

Technical Specifications (In-Cash Procurement)

Technical Summary: Mechanical Area - CAD & Engineering Framework Contracts

This Technical Summary covers the supply of engineering and technical support services to the ITER Organization in the areas of Computer Aided Design (CAD), Design Engineering, and Support to ITER's CAD environment / infrastructure in the mechanical area of expertise.

Technical Summary for

Mechanical Area

Computer Aided Design, Design Engineering, and Support to ITER's CAD environment / infrastructure Framework Contracts Tender

Abstract.

This Technical Summary covers the supply of engineering and technical support services to the ITER Organization in the areas of Computer Aided Design (CAD), Design

Engineering, and Support to ITER's CAD environment / infrastructure in the mechanical area of expertise.

1. BACKGROUND AND OBJECTIVE

The Design Office (DO) of the ITER Organization (IO) provides and manages the design capability for the ITER Project including the Domestic Agencies (DAS). The current Design and Engineering Support framework contracts were established at the end of 2012 and will terminate at the end of December 2020.

The objective of this Call for Tender is to select qualified companies / consortia with extensive experience in the required fields of work, proven track records in the implementation, exploitation and maintenance of the software platforms used by the ITER Organization, and to award the framework contracts that will supply the Design Engineering, Computer Aided Design, and CAD support needs through the Construction and Commissioning phases of the ITER Project for the period of 2021 – 2026 in the mechanical area.

The aim of the tender is IO may decide to award several framework Contracts (up to 4) for the execution of:

- The production of CAD data (2D & 3D) in the area of Mechanical Design and Engineering;
- Support and Maintenance of Mechanical CAD software environment

These Framework Contracts shall have a shared ceiling of expenditure.

The Framework Contracts shall be implemented by the means of awarded Task Orders in order to execute the specific services.

2. REQUIRED EXPERIENCE

The candidates shall have demonstrated capabilities and industrial experience through various project in the detailed engineering, manufacturing & construction design, integration, safety and quality of large, complex facilities, and in the fields of development and maintenance of CAD software platforms as an IT integrator and user support service.

The IOs cost containment objectives also favour companies with a proven track record of delivering projects on time and within budget, as well as companies with the capacity to conduct activities in both on-site and off-site conditions.

The specific experience and qualities sought by IO include:

- Implementation of large, multi-disciplinary projects, in an international environment;
- Design and systems integration (components & zones);
- Experience of internationally recognized QA and safety standards, preferably in a nuclear environment;
- Experience of international construction codes, preferably nuclear;
- Design and engineering support to owner, during construction phase;
- Contract execution to achieve the assigned tasks shall be performed based on strong methodologies and Quality assurance methods;
- Capability to mobilise and manage centralised, site-based resources, and also to establish and manage off-site services for remote working;
- Proven track record of delivering projects on schedule and within budget;
- Ability to respond rapidly to changing resource requirements, to accommodate peak demands, and to provide specific expertise in the design and engineering field;
- Value engineering on large construction projects;
- Experience in the integration of various data in a Multi-CAD environment
- Experience in the integration / development of several CAD software into a single CAD Platform within a unique CAD Reference Model;

- Experience in user support services for CAD including development of industrialized methodologies including their implementation follow -up; User training on site / in person or using a remote / on-line approach.
- Strong knowledge of lifecycle management, configuration management and operations within a PLM;
- Experience in writing technical documentation, technical specification, QA/QC documents and training material.

The established design and engineering capability of the ITER Project, comprising IO and the Domestic Agencies, has been developed around specific software applications that have been validated by IO. The engineering analysis and CAD activities to be provided under the Framework Contracts shall be executed using these software. Accordingly, the candidates shall have demonstrated capability in the implementation and application of the software packages relevant to their proposed areas of work:

List of relevant software used within IO:

