SYNOPSIS – Main Structure

Title: Final Design and Construction of Main Structure (MS) for the European – Extremely Large Telescope (E-ELT).

Introduction

The European Southern Observatory (ESO) has recently completed contracts for the Front End Engineering Design for the Main Structure for the European Extremely Large Telescope which will be located at Cerro Armazones in Northern Chile. As this design is being developed, ESO is now preparing for the next phase of the Work, being the final manufacturing design, manufacture and erection of the telescope Main Structure.

Definition

The E-ELT is a 40m class optical telescope (reference to the diameter of the primary mirror) that will be constructed in Cerro Armazones in Northern Chile

The Main Structure is a part of the E-ELT telescope.

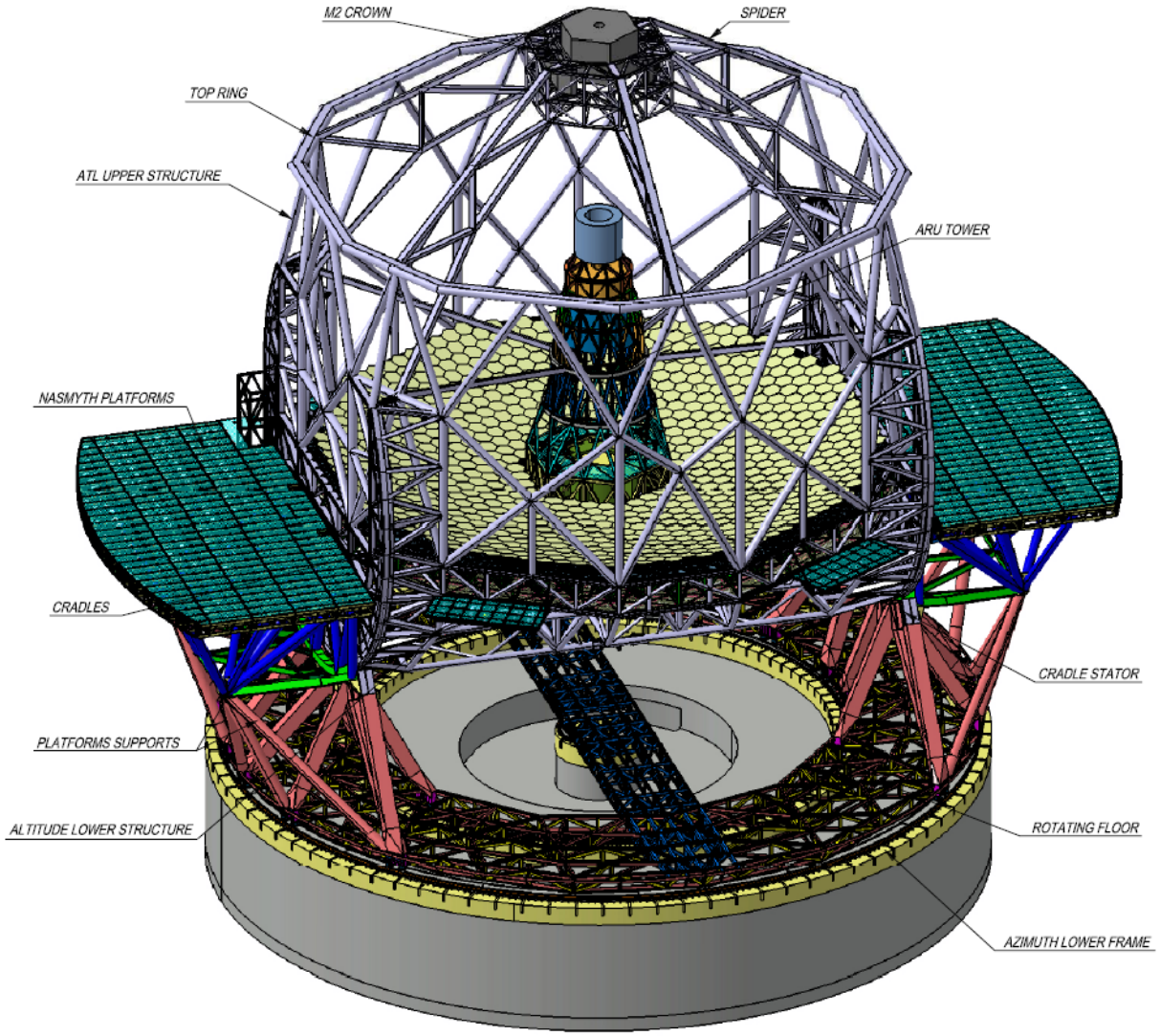

Figure 1: E-ELT Main Structure, without Hosted Units but with optomechanical dummies

The E-ELT is an active and adaptive 40-m class telescope, using a Laser Guide Stars as reference star. The E-ELT will be equipped with the following foci:

- A through-focus on each Nasmyth platform.
- Two lateral foci on each Nasmyth platform to which the central section of the field with a diameter of 5 arcminutes are directed by a M6 flat mirror.

- A coudé[1] focus beneath the telescope to which the central section of the field with a diameter of 20 arcseconds is directed by a M6 flat mirror. Only the Main Structure on the Nasmyth A platform will be equipped with a coudé path.

Note the hosted units (listed here below and basically all optomechanical elements) and the concrete foundation, will not be part of the contract resulting from this Preliminary Inquiry. The representative mass dummies will form part of the supply.

Hosted Units

The Main Structure hosts the following major external Units (not included within this contract):

a. Primary Mirror Unit (M1 Unit)
b. Secondary Mirror Unit (M2 Unit)
c. Third Mirror Unit (M3 Unit)
d. Fourth Mirror Unit (M4 Unit)
e. Fifth Mirror Unit (M5 Unit)
f. Athmospheric Dispersion Compensator (ADC)
g. Calibration Units
