

Analysis of Remote Handling compatibility of the ITER ECH Upper Port Launcher

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This paper presents a study of the remote handling (RH) compatibility of the ECH Upper Port Launcher for ITER. The existing design of the launcher has been evaluated in light of a number of key ITER RH documents [1,2]. Changes have been proposed and implemented into the launcher design, which has now successfully gone through the preliminary design review. The changes are mainly associated with the accessibility, maintainability and manageability of replaceable components. Captive bolts have been placed along the Blanket Shielding Module (BSM) flange, a hinge mechanism is proposed to simplify the (dis-)mounting of the BSM and a frame with incorporated cooling and actuation lines is suggested for simplified mounting and replacement of the steerable mirrors.

Rotating the upper port plug on its back greatly improves maintenance access and overall component handling. Tools which are needed to facilitate port plug rotation and for lifting, transporting and positioning of components with the use of a crane are proposed. Conceptual designs of tools for cutting and welding operations are presented.

A different aspect of the RH analysis of the launcher is the testing and validation of the maintenance procedures and the design. The design of the launcher, including the tools and the location in which maintenance takes place (the Hot Cell) are introduced in a Virtual Reality environment, which will be complemented by mockups and bench tests where VR simulation is non-conclusive or impossible. These activities will lead to a complete set of the RH documentation that is required to accompany the design in its final stage. Additionally, simulations in the VR environment will provide insights on ways how to limit radiological waste and reduce maintenance time, thereby reducing HC occupation.

[1] "ITER Remote Maintenance Management System", ITER_D_2FMAJY V1.6

[2] "ITER Remote Handling Code of Practice", ITER_D_2E7BC5 v1.2