

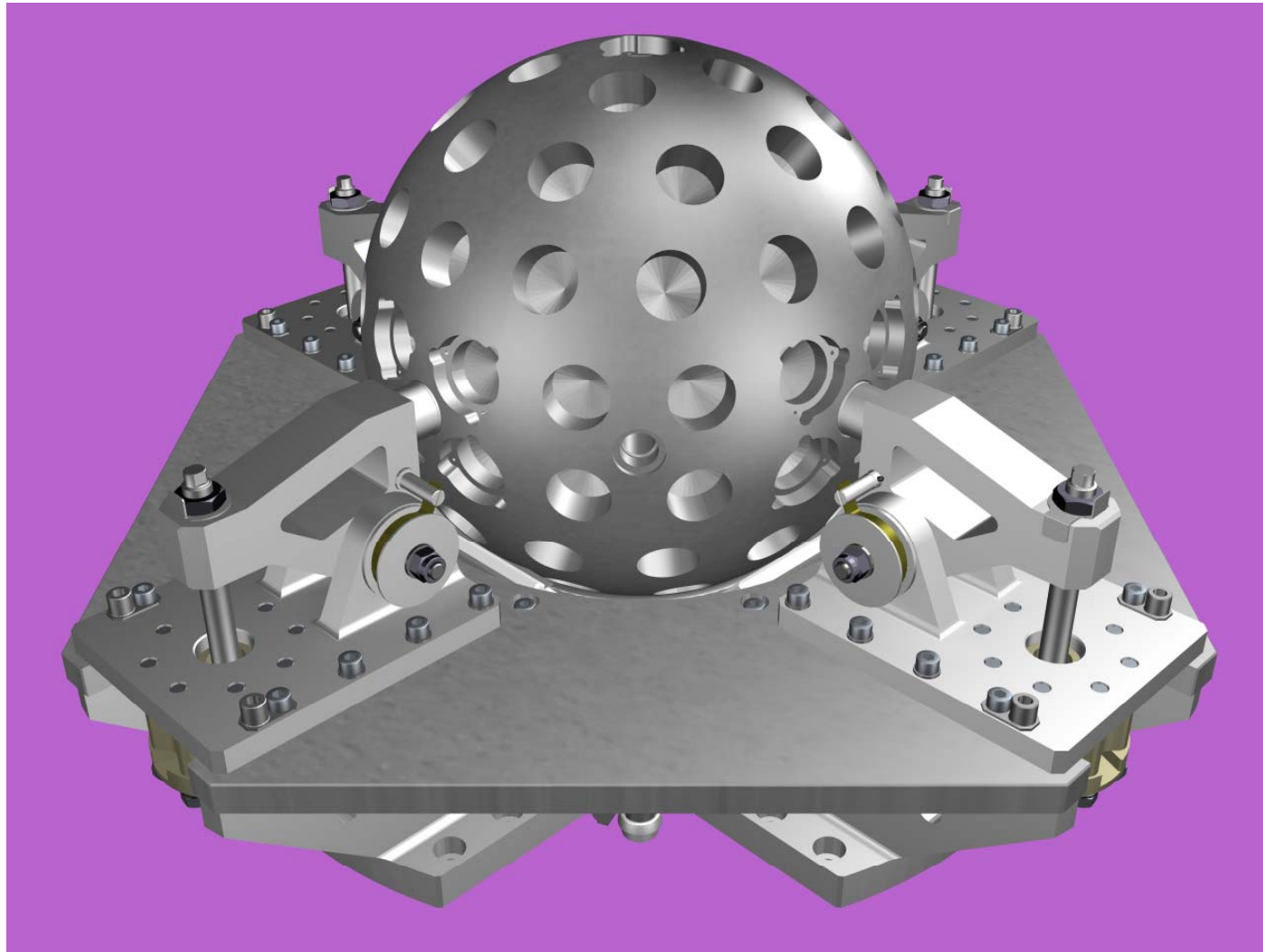
FIRST LARES WORKSHOP

Rome, 03/07/2009





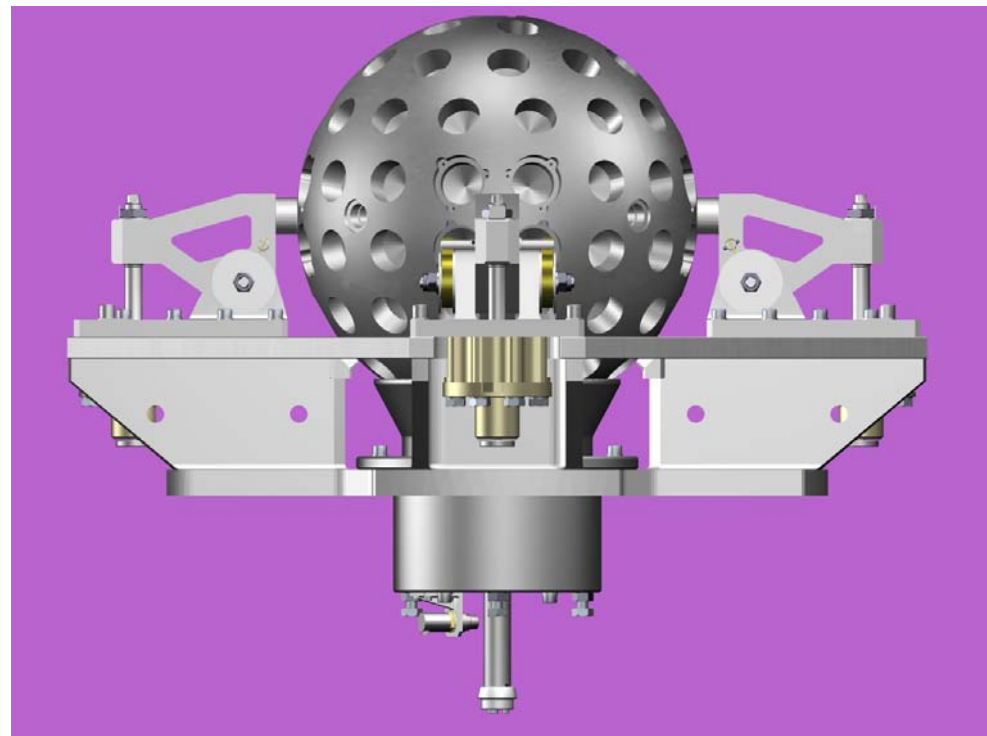
The Separation Subsystem - SSEP



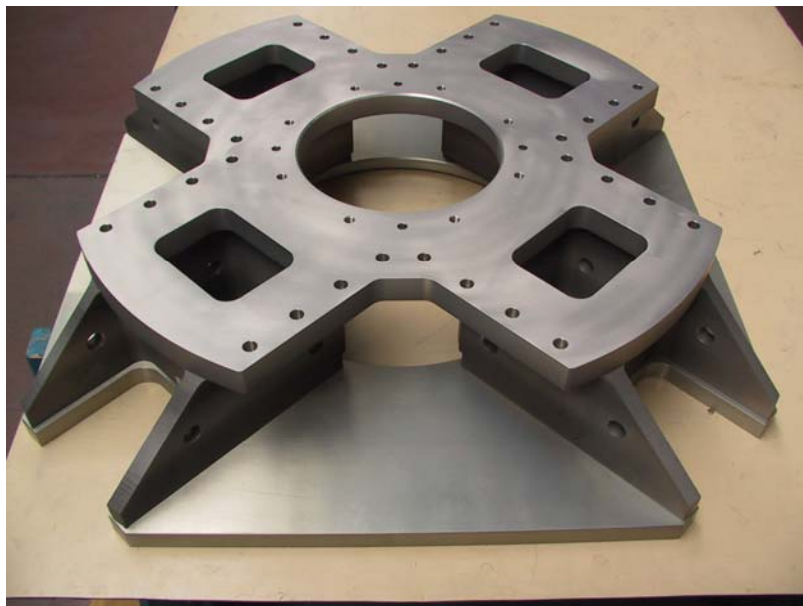


Main Functions

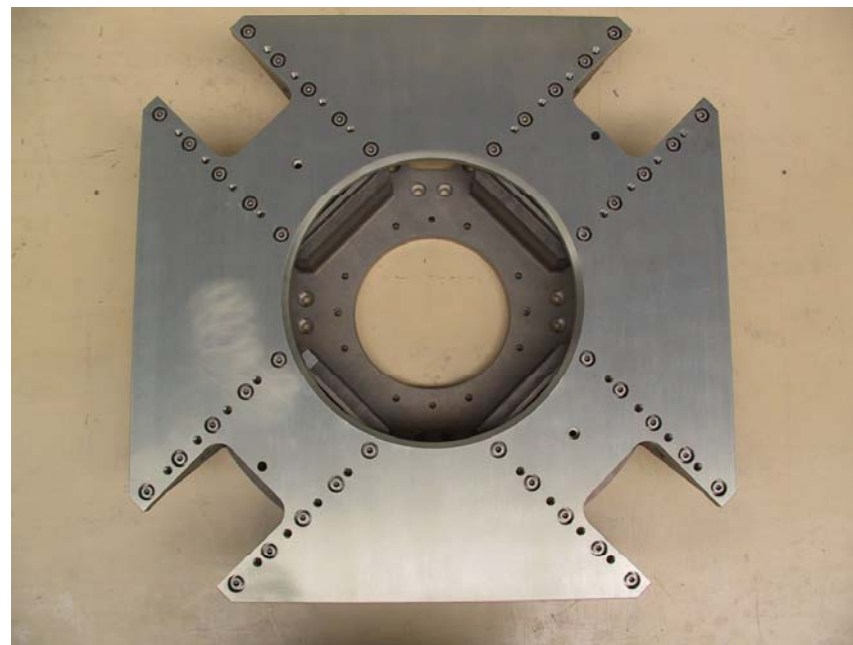
- Support LARES satellite during ground operations;
- Support LARES satellite during launching phase;
