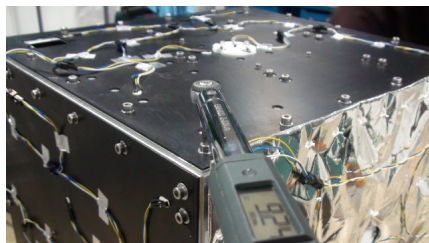
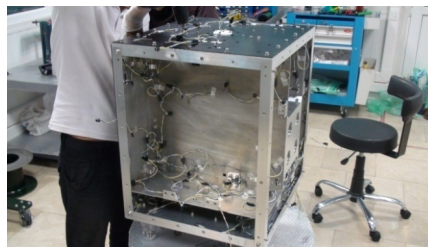
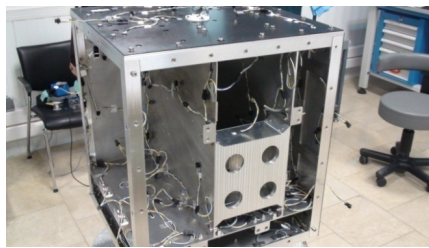
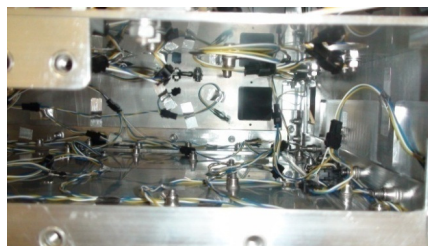
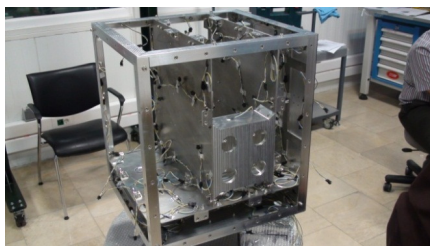


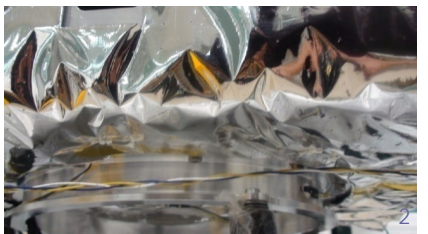
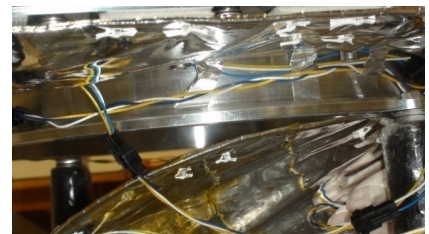
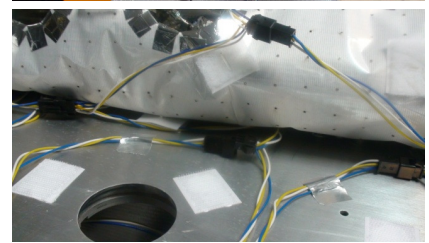
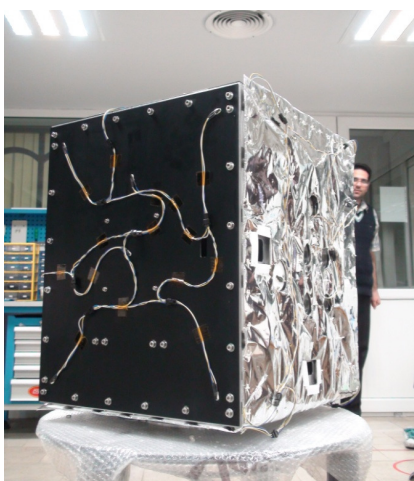
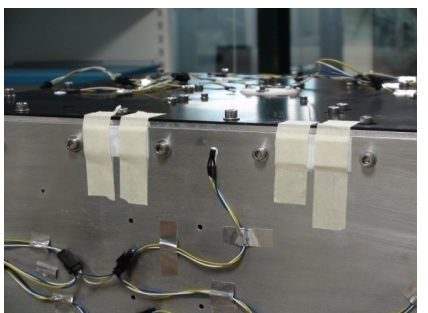
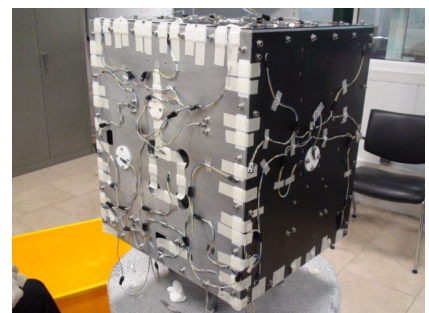
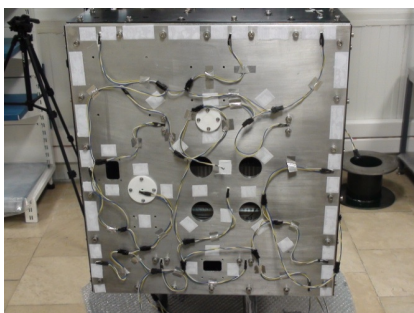
تست های حرارتی

