC fixture - see appended notes from Cliff. He noted that there will be modification to bring leads in from sides. Pt on kapton is said to be straightforward for heaters, and this should proceed.

6. Sector thermal testing. First 8-sector prototype to be tested by Doug, Frank. Will do all stress testing before irradiation on this sector. This has high priority but lower than completing stave testing.

7. Stave testing. Thermal tests after thermal cycling and thermal "shock" are complete. No change in performance. Next step is maximum pressure test. Have to glue on hose to ends of stave to make this possible. This has highest priority. Depending on how this goes, may try smoke test.

8. Coolant fittings. Tom presented latest test data. Neal will create summary and circulate for tomorrow's meeting with Europe. Considerable work remains in this area.

9. Ring into frame. The prototype ring has been mounted in the prototype frame. This procedure has worked well so far. A test plan proposed by Fred is appended.

10. Mockup status. The service rails need to be dismounted, deburred and cleaned. Friction tests are being planned and slider materials investigated. VESPEL with various fillers(or none) and Ryton are candidate materials for the sliders. Neal is requested to ask Tappern what material is planned for sliders for the ID and SCT insertions systems.

11. TVH. Allison is design a "calibration" fixture for the TVH system. Here notes are appended. It is desirable to test the latest prototype sector starting in a few weeks after the thermal measurements are made. Neal has identified a small environmental chamber that might be liberated from the ALS. Gil and Neal will look at it.

12. Ring fabrication. According to note from Bill, design drawings will be ready for him to review by end next week. Cost information regarding tooling, composites, etc will take about another week. So we should have response to RFQ in about 2 weeks.

IR Thermography Sector Test Fixture

by Clifton Jones, #004986

E. Anderssen/F. McCormack

6/6/01

IR Test Fixture Objectives

- Appropriate heating emulation;

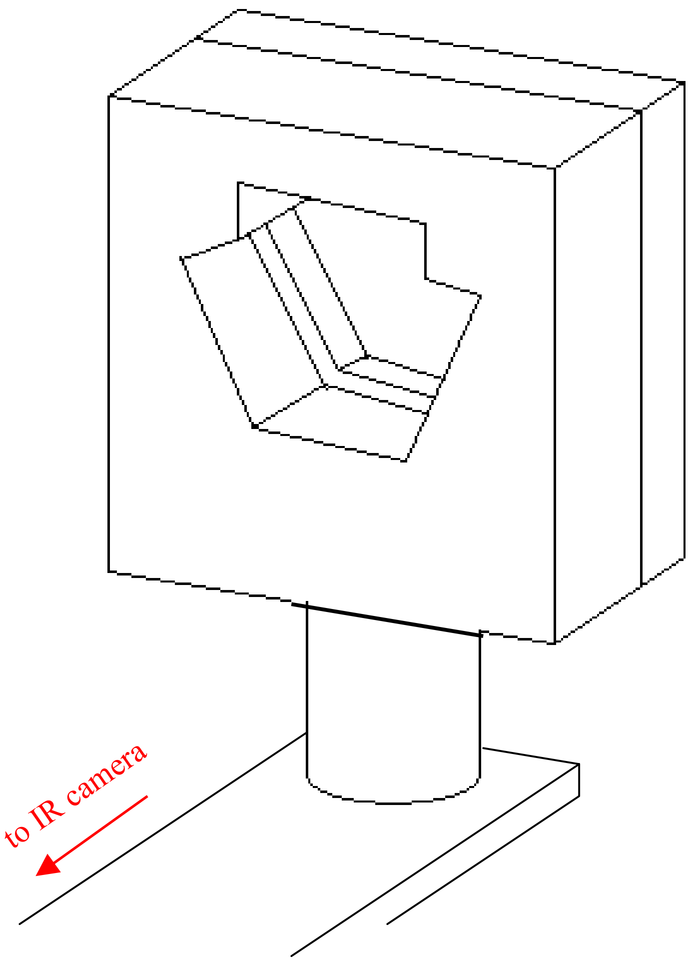
  Kapton® diaphragm, coated heating elements, vacuum cavity

- Standardization of IR test procedure;