- Release LARES satellite when it is on orbit;



In every phases LARES satellite surface and CCR's, mounted on LARES satellite, must not be damaged.

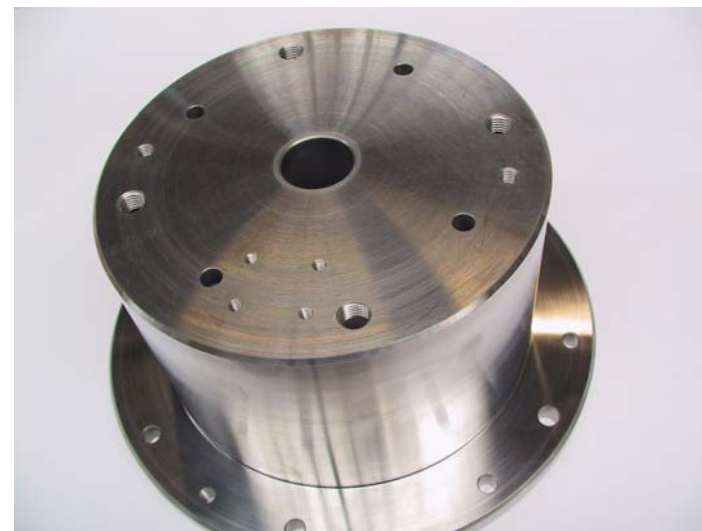


Supporting Frame





Preloading components





NEA Actuator

Features:

- Extremely Low Release Shock
- Redundant Electrical Actuation Circuit
- Simultaneous Release of Multiple Hold-Down Points
- Extended Operating Temperature Range
- Refurbishable by Replacing Initiator
- Calculated reliability > .999999
- Allows Angular Rod Misalignment (10° Cone)
- Operates using Pyro Circuitry
- Bolt Catcher Not Required
- Safe (Range Safety - friendly)
- Space-Rated Materials

