

UVIT-PMB

Mechanical Structure:

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- ▣ Mechanical Structure, its functions,
- ▣ Key aspects of UVIT design and analysis.
- ▣ EM structure, and Vibration Tests
(modifications indicated)
- ▣ FM-assembly – Key issues, details, status

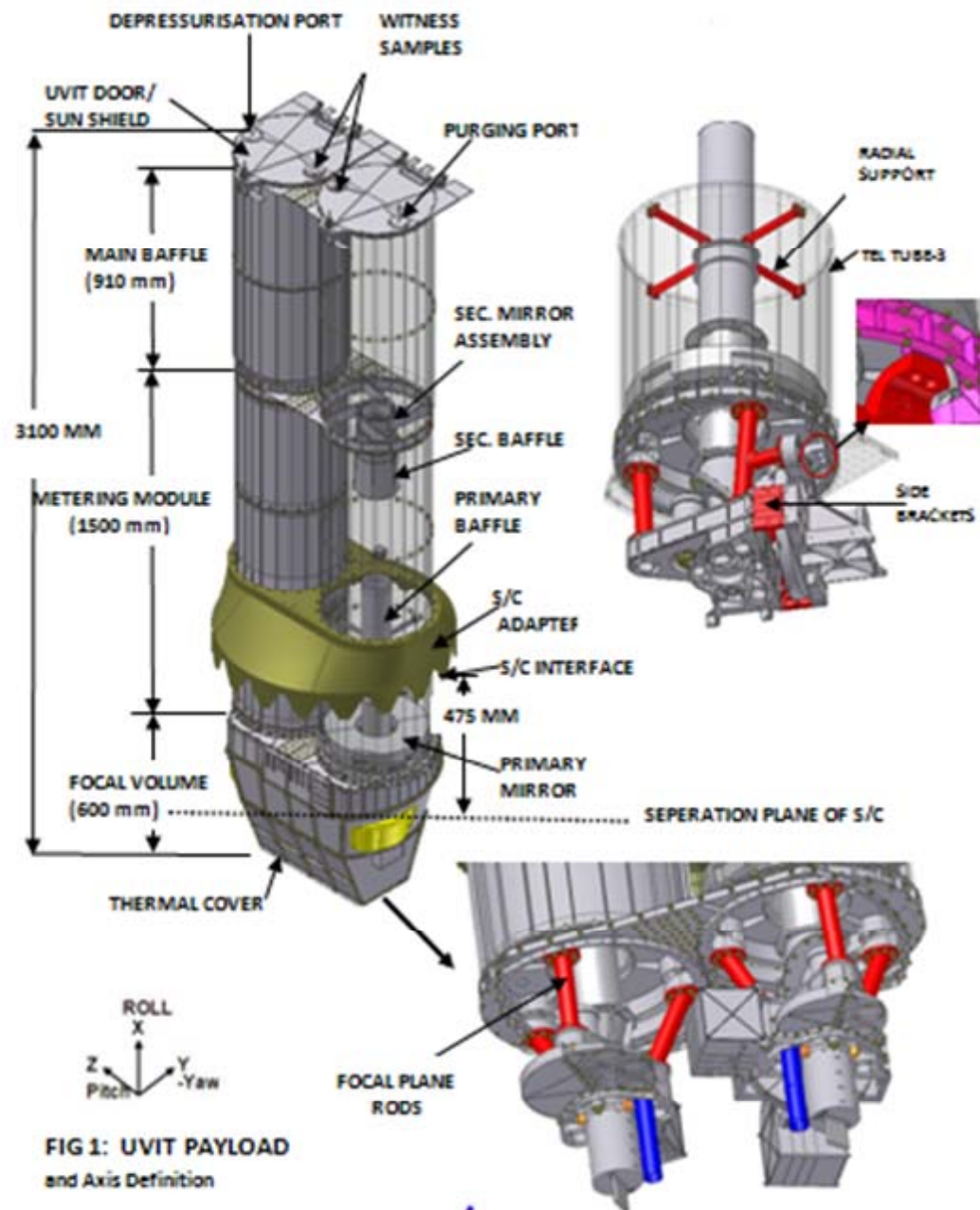


FIG 1: UVIT PAYLOAD and Axis Definition

2. Key aspects

- **UVIT MASS** (VIBRATED): 202 KGS. SATELLITE CLY. ~28 KG (ON EQUIP. PANEL), TOTALLY AMOUNTING TO 230 KG'S
- **FIRST RESONATING FREQUENCY:** 45 hz, (67, 75, 86, 93, 94 and 112 are subsequent)
- **ANALYSIS:** STATIC, FREQUENCY RESPONSE ANALYSIS HAVE BEEN CARRIED OUT, IT IS FOUND THAT ADEQUATE DESIGN MARGINS EXISTS .