  Constrain camera/fixture relationship, minimal manual sector positioning

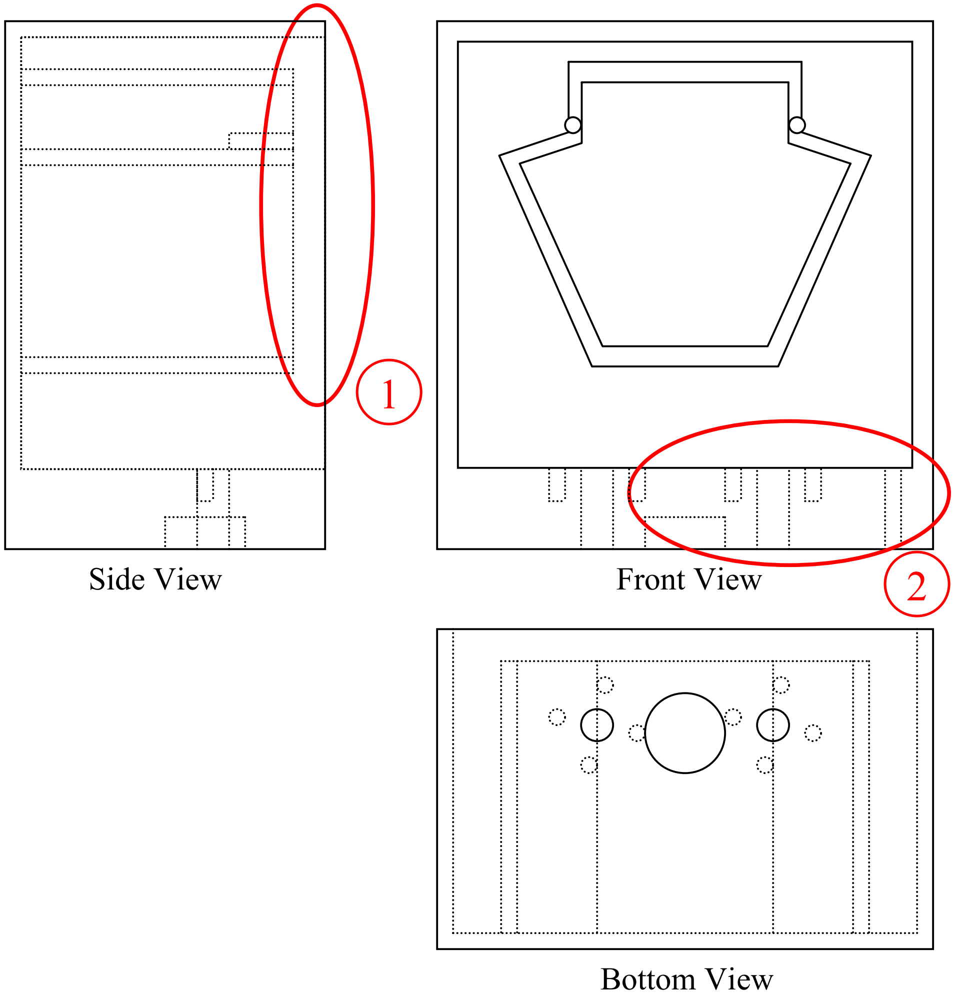
- Ease with test repeatability.

  Few individual parts, quick and easy connections



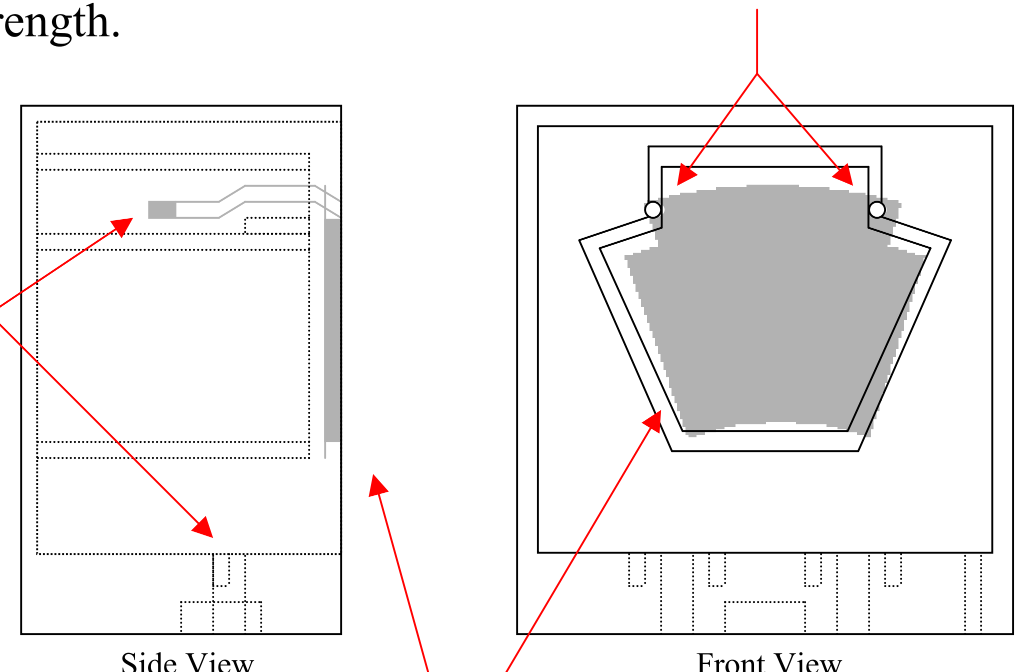
Housing Design (1/2)