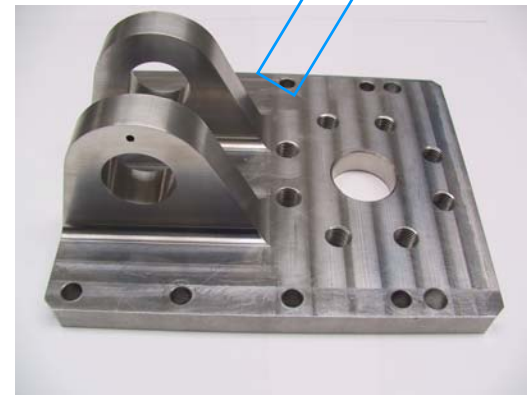
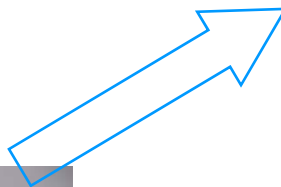
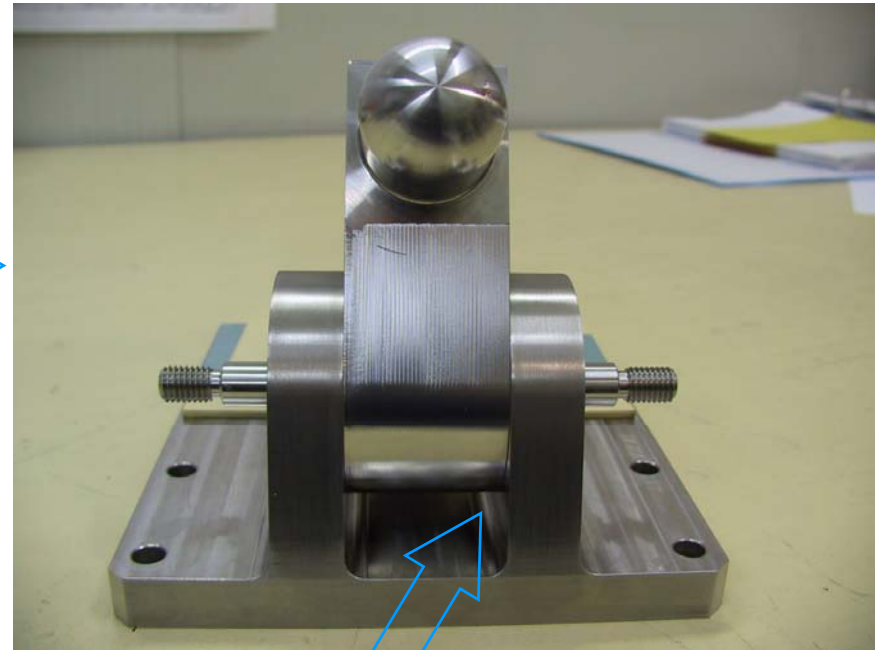
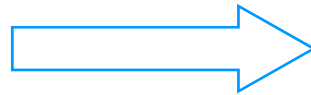
Specifications:

- Ultimate Load: 44,000 pounds (195,000 N)
- Max Rated Release Load: 32,000 pounds (148,000 N)
- Source Shock: <500 g's @ 30,000 lb. preload
- Actuation Circuit: 4 Amps @ 6 VDC per circuit
- Actuation Time: 25 milliseconds maximum
- Qual Temperature Range: -120°C to +130°C
- Weight: 1500 grams maximum