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2. Key aspects (conti..)

▣ **ALIGNMENT AND ACCURACIES**

- Between the two telescopes: < 1 arc min (targeted)
- Transfer of tel. tube axis to ref cube on s/c adapter cube < 30 arc sec

MATERIALS USED.

INVAR: Metering structure:

(E: 148Gpa, Yield: 240 Mpa, CTE: ~3 ppm, Density: 8050 kg/m³)

AL6061T6: Baffles, brackets, thermal cover.

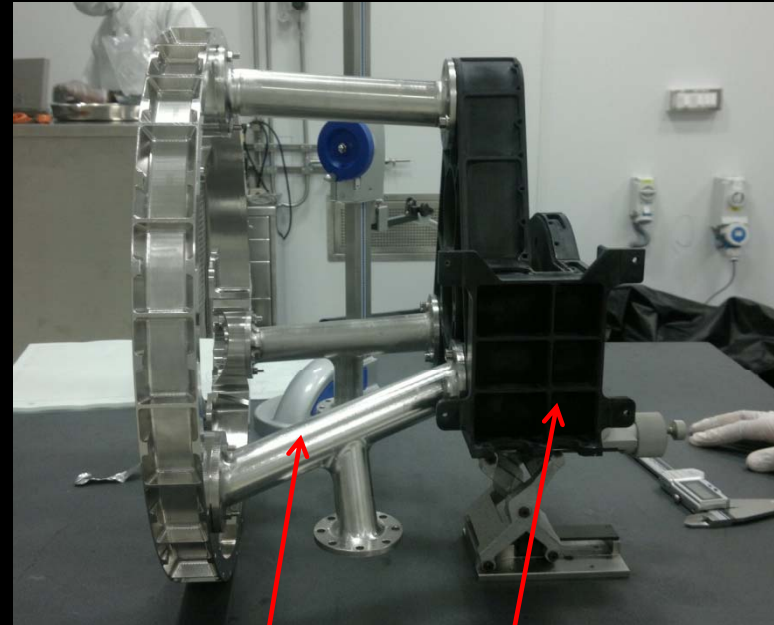
(E: 69 Gpa, Yield: 320 Mpa, CTE: ~23 ppm. Density: 2700kg/m³)

Ti6AL4V: Spacecraft adapter.

(E: 115 Gpa, Yield: 880 Mpa, CTE: ~8.6 ppm, density:4300 kg/m³)

2. Key aspects (conti..)

All parts are given inorganic coating (ISAC) to minimize scattering and also from thermal requirements, reflectivity <1 to 2%



