

Job Title: Instrumentation & Control Engineer IO0985

Req ID **1784** - Posted **22/05/2020** - (France, 13067 St Paul Lez Durance Cedex) - **Engineering of Systems - New Posting**

The ITER Organization brings together people from all over the world to be part of a thrilling human adventure in southern France—building the ITER Tokamak. We require the best people in every domain.

We offer challenging full-time assignments in a wide range of areas and encourage applications from candidates with all levels of experience, from recent graduates to experienced professionals. Applications from under-represented ITER Members and from female candidates are strongly encouraged as the ITER Organization supports diversity and gender equality in the workplace.

Our working environment is truly multi-cultural, with 29 different nationalities represented among staff. The ITER Organization Code of Conduct gives guidance in matters of professional ethics to all staff and serves as a reference for the public with regards to the standards of conduct that third parties are entitled to expect when dealing with the ITER Organization.

The south of France is blessed with a very privileged living environment and a mild and sunny climate. The ITER Project is based in Saint Paul-lez-Durance, located between the southern Alps and the Mediterranean Sea—an area offering every conceivable sporting, leisure, and cultural opportunity.

To see why ITER is a great place to work, please look at this video

Application deadline: 05/07/2020

Domain: Engineering

Department: Engineering Design

Division: Heating & Current Drive

Section: Electron Cyclotron

Job Family: Project Engineering

Job Role: Engineer - 1

Job Grade: P2

Language requirements: Fluent in English (written & spoken)

Contract duration: Up to 5 years

Purpose

You will support the development, installation, integration, commissioning and operation of the Electron Cyclotron Instrumentation and Control (EC-I&C), which is composed of the plant controller and the subsystem control units; the EC-I&C is the interface between the ITER control system and the hardware of the EC plant. This task includes the supporting the I&C system requirements definition, technical specifications and design finalization. Additionally, you will be involved in the Procurement Arrangement activities leading to installation and commissioning of the components, final integration and operation. The candidate will also support the Quality Assurance (QA), safety and manufacturing follow-up, development of installation, operation and maintenance plans.

Background

The EC system is responsible to deliver 20 MW of RF power to the Tokamak allowing to start-up, heat and control the plasma. It involves many different systems that have to be controlled in a synchronized manner to achieve this complex goal and react to fast events happening in the plasma. Dealing with such high power requires sub-millisecond real-time control and few a few microsecond reaction times in case of faults; this is achieved by using fast controllers interconnected with a real-time network and Field Programmable Gate Arrays.

Control and supervision of a distributed system of more than 30 nodes requires a strong interaction and an efficient management of parameters and HMIs.

RF sources able to generate high power for a long duration have only been developed in the last few years and advanced control functions to optimize their use is expected to be developed after their integration to

the EC-I&C system. This may involve model predictive control or other advanced control algorithms.

Major Duties/Role & Responsibilities

- Supports the technical responsible officer for the Electron Cyclotron Instrumentation and Control System (EC-I&C) in the design finalization, manufacturing oversight, installation, commissioning, final integration and operations phases;
- Supports the development of the I&C main and subsystem control units (SCU) final design;
- Ensures the compliance of deliverables with the I&C systems and collaborates with the third parties and industries involved as required;
- Assists in defining the interfaces of the control and data acquisition systems with EC system components, and with the auxiliary systems such as gas, water and electrical systems;
- Supports the design, procurement, installation and commissioning of the EC Temporary Control Room that facilitates the local control of the EC components; Manages the specifications and commissioning of the EC test equipment and instrumentation used during the EC plant installation and maintenance, which includes microwave, high voltage and low voltage equipment;
- Takes part in procurement activities related to the integration and control of the EC test equipment and instrumentation;
- Ensures design compliance with ITER project requirements and with other ITER systems interfacing with the EC-I&C;
- Co-ordinates the development of the draft qualification and test program of the EC-I&C leading to a final qualification program associated with the manufacturing, assembly, installation, commissioning and integration of the related SCU and Plant Controller;
- Designs and implements software and hardware changes of the delivered control systems to ensure integration with the other EC subsystems and with the external plant systems;
- Designs and implements Human-Machine Interfaces for the supervision of the EC system;
- Develops and performs the required testing, commissioning and operation plan for the EC-I&C;
- Maintains and updates the software already accepted by the ITER Organization;
- Designs and implements advanced control functions required for plasma operation;
- Assists in the monitoring of Quality Programs associated with the sub-system procurements;
- Performs the associated measurements (in collaboration with the other EC TROs) of the installed EC equipment to ensure compliance for operation;
- Performs calibration of the EC-I&C system and defines the periodic inspection plans;
- May be requested to be part of any of the project/construction teams and to perform other duties in support of the project;
- May be required to work outside ITER Organization reference working hours, including nights, week-ends and public holidays.

