
Master Oscillator PDR Charge Document

**Preliminary Design Review (PDR)
Master Oscillator
28 April 2017**

Charge for the PDR

Purpose of this PDR

A PDR is the first detailed design review of a component and its functional adjacent systems. It nominally, though not always, marks the transition from conceptual/basic specification to the procurement phase.

The design is reviewed against all design inputs, including technical and interface requirements.

A successful PDR gives confidence that the subsequent detailed design will meet all technical requirements and interface properly with all relevant accelerator subsystems. The completion of a PDR fixes the technology choice of the component being reviewed.

The objective and purpose of this PDR is to confirm that the design for the Master Oscillator is likely to meet all requirements and is specified in sufficient detail for tendering and procurement activities to begin. This includes a check on the status of all interface and performance requirements.

The inputs for conceptual design may include the following, where applicable and agreed by ESS:

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- The scope of work, as described in the agreement for the Master Oscillator with Lund University 2011-2016.
- Requirements on the Master Oscillator.
- The conceptual design, as described in the design report.
- Any specifications agreed as inputs for the conceptual design of the Master Oscillator.
- Any inputs provided during previous workshops, or other technical meetings that have been agreed and accepted as applicable input to conceptual design for the Master Oscillator.
- System integration
- Installation

In general terms, the expected outputs of conceptual design, which should be presented and reviewed in the PDR are:

- Hardware design of the Master Oscillator components
- Integration and installation of the Master Oscillator
- Identification of the interfaces, interface requirements between the Master Oscillator and other systems/subsystems in the linac
- Specifications and other descriptions resulting from conceptual design activities.

The specific information, which should be reviewed in the PDR, is listed as Deliverables. See Appendix 1.

The PDR boundaries and limitations

The PDR to be performed is limited in its scope as defined below.

- Included in the PDR are;
 - a. Interfaces and interface requirements
 - b. Performance Requirements
 - c. Hardware alternatives
 - d. System functionality description
 - e. Timetable
- Excluded from the PDR are:
 - a. Procurement

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Charge to the Committee

The Review Committee is composed of the Chairman and members as identified in Appendix 2. This list also shows reviewers, who provide comments and review but are not on the formal committee.

The Review Committee is asked to:

1. REVIEW: Scrutinize and assess the deliverables listed in Appendix 1, presented through the material presented and discussions, at the PDR. Note that the presentations themselves are means of communication only, and it is the design and design documentation which must be reviewed. “Is the conceptual design and documentation mature enough to commence detailed design”?
2. ANSWER: Answer each question listed in Appendix 3.
3. DECIDE: The Review Committee is to elaborate and deliver at the conclusion of this PDR, a clear recommendation to ESS and its partners about continuing with the detailed design along with a list of recommendations for the Master Oscillator.

Suggested forms for the decision are:

- Approved, without qualifying comments or further actions.
- Approved, but with recommended actions and or clarifications.
- Not approved, but with recommended actions, for further inputs and activities, and a proposal for a follow-on review.

(If the committee rules for “Approved with recommended actions” or “Not approved” of the PDR, it is of essence that the actions/comments requested are very precise in their formulation and that the fulfilment decision is transferred to WP8.4.1-3 all this due to time constraints in the schedule).

4. REPORT: The Review Committee is to document in a short report to be delivered as soon as possible after the PDR, its recommendation and any specific actions for Master Oscillator, identifying any further design necessary and other guidance for assisting planning and future success of the Work Unit related to its scope and deliverables.

(If the PDR is “Approved but with recommended actions”, at the PDR, there shall be a summary list of requested actions defined and who is responsible to perform needed work. In order to facilitate the actions WP 8.4.1-3 will work with ESS partners to accommodate any defined actions in order to meet the schedule constraints. This while awaiting the final report from the PDR review team).

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Appendix 1

Scope and Deliverables for Review

Scope for Work Unit Master Oscillator

The Master Oscillator is part of the LLRF Work Unit, led by Anders J Johansson, Lund University. The WU is part of ACCSYS WBS 11. Work Package 8 RF systems, led by Morten Jensen, ESS ERIC.

Deliverables for PDR - Information to be reviewed

The information identified below is to be described and communicated through presentation at the PDR, and the source information is to be available to reviewers for reference during the PDR.

The WU is requested to deliver to the PDR Chairman (Anders Sunesson) for distribution to the Review Committee and other reviewers, an agreed subset of the following information for pre-review and comments.

1. Hardware choices:

Reviewers shall assess the conceptual design and its compliance with requirements and validate the principle design choices.

2. Descriptions or other identification of systems and components – in General:

- Conceptual design
- Functional block diagram of the Master Oscillator
- Interfaces with the electrical distribution
- Interfaces with Phase Reference Line
- Interfaces with Timing System
- Integration to ICS
- Preliminary RAMI information

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3. Identification and Acceptance of baselined Requirements

Spreadsheet table(s) of the PBS Level 3 requirements, and any Level 4 requirements, including interface requirements, which have been communicated to the WU, with indication of their status.

4. Manufacturing and Verification:

- Description of planned test and measurements
- Standard used for engineering design, construction and verification of the Master Oscillator.
- Quality plan.
- Schedule for procurement, manufacturing, testing and delivery.
- Risk analysis.

Appendix 2

Review Committee and other Reviewers, Presenters and Observers

The PDR Committee conducts this review with the authority of ACCSYS Project Leader, Mats Lindroos, and ESS Director General, John Womersley.

