

ITER EQUATORIAL PORT PLUG ENGINEERING: DESIGN AND REMOTE HANDLING ACTIVITIES SUPPORTED BY VIRTUAL REALITY TOOLS

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ITER IO is in charge of the future reactor life cycle: design, integration and dismantling. Thus, it has to guarantee the management of all the machine components.

In the framework of ITER, CEA IRFM has contributed to several design and integration tasks regarding the Equatorial Port Plug engineering. Depending on the location of the components inside ITER, some components close to the plasma will be highly activated and will need to be manipulated by Remote Handling means.

Requirements in the field of nuclear plant management point out that accessibility and maintainability aspects were not considered during the design phase and lead to technical challenges in term of RH system design with long R&D programs [1]. Indeed, the accessibility and the maintenance of a component has strong consequences on the component design itself, especially when the component has to be teleoperated. The strategy is to design in synergy the component itself and its RH equipment to validate that it could be remote handled.

This paper describes the Remote Handling study performed by CEA teams on the Test Blanket Module system (TBM system). Regarding the TBM maintenance operation and in order to respect the ALARA reglementation, maintenance operations in front of the Bioshield will be performed by remote operators by means of Remote Handling systems (RH). The operability study has been done and fully integrated to the design process, enabling to provide space reservation for human or robotic system access. For this mean, CEA IRFM has used a CEA LIST virtual reality simulation software directly integrated to the SolidWorks CAD software. The feasibility to connect/dis-connect the pipes in front of the Bioshield by a set of potential standard industrial arms was demonstrated.

Since conceptual studies, the use of such tool combined with RH and tokamak engineering expertise allows to give recommendations, for both remotely maintained systems and their integration inside their environment.

Aiming to give more realism to the maintenance scenario and CAD models, CEA IRFM decided to build a Virtual Reality platform in the institute, integrated to the design office. With the expertise of CEA LIST who has 20 years experience in the field of Virtual Reality, Remote Handling and software development, this platform aims to provide the nearest possible links between design and remote handling needs. This platform could be used in fine for maintenance scenario validation, design review and also for operator training.

[1] Philippe Desbats, Gérard Piolain, ENC 2005, Remote Handling technologies overview.