DEFINITION, DEVELOPMENT AND OPERATION OF A COMPREHENSIVE VIRTUAL MODEL OF THE CPRHS

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The ITER project and more specifically the Remote Handling (RH) activities on ITER are huge scientific and technical challenges. One of the key issues to make the ITER nuclear maintenance successful is to develop new methodologies and tools based on Digital Mock Up (DMU) and Virtual Reality (VR) applied to the operation of the Cask and Plug Remote Handling System (CPRHS). The paper describes engineering studies to define, develop and operate a 3D Virtual Model (VM) of the ITER RH environment for the CPRHS.

The activities have been actually focused on improving the representativeness and the simulation capability of the existing DMU in order to support the CPRHS and the Air-cushion Transfer System (ATS) prototyping engineering activities. In particular by testing optimized trajectories inside the Tokamak and Hot Cell buildings, evaluating the suitability of viewing system through simulated cameras, approaching the most appropriate feature and functions of an Human Machine Interface (HMI) the CPRHS will have to incorporate.
This study followed the working logic presented below:

- Check the availabilities and the reference of the DMU (Tokamak and Hot Cell Building and CPRHS),
- Build the VM platform with the Tokamak and Hot Cell buildings CAD models and test the DMU with the optimized trajectories for ATS calculated based on the work described in [1].
- Define a HMI using CATIA™ V5 (R19) functionalities, define driving modes, choice of relevant configuration parameter (number of cameras, point of observation, etc).

The paper concludes by discussing a set of open issues on the use of these developments to support the design and future operation of CPRHS.

Figure 1: 3D VM of the Tokamak building divertor (level B1) with the CPRHS during a nominal operation

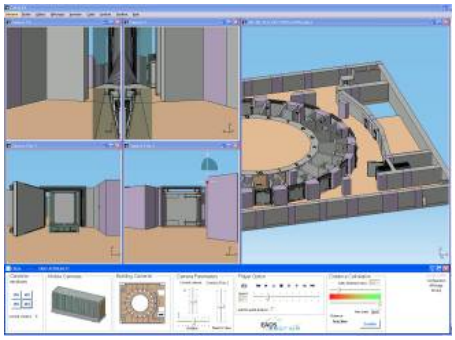

Figure 2: HMI snapshot: camera images and a general view of the scenario

References:

[1] C. González, C. Damiani, J-P Friconneau, A. Tesini, I. Ribeiro, A. Vale (2009). ITER Transfer Cask System: status of design, issues and future development. Proceedings of 9th Int. Symposium on Fusion Nuclear Technology, China, October 2009.