

IFERC-N-2023-21, 4 Dec. 2023

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Status of DEMO Design Activity

Highlights on Remote Maintenance

To meet the requirements of Task-4, Remote maintenance, the following major design studies were conducted in EU and JA.

Maintainable Architectures Study 16:

Study 16 aims to explore the feasibility space of EU-DEMO from a remote maintenance perspective (Fig.-1). The DEMO project is in a stage of development where data exists to parametrize design models.

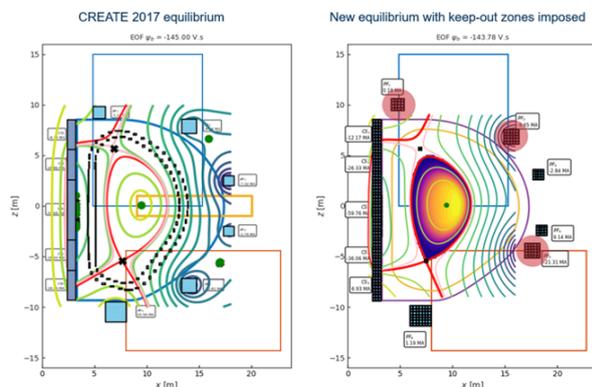


Fig.-1: MHD equilibrium together with configuration of poloidal coils. (left) without/ (right) with keep-out zone applied to poloidal coil positions

Recent DEMO investigations have identified a number of critical elements in physics and engineering (e.g. magnet design/fabrication/cost, divertor heat loads, overall machine size). Possible EU-DEMO re-baseline is produced with lowering of the aspect ratio A , by keeping the physics and technology assumptions but decreasing A from 3.1 to 2.6. In case of new DEMO baseline, a new parametrical CATIA CAD model of the tokamak needs to be created following the skeleton-based modelling hierarchy.

Remote Maintenance System (RMS) for divertor baffle & targets replacement in Active Maintenance Facility (AMF):

The Divertor Target Plates (DTPs) need to be replaced about every two years due to damage of the copper alloy. Therefore, RMS design scopes are i) to reduce the working loads of RMS under high radiation

environments due to the compatibility design between remotely handled DTPs and RMS, and ii) to promote the reuse of in-vessel components in order to reduce low-level radioactive wastes. Major results of design work were summarized as follows; 1) The divertor cassette interface structure between the baffle, DTPs, and cooling pipes to be consistent with remote maintenance in AMF has been designed as first step, and 2) To meet these requirements, Rough sliding mechanism for replacement of inner and outer baffle & target in AMF has been designed. The AMF comprises a facility for decontaminating radiation dust, storage for radiation dose rate reduction and decay heat cooling; replacement of BBMs and DTPs; and a subassembly for reinstallation of the vacuum vessel. Figure 2 shows the RMS for divertor baffle & targets replacement, where the dimensions are 13.5 m in length and width, and 6.5 m in height.

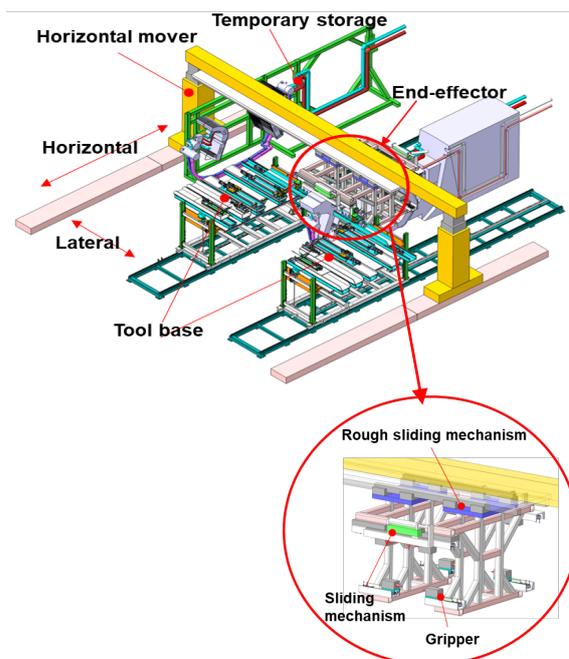


Fig.-2: (Upper) Schematic view for RMS and (Lower) enlarged end-effector

(DEMO Design Task-4 TROs)