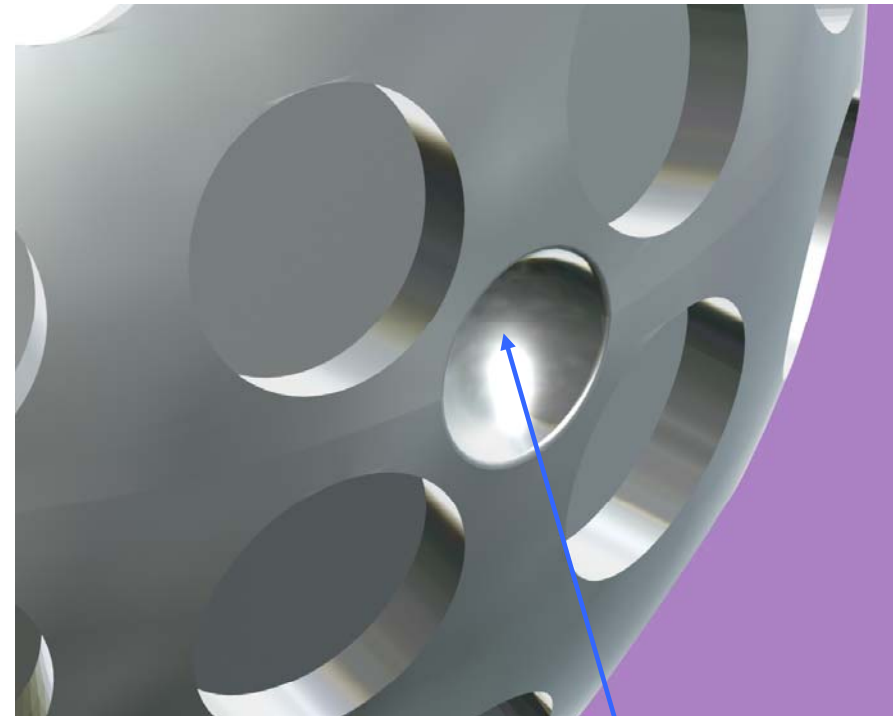
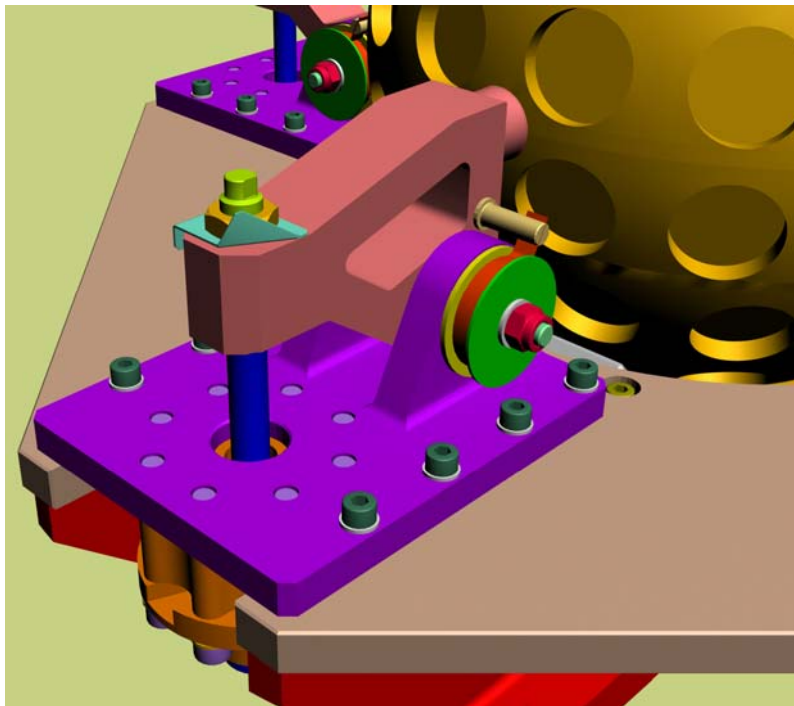