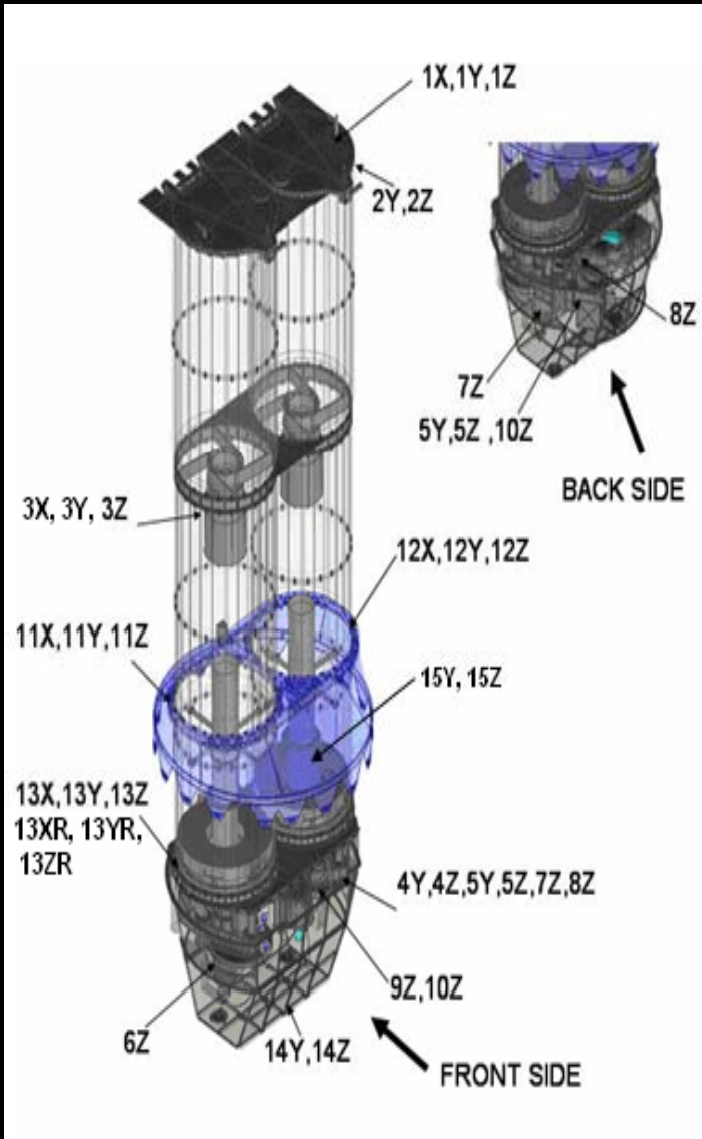
Un Coated
component

Coated
component

2. Key aspects (conti..)

IN order to get a high friction on the interfaces, and hence avoid any misalignments in the optics, Titanium bolts are used and these are tightened with a high torque, e.g. 12.5 Nm for M6 bolts. SNT

3. EM structure, and Vibration Tests (modifications indicated)



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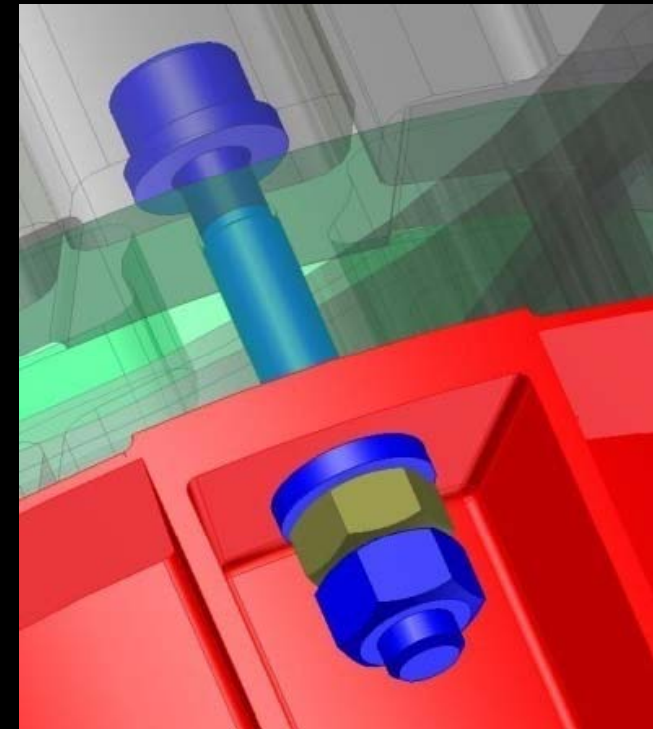
The vibration test was conducted for "sine", "random" and 15 g quasistatic loads as per the qualification load specs (isro).