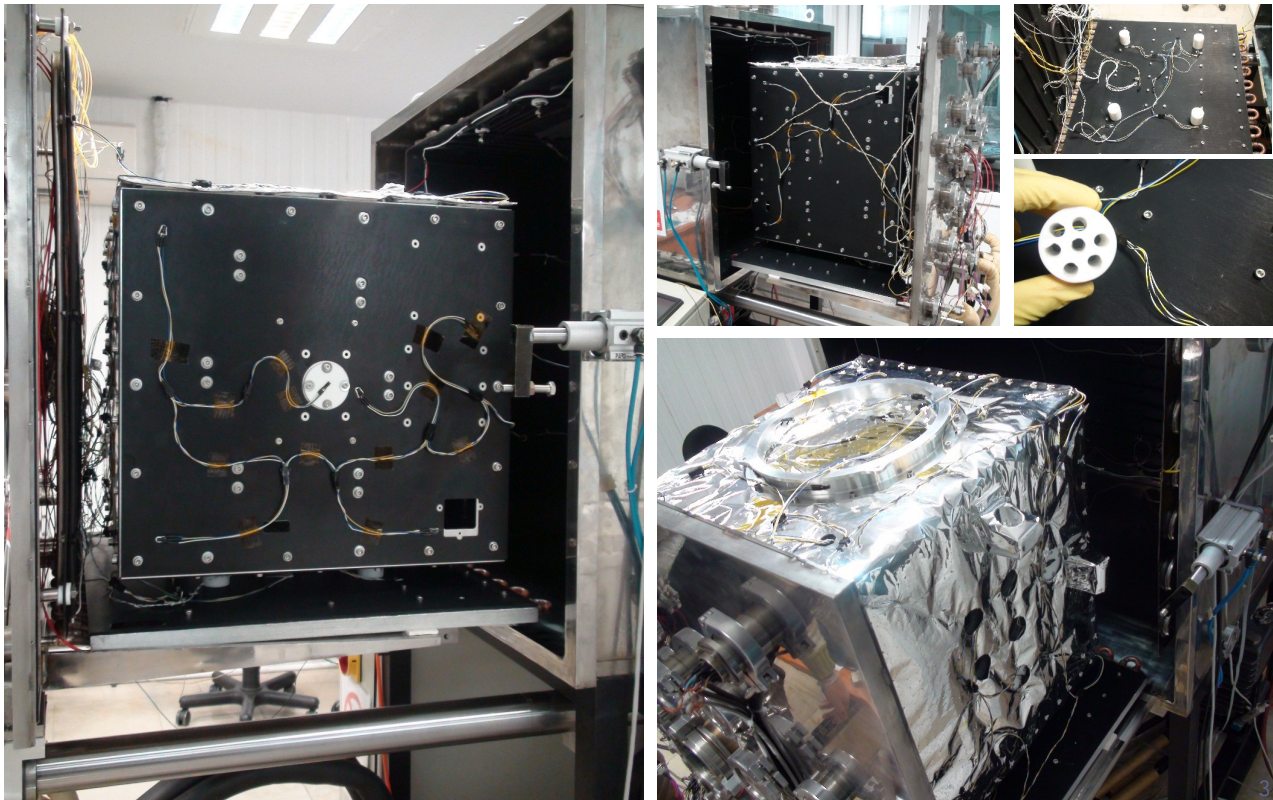
مدل حرارتی



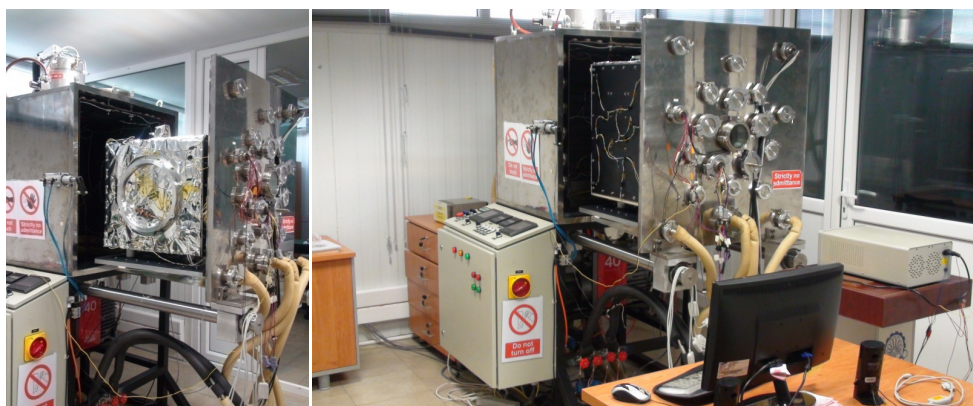
تست های حرارتی

مدل حرارتی





| Test Cases | Boundary Conditions | | | Description |
|------------|---------------------|-------|--------|--|
| | Base plate | Door | Shroud | |
| 1 | 60°C | -82°C | -82°C | Panel Z- to base plate, Panel X+ to door |