h. Pre Focal Station (PFS)
i. Instrumentations
j. Coudé feed
k. EELT Laser Guide Star (ELGS)

Functional Break Down

The Main Structure functional breakdown is defined as below.

Housing of optomechanical units: The Main Structure shall provide housing, support, access and supplies to the

a. M1 Unit (Primary Mirror Unit)
b. M2 Unit (Secondary Mirror Unit)
c. M3 Unit (Tertiary Mirror Unit)

[1] A coude is a focus in the enclosure structure below the telescope which will taek the form of an instrumentation room

d. M4 Unit (Adaptive mirror unit)

e. M5 Unit (Fast tip-tilt mirror unit)

f. Atmospheric Dispersion Compensator

g. Calibration Units

Kinematics: The Main Structure shall provide positioning and tracking possibility in the specified Azimuth and Altitude ranges

Housing of the Prefocal Stations: The Main Structure shall provide housing, support, access and supplies to the 2 Prefocal Stations.

Housing of Instrumentation: The Main Structure shall provide housing, support, access and supplies to all the Nasmyth Instrumentations.

Housing of coudé feed: The Main Structure shall provide housing, support, access and supplies to the complete *coudé feed.*

Housing of ELGS: The Main Structure shall provide housing, support, access and supplies to the complete ELGS.

Housing of Reserved Volume on Azimuth floor: The Main Structure shall provide housing, support, access and supplies to the reserved space on Azimuth floor

Handling: The Main Structure shall provide handling, hoisting and lifting of units or assemblies or equipments.

The Main Structure has completed a Front End Engineering Design (FEED) study and the design and analysis of the structure and mechanisms are at that level. It will be the first task of the contractor to develop this design to the final manufacturing level prior to the start of manufacture. The contractor will be provided with the relevant FEED data pack to act as the basis of the design (reference design). The contractor will be responsible for the final performance in line with the Requirements Specification included therein.