Fusion Diagnostics Optical Design 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. The ITER Organisation is bringing together people from all over the world to be part of this unique project and to contribute to building the ITER device which requires the best people from many disciplines. The work environment is flexible and dynamic with opportunities to work closely with many people and cultures from around the world. The device will study the potential of controlled nuclear fusion to provide energy for the future of mankind. In order to study the behaviour of this device, a set of monitoring systems (called Diagnostics) are required. These systems will provide the information required to understand and control the performance of the device.

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 systems 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 is required to allow an optimum system to be specified.

3 Scope of Work

The objective of this contract is to provide the Diagnostic Team with Optical Analysis of various systems to support the Procurement Arrangement preparation and also post Contract assessments and guidance. The work would be mostly (approximately 90%) carried out at the IO-site. More than one person may be considered to fulfil the total requirements of this contract.

4 Estimated Duration

The duration shall be for up to 3 years with a requirement for up to 100 days per year (to be evenly spread over the year) from the starting date of the contract.
5 Work Description

- Provide optical analysis of various systems to support the system procurement in the IO diagnostics Division. Specifically assess current designs for suitability for installation in ITER. (The consultant is expected to be familiar with the Zemax ray-tracing code although others may be acceptable especially if they are CATIA V compatible)

- Provide Straylight Analysis using a tool like LightTools or SPEOS

- Provide advice to the IO on the optimisation of the optical designs which are being proposed

- Assist in optimising arrangements of optical diagnostics primarily to minimise cost and installation time.

- Provide advice in order to assist in ensuring that the ITER nuclear effects are considered in the designs

- Promoting safety and quality at all times in all job site activities.

- Additional related work that may be required by Division Head / Responsible Officer during the course of the contract

6 List of reports and due dates

<table>
<thead>
<tr>
<th>Subtask</th>
<th>Deliverable</th>
<th>Dates</th>
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<tbody>
<tr>
<td>1</td>
<td>Initial progress report</td>
<td>1 month after starting date</td>
</tr>
<tr>
<td>2</td>
<td>Progress reports</td>
<td>Every month thereafter</td>
</tr>
<tr>
<td>3</td>
<td>Final report</td>
<td>At end of contract period</td>
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7 Acceptance Criteria

The selection will be done taking into account the following criteria:

1) Expert CV and Interview 70%
2) Price 30%

8 Specific requirements and conditions

The person to carry out the work described in this document must have proven experience, as appropriate, in the following:

- Educated to minimum Degree level in appropriate discipline
- Demonstrable significant experience in the appropriate discipline
- Familiarity with the Zemax ray-tracing code or similar optical code, compatibility with CATIA being an advantage
- Competent with the use of Light Tools, SPEOS or similar code for straylight simulations
- Experience in Nuclear Fission/Fusion is not essential, however, is an advantage
- Ability to balance quality/risk/cost when providing design information.
- Ability to work in multidisciplinary, international team environment.
- Must be fluent in 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 month, 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

Monthly payment, after submission and acceptance of reports to the ITER Organization and approved timesheets.

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 ITER Procurement Quality Requirements (22MFG4).

Prior to commencement of the task, a Quality Plan Quality Plan (22MFMW), 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 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 MOP Deviations and Non Conformities (22F53X).

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed MQP 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 Quality Assurance for ITER Safety Codes (258LKL).

12 References / Terminology and Acronyms