| 2 | 100°C | -82°C | -82°C | Panel Z- to base plate, Panel X+ to door |
| 3 | 60°C | -82°C | -82°C | Panel Y+ to base plate, Panel X+ to door |
| 4 | 100°C | -82°C | -82°C | Panel Y+ to base plate, Panel X+ to door |
| 5 | 70°C | 100°C | -82°C | Panel Y+ to base plate, Panel Z- to door |

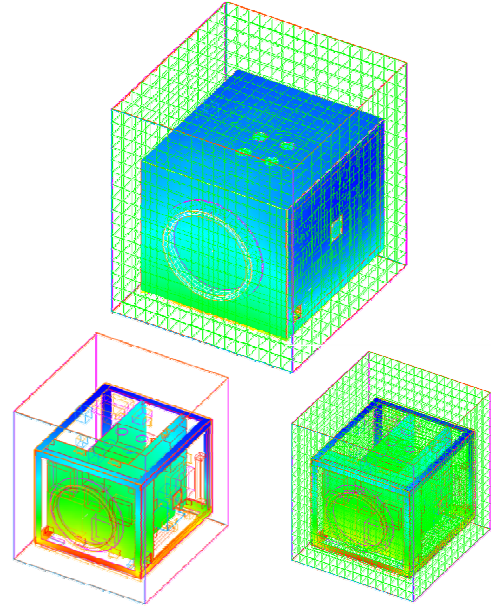
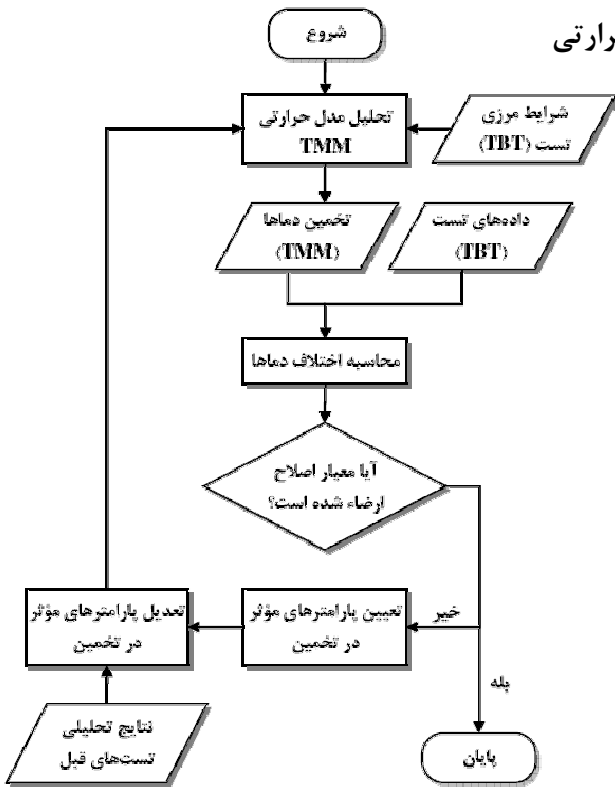