<u>Software</u>	<u>Mechanical area</u>	
	<u>Production</u>	<u>Infra</u>
CAD: CATIA V5 Mechanical	<u>X</u>	<u>X</u>
CAD: CATIA V5 Equipment and Systems	<u>X</u>	
CAD Mechanical Catalogues: CADENAS	<u>X</u>	<u>X</u>
CAD Plant Catalogues: SmartPlant		<u>X</u>
CAD Data Base: ENOVIA LCA – VPM 5	<u>X</u>	<u>X</u>
Assembly & maintenance simulation: DELMIA V5; DELMIA Process Engineer	<u>X</u>	<u>X</u>
Assembly & maintenance simulation: Synchro	<u>X</u>	<u>X</u>
3D Illustration: CATIA Composer	<u>X</u>	<u>X</u>
2D: AutoCAD	<u>X</u>	<u>X</u>
2D Electrical diagrams: See Electrical Expert (SXP)		<u>X</u>
CAD quality checking: Q-CHECKER / Q- PLM	<u>X</u>	<u>X</u>
Isometrics: ISOGEN	<u>X</u>	
Visualisation: NAVISWORKS		<u>X</u>
Engineering Data Configuration Management: Dassault 3DEXperince	<u>X</u>	<u>X</u>
Reverse engineering: PolyWorks and specific CATIA V5 modules	X	X
Remote Connection: Teradici, RDS or VPN for ENOVIA. <i>If the distance with IO exceeds 1000-1500 km, the Company shall connect to the closest DA (DA approval being a pre-requisite)</i>	<u>X</u>	<u>X</u>
Remote Connection: Remote Desktop Services (RDS)for SSD	<u>X</u>	
Remote connection: Web based for IO's intranet (ICP, IDM, EDB, PLM portal...)	<u>X</u>	<u>X</u>
Structural Analysis: ANSYS Classic	<u>X</u>	
Structural Analysis: ANSYS Workbench	<u>X</u>	
Structural Analysis: Hyper-mesh	<u>X</u>	
Structural Analysis: SIMULIA / ABACUS	<u>X</u>	
Other: PIPE-STRESS and CAESAR II, for piping stress analysis	<u>X</u>	
Other: DOORS, for requirements documentation	<u>X</u>	
Other: 3DCS, for 3-d tolerance analysis	<u>X</u>	
Other: OPTICS, for diagnostics optical analysis	<u>X</u>	
Other: DYMOLA, for modelling and simulation	<u>X</u>	
Other: CAMEO, for model-Based Systems Engineering	<u>X</u>	

Proprietary/Home-made: Data management tools, such as SMDD, EDB, and Replication Manager...		<u>X</u>
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3. SCOPE OF WORK

Under the proposed Framework Contracts the contractor will provide, in a timely manner, support to the ITER Organization on the Cadarache Site, and at remote locations (Locations adjacent to IO, or at the contractor's place of business) as required by the Organization, to reinforce capability in the fields of Design Engineering and Computer Aided Design, and CAD infrastructure support.

The Contractor's staff working on the IO's site, they could be asked to work in shifts under the scope of these Framework Contracts. There are 2 envisaged shifts:

- Mornings: From 6.00 to 13.00 (Uninterrupted);
- Afternoons from 13.00 to 20.00 (uninterrupted).

This requirement will be clearly stated as part the Task Order's dedicated technical specification prior the award of the tasks.

For Contractors working from their own premises, they must ensure that the working time at their respective offices have at least a 4 hour/day overlap with the IO's business hours (8:30 to 17:30 – Central European Time)

3.1 Mechanical Area Scope of Work

3.1.1 Mechanical Production

The mechanical systems of ITER comprise large, heavy, complex and precise components.

The main scope of the activities is to support the CAD design in the production and integration of the systems of the TOKAMAK machine In-Cryostat systems Area and TOKAMAK complex.

