



**Plant Design Engineer support for Tritium Plant systems design and 3D model management**

**Technical Specifications**

	<i>Version 1.0</i>	<i>Date:</i>
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## Table of Contents

1	Abstract.....	3
2	Background and Objectives .....	3
3	Scope of Work.....	3
4	Work description .....	4
5	Deliverables and Timetable .....	5
6	Specific requirements and conditions .....	5
7	Work Monitoring / Meeting Schedule.....	5
8	Quality Assurance (QA) Requirement.....	6
9	Terminology and Acronyms .....	7
	List of technical Abbreviations .....	7

## 1 Abstract

The purpose of this contract is to provide support for Tritium Plant systems design and integration activities performed under responsibility of Tritium Plan section for design and procurement of Tritium Plant systems and Radiological and Environmental Monitoring System to the level of details required by the present status of ITER construction phase.

Presently construction design of the building is progressing with focus on finalizing of the civil structures design documentation to allow for start of construction. Definition of the system interfaces need to be updated and justified in order to allow for validation of the building construction design and to support construction activities itself.

Engineering support is required to complement core activities for progressing mechanical design of the tritium plant systems in accordance to the demanding schedule imposed by building construction plan. The work shall support activities of the Building Integration Task Force (BITF).

## 2 Background and Objectives

The Tritium Plant section is responsible for design and procurement of systems assigned in Plant Break Down system as PBS 32 (Tritium Plant systems) and PBS 64 (Radiological and Environmental Monitoring System REMS systems) mainly located in Tokamak complex and Hot Cell facility buildings. According to ITER Systems Engineering process 3D models for each system shall be developed for the purpose of systems integration and Configuration Control. For preliminary design 3D Detailed Models (DM) are required as a part of systems design definition.

Two major systems of Tritium Plant are air Detritiation System and Water Detritiation System (WDS) presenting the largest piping networks and large number of component among PBS32. Scope of PBS64 (REMS) system includes all radiological monitoring instrumentation and components for all ITER facility. This includes larger number of components located in many building which needs to be modeled in 3D configuration models.

The objectives of this work is to provide engineering support for building Tritium plant section activities for developing detailed mechanical design of WDS system and REMS systems. This design needs to be incorporated into 3D CATIA/ENOVIA models.

The work is oriented toward continuing support to the systems design in the field of the plant layout engineering.

## 3 Scope of Work

Under the scope of this contract, the contractor is foreseen to provide engineering support for mechanical design of Tritium Plant systems and REMS for development of detailed models in CATIA V5/ENOVIA software.

1. Management and integration of detailed models for all systems under PBS 32 and PBS 64. Support of configuration control and CMM process.
  - Provide support for penetrations and embedments definition/check
  - Produce clash detection to supports systems integration
  - Create 3dxml and 3DVIA composer files
  - Produce 2D layout extracted from the 3D model

- Give best methodology and solutions for daily CAD design tasks (CATIA V5) for a team of designers
  - Manage ENOVIA structure of PBS32 and PBS64
  - Occasionally provide any required support for WDS and DS 3D modelling in the Tokamak Complex
2. Development of detailed design and CAD detailed models for Water Detritiation system (PBS 32.WD)
    - Finalise WDS piping layout (including supports definition) according to P&ID produced by NUVIA
    - Finalise equipment specification (emergency holding tanks and LL/HL holding tanks) based on previous piping layout study
    - Produce interface sheets between PBS 22 and 32 for emergency holding tanks and LL/HL holding tanks
  3. Provide support for development of 3D models for Detritiation System in Tokamak Complex.
  4. Development of detailed design and CAD detailed models for Radiological and Environmental Monitoring System (PBS 64)
    - Support REMS RO with system 3D modelling and 2D layout

#### **4 Work description**

Subtask-1: Support development of structure for Detailed Model (DM) in ENOVIA database in accordance to DO requirements and under supervision of PBS32 DECO. Generate guideline and oversee implementation by CAD designers working on PBS32 and 64 models.

Subtask-2: Provide support for penetrations and embedments definition/check. Produce clash detection to supports systems integration. Provide support for configuration management and development of CMM models.

Subtask-3: Develop piping layout of the of the WDS system and provide integration between all systems in the WDS sector. Develop detailed model in CATIA for the WDS system including all components, piping, supports, access platforms. Produce 2D layout drawings based on 3D models. Support management of the CAD drawings and CAD models from supplier.

Subtask-4: Prepare equipment specification for WDS water holding tanks. Equipment specification shall cover all mechanical details including nozzles specification, supports specification, details for

Subtask-5: Develop interface sheets between assembly (PBS 22) and WDS systems. Ensure compliance check of the interfaces in the 3D models and engineering documentation including CAD data.

Subtask-6: Give best methodology and solutions for daily CAD design tasks (CATIA V5) for a team of designers.