اصلاح مدل ریاضی- حرارتی با نتایج تست

تست های حرارتی

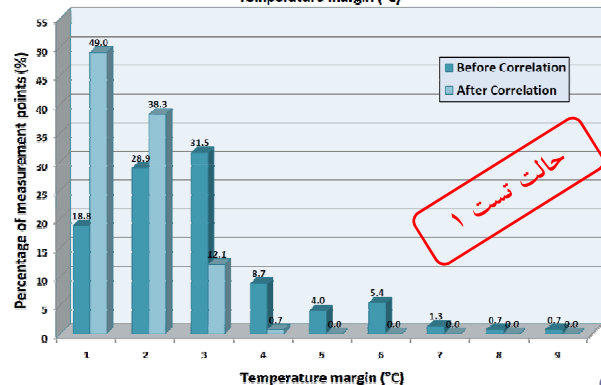
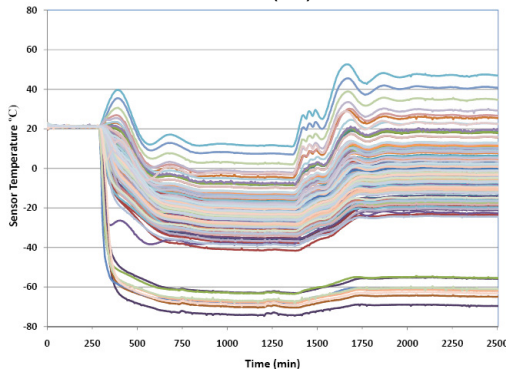
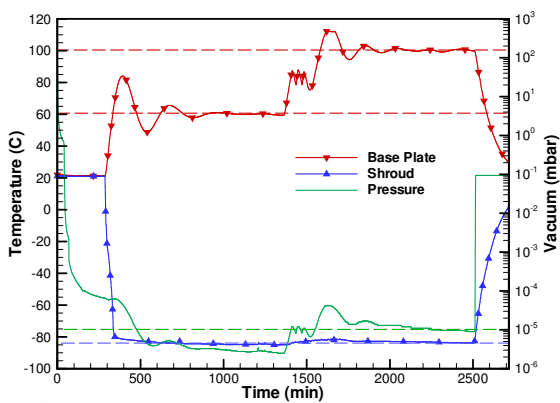
❖ شبیه سازی نرم افزاری تست و اصلاح مدل ریاضی - حرارتی

- شبیه سازی محفظه و مدل در نرم افزار I-DEAS
- الگوریتم اصلاح مدل با استفاده از نتایج تست



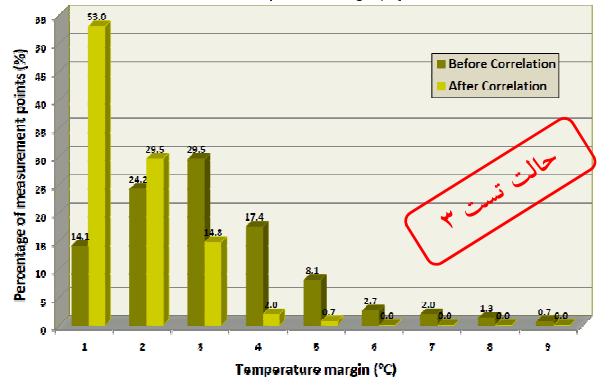
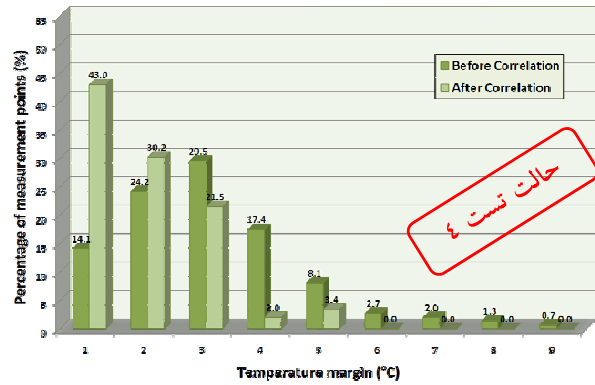
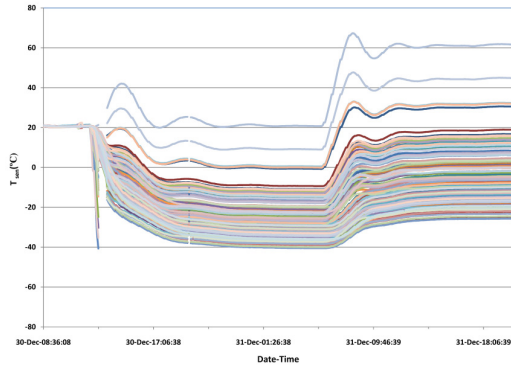
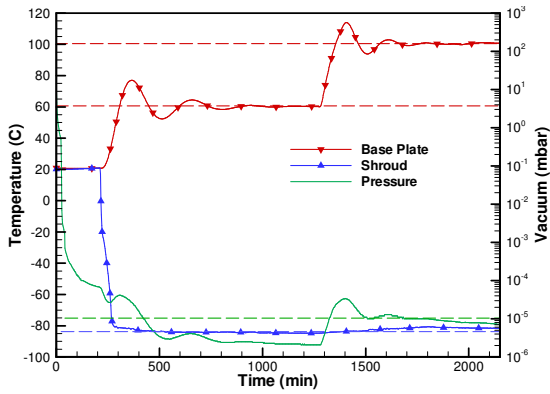
نتایج تست و اصلاح مدل ریاضی- حرارتی