The **qualification tests** on the payload were **successfully completed**. The mechanical integrity of the payload was established by pre and post signature test data. The mechanical alignment stability before and after the qualification tests were correlating. **The functional tests of the payload were satisfactory.**

3. EM structure, and Vibration Tests (conti..)

A set of three M5 bolts in the support for the secondary mirror loosened during random vibrations of qualification level.

These M5 bolts were replaced by M6 bolts which should give a 40% larger preload.

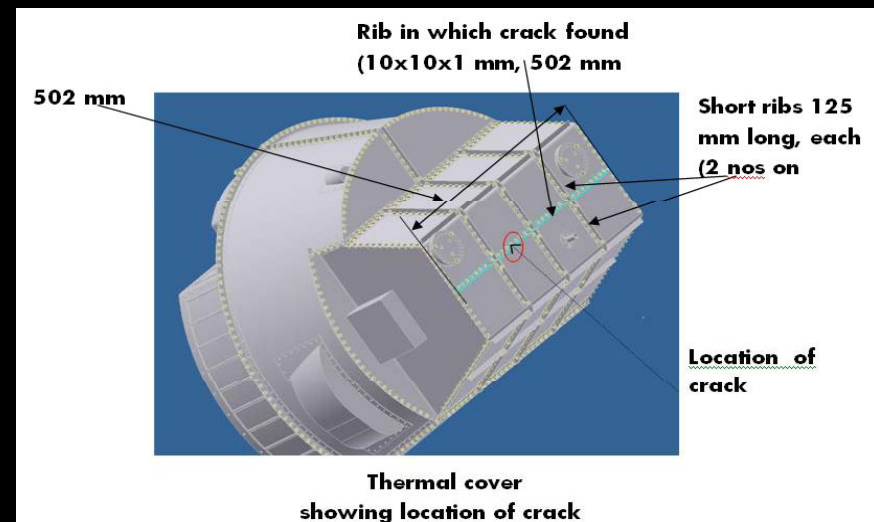


The modifications are reviewed and cleared by design/test review committee.

3. EM structure, and Vibration Tests (conti..)

A Crack spotted in the rib of thermal cover:
Failure is attributed to the fatigue, associated with joint design, refurbishment of joints are as follows.

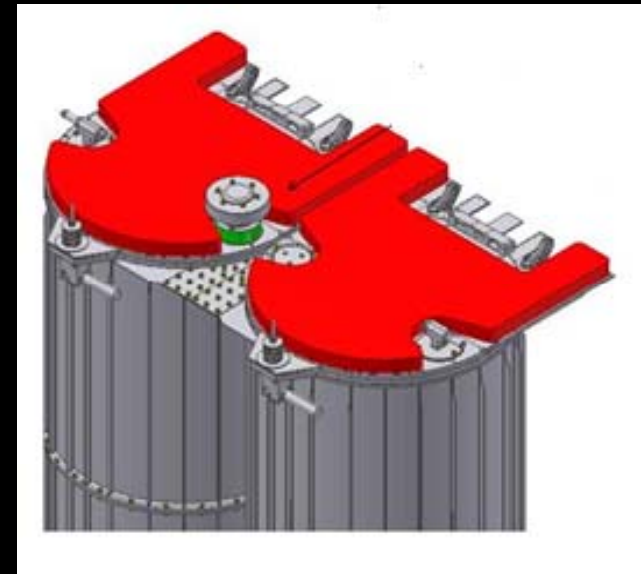
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3. EM structure, and Vibration Tests (conti..)

Door hinge broke during Z axis random test, it was made out of Al. Alloy. The problem was analyzed, and the door is now redesigned and fabricated by the group in ISAC .

The modifications are reviewed and cleared by design/test review committee.



3. EM structure, and Vibration Tests (conti..)

The cable beta support clamp, supporting heavy cable CPU and HVU broke at one place: Clamp design Modified, tested, committee reviewed and cleared to use it in FM.

The modifications are reviewed and cleared by design/test review committee.

