3D Imaging Dome Prototype

Second Round of Prototype Tests
And Some Modifications

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SLAC MAGIS Group Meeting

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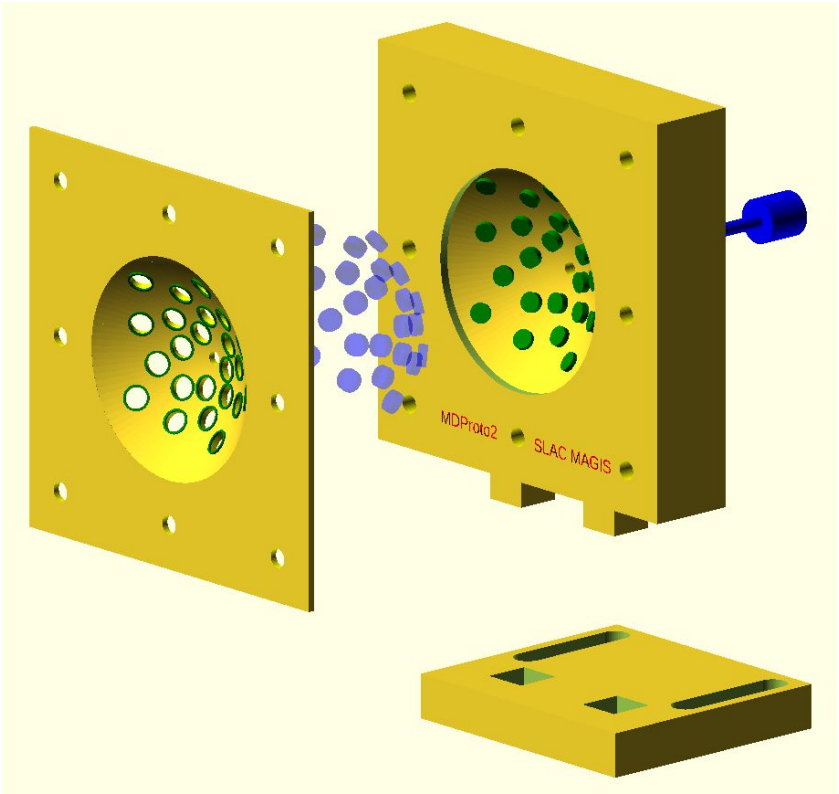
U.S. DEPARTMENT OF ENERGY
Office of Science

SLAC NATIONAL ACCELERATOR LABORATORY

MDProto2: Review

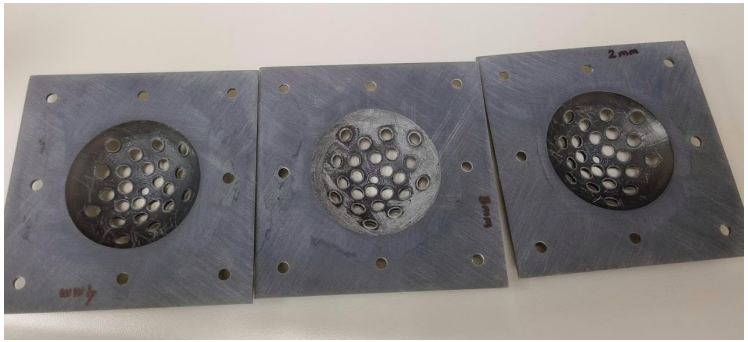
- Reflects lessons learned from MDProto1
- Object rod now has a knob for easy handling
- Local support board & base board separated
  - Base can stay on the optical table
  - **LS board can be printed face-up**, hopefully leading to better quality
- Parameters tested:
  - Hole diameter: 5.2mm
  - Front-stop overlap: {0.2, 0.3, 0.4} mm

