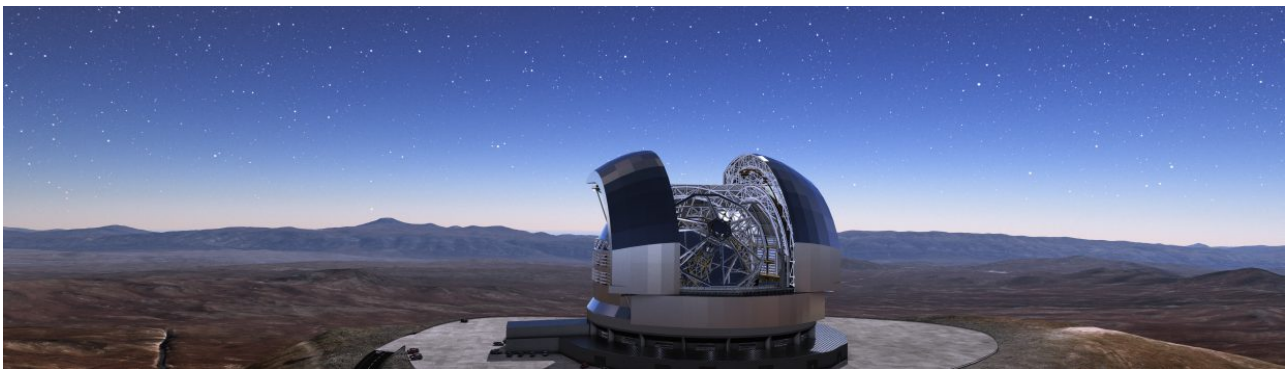




# Extremely Large Telescope M1 Segment Manipulator



SENER AEROSPACE & DEFENSE / SPACE / GERMANY

*EXTREMELY LARGE TELESCOPE M1 SEGMENT MANIPULATOR*

**Cliente: European Southern Observatory**

---

**País: Germany**

---

Sener Aeroespacial has been contracted by the European Southern Observatory (ESO) for the design, manufacturing, assembly and verification of the Extremely Large Telescope (ELT) M1 mirror Segment Manipulator system (SeM). The contract includes the delivery of one unit and a second unit optional.

The ELT M1 is formed by 798 mirror segments, and the SeM is needed to allow the daily substitution of a part of the segments for maintenance and re-coating.

The SeM includes mechanisms for segment removal and replacement, with a wide 6 dof operative range, with high accuracy and repeatability. It includes also a long range hoisting capability out of the mirror (23 m). The SeM criticality is outlined by the fact of being the only system which is allowed to flight over the



main telescope mirror.

As with the other telescope mechanisms contributed by Sener Aeroespacial (for M2, M3 and M5), the SeM shall correctly operate for the 30 years foreseen operation, under extreme conditions; the ELT is built in Cerro Armazones (Chile), above 3,000 m over sea level, and submitted then to low temperatures, a wide humidity range and potential dust contamination. The M1 SeM is designed also to resist extreme earthquakes that it is a critical requirement to accomplish.

### **The Extremely Large Telescope (ELT)**

The European Southern Observatory (ESO) Extremely Large Telescope (ELT) is a revolutionary ground-based telescope that will have a 39-metre main mirror and will be the world's largest visible and infrared light telescope. In addition to this unparalleled size, the ELT will be equipped with cutting-edge instruments, designed to cover a wide range of scientific possibilities. The ELT can lead to a paradigm shift in our perception of the Universe.

---