

INTEGRATION AND HANDLING STAND STRUCTURE

Application

This product is part of the AOF (Adaptive Optics Facility) of the VLT telescope.

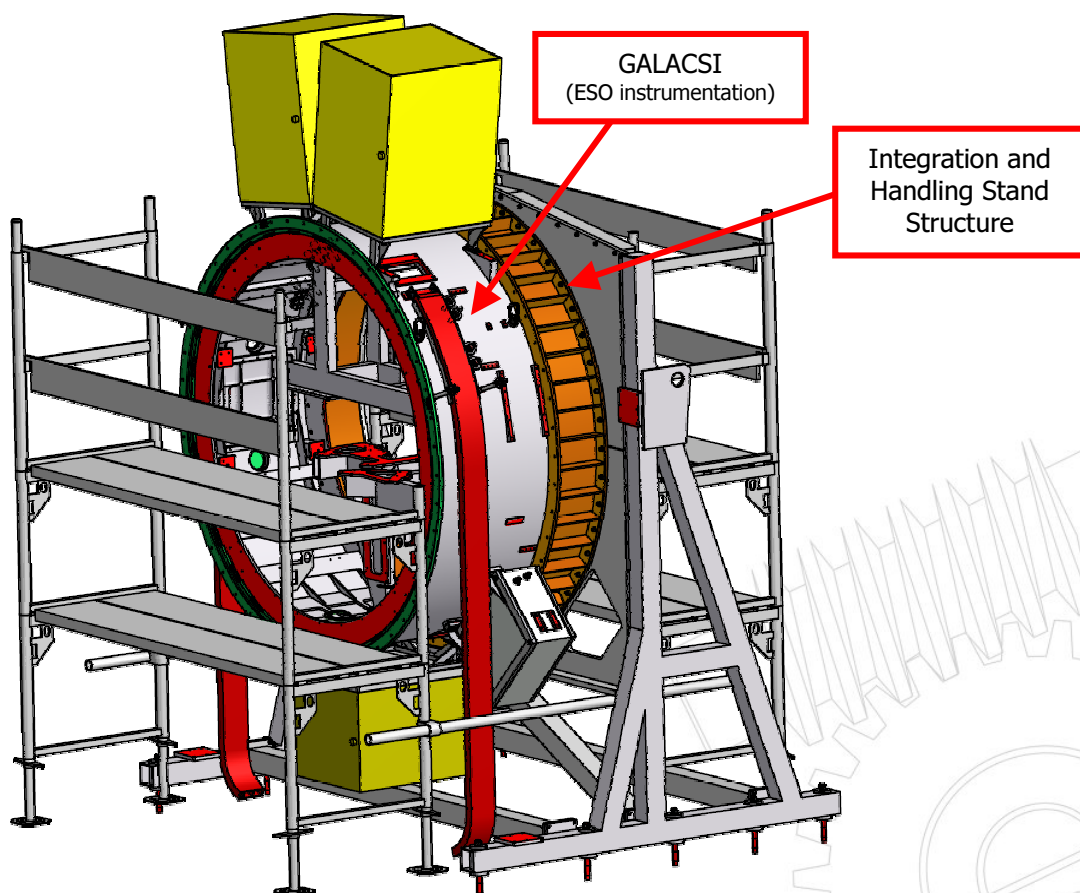
The Integration and Handling Stand Structure is used for the assembling and handling of the GALACSI module. The structure allows also the installation of the GALACSI and GRAAL modules on MUSE (Multi Unit Spectroscopic Explorer) and HAWK-I (High Acuity Wide field K-band Imager).

The instruments are mounted and tested on the floor, and then lifted to the final installation position. For this reason the Integration and Handling Stand Structure has an important role for the correct completion of the commissioning of the devices.

This structure is designed in order to minimize the total weight, also assuring the required stiffness for handling high loads (1400 kg). At this purpose specific functionality tests were carried out in CECOM (up to 1837kg).

In addition to the Integration and Handling Stand Structure, CECOM produced also the additional protection tools, needed by ESO personnel during the installing operations.

The main characteristics of these components are described in this document.



Summary

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1 References

This product was produced, tested and delivered by CECOM for "ESO" (European Southern Observatory - Chile). The references of contact persons for this work are available under request.