The Committee serves in an advisory capacity to:

- the Work Unit team for WU LLRF/MO
- the RF group leader
- the ACCSYS WP 8 Leader
- the ACCSYS management team

Name	Organisation	Appointment for PDR
Anders Sunesson	ESS, ACCSYS RF group leader	Chairman of the Review Committee
Rihua Zeng	ESS, ACCSYS WU 8.4.1-3 leader	Review Committee member
Morten Jensen	ESS, WP 8 leader, RF section manager	Review Committee member
Duy Phan	ESS, ACCSYS safety group	Review Committee member
Kent Wigren	ESS, ACCSYS Quality	Review Committee member
Thomas Shea	ESS, WP 7 leader, Beam diagnostics section manager	Review Committee member
Timo Korhonen	ESS, ICS, Chief Engineer	Review Committee member
Stevo Calic	ESS, ACCSYS	Reviewer
Rafael Montano	ESS, ACCSYS	Reviewer
Staffan Ekström	ESS, ACCSYS	Reviewer
Rutambhara Yogi	ESS, ACCSYS	Reviewer
Bruno Lagoguez	ESS, ACCSYS	Reviewer
Inigo de la Fuente	ESS, ACCSYS	Reviewer
Dennis de Wit	ESS, ACCSYS	Reviewer
Stephen Molloy	ESS, ACCSYS	Reviewer
Anders J Johansson	Lund Universtiy	presenter

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Anders Svensson	ESS ERIC	Presenter
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Appendix 3

PDR Charge Questions

1. Has the project and supporting activities for the Master Oscillator progressed in accordance with the activities and milestones for this Work Unit recorded in the ESS ACCSYS Project Plan?
2. Has the Master Oscillator design been documented appropriately and presented in a suitable format to enable review?
3. Have the correct design options for the Master Oscillator as well as their verification methods been selected and described?
4. Have all or a sufficient coverage of requirements for the Master Oscillator been identified and documented by ESS, communicated to and understood by the Work Unit team?
5. Do the Master Oscillator specifications comply with the requirements for the system and its interfaces?
6. Is the Master Oscillator specification sufficiently developed for transition to tendering, procurement and the detailed design?
7. Does the Work Unit require additional input from ESS or the other partners to proceed to the Master Oscillator detailed design?
8. Have safety issues and technical risks been identified and eliminated or otherwise mitigated appropriate for in the conceptual design?
9. What conceptual quality assurance and quality control activities have been planned and how will these be conducted and documented or reported?
10. Are there sufficient staff resources and competence assigned to the Work Unit team by the project to allow to progress with work in accordance with activities, durations and milestone dates shown in the ESS ACCSYS Project plan?
11. Are the strategy, policies and regulations for procurement, manufacture and assembly sufficiently identified, defined, documented and understood by the Work Unit team, including supplier source(s) and pre-procurement activities and progressed to a sufficient stage?

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12. Is the design information and information on procedures required for the operation of the Master Oscillator delivered and presented at PDR sufficient to define the controls interfaces and allow the start of the controls system design?

13. Are there any outstanding agreements to be made or other actions necessary to allow the work unit to achieve the Plan?

Appendix 4

Detailed checklist, can be used as guidance and for clarification

The 4 main question areas for the Master Oscillator PDR are;

1. The design ;
 - a. Is the design documented sufficiently and presented in a suitable format to enable review at this PDR?
 - b. Does the design meet the requirements and specifications?
 - c. Does the design meet the ESS needs? (plant integration, testing, operability)
 - d. Are all or a sufficient coverage of requirements and specifications for the Master Oscillator, including its interfaces with other systems, documented, communicated to and understood by the Work Unit team?
 - e. Has the design and supporting activity for Master Oscillator progressed and reached a level of technical maturity to start tendering?
 - i. What open technical questions exist?
 - ii. What is the path forward to clarify the open questions?
 - f. Have a proper safety and risk analysis been performed for this stage of the project?
 - i. What safety issues and technical risks have been identified?
 - ii. Are they documented?
 - iii. What mitigations have been implemented? Are they documented? What is the result?
 - iv. Future actions planned? To eliminated or otherwise mitigated in the detailed design or identified for managing for manufacture, assembly, installation or operation?
 - g. Does the work unit team require additional input from ESS or its other partners, or seek additional review, decision or approval from ESS to proceed with all work planned?
 - h. Are there any outstanding agreements to be made or other actions in the work unit necessary to realize the Plan?
2. The manufacturing;
 - a. Is there a Manufacturing strategy and sequence?
 - b. Are the strategy, policies and regulations for procurement, manufacture and assembly sufficiently identified, defined, documented and understood by the Work Unit team, including supplier source(s) and pre-procurement activities and progressed to a sufficient stage?
 - c. Are all needed procedures/inspection plans, including risk analysis for manufacturing, including pre-series validation, performed and planned for

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mitigating actions? (eg. Major components, overall manufacturing sequence, procedures, etc.)

- d. Alternative: are there provisions in the Statement of Work that allows quality procedure inspection, manufacturing inspection, risk analysis, pre-series validation, and risk mitigation?
 - e. Will the manufacturer be given sufficient time to perform the work?
3. Time schedule and critical paths;
- a. Is the project planned in sufficient detail?
 - b. What top 3 risks are identified and how are they managed?
 - c. Is the schedule for delivery of components and for the manufacture of the Master Oscillator sufficiently understood and in accordance with activities duration and milestones dates shown in the ACCSYS project plan?
4. WU plan to meet the schedule
- a. Are all resources named?
 - b. Is the schedule resource loaded?
 - c. Are all resources available and released by management in due time?
 - d. Is there any surplus in the critical areas?
 - e. Which bottlenecks do exist?