Restraining Mechanism





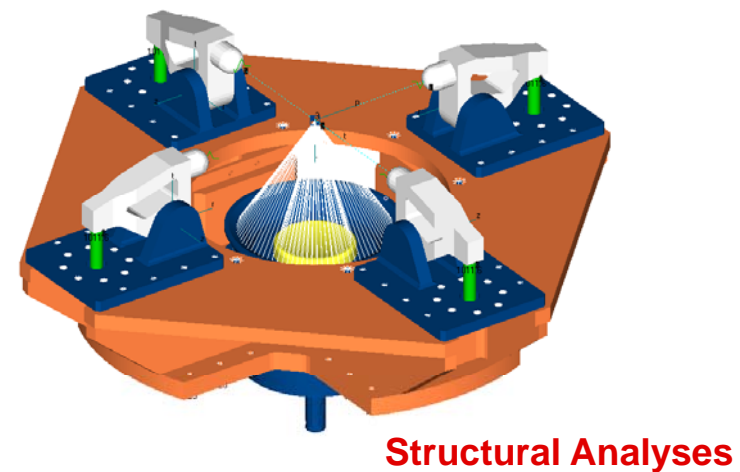
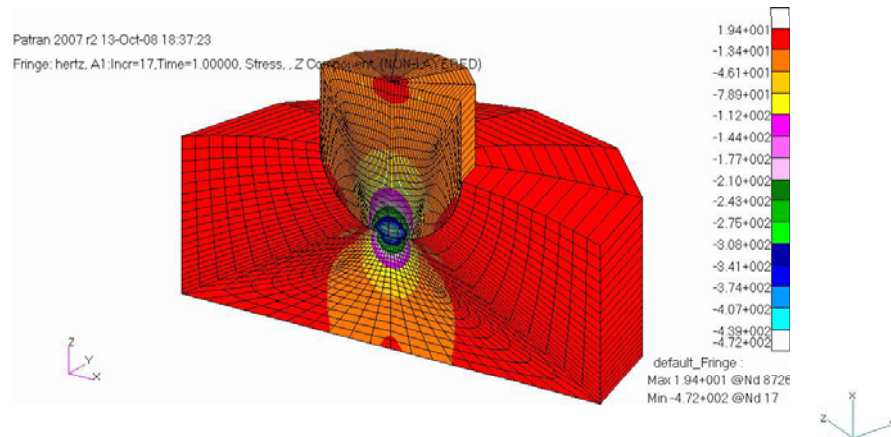
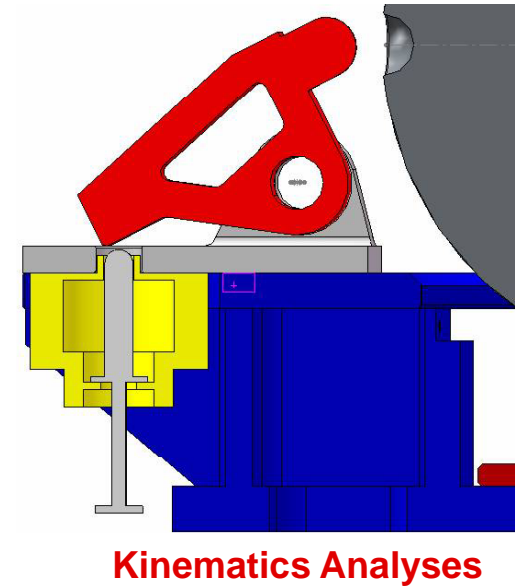
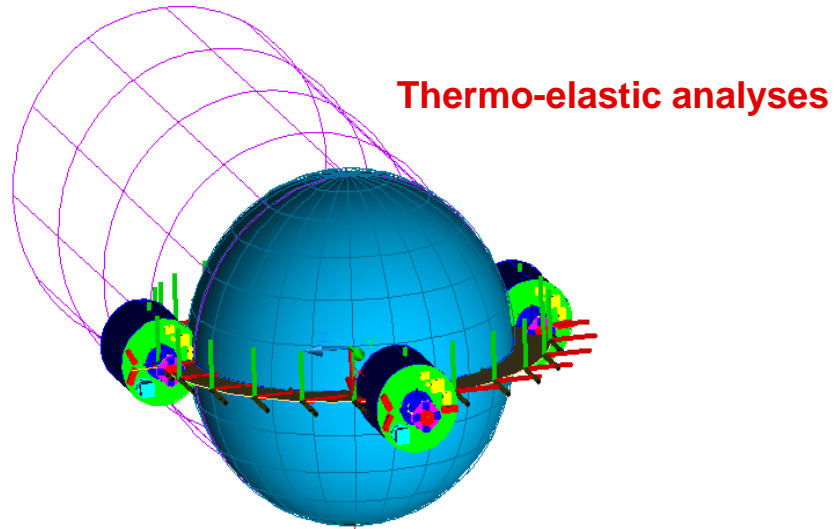
Mechanical Interfaces



