Contribution ID: **161** Type: **not specified**

Development of medium size DOME & reflector plate for ITER like tokamak application

Monday, 17 September 2018 11:00 (2 hours)

A medium sized water-cooled Divertor DOME has been manufactured at Institute for Plasma Research (IPR), India. Divertor Plasma Facing Components (PFCs) such as DOME and Reflector Plate has multi-layered joints which are made of various materials such as Tungsten (W), OFHC Copper (Cu), Copper alloy (CuCrZr) and SS316L etc. Joining of such multi-layered joints is known to be problematic as being used of several dissimilar materials. Vacuum brazing route was employed to fabricate the medium size DOME as well as the Reflector plate. In order to evaluate the performance of the DOME against ITER-like scenarios, the DOME has been successfully tested for 1000 numbers of steady-state thermal cycles with an incident heat flux of 3.87 MW/m2 in the High Heat Flux Test Facility (HHFTF) at IPR. Subsequent testing with additional 200 thermal cycles was also done with an incident heat flux of approx. 6 MW/m2 at 24.6 kW of Electron beam power. The absorbed heat flux was calculated to be 4 MW/m2 which indicated the absorbed power was nearly 70%. During the HHF tests, the surface temperature of the W tile reached 640oC and the beam power was restricted to 24 kW due to the temperature limit of 450oC at the CuCrZr heat sink. A total 1200 cycles of steady-state thermal cycles have been completed. Engineering analysis on the HHFT of the DOME has been performed using Finite element method (FEM) and Computational Fluid Dynamics (CFD) to simulate and to correlate with the experimental data.
Ultrasonic immersion technique (NDT) was incorporated to inspect the brazed joint quality of the Reflector plate and the DOME mock-up before and after the HHFT. The results of the experimental details, engineering analysis and methodology adopted to fabricate the DOME and reflector plate will be presented in the paper.

Co-authors: Dr KONGKHAM, Premjit Singh (High Temperature Technology Division, Institute for Plasma Research); Dr KHIRWADKAR, Samir S (High Temperature Technology Division, Institute for Plasma Research); Dr PATEL, Nikunj (High Temperature Technology Division, Institute for Plasma Research,); Dr MOKARIA, Prakash (High Temperature Technology Division, Institute for Plasma Research); Dr BHOPE, Kedar (High Temperature Technology Division, Institute for Plasma Research); Dr BELSARE, Sunil (High Temperature Technology Division, Institute for Plasma Research); Dr MENON, Vinay (High Temperature Technology Division, Institute for Plasma Research); Dr KRISHNAN, Deepu (High Temperature Technology Division, Institute for Plasma Research); Dr MEHTA, Mayur (High Temperature Technology Division, Institute for Plasma Research); Dr TRIPATHI, Sudhir (High Temperature Technology Division, Institute for Plasma Research); Dr PATEL, Alpesh (High Temperature Technology Division, Institute for Plasma Research); Dr SWAMY, Rajamannar (High Temperature Technology Division, Institute for Plasma Research); Dr PATEL, Tushar (High Temperature Technology Division, Institute for Plasma Research); Dr GALODIYA, Kalpesh (High Temperature Technology Division, Institute for Plasma Research)

Presenter: Dr KONGKHAM, Premjit Singh (High Temperature Technology Division, Institute for Plasma Research)

Session Classification: P1

Track Classification: Plasma Facing Components