- Rectangular aluminum housing;
- Rotation about vertical axis;
- Window allows greatest exposure to IR camera while providing holes for sector support via pins;
- Kapton® diaphragm with rubber cement seal provides setting for detector-emulating heaters while minimizing IR interference;
- Sector frame inset depth equal to sector width plus twice the diaphragm deflection (1);
- Cooling water/heater power introduced using baseplate on inside bottom housing face (2);
- Machined vacuum inlet (2).

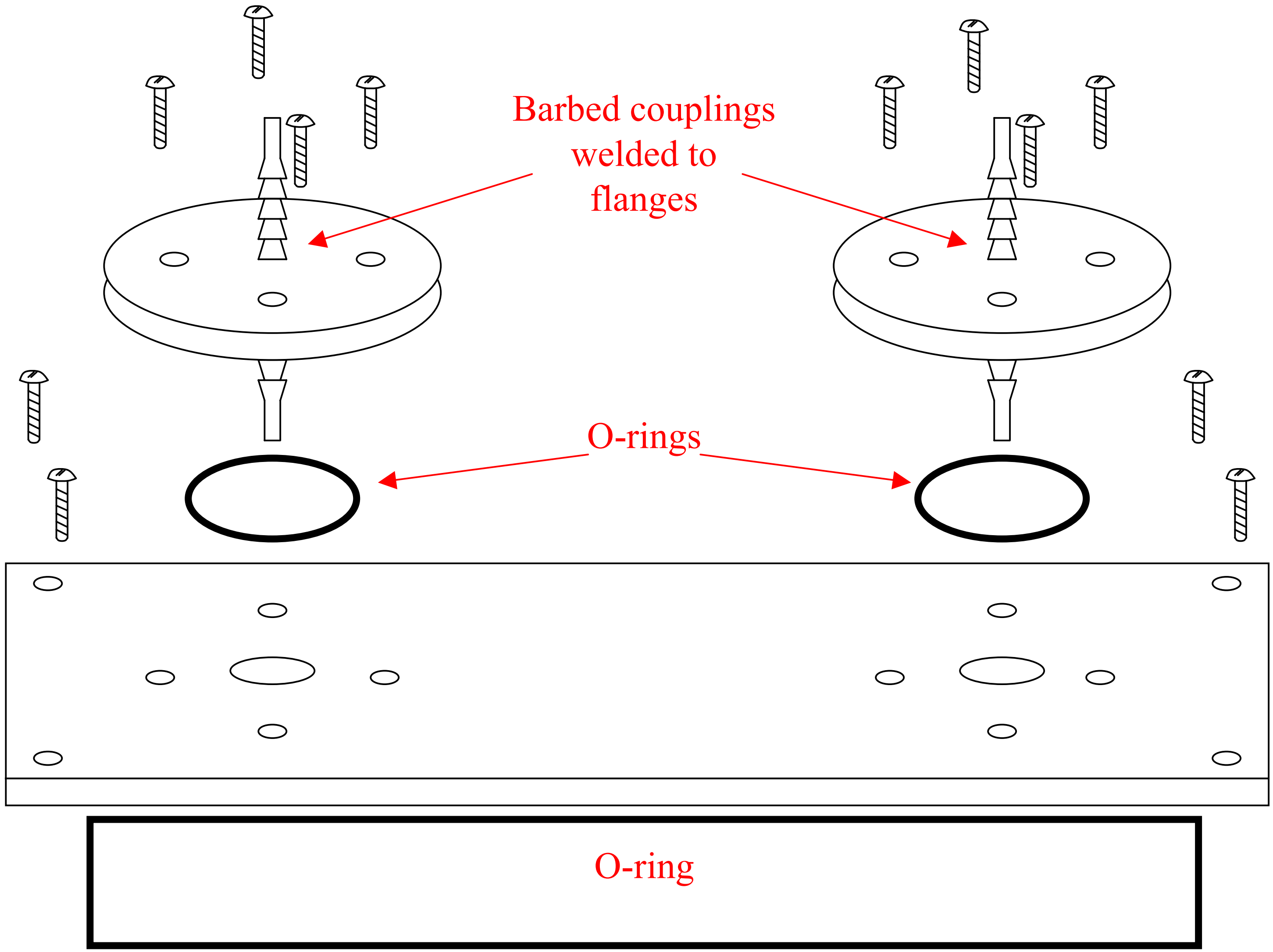


Housing Design (2/2)