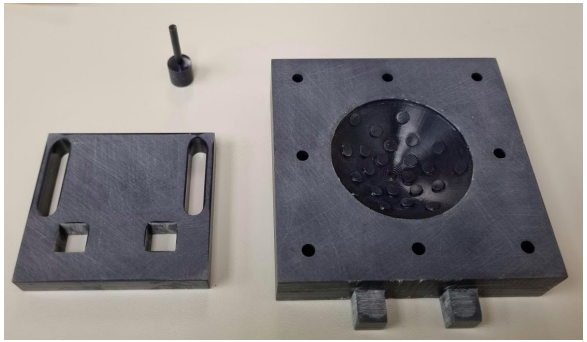


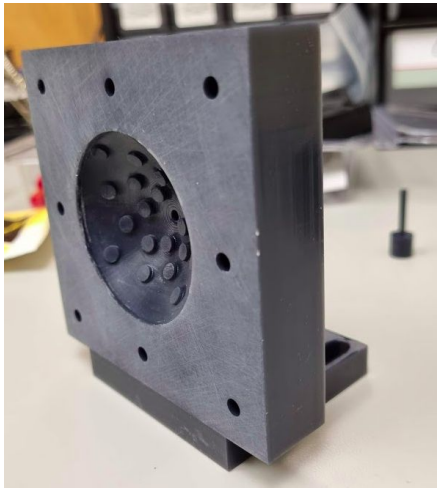
MDProto2: Products Arrived

Arrived on Monday, Aug. 2nd

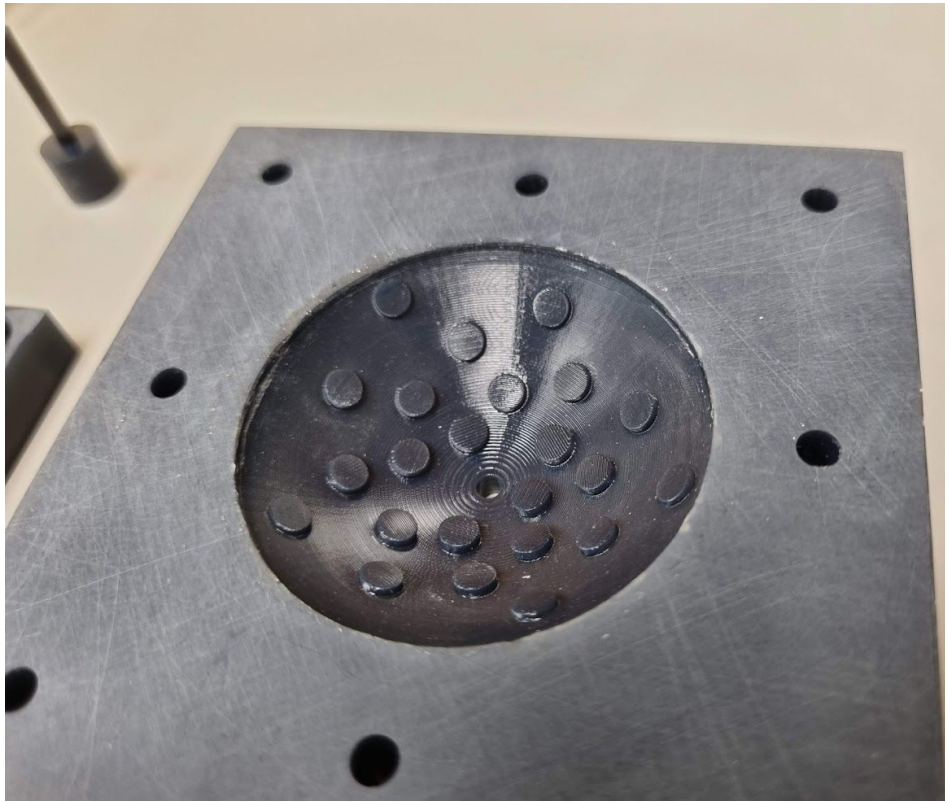
- **Black opaque material**
  - Different material called “Somos Taurus”
  - “… I thought that you were in a rush for this part and that machine was open.”
  - Seems slightly tighter, but not a major issue
- Local support board
  - Seems to be better quality overall, particularly the “knobs”
  - **Printing orientation seems to have helped!**