تست های حرارتی



نتیج تست و اصلاح مدل ریاضی- حرارتی

تست های حرارتی

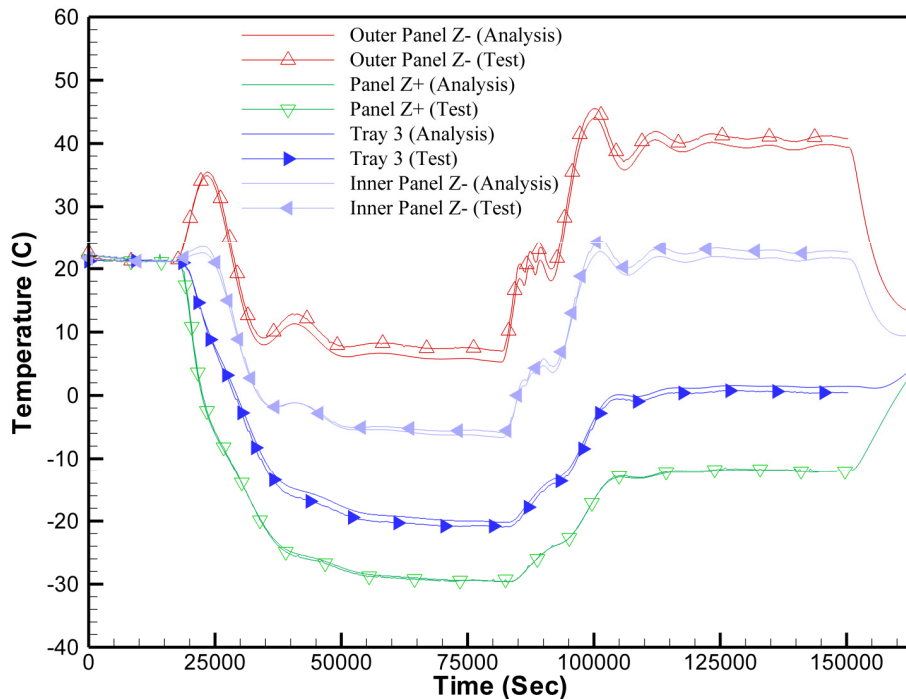


7

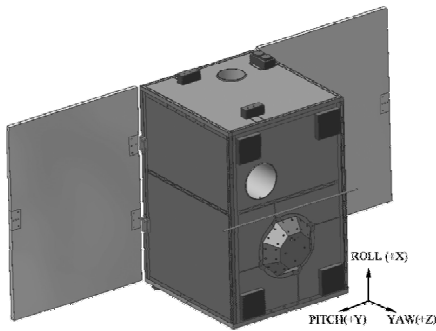
نتیج تست و اصلاح مدل ریاضی- حرارتی

تست های حرارتی

❖ مقایسه نتایج تست و تحلیل برای حالت گذرا در طول تست ۱ و ۲ پس از اصلاح مدل



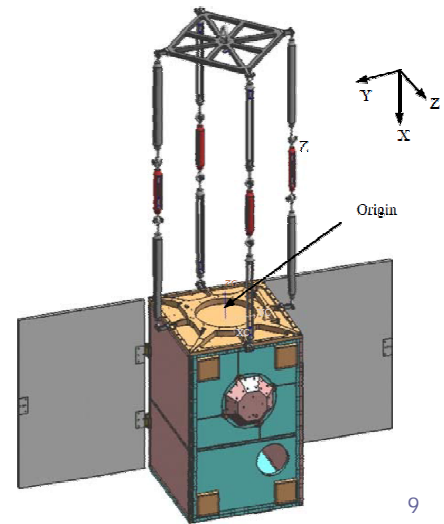
8



❖ تست بالانس حرارتی مدل حرارتی میکروماهواره X-Sat

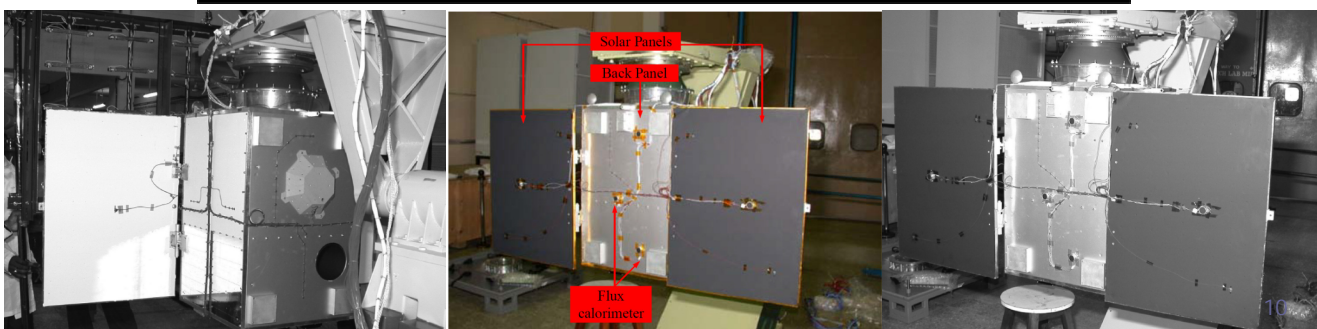
- ماهواره ۱۲۰ کیلوگرمی با کنترل سه محوره
- ارتفاع مداری ۶۰۰ الی ۹۰۰ کیلومتر با شیب مداری حدود ۹۸ درجه
- تعریف حداقل یک تست دائم و چند تست غیردائم

| Test cases | Description | Duration |
|------------|--|-------------|
| Case 1 | Sun-tracking scenario: 102 min orbit with 34 min eclipse Solar flux intensity: 1000 to 1280 W/m ² | 20 orbits |
| Case 2 | Imaging scenario: 102 min orbit with 34 min eclipse Solar flux intensity: 1000 to 1280 W/m ² payload/subsystems operation as per predefined profile | 7 orbits |
| Case 3 | Worst hot case scenario: no eclipse Solar flux intensity: 650 to 780 W/m ² full load simulation, i.e., all subsystems were on during this test | 19 h 32 min |