The main systems falling into this area include:

- The Internal Components (Divertor, Blanket).
- The Vacuum-Vessel (which include the Port systems)
- The Magnet system
- The Cryostat.
- The Thermal Shield.
- The Remote Handling system
- The Diagnostics systems.
- Plasma Heating systems (NBH, ICH,ECH,)
- Fuelling and wall conditioning systems

Typical tasks and deliverables in the scope of the Mechanical area include the production of the following deliverables:

- Design description: Process Flow Diagram (PFD); System Design Description (DD); Detailed Models (DM); Piping and Instrumentation Diagram (P&ID); Single Line Diagram (SLD); Cabling Diagrams; Routing diagram; Other diagrams (fault tree, interlock, sequence, block diagrams); Design definition (BOM); Assembly drawings (2D); Component drawings (2D); As-Built drawings (2D); Execution drawings (2D); Installation Drawing (2D); Component/subsystem specifications; Foundation/support drawings (Bird-eye / cutaway, etc.); As - built Drawings; Other Engineering & general arrangement drawings (2D/3D); Instrumentation & Control documents (I&C); production of Catalogues.
- Design Justification and verification: Design Justification Document (DJD); Design justification plans; Design Compliance Matrix (DCM), Design Verification Matrix (DVM); System functional analysis; System load specification; Design analyses; Design Justification

reports; Assembling / installation/ testing and inspection plans; Commissioning reports; Engineering Work Packages (EWPs)

- Manufacturing documents: Manufacturing/ inspection plans; Manufacturing/inspection Monitoring report; End item data package (as built document);
- Construction Documents: Shipping and Logistic Records; Field Change Request documentation; Construction Work Package (CWP) Description; Inspection and Test Reports; Installation Work Package (IWP) Description

3.1.2 Mechanical Infrastructure

The required support concerns the CAD mechanical environment with focus on, but not limited to the CAD tools as indicated in the table in Section 2. Typical tasks are:

- CAD software operation, maintenance, development and integration; typical deliverables are report of key parameters of software usage, test scenarios and protocols, enhancement specifications;
- CAD processes and methods; typical deliverables are Quality Assurance documents (processes procedures, CAD manual), development of CAD methodologies, development of training and user certification;
- ITER CAD collaboration schemes (Specification of the CAD collaboration with DAs and contractors, implementation and follow-up of the infrastructure enabling the CAD Collaboration, support to CAD designers in applying CAD Collaboration methodologies, Production of the CAD Exchanges between ITER partners);
- Interfaces with the Engineering Data-bases, mechanical design components (engineering practices: layout, schematics, numbering systems specific to IO and their associated tagging in the authoring tools...);
- Multi CAD and Quality Assurance;
- CAD catalogues administration, quality checking and integration with assembly/construction tools and processes;

3.2 Training

The contractor shall implement a training program and coaching for its staff to establish and maintain the level of competence and versioning in the software referenced in Section 2 for all resources producing CAD Data. In the case of CAD software, IO will provide the training to **one dedicated Trainer** from each Contractor, and the associated training material.

For software administration and user support, IO **shall not provide** any training sessions; the contractor's staff is expected and shall be competent at the start of each Task Order on the specific software specified, IO will limit its responsibility of these activities to the explanation to the contractor of IO common methodologies, CAD environment and context.

IO shall **only** perform supplementary training sessions for **any ITER specific** customisations and new software releases, which then will result in an IO internal Certification; IO will periodically assess competence of the trainees and issue the relevant certification on IO requirements.

4. QUALITY ASSURANCE REQUIREMENTS

As a Nuclear Operator, IO requires that for the entire duration of the Framework Contracts, Contractors shall hold, and maintain, as a mandatory requirement a valid ISO 9001 & ISO 14001 (or equivalent). Failure to do this may lead to a potential termination of such contract.

The missions and tasks executed under these framework contracts shall be carried out in compliance with the ITER CAD Manual, and the IO Quality Requirements (See supplementary information package)

5. CONTRACT BASIS AND EXECUTION

The Design, Engineering & CAD Support requirements of the ITER project will be procured via framework contracts. Multiple Framework Contracts will be awarded (up to 4 Contracts) with a shared ceiling of expenditure.

Following Contract award, Task Orders will be issued for the implementation of the services. All Task Orders to be executed under this contracts are on a deliverable basis. At the Call for Tender process, IO will attach, as part of the answer to the tender, the first Technical Specifications for the scope of CAD Production and main CAD infrastructure activities. Once the contract is awarded, the Contractor is expected to start such Task Orders within the first 4 weeks from when the Contract and associated Task Orders enter into force.