- **Note:** “Rear” housing is identical to this, except for thinner profile, no holes for connections/stem, and sector frame is flush with outer housing edge.
- Held together by vacuum strength.



Baseplate Design



Note: Guide pins located on the bottom face of the baseplate help to mount connections.

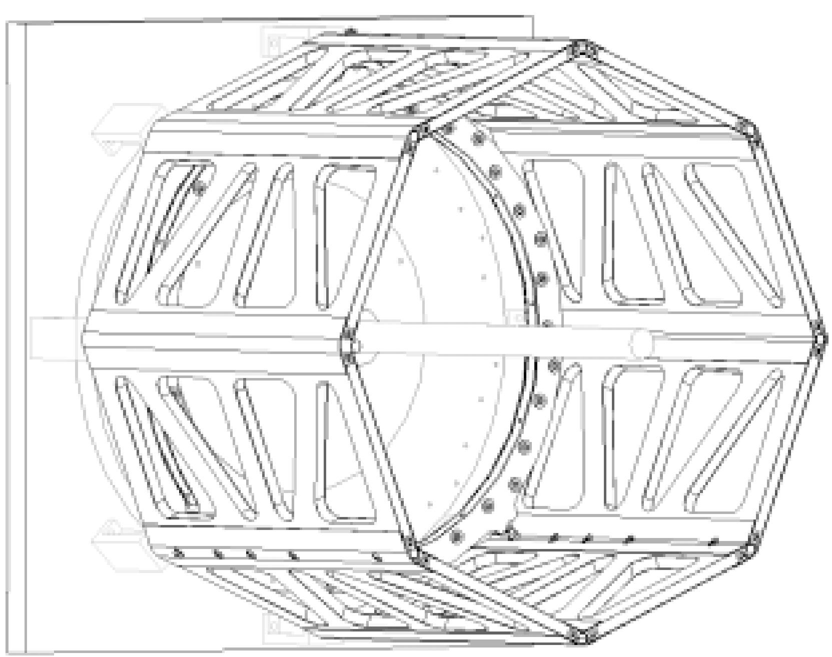
Unfinished Design

- Platinum heater design for module emulation;
- Characterization of sector face inset depth;
- Characterization of IR camera geometry;
- CAD drawings of complete test fixture and heater/Kapton® fabrication mask.

