

**SUPPORT TO ITER IN THE AREA OF SYSTEM ENGINEERING  
REF. ITER/C4N/08/21/CDP**

### 1) Objectives

The management of the detailed design and construction phase of ITER will represent a major challenge because of the intrinsic complexity of the tokamak design, the large number of different systems which are all essential for its operation, the worldwide distribution of the design activities and the unusual procurement scheme largely based on in-kind deliverables. A key requirement for the success of the project is in the establishment of a systematic approach to ensure that consistency of the design with the required performance is maintained through the entire lifetime of the project. This requires that:

- effective project management methods, tools and working practices are deployed and managed, and
- adequate resources are available to control and integrate the activities of all Domestic Agencies and technical departments.

The IO has recognised the need to involve industrial partner(s), with proven experience in the management of the engineering activities in large and innovative projects.

The contractors will provide support to the IO in the area of Systems engineering, configuration control and design integration.

The objective of this letter is:

- To inform the ITER Domestic Agencies about the ITER intention to organize an international call-for-tender for the selection of a qualified engineering company.
- To briefly describe the main scopes of the call-for-tender and plan for the awarding of the contract
- To invite the ITER Domestic Agencies to propose industrial companies, entities or groups.

### 2) Acronyms

CAD:	Computer Assisted Design
CMP	Configuration Management Plan
DMU:	Digital Mock-Up
DI & CC:	Design Integration and Configuration Control
DO:	Design Office
ICD:	Interface Control Document
IDM:	ITER Documents Management System
IO:	ITER Organization
PR:	Project Requirements Document
PS:	Project Specifications
PDM:	Product Data Management
IT:	Information Technology
PFD:	Process Flow Diagram
P&ID:	Process & Instrumentation Diagram
PRO:	IO Project Office
RO:	ITER Organization Responsible Officer for level 2 or 3 activities of the ITER WBS
SEMP:	System engineering Management Plan
SRDs:	System Requirements Documents
WBS:	Work Breakdown Structure

### 3) Scope of work

The call-for-tender will cover the industrial support in the area of systems engineering support (SES) during the design and construction of ITER.

The activities will be in the following areas:

#### a. **Development and implementation of the Systems Engineering Program**

The Contractor will be responsible for:

- updating SEMP to reflect enhancements and changes in the systems engineering program,
- developing and updating implementing plans and procedures,
- training for project participants.

**b. Management of the ITER design requirements**

The Contractor is expected to bring its experience on how to manage requirements in the ITER environment and will be responsible for:

- reviewing the technical specifications and changes to approved technical specifications,
- assuring consistency among requirements,
- coordinating the development of safety requirements with the Safety Analysis Section and the ROs for inclusion in System Requirements Documents (SRDs) and,
- managing requirements using DOORS®.

**c. Interface control**

The Contractor will provide qualified persons to support the ITER technical staff for the:

- assisting the IO Technical ROs in the development of the ICDs,
- definition of work plans for the resolution of the interface issues,
- tracking development of interfaces,
- supporting the design integration section and project management in the arbitration of interface issues.

**d. Design verification**

The Contractor will provide assistance in:

- implementing the system for conducting design review,
- archiving all design review records for future reference,
- assuring that issues raised at design reviews are properly documented using issue cards,
- tracking resolution of the issues and assuring that all issues are resolved before the design review is closed.

**e. Configuration management**

The Contractor will assist the IO PRO in the management of the configuration baseline; this includes:

- coordinating the assessment of technical, cost, and schedule impacts;
- tracking action items arising during deliberation of the change;
- tracking action items resulting from approved changes.

**f. Data management**

The Contractor will:

- assist the Project Office to define the technical specification for an object oriented Product Data Management (PDM) System,
- assist in the selection of the appropriate software solutions,
- assist in the PDM implementation and management.

**g. Human Factors Engineering**

The Contractor will assist the ITER PRO in:

- identifying appropriate industry guidelines to apply for human factors in the design, operation, and maintenance of ITER;
- providing assistance to the ROs in their application.

#### **h. Integrated systems test planning**

The Contractor will provide support to the IO in:

- developing a program for integrated systems testing and documenting it in an Integrated Systems Test Plan (ISTP),
- identifying the purpose, scope, and objective of each system test, test configurations and test responsibilities,
- coordination of the development of the ISTP with the Responsible Officers (ROs) to assure that the ISTP can be supported by the subsystems.

#### **i. Development of the Tokamak configuration model (Digital Mock-up) and the Plant model of Tokamak Building**

The Contractor shall provide technical support for:

- the development and maintenance of the 3D tokamak configuration model and the plant model of the Tokamak Building,
- performing interference checking,
- assist the design Integration section in verifying assembly and maintenance operations.

#### **4) Estimate of the amount of work**

- Contractual aspect: The System Engineering Support contract will be executed through a framework contract.
- Total number of staff: The Contractor will have to provide staff with suitable experience in the various areas. The total number of staff is expected to be limited to about 10 senior engineers and 10 junior engineers/technical staff.
- Duration: The contract shall start at the beginning of September 08. The frame-work contract will be valid for a 2-year period possibly extended twice for a one-year period.
- Location: A very large fraction of the assistance staff will be located at the ITER site.
- Language: The language used at ITER is English. A fluent professional level is required (spoken & written English)

#### **5) Selection criteria**

In the selection process of the tenders both the capability of the nominated company and the quality of the offer will be considered:

The capability of the nominated company will be assessed based on the:

- Relevant experience: the nominated company must have the capability to provide all missions and tasks described above. A demonstrated experience at least 10 years in providing similar services / support in large & complex international industrial and research projects developed in a remote collaboration manner (hundreds of remote Participants and complex interfaces).
- The QA system and the engineering processes adequate to the scope of the task used by the company. The nominated company must provide a description of their Quality Management System for ITER to review and evaluate.
- Organisation ability: The nominated company must have the capability to provide a number of available consultants, engineers, technicians and CAD designers adequate to the tasks described in the specification.
  - 20 % should have at least 10 years professional experience
  - 60 % should have at least 5 years professional experience
  - 20 % should have at least 3 years professional experience.

- Financial capability: the yearly contract should not exceed 20% of the company's income.

Comments: ITER reserves the right to contact some or all of each nominated company's references to ask if: (1) the nominated company delivered a quality product which was compliant with the customer's requirements; (2) the company's performance conformed with the terms and conditions of its contract, including the delivery schedule; and (3) the company was reasonable and cooperative during performance and committed to customer satisfaction. ITER may choose to visit customer references and may also use other sources of information.