**Recent highlights of diagnostics and their port integration at ITER**

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ITER has 26 diagnostic ports which house about 50 diagnostic systems. They are procured through 7 different DAs (CN, EU, IN, JA, KO, RF and US) and by the ITER Organization. Manufacturing has started for many of these systems. For some of the in-vessel diagnostics or diagnostics in the buildings, the first parts have already been installed. New solutions had to be found in response to the numerous challenges posed by ITER to the design of the diagnostic systems. Here we report on the status of some port-based diagnostics (covering the Visible, VUV and X-ray Diagnostics, the Fusion Product Diagnostics and the Heat and Imaging Diagnostics) and of the ports in the form of recent development highlights which are examples of such cases.

Many ITER specific systems and subsystems adapted to the various harsh environment aspects of ITER have been developed and/or manufactured such as radiation hard components (sensors for bolometers, low voltage ionization chambers for X-ray cameras), erosion resistant mirror materials (single crystal molybdenum mirrors), various shutters (e.g. linear or rotating electrical) steam resistant devices (obligatory test for all in vessel components), ECRH reflecting or absorbing coatings, remote handling or human assisted handling tools, shielding materials (B4C and others) and collimation solutions for neutrons (e.g. in the Neutral Particle Analyzer), robust mounting of optical components under high thermal mechanical and electrical constraints (e.g in the H-alpha diagnostic).

R&D related risks were often minimized by initially parallel developments and diversity followed by selection of the best options and cost control by standardization e.g. for detectors (e.g. common detectors for all VUV systems), port integration, common infrastructure etc..

In the area of assembly, testing, commissioning, calibration and alignment much work has been carried out with the more mature areas being those that are planned for the early campaigns (Equatorial Port 11 and 12). Specific solutions comprise onboard mirror cleaning, onboard alignment and calibration devices and agile in vessel calibration tools.

Some novel diagnostic systems were developed e.g. for measuring the divertor flow, the core ion temperature or for the in vessel lighting to account for new demands and/or the tight integration space.

Presently one of the main directions of work is to reduce remaining maturity differences between diagnostics and ports to meet the tight and complex installation schedule.

The biggest progress and largest number of tangible achievements can be seen in the first plasma ports and the diagnostics to be installed therein, setting the scene for the others to follow. The continued support of the Plasma Diagnostic community is important and highly welcome for ITER.

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