Fred Goozen
4 Jun 01

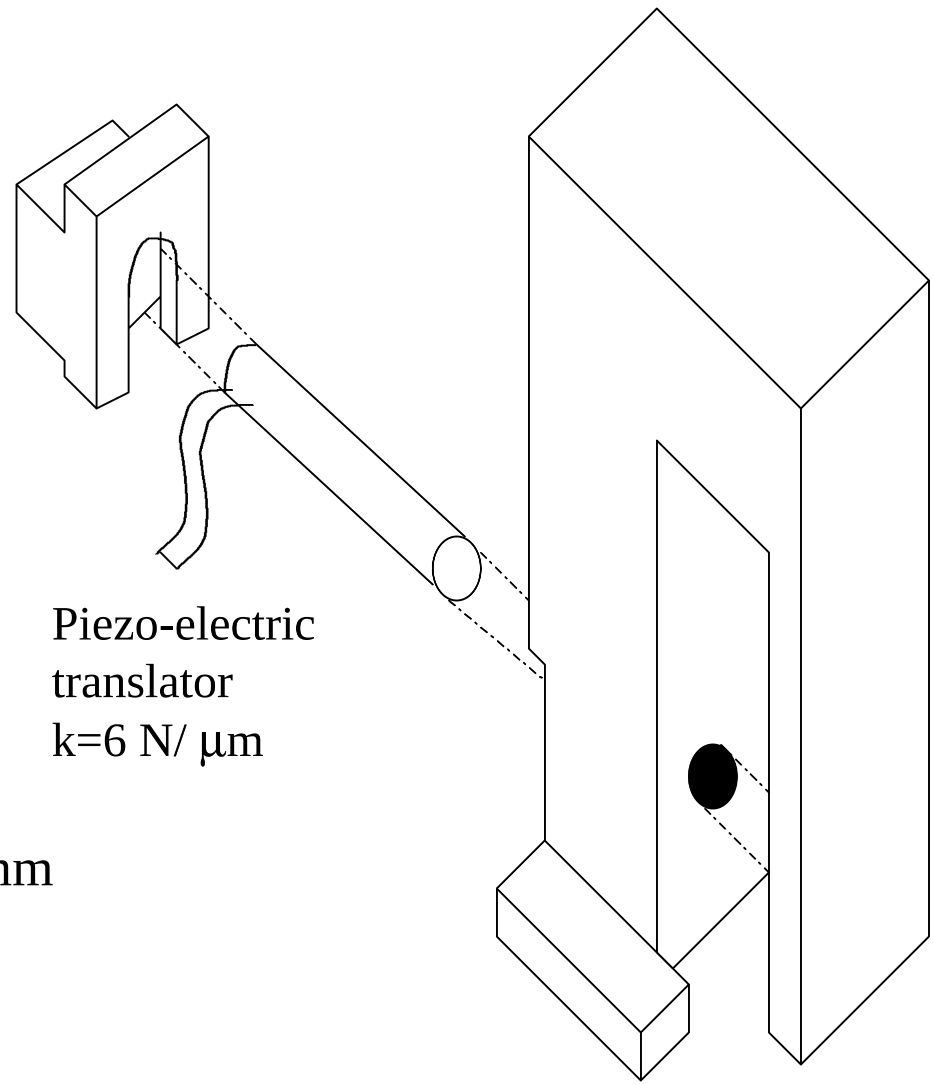
Measurements of 11 Sector Ring in Support Frame

1. Do not open or adjust mount connections or remove assembly from drilling fixture base
2. Disconnect and lower fixture ring support plate and secure to fixture to base
3. Label each mount connection A,B,C
4. With dial indicators measure play in all connections
5. With pulley and weights load support ring at mid point between supports (single point) and measure deflection of support ring at load and other mid points also motion in connections wile assembly is on drilling fixture with Z axis up. Load in 100gm steps and not to exceed 100micron deflection at any point.
6. Rotate assemble so the Z axis is in the horizontal secure with angle plates and clamps note orientation of frame
7. Measure elevation of large holes in end of space frame by inserting pin and sub set of holes in support ring using same technique and reaching through holes in support frame
8. Remove and replace support ring
9. Redo steps 4 through 7
10. Remove assembly from drill fixture and secure to table with z axis in the horizontal and orientation as close as possible to step 6 (flat surface down and bar clamped to table to take load in Z direction use hot melt to secure in XY plane
11. Redo steps 4 through 7