Satellite/SSEP Interface

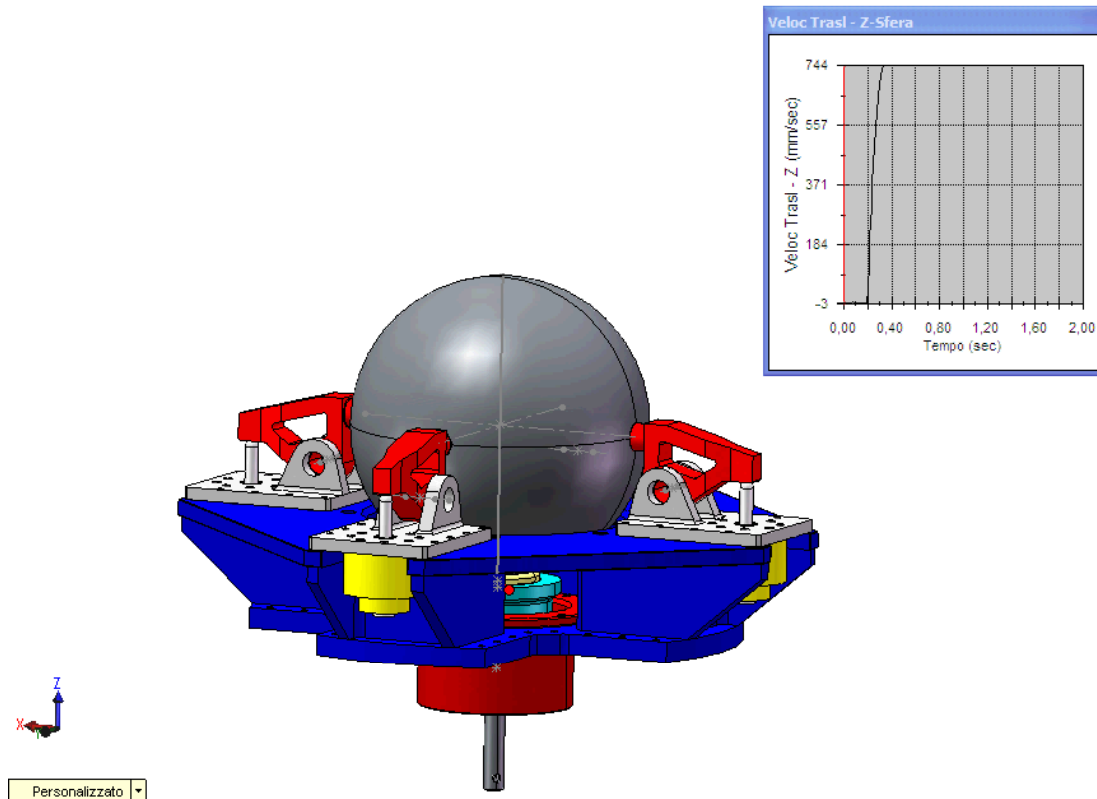


Performed Analyses





Performed Analyses



Kinematics Analyses



Models Philosophy

- **Breadboard type 1 (B/B 1):**
Representative of contact between satellite cave vs SSEP pin

- **Breadboard type 2 (B/B 2):**
Representative of Restraining Mechanism

- **Qualification Model (QM):**
Complete Separation Subsystem, fully representative of the Flight Unit

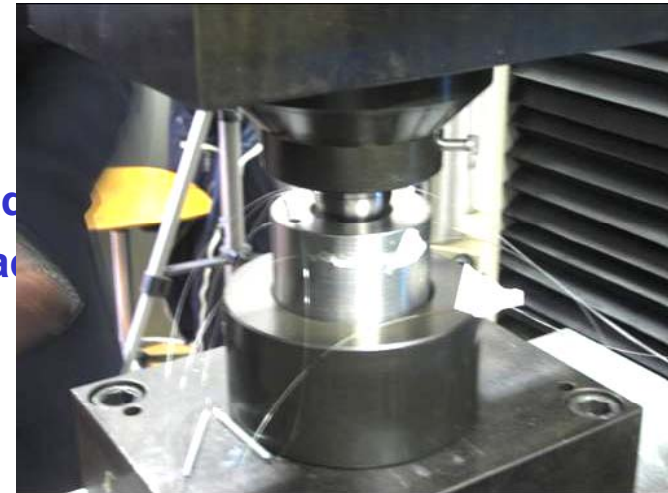
- **Flight Model (FM)**



Test Approach

Breadboard type 1:

- Dimensional check
 - Visual inspection
 - Compression test under flight loads
 - Compression Test under flight loads
 - Dimensional check



Breadboard type 2:

- Dimensional check
 - Visual inspection
 - Hinge friction measurement
 - Stiffness measurement (on 3)
 - Static test under flight loads,
 - Static Test under flight loads
 - Hinge friction measurement
- Dimensional check





Test Approach

Qualification Model:

- Dimensional check
- Visual inspection
- Mass measurement
- Friction measurement on Ejection Mechanism
- Vibration test (low sine, nominal sine, low sine)
- Separation test (low temperature)
- Friction measurement on Ejection Mechanism
- Visual inspection
- Dimensional check

Flight Model:

- Dimensional check
- Visual inspection
- Mass measurement
- Friction measurement on Restrain Mechanism and Ejection Mechanism



Separation Test

