



ITER Diagnostics

Michael Walsh and the ITER Diagnostic Teams

ITER Organization, CS 90 046 - 13067 St Paul Lez Durance Cedex, France

The ITER Project is now advancing quickly on several fronts. This includes the buildings, the major components and the independent systems. Amongst these are the diagnostic systems.

Currently, the Diagnostic systems are being worked on by teams across the world. This work is being coordinated through a rigorous system engineering approach with detailed requirements flow-down from the top level Project Requirements to System requirements and beyond. These requirements really define all the needs of the different projects. One very important aspect of these requirements is the measurement requirements. These define what each system will measure. This can be the spatial resolution to the time resolution to the measured quantity error. At each diagnostic system level, the requirements are flowed down to further define what each system will measure more precisely. For example, an error of 10% may be specified on a parameter but this needs further elaboration to ensure that it is realistic in all aspects of the parameter range.

A major part of the diagnostic systems are the engineering infrastructures that support them. From an engineering perspective, ITER demands are very exact and space is at a premium even in this very large device. This means that the engineering of the diagnostics has to be very closely integrated with each other and the other systems surrounding them. Adding to this is the fact that ITER is the first Nuclear Tokamak facility, means that the engineering is pushing the boundaries in many dimensions. This extends from welding attachments of components to the vacuum vessel to maintaining the performance of first mirrors that are so important for several measurements.

Several strong teams across the partners have been working on the diagnostics and the engineering developments and at this time, some systems have reached Final Design and indeed some systems are in manufacture. One magnetic measurement system has in fact already been delivered to ITER and is now awaiting installation in the Toroidal Field Coil case. In general, in order to manage resources, the systems are being developed with a priority to meet the construction needs of the project as well as the diagnostic needs of the ITER Research Plan.

This paper will discuss the current status and outstanding challenges of the diagnostic systems as well as the key roles of the main systems. An assessment of the different risks that may impact the performance of these systems will be outlined. Finally, a brief look at the commissioning, installation and operation planning of these systems will be presented.

The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.