2 CECOM activities

CECOM carried out the following activities:

- Review of manufacturing drawings (engineering design and development of tools and equipments needed for the manufacturing).
- Optimization of technical solutions for production and assembling
- Manufacturing of components
- Assembling, welding and thermal treatments for stress relieving, and painting
- Cleaning and special packaging
- Quality check:
 - Dimensional checks of components and assemblies
 - Weight load tests

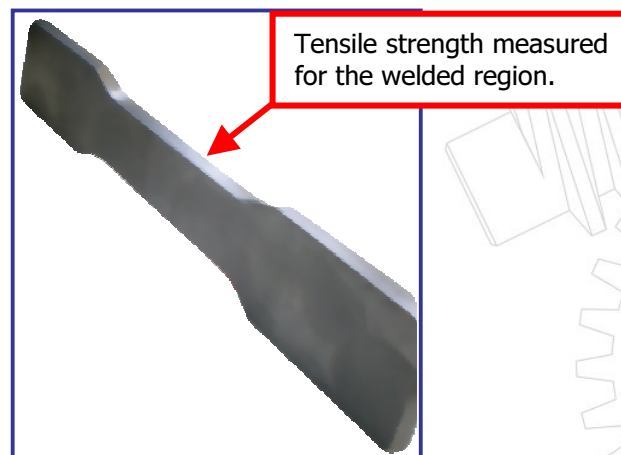
3 Materials and treatments

Used materials:

- Alluminium (Integration and Handling Stand Structure and protection tool)
- Steel (additional protection tools)

All Alluminium assemblies were treated for stress relieving after the welding. All welds of the structure items were ultrasonically tested.

Dedicated welding samples were produced by CECOM, in order to verify the tensile strength of the welded joints.



4 Manufacturing and assembling

The Manufacturing and assembling cycle was optimized in order to maximize the mechanical performances, in terms of:

- Compliance of dimensions and tolerances for the final assembly
- Stiffness of the assembled structure

A suitable sequence of machining, heat treatment and welding was applied in order to obtain the required result.

The most critical component for the production is the Integration flange: the reinforced flange with a diameter higher than 2 meters, which is used for connecting the Customer instrumentation during installation and handling.

In the original design, this flange was obtained by welding each reinforcement slab to the main discs rings of the flange. After several optimizations and checks, in collaboration with the Customer, the CECOM proposal was applied: the flange was obtained by means of assembling and welding several slices. Each slice was machined and stress relieved apart.