Additional needs will be awarded for implementation using the “mini-competition” process among all winners of a Framework Contract. This process is started through a Task Request.

The ITER Organization will award the Framework Contracts for a total period of 6 years. The initial award shall be for a 4 firm year period, and 1 option of 2 years.

It is envisaged that the first Task Orders will commence in November / December 2020.

The release of the Options are correlated to performance requirements that will be indicated in the Technical Specification at tendering stage. The Options may or may not be released at the IO’s sole discretion.

Resource Estimates

Time dependent resource profiles and uncertainties related to Project scope over the potential 6 year lifespan of the framework contracts, preclude the accurate prediction of resource requirements. The estimated levels of resources (PPY) required to cover in the plant area of work are:

Type	2021	2022	2023	2024	2025	2026
CAD	67	51	47	43	41	36
ENG	16	15	15	14	12	12

[Details per area of work can be found in the 2 tables below.](#)

Under no circumstances should these quantities be taken as a commitment by the IO. The tables above and below are scenarios currently estimated and have been generated for the purposes of this Tender.

Mechanical Design and Engineering

Type	2021	2022	2023	2024	2025	2026
CAD	50	45	40	32	37	43
ENG	11	8	8	5	5	5

Support and Maintenance of Mechanical CAD software environment

Type	2021	2022	2023	2024	2025	2026
CAD	17	6	5	3	3	3
ENG	10	9	9	9	7	7

IO may require the contractor to perform the work either on the ITER site, at a close support locations to be established and maintained by the contractors within easy reach of the ITER site, and/or at remote locations such as the contractor’s usual place of business (Requirement on time-zone 4 hour/day overlap as per Section 3). In the case of off-site CAD work, the contractor will be

required to implement one of the connection schemes described in Section 2, to utilise data sharing mode.

Some examples of the remote work envisaged could be:

- Preparation of large 2D packages / mass production of drawings based on frozen 3D data;
- Production of Catalogues;
- Review of Engineering Documentation based on IO requirements

The activities above are indicative depending on schedule & technical means and criticality, IO will deliberate the location(s) of all services per Task Order.

The working language of ITER is English, and a fluent professional level is required (spoken and written) by all staff working under the Framework Contract(s) and Task Orders.

6. TENDER TIMETABLE

The tentative timetable for setting up the contract is as follows:-

- Call for nomination sent : January 2020
- Pre-Qualification launch: February 2020
- Call for Tender launch: April 2020
- Award of the Contract: September/October 2020
- First Task Orders: November 2020

7. CANDIDATURE

Participation is open to all legal entities established in an ITER Member State, which is:

- European Union including Switzerland (EURATOM Members),
- Republic of India,
- Japan,
- People's Republic of China,
- Republic of Korea,
- Russian Federation, or
- United States of America.

The UK is not a party to the ITER Agreement but to EURATOM Treaty. The draft Withdrawal Agreement between the EU and the UK provides that the provisions of the EURATOM treaty continues to apply to and in the UK for a transition period following its withdrawal from the EU and EURATOM. If the Withdrawal Agreement is not ratified (a no-deal Brexit) the EURATOM Treaty ceases to apply to and in the UK on the withdrawal date.

Until the Withdrawal Date, the UK remains a full member of the EU and EURATOM and until that date UK entities retain the right to participate in IO procurement procedures. In case they are selected, a Brexit clause is included in the contract. Likewise during the Transition period UK entities may participate in IO procurement procedures.

After the end of the Transition Period, when the Euratom Treaty ceases to apply to and in the UK, any UK entities bidding as a prime contractor or consortium partner, will be rejected from the IO procurement procedures. UK entities will no longer be recognised as entities of an ITER Member and will no longer have the right to participate in IO procurement procedures, unless the UK has entered into an Agreement with Euratom. Where UK entities can demonstrate a unique and specific competence in a certain field the

IO, with approval of the ITER Council, may also allow them to participate in a procurement procedure.

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.

In the event of a consortium, a draft of the Consortium Agreement, or letter of intent and Power of Attorney signed by all the consortium members shall be submitted together with the tender.

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 from the tender procedure.

8. REFERENCE

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