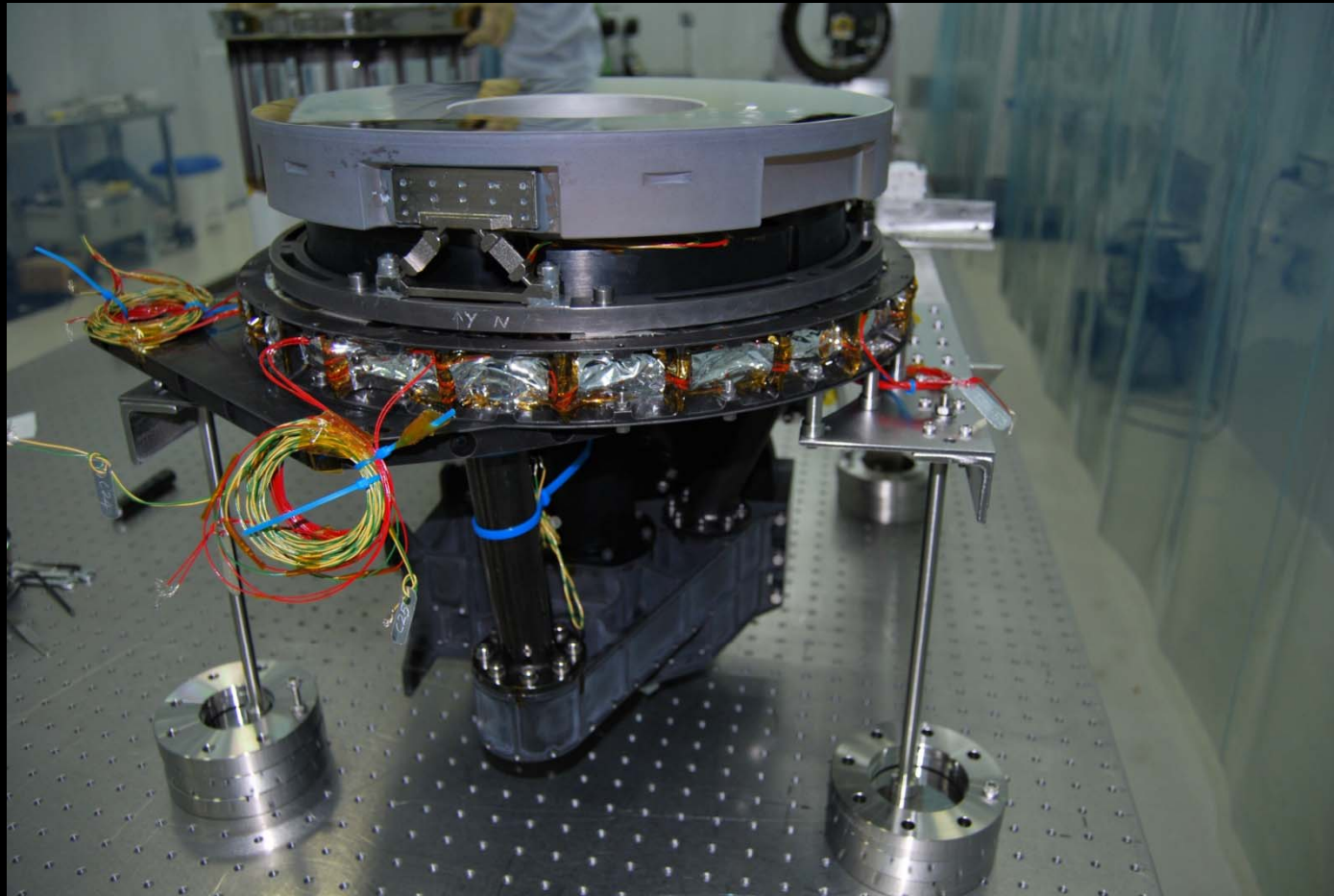
4. FM-assembly – Key issues, details, status