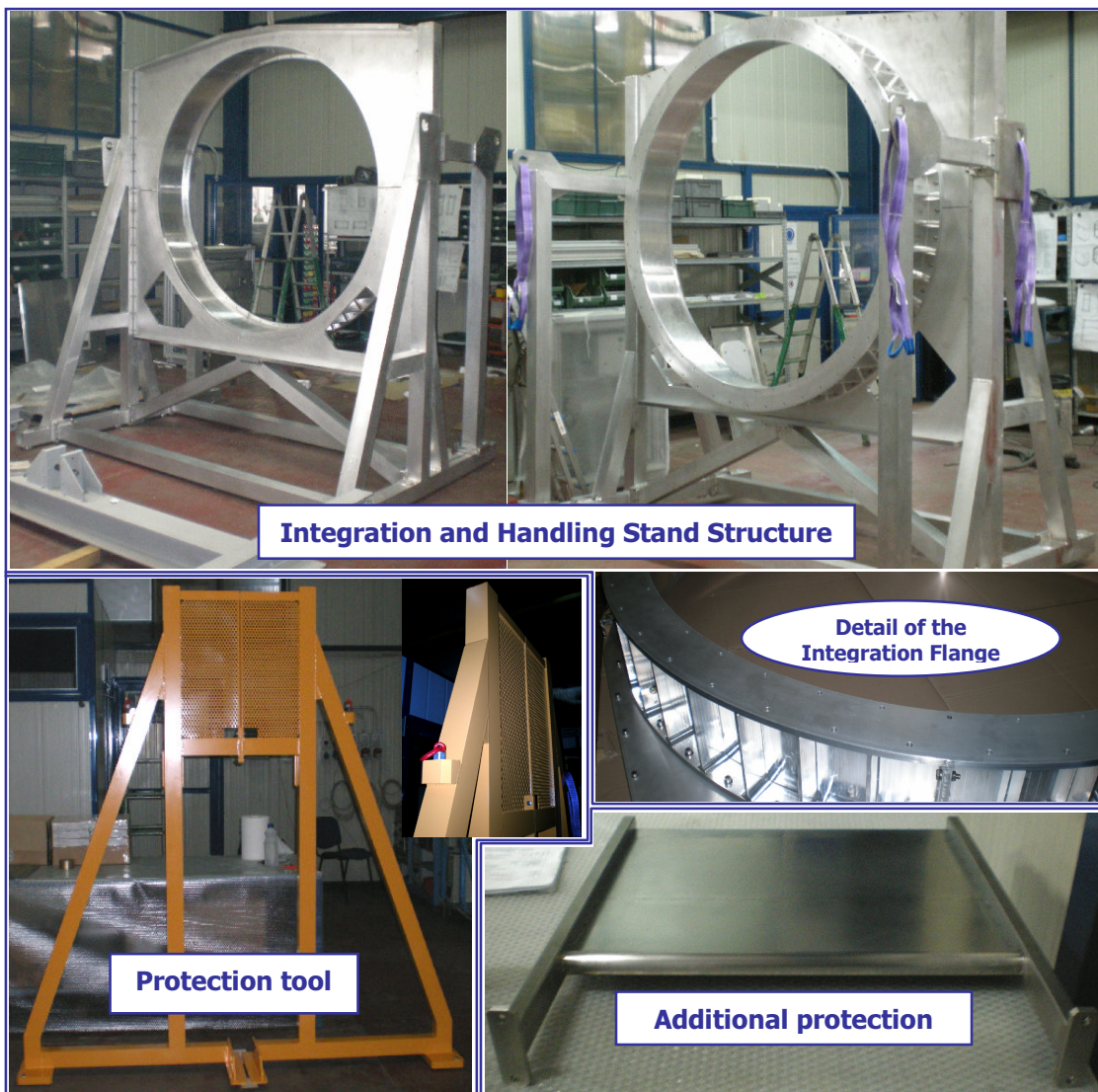


Fig. 1: Pictures of the assemblies

5 Final tests

The functionality test of the Integration and Handling Stand Structure included a simulation of the working condition with the weight load applied. The test equipment (a suitable additional structure) was designed and produced, in order to allow the precise setting of the applied weight load, and the related regulation of the COG¹ position.

CECOM carried out the following activities, involved with this qualification tests:

- Design of the structure used as test equipment
- 3D simulation and structural analysis of the test structure, according to the weight load to be applied, and to the required positions of the COG
- Construction of the structure, and check of dimensions and weights
- Construction of the dedicated crane handling tool, including related structural calculations
- Execution of the final tests

