Diagnostics Optical consultancy

Technical Specifications
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1 Abstract

This document describes technical needs of Fusion Diagnostics Optical Design Consultancy, including activities and follow up activities.

2 Background and Objectives

ITER is a major new device that is under construction in Cadarache in Provence, France. This device will study the Fusion concept on a scale previously unequalled on earth. To study the behaviour of this device, a set of monitoring systems (called diagnostics) are required. The will provide all the information to show and understand the performance of the device.

Many of these devices are based on optical effects and as a result light is required to be collected from the tokamak and transported to an area where it can be sampled and analysed.

The work described below is related to system-concept-defining and assessing the performance to ensure that procurements can be carried out. Most of these procurements are at the functional specification level and hence significance experience in the fusion and optical field in required to allow an optimum system is specified.

3 Scope of Work

The objective of this contract is to provide to the Diagnostics team Optical analysis of various systems to support the procurement arrangement preparation, specifically provide an analysis of the Upper port and Equatorial port optical systems so that they can be judged to pass a design review.

The work would be mostly (approximately 90%) carried out at the IO-site.

4 Estimated Duration

The Consultant would be expected to be available approximately 50% of the time. The work would be carried out over a 2 year period. The work will be carried at ITER Head Quarters. Exceptionally, the consultant may be asked to work at one of our partner sites around the world:

5 Work Description

IO requires the services of an experienced optical design consultant to assist in the design of the Diagnostic systems. Due to the large number of projects involved, the work will be broken into 50 modules that can be carried in isolation while being able to tackle different systems when needed. This would involve being at the ITER HQ to work directly with the customer.
A module of work would encompass the following:

- Requirement definition collection
- Debrief of customer to understand the requirements
- Environment scope clarification
- Provision of concept or development of existing concept
- Performance analysis
- Integration of system check
- Presentation to the Responsible Officer
- Update of design as needed to account for clashes or environment
- Re optimisation of design (iterate above)
- Write report and deliver design data

The detailed requirements would be agreed with the Responsible Officer before commencing the module.

Typically, the modules would be compact so as to allow each design to proceed in line with the development of the hardware and other aspects of the ITER system.

6 List of deliverables and due dates

<table>
<thead>
<tr>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular progress report</td>
<td>On completion of each module</td>
</tr>
<tr>
<td>Design Files</td>
<td>Design data to be provided in ZEMAX format</td>
</tr>
<tr>
<td>Final report</td>
<td>At the end of the contract</td>
</tr>
</tbody>
</table>

7 Acceptance Criteria

This criteria shall be the basis of acceptance by IO following the successful completion of the services. These will be in the form of monthly progress reports as indicated in section 6, table of deliverables and further detailed below:

Report and Document Review criteria.
Reports as deliverables shall be stored in the ITER Organization’s document management system, IDM by the Contractor for acceptance. A named ITER Organization’s Contract Technical Responsible Officer is the Approver of the delivered documents.
The Approver can name one or more Reviewers(s) in the area of the report’s expertise.
The Reviewer(s) can ask modifications to the report in which case the Contractor must submit a new version.
The acceptance of the document by the Approver is the acceptance criterion.

8 Specific requirements and conditions

The consultant should:

- Have a minimum qualification of a Master degree or the equivalent relevant education.
- Have a minimum of 5 years experience using the ZEMAX Optical Design Software for both sequential and non-sequential optical systems.
- Have a minimum of 10 years design, specification, manufacture and assembly experience of advanced optical systems for operation in a variety of environments but in particular for the Fusion Industry.
- Have a minimum of 10 years optical design experience, for a wide range of requirements for use in commercial, industrial, military and scientific applications including large mirror and lens systems.
- Be available to work at least 80% of time at IO site.
- Have proven ability to working in multidisciplinary, international team environment.
- Be fluent in the English language, both written and oral.

9 Work Monitoring / Meeting Schedule

Meetings and progress reports

The work will be managed by means of Progress Meetings and/or formal exchange of documents transmitted by emails which provide detailed progress. Progress Meetings will be called by the ITER Organization, to review the progress of the work, the technical problems, the interfaces and the planning.

The main purpose of the Progress Meetings is to allow the ITER Organization/Diagnostics Division and the Contractor Technical Responsible Officers to:

a) Allow early detection and correction of issues that may cause delays;
b) Review the completed and planned activities and assess the progress made;
c) Permit fast and consensual resolution of unexpected problems;
d) Clarify doubts and prevent misinterpretations of the specifications.

In addition to the Progress Meetings, if necessary, the ITER Organization and/or the Contractor may request additional meetings to address specific issues to be resolved.

For all Progress Meetings, a document describing tasks done, results obtained, blocking points must be written by the engineer. Each report will be stored in the ITER IDM in order to ensure traceability of the work performed.

Every 3 months, the Contractor shall submit to ITER Organization a Progress Report to be issued five working days before the each Progress Meeting so that the report can be reviewed prior to, and discussed at, that Meeting.
The quarterly Progress Report shall illustrate the progress against the baseline work plan and indicate variances that should be used for trending. Performance indicators suitable to measure the progress of the work as compared to the approved work plan shall also be reported in the Monthly Progress Report.

10 Payment schedule / Cost and delivery time breakdown

Interim payments will be made upon production and acceptance of a module report as defined in section 5. Payments will only be processed upon IO approval of the reports and against receipt of a valid invoice.

11 Quality Assurance (QA) requirement

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system. The general requirements are detailed in ITER document \textit{ITER Procurement Quality Requirements (22MFG4)}.

Prior to commencement of the task, a Quality Plan \textit{Quality Plan (22MEMW)} must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities.

Prior to commencement of any manufacturing, a Manufacturing & Inspection Plan \textit{Manufacturing and Inspection Plan (22MDZD)}, must be approved by ITER who will mark up any planned interventions.

Deviations and Non-conformities will follow the procedure detailed in IO document \textit{MOP Deviations and Non Conformities (22F53X)}.

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed \textit{MOP Contractors Release Note (22F52F)}.

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc shall be reviewed and approved by the IO prior to its use, it should fulfil IO document on Quality Assurance for ITER Safety Codes \textit{Quality Assurance for ITER Safety Codes (258LKL)}.

12 References / Terminology and Acronyms