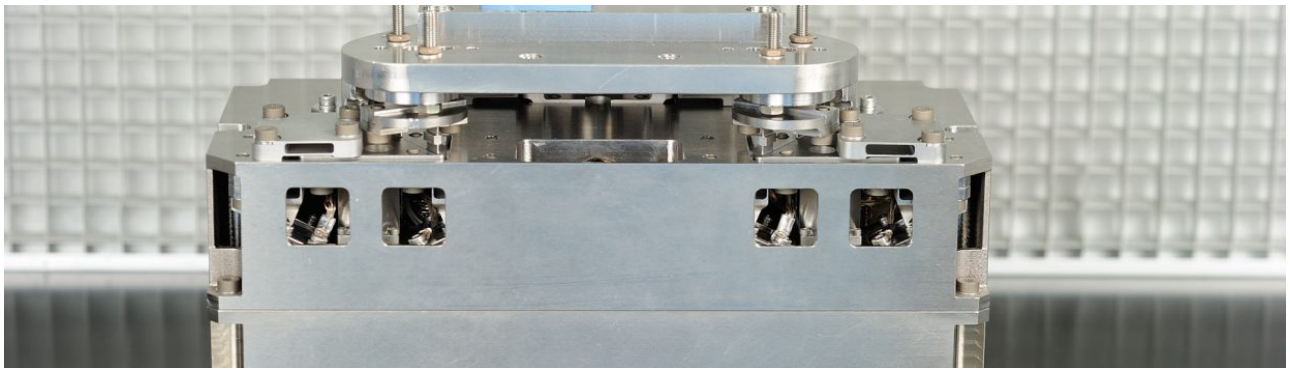
Secondary Mirror Refocusing Mechanism (M2M) of the Euclid telescope



SECONDARY MIRROR RE-FOCUSING MECHANISM (M2M) OF THE EUCLID TELESCOPE

Cliente: ADS F / TAS-I / ESA

País: Space

At Sener, we develop the **Secondary Mirror Refocusing Mechanism** (M2M). The M2MM is a positioning mechanism with 5 degrees of freedom which allows the movement and adjustment of the secondary mirror (M2M) of the Euclid telescope to guarantee the optical quality required in orbit, necessary to recover telescope misalignment caused by the difference in conditions between the earth and space.

CHARACTERISTICS:

- **Radiation environment:** The unit is designed to tolerate a uniformly distributed total dose of 22 krad inside the box.
- **Mass:** MDE 2.1 kg. Harness 1.6Kg. Mechanism 4.45 kg
- **Thermal:**
  – MDE operating range: 250K – 313K; non operating range: 230K – 313K.
  – M2MM operating range: 110K – 313K.

– Harness operating range from 110K to 313K and support a gradient of 203K.
– Special cabling to connect the mechanisms to the electronics with low thermal conductivity.
– Max. dissipation by conduction for MDE < 8W .
– Max. dissipation by radiation for MDE < 2W.
– Harness transfer in cryogenic zone < 0.0005 W in non-operational mode

- **Functional:** Mechanical Resolution is half micron resolution over a travel of +/- 225 µm with stable positions and high load capability to withstand launch loads without losing a given position in a compact volume.
  – Positioning method based on a stepper motor.
  – Adjustment in 3 degrees of freedom of translation.
  – Adjustment in 2 degrees of freedom of rotation.
  – Linear resolution <0.050 µm.
  – Angular resolution <5µrad.
  – Range of linear operation 300 µm.
  – Range of angular operation 2mrad.
  – Precision of 2 µm for linear adjustments.
  – Precision of 30 µrad for angular adjustments.
- **Redundancy:** Two fully redundant sections in a single box.
- **Power:** Each section powered by a 10W isolation converter.
- **Control:** Each section provided with an “intelligent” device capable of decoding all telecommands received via serial channels, (MIL-STD-1553, preferred) providing the switching sequences required by the motors, and encoding the status information to provide serial telemetry.
  Compact electronics for the operation and control of the twin mechanisms (up to 10 degrees of freedom).
- **Motors drive:** Ten independently biphased motors (with main and redundant wiring) can be managed by MDE main and redundant section in cold redundancy.