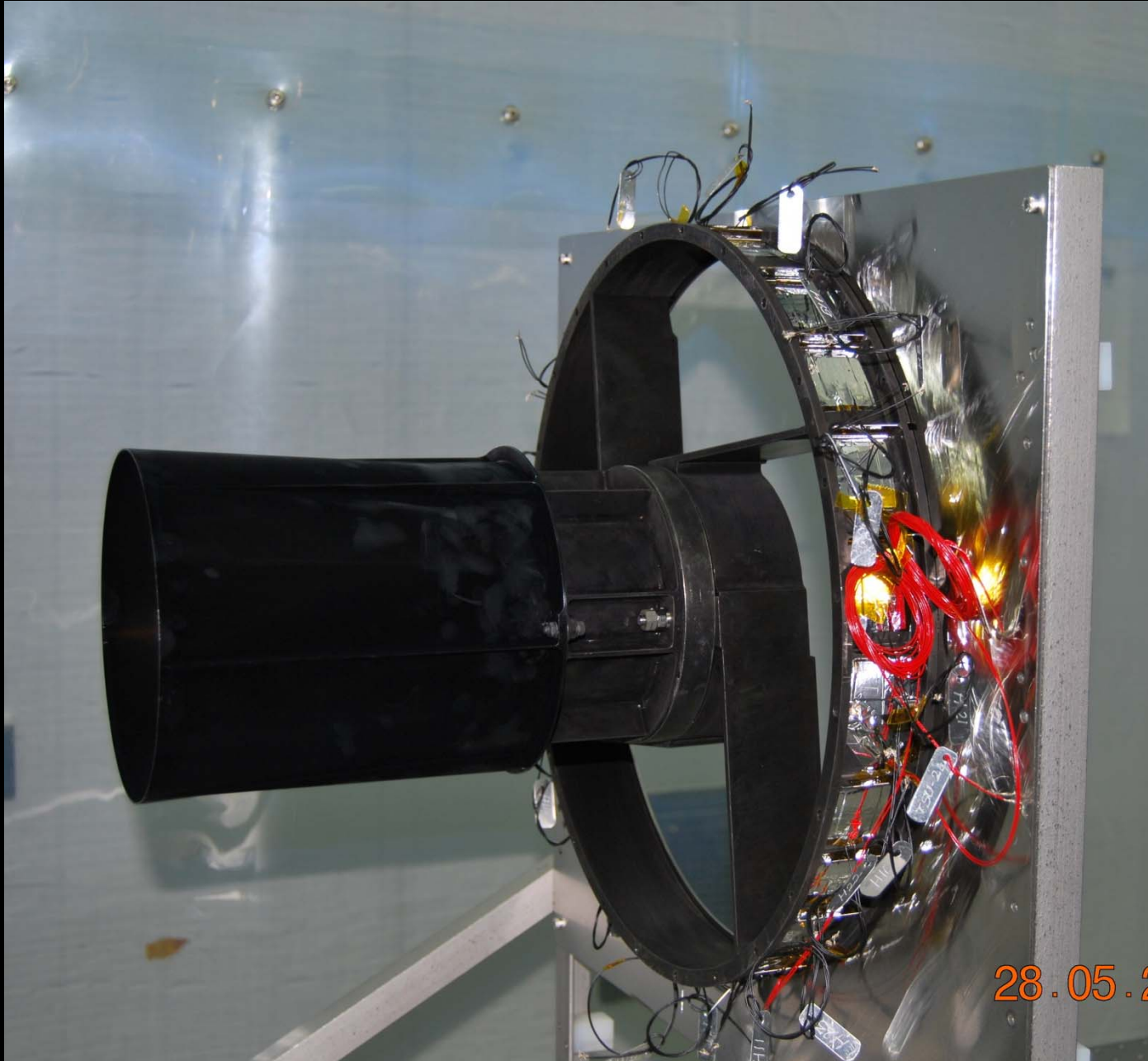
Torquing of the mirror interface's and optical mounts needed special care to control astigmatism .

