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Design, Manufacturing, and Integrated Testing of the ITER Port Instrumentation

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At ITER more than 50 different diagnostics are under development for the tokamak. The diagnostic systems are designed to be integrated within the interspace and port cell support structures of 27 upper, equatorial and lower ports. Basic instrumentation and control (I&C) is required to monitor the temperatures at selected locations of the port plug and interface support structure and for the electric heaters used for baking of windows and thermal stress compensation. Spare measurement channels have to be provided for future use.

Currently the ITER project is transitioning from the detailed design phase to manufacturing, testing and integration in preparation for integrated commissioning. The focus of the work is on the first plasma diagnostics for which system integration in the equatorial ports 11 and 12 is essential. Since the port system I&C is required for many port systems, the development is already quite advanced with manufacturing and acceptance testing currently taking place. Furthermore the port system I&C is typical for industrial plant I&C and can therefore serve as an example for those plant systems.

The design process starts with the requirement capture from all relevant sources, continues with a description of use cases and operating procedures, and is followed by the functional analysis including the definition of all the variables providing the interface with CODAC through its networks. The software implementation process is based on the CODAC Core System (CCS) and CODAC provided tools. The integrated testing follows a set of test campaigns starting from acceptance of the installed hardware and of the source code in the software repositories.

This paper presents the development process of the port system I&C through all lifecycle phases from design to site acceptance and summarizes the test results.

Eligible for student paper award?

No

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