Subtask -7: Provide support for development of 3D models for Detritiation System in Tokamak complex.

Subtask-8: Support development of 3D layout of Radiological and Environmental Monitoring System (REMS) in CATIA V5/ENOVIA. Development of detailed design and CAD detailed models for Radiological and Environmental Monitoring System (PBS 64) in Tokamak Complex and Hot cell facility.

## **5 Deliverables and Timetable**

ITER Organization shall during the Contract period establish the Expert work plan on ad hoc basis and relative to the specific tasks defined in section 4 and deliverables defined on a quarterly basis.

The total duration of this contract will be 24 month. Contractor shall be available for about 100% of working time at ITER site for performance of all activities. Start date of the contract shall be in August 2013.

A monthly report shall be submitted to IO by the end of the fifth working day following the end of each month. The report shall cover the following:

1. A brief summary of the work and achievements during the month
2. Financial summary showing amount to be charged by contractor for previous month; the cumulative totals.
3. A time sheet for the previous month with short description on day by day basis

## **6 Specific requirements and conditions**

Contractor shall propose candidate with qualification for technical support in the field of plant layout.

The ITER Organization may organize an interview with the Contractor to complement the assessment of the submission.

The official language of the ITER project is English. Therefore all input and output documentation relevant for this contract shall be in English.

All CAD work shall be performed according to ITER CAD Manual.

The work requires full time presence of the Contractor at the site of the ITER Organization, Route de Vinon sur Verdon, 13115St. Paul-lez-Durance, France.

## **7 Work Monitoring / Meeting Schedule**

A monthly report shall be submitted by the contractor. Contractor shall also propose a list of meetings with ITER for progress monitoring in agreement with schedule proposed. At least the following meetings listed below should be foreseen for the contract including meetings for the particular subtasks as required.

Scope of meeting	Point of check	Deliverable	Place of meeting
Kick-off meeting	Initiation	Written report/meeting minutes	ITER site
Coordination or progress meeting as required	Questions and issues to address Progress review	Written meeting summary – resolution of questions, future actions	ITER site
Final draft report/deliverable review meeting	Deliverable completion, draft report	Draft written and oral reports	ITER site
Closing Task Order meeting	Deliverables acceptance	Final written report	ITER site

## 8 Quality Assurance (QA) Requirement

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 organization 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 [MQP 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 ulfill, etc shall be reviewed and approved by the IO prior to its use, it should ulfill IO document on Quality Assurance for ITER Safety Codes [Quality Assurance for ITER Safety Codes \(258LKL\)](#).

Work must be performed in accordance with the French Quality Order of 10 August 1984 (and subsequent revisions such as 7 February 2012) which describes quality requirements for design, construction and operation in Basic Nuclear Installation. These orders are the basis for the following safety requirements:

- ITER Preliminary Safety Report (RPrS), (ITER\_D\_3ZR2NC)
- Safety Important Functions and Components Classification Criteria and Methodology (ITER\_D\_347SF3)
- Overall supervision plan of the chain of suppliers for Safety Important Components, Structures and Systems and Safety Related Activities, (ITER\_D\_4EUQFL)

All work activities and products must comply with these requirements.

## 9 Terminology and Acronyms

<u>Denomination</u>	<u>Definition</u>	<u>Acronym</u>
ITER Organization	For this Contract the ITER Organization	IO-
ITER Organization Responsible Officer	Person appointed by the ITER Organization with responsibility to manage all the technical aspects of this contract	IO-RO
Contractor	Firm or group of firms organized in a legal entity to provide the scope of supply.	C-
Contractor's Team	The Contractor plus all the sub-contractors/consultants working under its responsibility and coordination for the performance of the contract	C-Team
Contractor Responsible	The person appointed (in writing) by the legally authorized representative of the Contractor, empowered to act on behalf of the Contractor for all technical, administrative legal and financial matters relative to the performance of this contract	C-R
ITER Organization Task Responsible Officer	Person delegated by the IO-RO for all technical matters, but limited to one specific task order	IO-TRO
Contractor Task Responsible Officer	Equivalent to the IO-TRO in the Contractors team.	C-TRO

### List of technical Abbreviations

A&E	Architect Engineering
BITF	Buildings Integration Task Force
CMM	Configuration Management Model
DICC	Design Integration Configuration Control
DS	Detritiation System
HCF-DS	Hot Cell Facility Detritiation System
HVAC	Heating Ventilation Air Conditioning

ICD	Interface Control Document
IO	ITER International Organization
IS	Interface Sheet
PBS32	Plant Break Down 32: Tritium Plant
PFD	Process Flow Diagram
SRD	System Requirements Document
TBM	Test Blanket Module
TC	Tokamak Complex
TC-DS	Tokamak Complex Detritiation System
TCWS	Tokamak Cooling Water System