Measure of Effectiveness

- Supports effectively the design, procurement, installation and commissioning activities related to EC subsystem control units to meet the defined quality, cost and schedule;
- Prepares the procedures for testing, commissioning and operation of the EC system within the defined schedule and in line with quality standards and regulations;
- Maintains the systems after delivery by implementing efficiently additional required control and protection functions and updating documentation accordingly;
- Maintains effective communication with the interfacing teams within ITER, Domestic agencies and with external contractors.

• Experience & Profile

- **Professional Experience:**
 - At least 5 years' experience working with the design, implementation, installation and operation of I&C systems including experience in software engineering and software quality assurance.
- **Education:**

- Master or equivalent degree in Instrumentation and Control systems or other relevant disciplines.
- The required education degree may be substituted by extensive professional experience involving similar work responsibilities and/or additional training certificates in relevant domains.
- **Language requirements:**
 - Fluent in English (written and spoken).
- **Technical Competencies and Demonstrated Experience in:**
 - Design, development and testing of real-time control systems and fast data acquisition;
 - Linux system and also C/C++ or similar programming languages;
 - System/process modeling and simulation, rapid prototyping and data processing;
 - Simulation, control system design and data processing tools (Matlab/Simulink, LabView or similar);
 - Design, development or testing of custom electronics is considered an advantage;
 - Familiarity with laboratory equipment like multimeters, oscilloscopes and signal generators is considered an advantage;
 - Design and development of I&C control systems for EC plants or equivalent is considered an advantage;
 - Software frameworks used in the EC system (LabView FPGA, MARTe, ICL, UNICOS) is considered an advantage.
- **Behavioral Competencies:**
 - Collaborate: Ability to facilitate dialogue with a wide variety of contributors and stakeholders;
 - Communicate Effectively: Ability to adjust communication content and style to deliver messages to work effectively in a multi-cultural environment;
 - Drive results: Ability to persist in the face of challenges to meet deadlines with high standards;
 - Manage Complexity: Ability to analyze multiple and diverse sources of information to understand problems accurately before moving to proposals;
 - Instill trust: Ability to apply high standards of team mindset, trust, excellence, loyalty and integrity.

The following important information shall apply to all jobs at ITER Organization:

- Maintains a strong commitment to the implementation and perpetuation of the ITER Safety Program, ITER Values (Trust; Loyalty; Integrity; Excellence; Team mind set; Diversity and Inclusiveness) and Code of Conduct;
- ITER Core technical competencies of 1) Nuclear Safety, environment, radioprotection and pressured equipment 2) Occupational Health, safety & security 3) Quality assurance processes. Knowledge of these competencies may be acquired through on-board training at basic understanding level for all ITER staff members;
- Implements the technical control of the Protection Important Activities, as well as their propagation to the entire supply chain;
- May be requested to work on beryllium-containing components. In this case, you will be required to follow the established ITER Beryllium Management Program for working safely with beryllium. Training and support will be provided by the ITER Organization;
- May be requested to be part of any of the project/construction teams and to perform other duties in support of the project;
- Informs the IO Director-General, Domain Head, or Department/Office Head of any important and urgent issues that cannot be handled by line management and that may jeopardize the achievement of the Project's objectives.