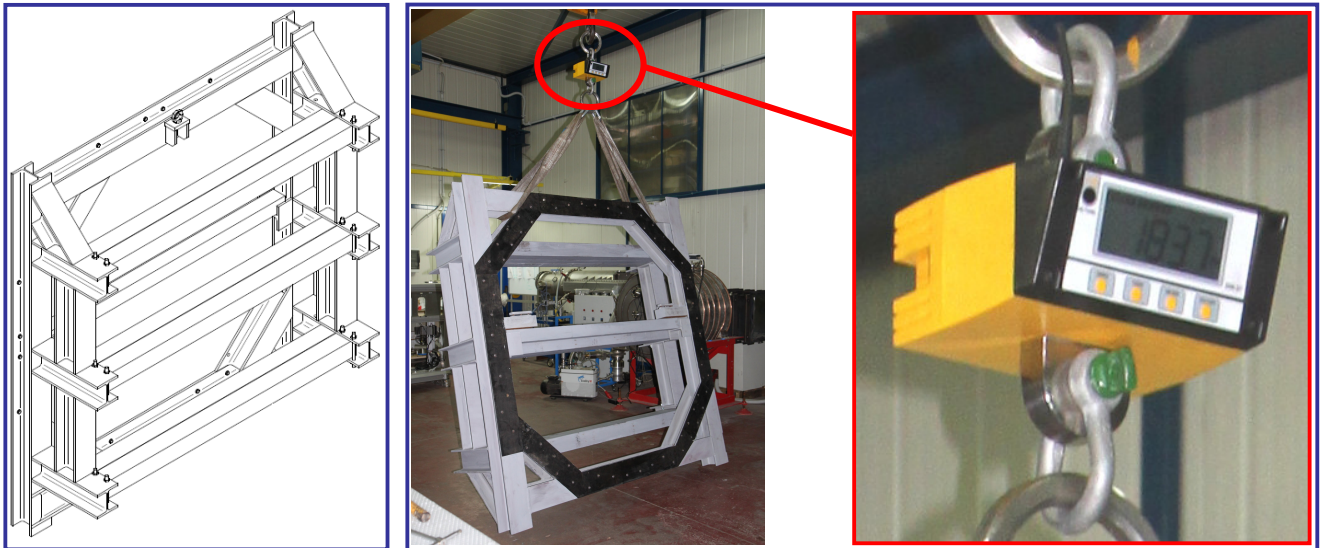


Fig. 2: Design and weight measurement for the test equipment

The following tests were successfully performed:

1. Load test integration (GRAAL configuration):
 - a. Installation condition for the assembly: fixed to floor
 - b. Weight load applied to the integration flange: 1813 kg (tolerance: -0 / +10%)
 - c. Position of the center of gravity (COG) of the applied weight (tolerance: -0 / +10%): On-axis with the integration flange, at 240 mm from the fixation surface.
2. Load test crane handling (GALACSI configuration):
 - a. Installation condition for the assembly: lifted from the floor by means of crane.
 - b. Weight load applied to the integration flange: 1375 kg (tolerance: -0 / +10%)
 - c. Position of the center of gravity (COG) of the applied weight (tolerance: -0 / +10%):
 - i. On-axis with the integration flange, at 310 mm from the fixation surface.

¹ Center Of Gravity

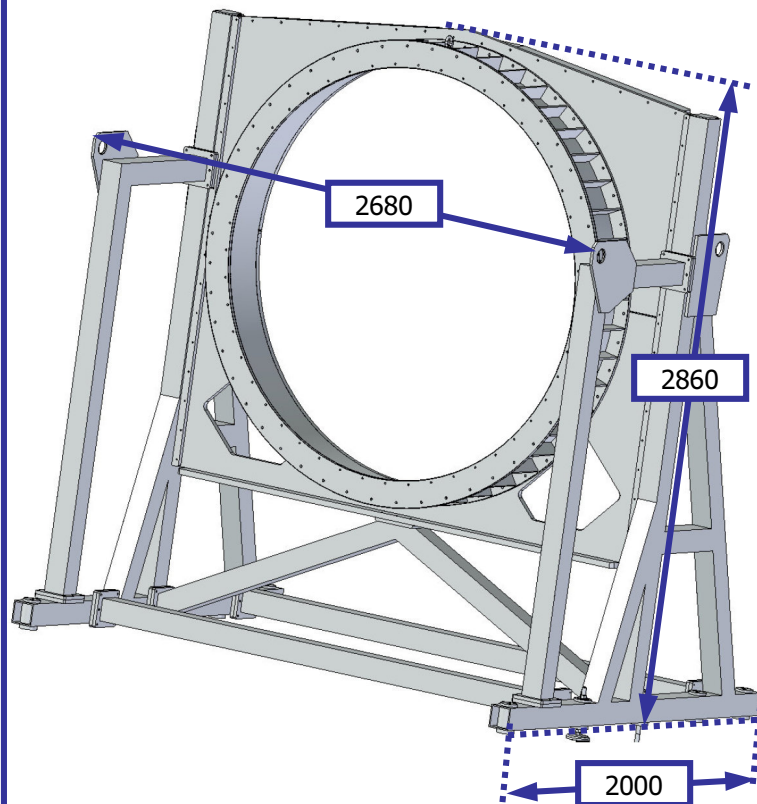


Fig. 3: Installation of the test equipment on the Integration Flange



Fig. 4: Pictures of the weight load tests of the assembly

6 Reference drawings



1840 kg weight load test equipment

