china eu india japan korea russia usa

Call for Nomination

Diagnostic Structural Engineering

Ref. IO/16/CFT/7-245/CDP

Purpose

The purpose of this Framework Contract is to provide diagnostic structural engineering service for justification of ITER Port Plugs and Diagnostics integration. Most of the systems are the scope of the Domestic Agencies (DAs). About 30% of the systems scope is however completely IO scope. A large variety of systems are covered by this Contract.

Background

The ITER Project is an international effort aimed at demonstrating the scientific and technological feasibility of nuclear fusion energy. The nuclear fusion reactions occur within the volume of the ITER vacuum vessel, which is filled during operation with a hot gas (plasma). A key aspect of the research program of ITER is the diagnosis of the plasma and the first-wall, e.g. the plasma temperature, density, radiative properties, first-wall resilience, etc. For this purpose, a large number of different types of diagnostic equipment peer into the ITER vacuum vessel from many different vantage points.

Many diagnostics are integrated within support structures called port plugs. Port Plug structures must provide, amongst others, platform for diagnostic integration by supporting Diagnostic Shield Module (DSM) and Diagnostic First Wall (DFW), ensure adequate nuclear shielding for port cell, vacuum vessel and magnets, maintain safety boundary and withstand various types of loads from the plasma. The diagnostics and integrated port plugs inside the primary vacuum have to be justified engineering-wise to withstand the loads resulting from the plasma disruptions, seismic events and radiation. The integrity of the confinement boundaries is a critical issue in ITER. For diagnostics, these are typically defined by port plugs, feedthroughs and window assemblies. For port plugs, controlling neutron leakage and minimizing deflections due to large electromagnetic loads is a particular challenge. For ex-vessel components of diagnostics, it is important to justify that they can survive the combination of “normal” and accidental loads, such as fire or loss of coolant events, without aggressing any safety functions of systems and buildings.

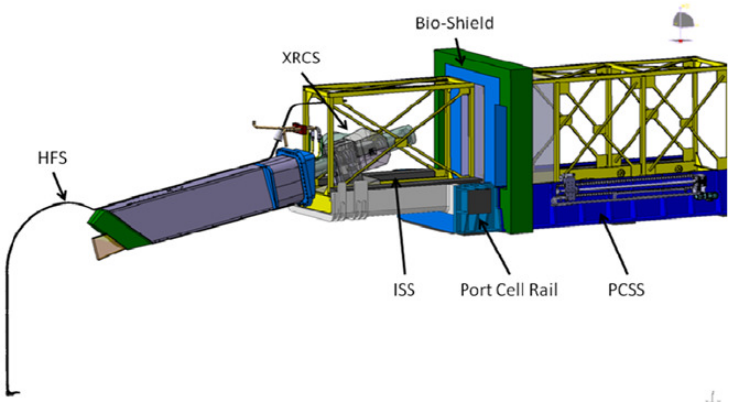

Figure 1: Example of an assembled diagnostic upper port.

Scope of work:

The scope of the development services requested in this specification requires that the Contractor's company provides specialized expertise to contribute to, establish and reinforce the ITER Port Plugs and Diagnostic Integration Teams.

As a general statement, the details of the services to be provided by the Contractor will be defined in the Task Order Technical Specification.

These Technical Specifications will be defined specifically for each Task Order depending on the actual requirement and will include a technical scope, the organization of the Task Order within IO and a description of the deliverables.

The ITER project Port Plugs and Diagnostic scope comprises of more than 100 diagnostics projects including diagnostics, structural engineering, Port Plug Test Facilities, as well as conventional and Nuclear Protection Important Components. They require a variety of engineering activities, such as structural assessment, maintenance loads assessment, thermos-hydraulic calculations. As a consequence, the workload for the analysis and engineering design activities to be performed will not match exactly the number of individual resources.

Experience

The Contractor shall have adequate experience for the work and activities as detailed below:

- Fatigue assessment of mechanical attachments on the nuclear pressure vessel;
- Creation of Finite Element models for electromagnetic analysis of complex structures and systems;
- Structural assessment of complex systems and structures in nuclear plants and facilities;
- Structural assessment of systems located in buildings;
- Assessment of loads due to accidental conditions (fire, loss-of-coolant) for complex systems and structures in nuclear plants and facilities;
- Application of nuclear codes and standards, such as RCC-MR, ASME, EN etc to design and manufacturing follow-up of complex systems and structures in nuclear plants and facilities;
- Thermo-hydraulic assessment of complex systems and structures in nuclear plants and facilities;

- Assessment of maintenance loads on for complex systems and structures in nuclear plants and facilities;
- Creation of load specifications and structural integrity reports following rules and guidelines of nuclear plants and facilities for complex systems and structures.

Work description

Port Plugs and Diagnostic Integration Development requires skills to progress the technical development of diagnostics in-vessel, ex-vessel and port-based systems.
The scope of work covers the provision of both **on-site** and **off-site** diagnostics structural engineering expertise supported by back-office engineering as necessary. The following activities are foreseen:

- Development of ANSYS Finite Element models (generic or specific) for Electro-Magnetic (EM) analyses of in-vessel or port plug based diagnostics or structures;
- Thermal-hydraulics/Computational Fluid Dynamics (CFD)coupled analyses of diagnostic systems and component in order to determine thermal profiles to be used in the structural integrity evaluation;
- Complete fatigue assessment of a diagnostic attachment to the ITER Vacuum Vessel following relevant ITER guidelines:
    - Development of analysis report;
    - Follow-up with Vacuum Vessel group and Vacuum Vessel Agreed Notified Body (ANB);
- Stress analysis and stress reports of system and components in accordance to System Load Specifications and following nuclear codes (RCC-MR 2007):
    - Identification of failure modes, critical sections;
    - Justification of stress categorization and classification procedures;
- Detailed welding distortion analysis of diagnostic components and structures to ensure the manufacturing feasibility;
- Production of Technical Specifications for the manufacturing of diagnostic components in the context of a nuclear manufacturing Code and QA/QC system (RCC-MR 2007) and the various additional handbooks which compliance with is required by diagnostic components and systems (ITER Vacuum Handbook, ITER Alignment and Metrology Handbook, Project requirements…).

Duration of services

The Contract will be carried out over an initial firm period of four (4) years and an optional period of two (2) years. The Contract is scheduled to come into force in December 2016.

Timetable

The tentative timetable is as follows:

Description	Date
Call for Nomination	3 June 2016
Release of Pre-qualification	July 2016
Pre-qualification results	August 2016
Release of Call for Tender	August 2016

Tender submission date	October 2016
Indicative Award date	November 2016
Indicative Contract signature	December 2016
Indicative Contract start date	January 2017

Candidature

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State. A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization. The consortium cannot be modified later without the approval of the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. IO reserves the right to disregard duplicated references and may exclude such legal entities form the tender procedure.

Reference

Further information on the ITER Organization procurement can be found at:
http://www.iter.org/org/team/adm/proc/overview