china eu india japan korea russia usa

RH Control System R&D Engineer Services

Technical Specifications

	Version 1.1	*Date: 12/10/2010*
	Name	*Affiliation*
Author	**D. Hamilton**	**CIE/AOP/RH**
Reviewers	**A. Tesini**	**CIE/AOP/RH**
Approver	**K. Blackler**	**CIE/AOP**

Table of Contents

1 Abstract

The purpose of this contract is to acquire the services of an RH Control System engineer for a fixed period to assist in the realization of ITER RH control system R&D activities.

2 Background and Objectives

The ITER remote handling section is responsible for the remote maintenance of the ITER machine. During the current phase of the project, the RH section is defining the specifications for the design and manufacture of the RH equipment systems.
The main approach for machine maintenance at ITER is to:-

- remove vessel components using dedicated handling equipment,
- transfer the components to the Hot Cell facility using a transfer cask system,
- maintain/refurbish components in the Hot Cell facility using general purpose RH equipment (lifting devices, dextrous manipulators, tooling),
- transfer the component back to the Tokamak,
- install the components back on the machine.

Machine maintenance will generally be performed during long term shutdowns which are scheduled to occur every 2 years.

The RH System is made up of several RH equipment systems:-

- 23.01 Blanket RH System: System for installation and removal of the blanket modules,
- 23.02 Divertor RH System: System for installation and removal of the divertor cassettes,
- 23.03 Cask and Plug RH System: System for port plug handling and performing equipment / component transfers,
- 23.04 In-Vessel Viewing System: System for performing in-vessel inspections and metrology during short term shutdowns,
- 23.05 NB Cell RH System: System for performing in-situ maintenance of the NB system,
- 23.06 Hot Cell RH System: System for performing the cleaning and maintenance operations in the Hot Cell facility,
- 23.10 Multi-purpose deployer: System for performing general purpose tasks inside the vessel such as inspection, dust removal, diagnostic testing.

The RH equipment control systems shall be integrated together to form a uniform RH Control System operating from the RH control room(s). The RH Control System is estimated to contain approximately 250 control cubicles.
To support the integration process, the RH Section shall provide a common functional specification for the control system element of each of the RH procurements. The RH Section shall also promote the use of standards for hardware, software, communications, and behaviour of the RH equipment systems.
An Integrated Product Team has been created for the Remote Handling activities, with a sub-group concerning the RH Control System [1]. In this phase of the project, the IPT is concerned

with the specification of the RH Systems and so the R&D and Standardization activities shall be reported to the RH-IPT.

3 Scope of Work

The scope of the work of this contract is to provide support to the IO in the realization of RH Control System R&D and standardization activities.

4 Estimated Duration

The contract is for a minimum of 220 work days over a period of 52 weeks from the signature date.

5 Work Description

The engineer would be expected to provide support to the RH control system responsible officer on a range of R&D tasks:-

- Assisting in the definition of R&D tasks to validate the RH control system architectural model,
- Assisting in the definition of standardization R&D tasks to evaluate options for control system standard parts (hardware and software),
- Monitoring and providing support to the R&D tasks,
- Research commercial-off-the-shelf (COTS) items for use in RH control system,
- Perform in-house evaluation studies on infrastructure and integration issues:-
    - Switching mechanism,
    - Connector standardization,
    - Standard cabling.

6 Required Skills

The engineer providing the services should meet the following requirements:-

- Degree in electrical, electronic or control engineering,
- Minimum of 5 years experience in robotic/remote handling industry,
- Experience developing and implementing control systems,
- Experience with a wide range of industry products:-
    - Robots,
    - PLC's,
    - Motion controllers,
    - Real-time operating systems.
- Knowledge/skills in the following are an advantage:-
    - Object oriented programming,
    - Real-time systems,
    - Human-machine interfaces,
    - Virtual reality systems,

- Communication middleware,
- Control cubicle design,
- VME/PCI internal buses,
- Cabling schematics,
- Remote viewing systems,
- Networks.

- Excellent knowledge of English, to allow easy communication and adequate drafting of technical documentation.

7 List of deliverables and due dates

The control system engineer shall work closely with the ITER RH staff throughout the period. The contract shall have the following deliverables and due dates:-

Deliverable	Deliverable description	Due date
D1	Create specifications for R&D and standardization activities	T0 + 8 weeks
D2	Create standard scheme for cask operations cabling	T0 + 16 weeks
D3	Perform state-of-art research to validate RH control system specifications	T0 + 24 weeks
D4	Provide progress report on R&D and standardization activities	T0 + 32 weeks
D5	Investigate COTS items for use in RH control system	T0 + 40 weeks
D6	Update IO documents with results of R&D and standardization activities	T0 + 52 weeks

Further details of the deliverables shall be established by the IO-TRO at the beginning of the relevant work period.

8 Acceptance Criteria

The deliverables shall be reviewed by the IO-TRO for acceptability.

9 Specific requirements and conditions

In response to this call for expertise the company/individual shall provide:

- Finacial proposal
- Profile(and/or CV) of key personnel involved in execution of the work activity

The official language of the ITER project is English. Therefore all input and output documentation relevant for this Contract shall be in English. The Contractor shall ensure that all the professionals in charge of the Contract have an adequate knowledge of English, to allow easy communication and adequate drafting of technical documentation. This requirement also applies to the Contractor's staff working at the ITER site or participating to meetings with the ITER Organization.

Documentation developed shall be retained by the contractor 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 calculation code for safety analysis.

The work shall require the presence of the Contractor's personnel at the site of the ITER Organization, Cadarache, 13108 St Paul-lez-Durance, France, for the duration of the contract.

For all deliverables submitted in electronic format the Contractor shall ensure that the release of the software used to produce the deliverable shall be the same as that adopted by the ITER Organization.

Financial proposal: The daily rate will involve all travelling and accommodation costs.

The engineer provided for on-site duties shall keep the normal daily working hours of the ITER Organization.

10 Work Monitoring / Meeting Schedule

The control system engineer shall report to the ITER Organization TRO and the RH section leader. Meetings shall be held as and when deemed necessary by the ITER RH staff.

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 v4.0) and can be used in analogy to this Task Agreement.
Prior to commencement of the task, a DA Quality Plan (conformant with 22MFMW v3.0) 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.

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 v1.4).

12 References / Terminology and Acronyms

12.1 References

[RD1] RH IPT Objectives and Work Plan (2LN6AL v2.0)

[RD2] RH Control System Architectural Model (35FE6M v1.2)

[RD3] RH Control System R&D Topics (34FYA5 v1.1)

12.2 Terminology and Acronyms

In the following table denominations and definitions are given of all the actors, entities and documents referred to in this Specification, together with the acronyms used in this document.

Denomination	Definition	Acronym
ITER Organization	For this Contract the ITER Organization	IO-
ITER Organization Task Responsible Officer	Person delegated by the IO-RO for all technical matters, but limited to one specific task order	IO-TRO
Remote Handling	Remote handling	RH