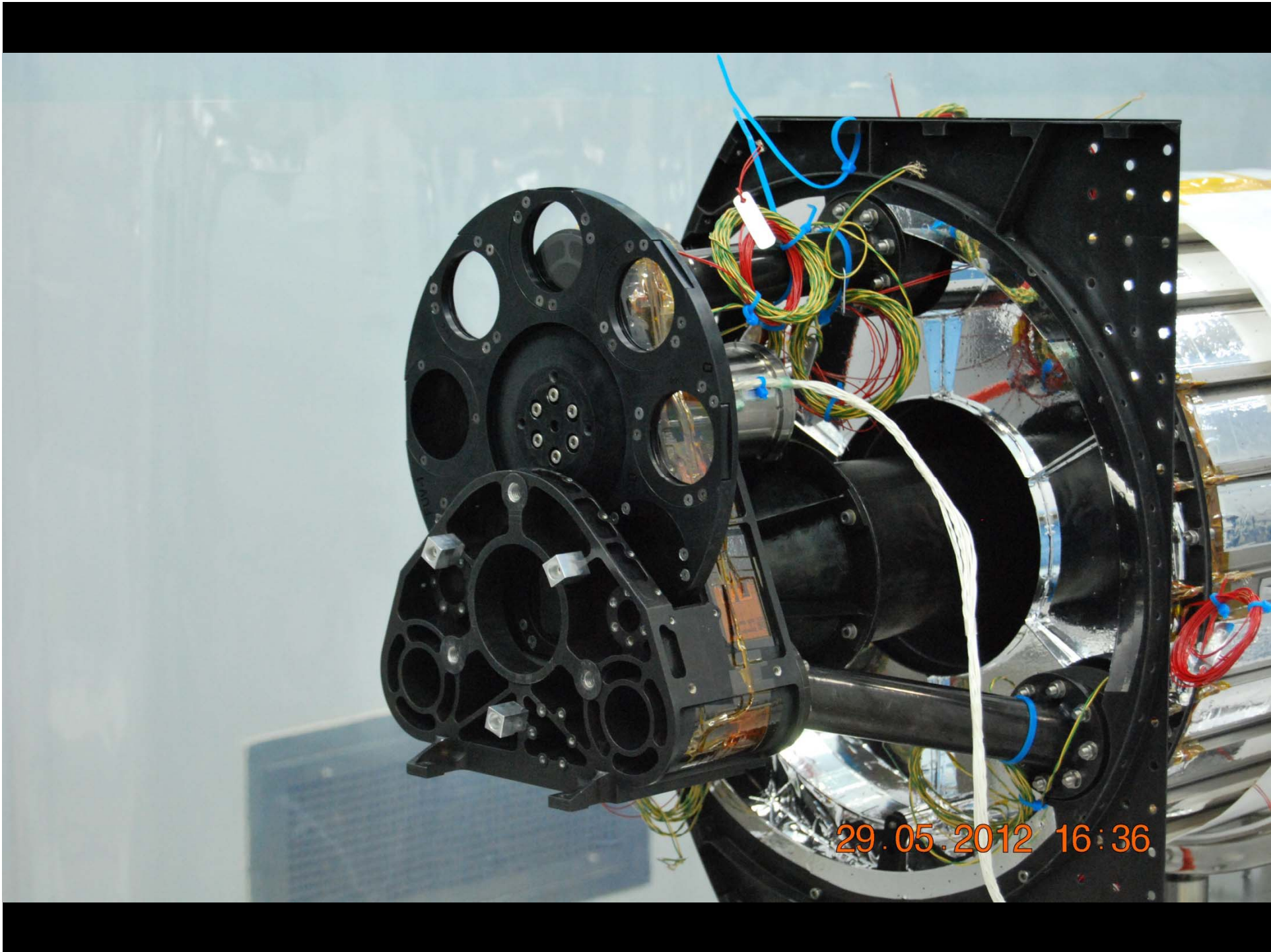


4. FM-assembly (conti..)

Key issues, details, status

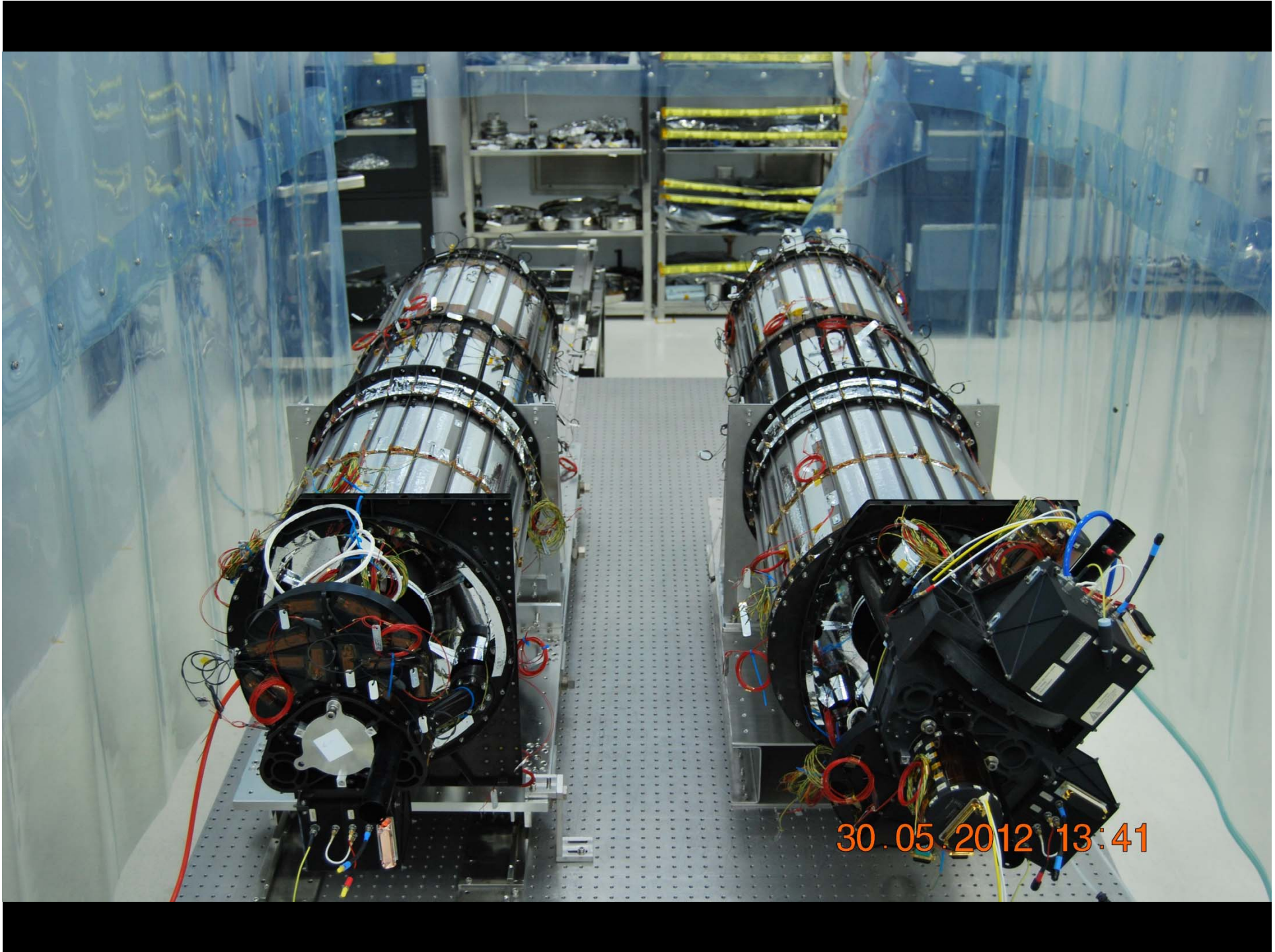






4. FM-assembly (conti..)

1. NUV/VIS telescope is fully integrated Ready to integrate on Spacecraft adapter.
2. FUV telescope mechanical integration is fully completed, focus test is under progress in vacuum chamber.
3. Thermal cover sub assemblies completed.



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Activities ahead

1. Completion of FUV focus test and CPU final torquing
2. Integration with spacecraft adapter.
3. Baffle checks
4. Door deployment tests.
5. Baffle integration
6. Door integration, ports integration
7. Cable harness,
8. Thermal cover integration,
9. Heater and the thermister wire harness,
10. Vibration tests, MLI fixing, thermovac tests,
11. Post vibration checks and integration with spacecraft,

Thanks