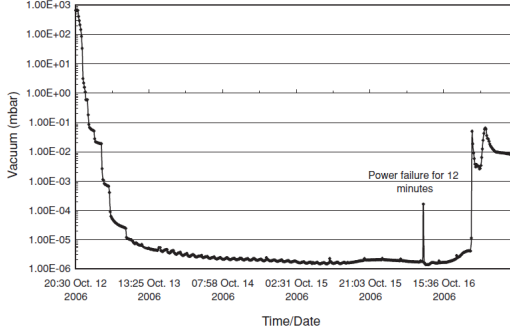


❖ مدل حرارتی میکروماهواره X-Sat

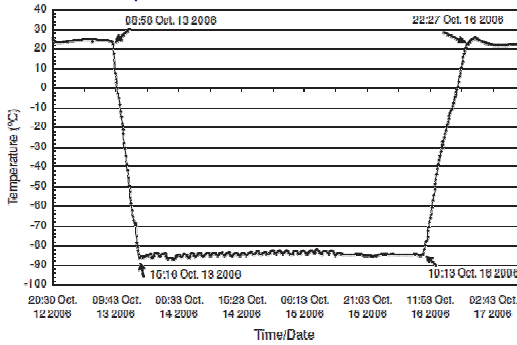
| Component | Material | | Surfaces | Thermal control material |
|-------------|------------|-----------------|---|--|
| | Face sheet | Core | | |
| DSP | Al 3003 | 1/4-5052-0.0025 | Front Back | Black paint, B-115 White paint, W117 |
| Optic bench | Al 3003 | 1/4-5052-0.0025 | Both | Low-emittance tape—aluminized Kapton |
| Side panels | Al 3003 | 1/4-5052-0.0025 | Upper half of outer Lower half of outer Inner | Low-emittance tape—aluminized Kapton White paint, W117 Aluminized Kapton, 1 mil, Kapton side |
| Back panel | Al 3003 | 1/4-5052-0.0025 | Upper half of inner Lower half of inner Outer | VSSC aluminum paint, MAP280 Low-emittance tape—aluminized Kapton VSSC aluminum paint, MAP280 |
| Front panel | Al 3003 | 1/4-5052-0.0025 | Outer Inner | VSSC aluminum paint, MAP280 Aluminized Kapton, 1 mil, Kapton side |
| Top panel | Al 3003 | 1/4-5052-0.0025 | Outer Inner | Aluminized Kapton, 1 mil, Kapton side Low-emittance tape—aluminized Kapton |



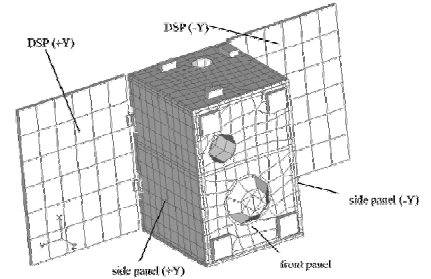
Vacuum profile of the TBT conducted in the 4 m TV chamber



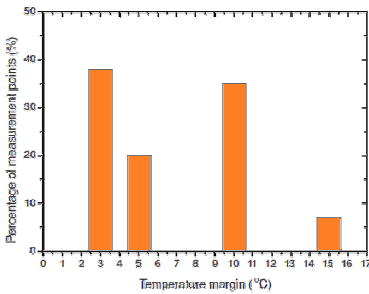
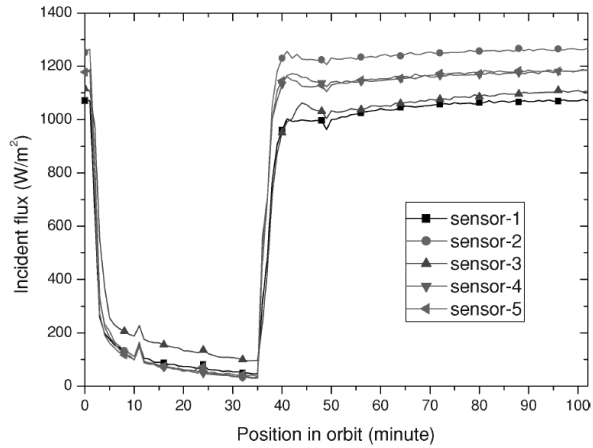
Shroud average temperature profile of the TBT conducted



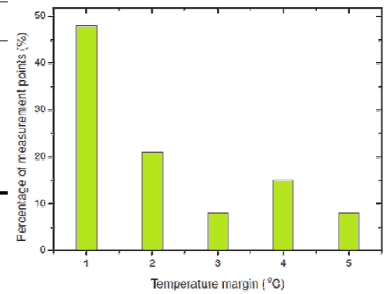
❖ تست بالانس مدل حرارتی ماهواره X-Sat



Heat flux trends for the 20th orbit of test case 1



| Surface contact conductance (W/K) | | | |
|-----------------------------------|----------------------|---------------|-------------|
| Bolt thread size | Seating torque (N-m) | Nominal value | Tuned value |
| M2 | 0.36 | 1.36 | 0.09 |
| M2.5 | 0.73 | 2.21 | 0.15 |
| M3 | 1.26 | 3.18 | 0.21 |
| M4 | 2.76 | 5.23 | 0.35 |
| M5 | 5.7 | 8.64 | 0.58 |
| M6 | 9.6 | 12.12 | 2.02 |



Correlation

