THE REMOTE HANDLING SYSTEMS FOR ITER

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During ITER lifetime all components that provide the base functions of the machine must be inspected and maintained. Because of the level of radioactivity, soon after the start of the Deuterium-Tritium pluses, these operations will heavily rely on Remote Handling (RH) procedures. The novelty and complexity of the RH requirements, and the need for timely, safe and effective remote operations in an environment like ITER constitute a major challenge of the overall project, making RH a key component in ITER's design and operation.

This paper gives an integrated view of the ITER requirements in terms of RH and presents recent results on the development of its various components: the Transfer Cask System, the Divertor RH System, the In-Vessel Viewing System and the Neutral Beam Injectors RH System allocated to European teams, and the Blanket Remote Handling and the Hot Cell RH, whose development are allocated to Japan and to ITER Organization, respectively.

The Transfer Cask System (TCS) transports contaminated in-vessel components from/to the Tokamak and the Hot Cell buildings. The paper presents results on the set of optimized trajectories for the TCS, the docking procedures to a vessel port, a 3D Virtual Reality software that supports offline assessment of the TCS motion in an accurate 3D model, and the main features of a test facility for validating the design of an ITER –relevant TCS prototype.

The Divertor Remote Handling system and the full-size test facility DTP2 (Divertor Test Platform for ITER) that helps developing and testing a remote handling system to change divertor cassettes are described. The DTP2 architecture, its present components, namely the Cassette Multifunctional Mover, the use of virtual techniques to support its operation, and the possible future facility upgrades, are presented in the paper.

The In-Vessel Viewing System (IVVS) goal is to perform inspections and to provide high resolution pictures and metrology data through which information related to damages of plasma facing components can be obtained. The IVVS probe and its insertion system are described together with the latest results obtained with this laser based inspection system. Additionally the layout of a test bed for an IVVS prototype is described.

The Neural Beam (NB) Remote Handling System performs remote substitution of components belonging to the NB injectors and to the upper diagnostic plugs located in the NB cell. The conceptual design of the NB RH system and the various devices that compose it are presented.

The R&D results of recent Blanket Remote Handling system trials are also presented. The Hot Cell Remote Handling equipment systems and other related Remote Handling systems are briefly described.

The paper concludes by discussing the open issues and forward plan for the Remote Handling Systems for ITER.