TVH Test Cantilever

back plate
k=842 N/ μm



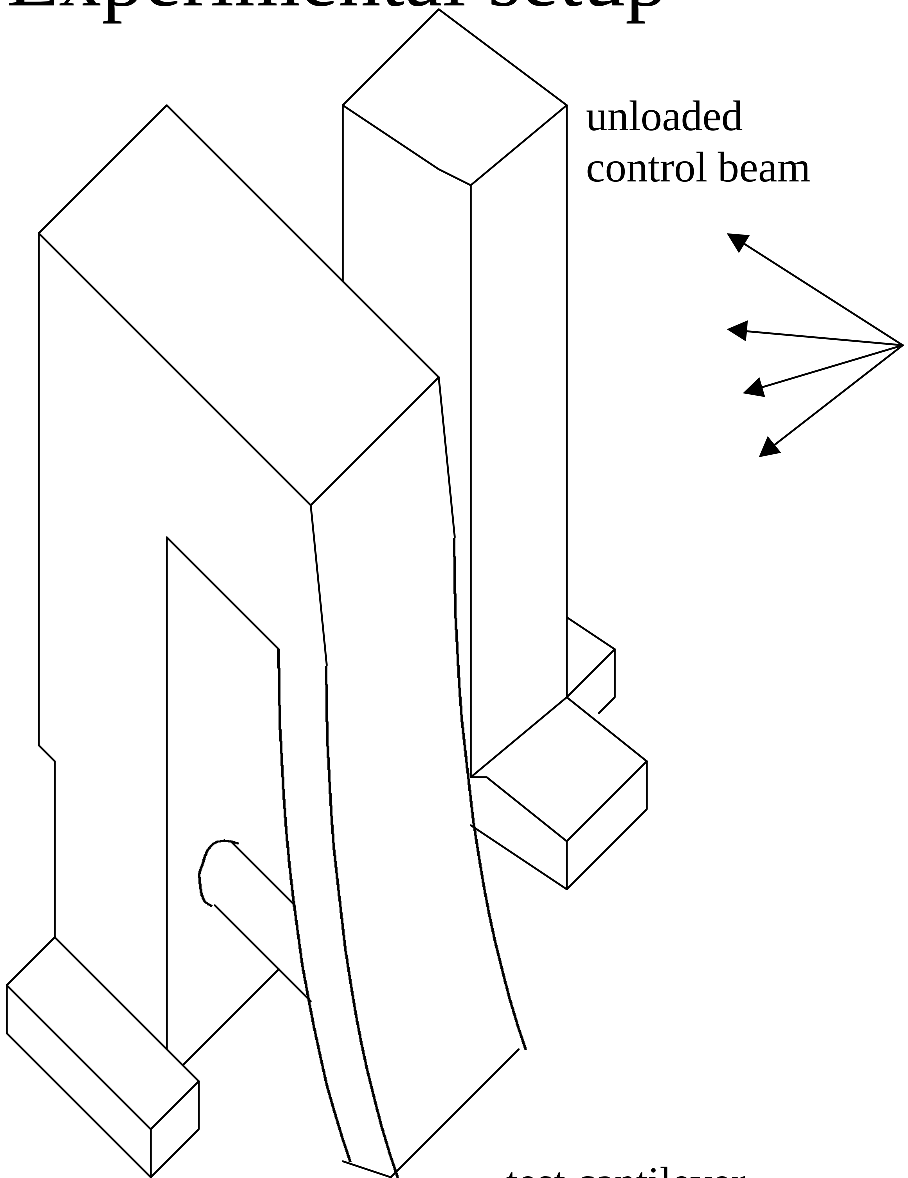
cantilever
k=1.078 N/ μm
(front)
k=364 N/ μm
(back)

Piezo-electric
translator
k=6 N/ μm

Overall
cantilever
dimensions
206 x 85 x 40 mm

Allison Ryan
4-6-01

Experimental setup



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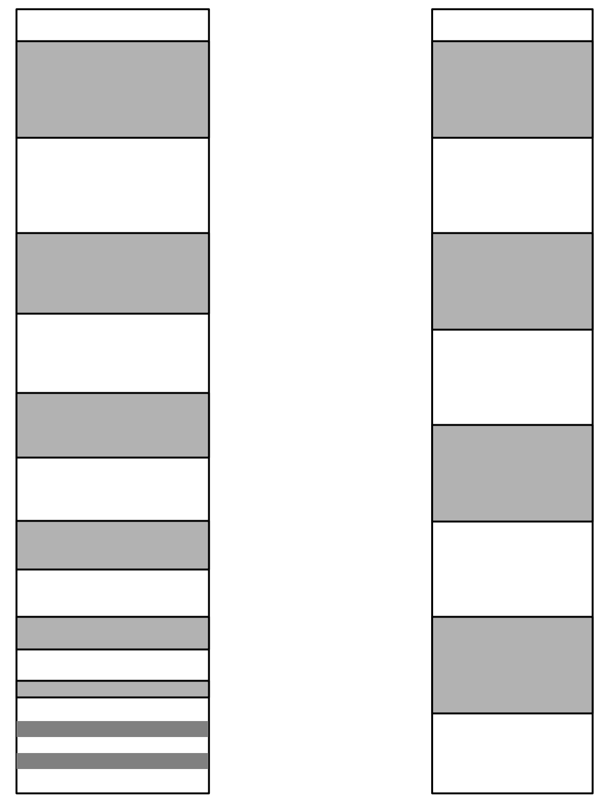
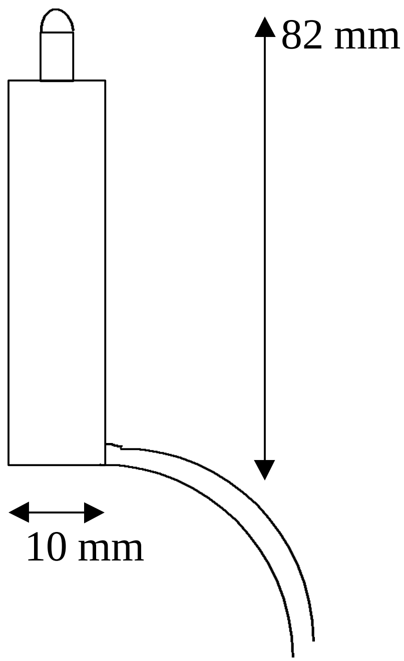
Expected Results