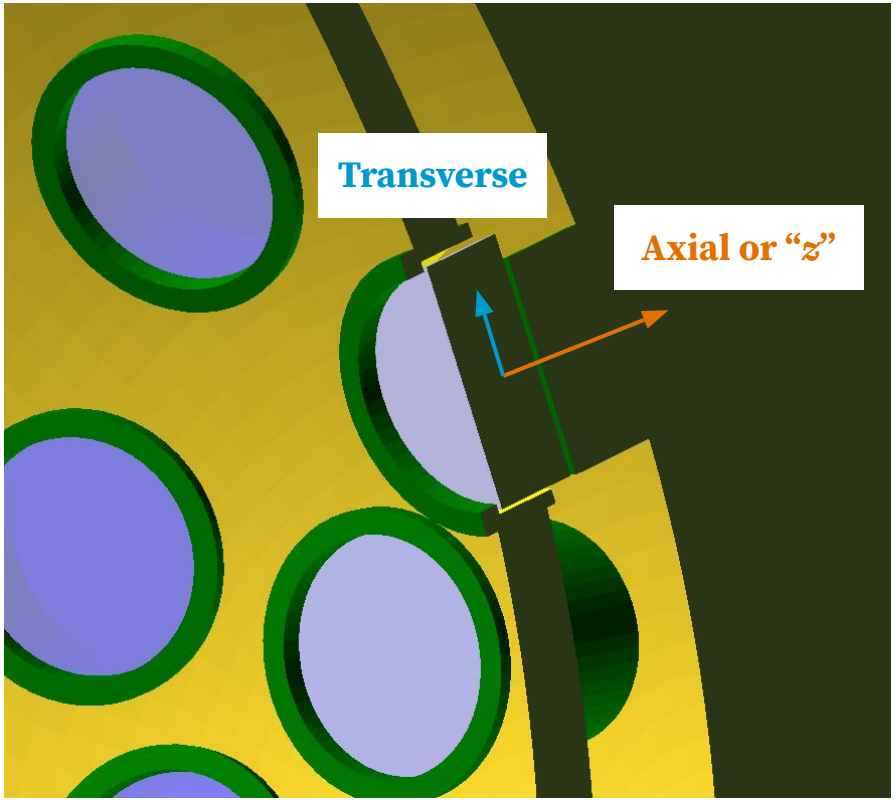


MDProto2: Local Support Board



MDProto2: Mirror Loading Experience

- All 5.2mm holes, still **loose**
  - Transverse movement
  - Not a major issue by itself,
  - But, combined with axial movement
    ⇒ Can cause alignment errors
- **Visible axial movements**
  - Particularly among inner mirrors
  - Hints at back knobs not pushing in properly
  - In MDProto1, edge mirrors had loose axial pressures
    - Mainly attributed to back knob print quality



