

UPGRADE OF THE MATERIAL ION BEAM TEST FACILITY MARION FOR ENHANCED REQUIREMENTS OF JET AND ITER

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The high heat flux Ion beam test facility MARION has been used for Ion source conditioning and material testing within the IEF-4 for several years [1]. Mainly small samples have been tested in the past by perpendicular irradiation with the mixed Neutral- / Ion Beam. Due to the limitation by the maximum heat load capability of the tested material as well as the corresponding support structure, only 25% of the available power density of MARION (80MW/m^2) could be used so far. The aim grow up to activate these resources for material testing. This was realised in the first test phase of the new tungsten divertor element for the JET tokamak [2]. A realistic angle of incidence in the range of 6° was treated as an essential point for the testing of the tungsten lamellae structure. In order to meet the heat load requirements for the JET divertor it was necessary to place the prototype at the centre of the beam at 70MJ/m^2 . Therefore a new protection scraper was needed to guard the support structure. This scraper is shown as first step of the enhancement of MARION.

During the last experiments the need of a more flexible handling of the probe itself and the facility became clear. Based on those experiences an upgrade concept was developed. To prepare MARION for future demands the target chamber will be enlarged, allowing the handling of much bigger prototypes. This chamber will be separated from the main vessel and its cryo-components in order to avoid thermal cycles during maintenance or exchange of the sample. By assembling a new test desk within vacuum the handling will become easier. It will allow movements inside the evacuated vessel along two axes and a tilting of the desk up to 90° . The second generation of the protection scraper is designed as actively cooled copper tile device, movable from external up to the centre of the beam.

Additionally main emphasis is given to the access to improved (surface) diagnostics for all orientations of the target.

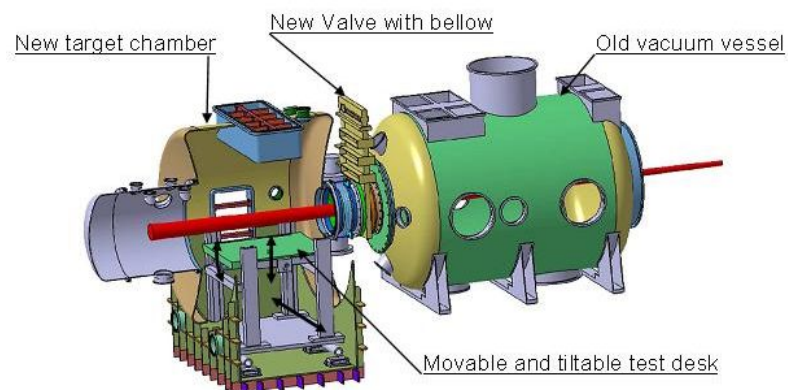


Figure 1: Mechanical concept of MARION upgrade

[1] M. Lochter et al., Fusion Technology 19 , (1991), 2101

[2] Ph. Mertens et al., submitted to this conference