(interference fringes)



use control data to subtract effect of table displacement from test cantilever

Piezo



Max displacement	105 µm
Stiffness	6 N/µm
Max force	800 N
Manufacturer	American Piezo Ceramics
Appx cost	$900

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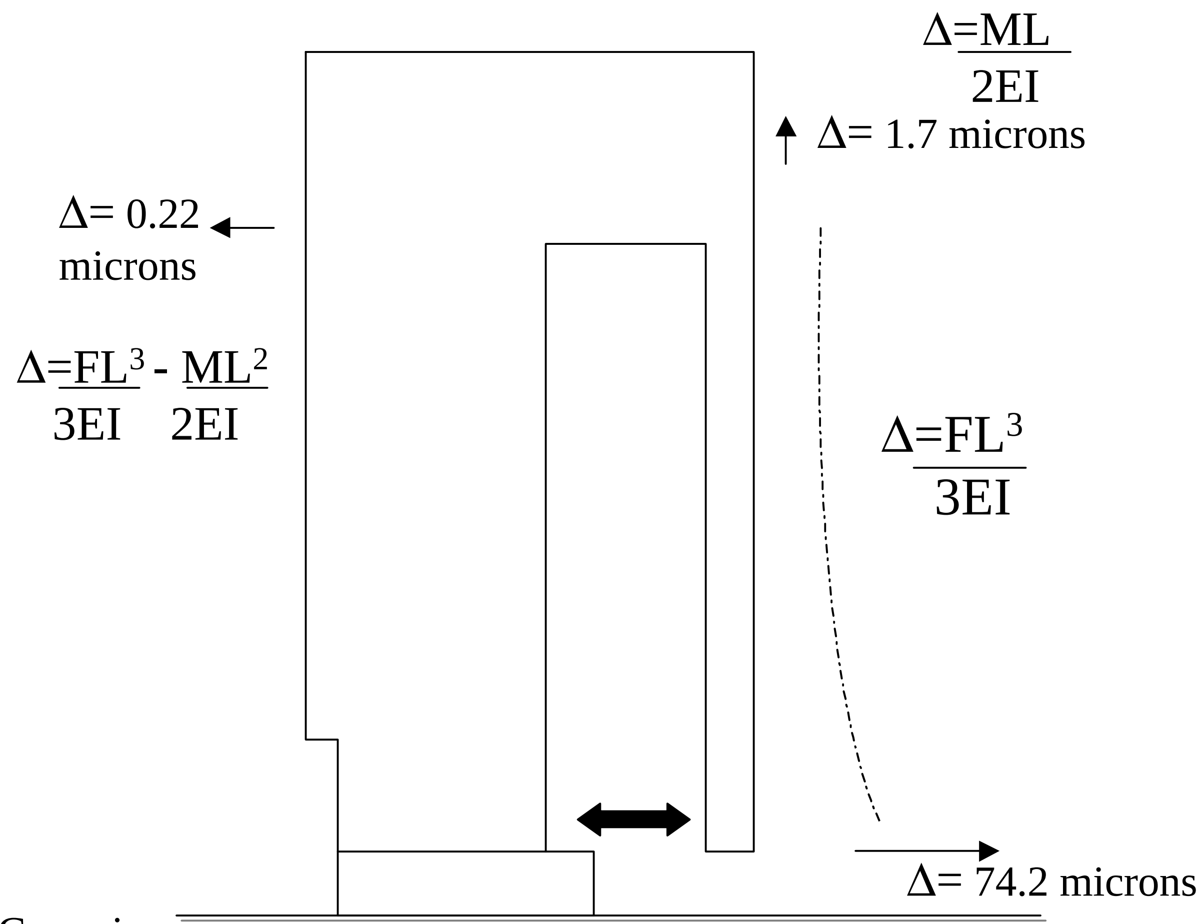
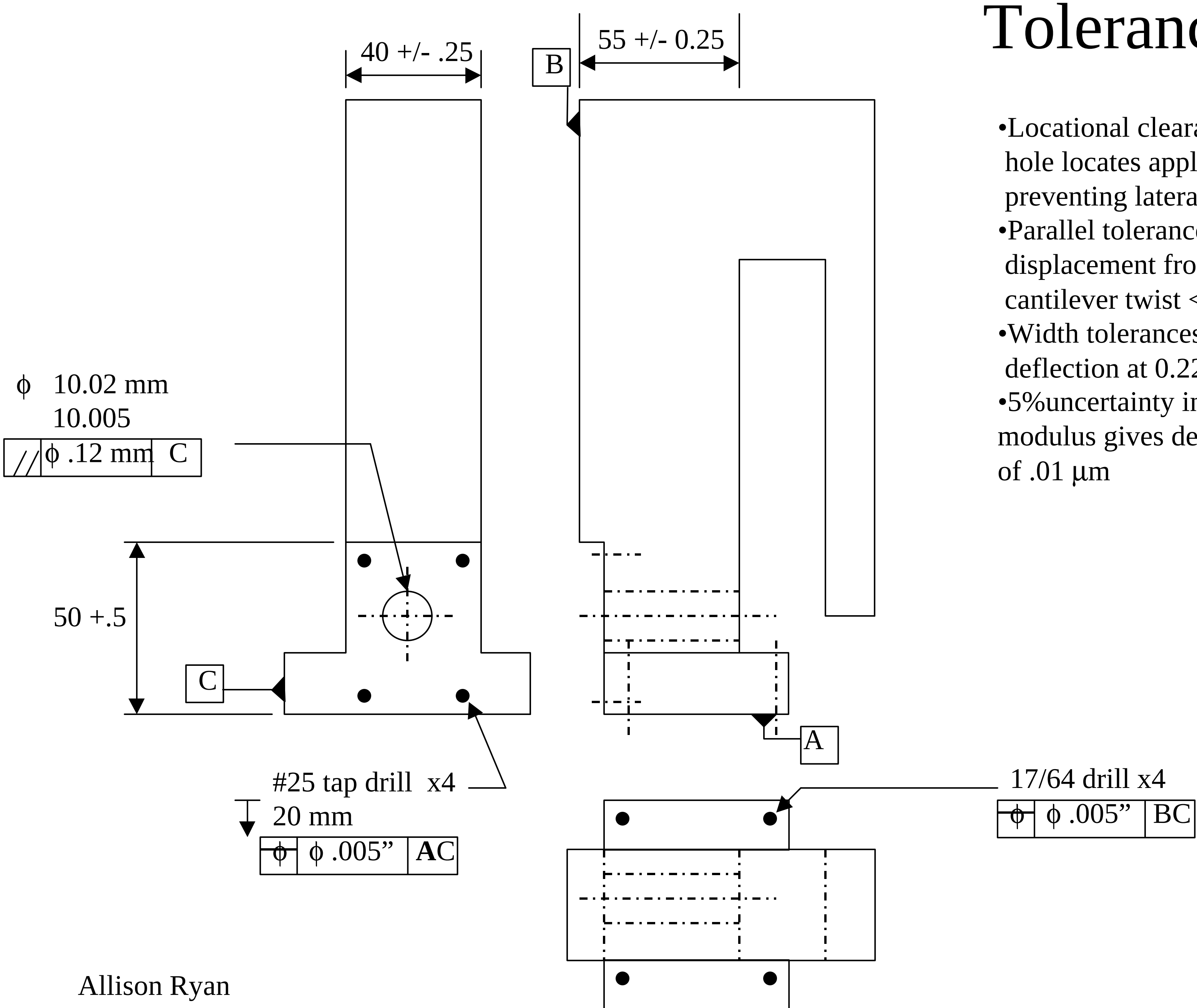
Deflections



for 80 N force

Tolerances



- Locational clearance fit on piezo hole locates applied force while preventing lateral forces on piezo
- Parallel tolerance keeps displacement from cantilever twist <0.1μm
- Width tolerances keep back deflection at 0.22 μm +/- .005
- 5%uncertainty in elastic modulus gives deflection error of .01 μm

Allison Ryan
4-6-01