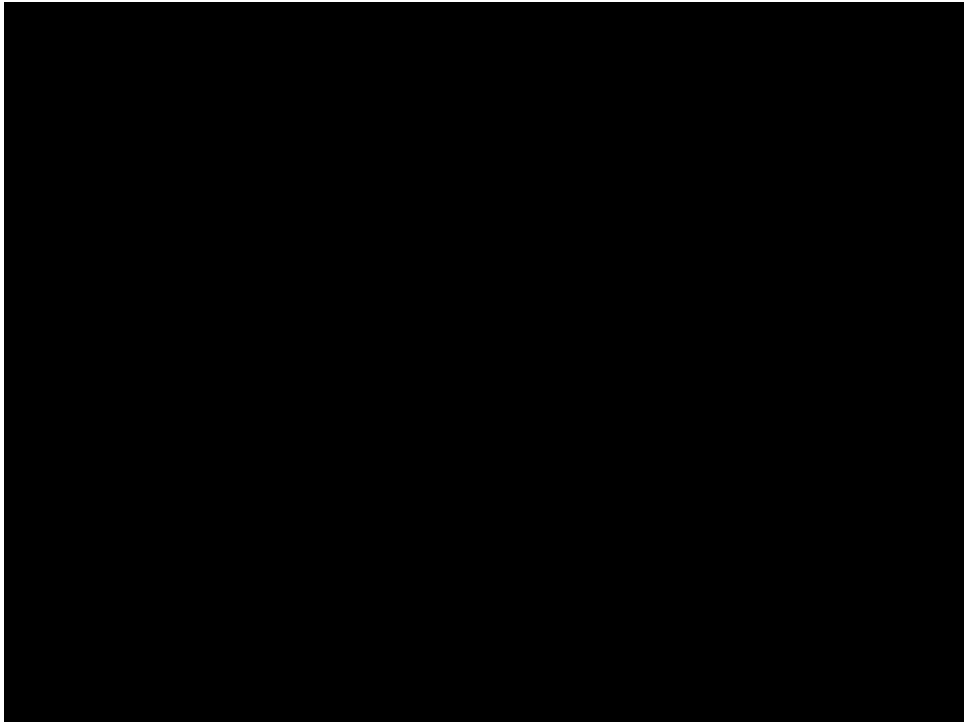
MDProto2: Imaging Attempt

What is being done here:

- All 23 mirrors loaded
- Imaging a tiny LED (< 1mm)
- Tapping the dome to create some disturbances

What we see:

- Significant alignment shifts in inner ~10 mirrors



MDProto2: Debugging the Issue

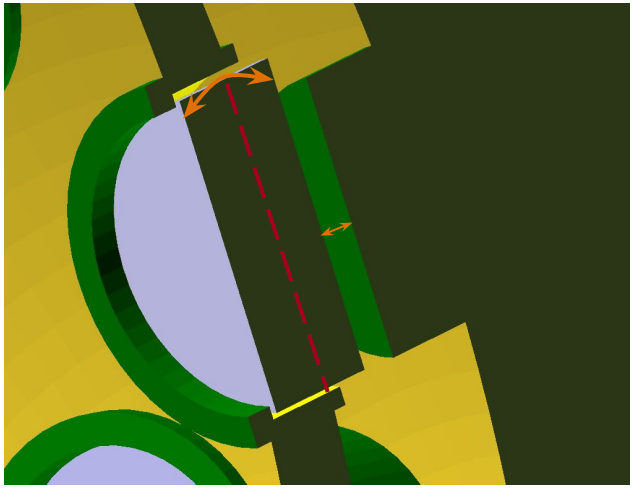
Potential Cause 1:

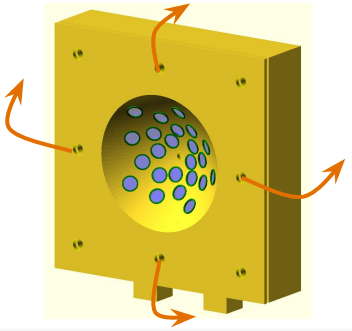
- The back knobs are simply not long enough to push the mirrors actively
- Too much axial room

Potential Cause 2:

- Front & back boards are screwed only at the edges
- This could flex the board towards the edge
- Better contact at the outer mirrors, looser contact at the inner mirrors

Could be a combination of both (and more) causes





MDProto2: Addressing the Potential Causes

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Addressing potential cause 1:

- Make the back knobs longer
- Two adjusted versions
  - +0.5mm back knobs at all locations
  - +0.5mm back knobs at inner 10 locations only

Addressing potential cause 2:

- Add a screw at the center for more even pressure
- Can use the existing hole (originally for object rod)
  - Current design: 3.2mm diameter hole
  - Use long M2.5-0.45 or M3-0.50 screw + nut
- No adjustment required for the print, just need some screws

Summary

- MDProto2 arrived & briefly tested
  - Still some issues with mirror alignments
  - Seems like some mirrors are not being pushed well (inner ~10)
  - Some room in both transverse & axial directions
- Trying to address the axial issue first
  - Make the back-knobs longer
  - Add a screw at the center to prevent board flexing
    - Buy another pack of screws?
    - Can we get a few from somewhere within SLAC
- New design files sent to Ariel on Wednesday, August 4th
  - Should be able to test some time next week