

NAOMI Wavefront-Sensor PDR Requirements

wht-naomi-84

Internal document AOW/WFS/RAH/1.0/09/96 Wavefront Sensor PDR Requirements

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1. Drawings

Preliminary drawings of the WFS and calibration source(s) approaching the assembly level shall be supplied. Outlines of commercially available components such as motors are acceptable provided the components are identified, i.e. manufacturer, model number, with basic characteristics or data sheets available as back-up. Drawings indicating preliminary cable layouts and component locations on the optical table shall be provided. The cable routes to the electronics racks shall be indicated. Any limitations on cable lengths that may severely restrict the freedom to reposition key components should be pointed out. Sufficient information is needed to prove that interface and space requirements have been satisfied. In particular the choice of optical-axis height shall be clearly shown. If the design goal of 150 mm has not been achieved then the case for the selected height must be presented.

Information shall be presented on the adequacy of the space nominally allocated to the tip/tilt sensor upgrade. If the initial allocation has been found inadequate a drawing should be available showing the requested allocation.

Where an assembly-level drawing does not provide sufficient detail or clarity to convey the operation or nature of mechanisms, adjustments or key components, simple drawings or artist's concepts are acceptable although detailed design drawings are preferred.

2. Optical Design

Details of the optical layout, e.g. component locations, sizes, radii, thicknesses, material types, characteristics of lenslet arrays, etc. and performance predictions are required. The predicted ADC performance as a function of zenith angle and spectral bandwidth should be provided. Sufficient tolerancing of optical components to at least define adjustment ranges and the resolution of the adjustments is required. Machining tolerances for lenses mounted in cells are not required at this stage.

Spectral transmission predictions and information on proposed coatings, e.g. coating supplier and coating type, should be presented in sufficient detail to demonstrate that the throughput specifications will be satisfied. Representative spectral transmittance (or reflectance) curves for the coatings should be available if requested.

3. WFS Performance Predictions

The results of predictions of the overall WFS performance for the conditions specified in work package are required. In particular the measurement ranges and phase-gradient accuracy shall be addressed. The performance predictions shall take into account factors such as the lenslet aberrations, CCD readout noise, errors in calibrating the CCD.

A preliminary analysis of thermal and vibrational sensitivities shall be presented. This work must be taken to at least the level where any potential problems can be anticipated. Any other potential problems associated with the GHRIL environment must be identified. Proposed solutions to these problems shall be presented if available.

4. CCD and Controller

Recommendations on the choice of CCD chip with key performance parameters (quantum efficiency, noise, number of ports, etc.) shall be presented. The size and general characteristics of CCD camera head including power requirements, cooling, etc. are also needed. The choice of controller and a review of any options shall be presented. The ability to meet requirements such as the switchable readout rate, binning, shall be addressed.

5. Electronics

All major aspects of the electronics design and interfaces for the WFS (not previously addressed in Section 4) shall be covered, e.g. motors, drivers, power supplies, rack configuration, etc. Any anticipated problems or measures related to EMC shall be identified.

The cooling method and plan for the electronics racks must be presented.

NOTE: As the cooling method(s), overall electronics layout and cabling are the responsibility of the Optical Chassis WP, any designs presented here should have been agreed previously with the Optical Chassis WP Manager.

6. Software

The proposed software architecture, systems and interfaces should be presented, together with an improved estimate of the effort needed. The interface between the WFS software work and the RTCS processing of WFS data and the responsibilities for each should be clearly defined. Note that only the software required for WFS mechanism control and laboratory testing should be addressed.

7. Weights

Weight estimates for all major mechanical, optical and electronic sub-systems are needed, i.e. the WFS assembly, calibration source(s), electronics modules, etc.

8. Alignment and Calibration

Plans for the WFS internal alignment and the alignment to the optical chassis must be described.

The approach to the WFS calibration must be described in sufficient detail to establish that the WPD requirements will be satisfied, i.e. design and functionality should be covered.

9. Testing

An outline of plans for testing and integration is required. The outline must cover testing as a subassembly and testing when integrated with the complete system both in the UK and at La Palma. The need for any special test equipment or facilities should be addressed, together with an estimate of the additional cost if available

10. Facility Requirements

The power, cooling requirements and predicted heat dissipation of all major subassemblies shall be provided.

Any special handling or storage requirements must be identified.

11. Documentation

A preliminary list of documentation that will be provided on or before delivery is required.

12. Miscellaneous Topics

These may include comments on the expected reliability of components and need for spare parts, safety and handling, etc. Any components requiring ING approval must be identified and approval for their use should have been received from ING.

13. Future Work

The latest schedule with key milestones should be presented. Critical-path items shall be clearly identified. Updated cost estimates and profiles are needed.

Any further analyses or trade studies of significance still required or recommended shall be briefly addressed.

Any anticipated high risk or problem areas shall be identified (if not addressed elsewhere in the presentation), together with any proposed solutions.