Institute for Magnetic Fusion Research

WEST Newsletter N°7 - November 2014

Installation of the WEST first component

On Monday 6th October, the WEST first component was installed in the Tore Supra vacuum vessel by Gabriele Fioni, Director of the CEA Physical Science Division and Osamu Motojima, General Director of Iter Organization. The WEST project has entered a new stage: the start of new components installation.

This first component bolted in the vacuum chamber is an in-vessel supporting plate. An exhibition with the other new WEST components such as a cooling protection panel, a chair supporting the divertor structure, a new telescope for the visible spectroscopy diagnostic and magnetic probes which had already arrived at IRFM, was held in the Tore Supra hall during the ceremony.

From left to right :
Mr Becoulet (Director of CEA/DSM/IRFM),
Mr Fioni (Director of CEA/DSM),
Mr Motojima (Director-General of ITER Organization)

Mr Motojima (Director-General of ITER Organization)

This day marked the transition into the WEST assembling phase All of the 150 in-vessel supporting plates, like those installed by Mr Fioni and Mr Motojima, have been mounted in the tokamak. They will support the in-vessel protection panels. The magnetic diagnostics are now being installed: 400 sensors will accurately measure the magnetic field all around the plasma to determine its position and its magneto-hydrodynamic (MHD) activity.

http://www.youtube.com/watch?v=-d2h4YsgpfM

http://www-cadarache.cea.fr/fr/actualite/video/video-west-1er-composant.php

Watch the event in VIDEO

Industry in Provence attracted by WEST and Fusion Technologies

The sixth edition of the CEA-Industry meeting in Provence was dedicated to WEST and fusion technologies. It gathered more than 100 people at the "Ecole des Mines de Saint-Etienne" in Gardanne, on 30th October.

About 50 companies attended this meeting co-organized by the Chamber of Commerce and Industry of Marseille Provence. The participants were captivated by the presentation of WEST and the technological challenges related to magnetic fusion: superconducting magnets, coatings for plasma facing components, infrared viewing systems, use of virtual reality, etc. The company CNIM gave an account of what it is manufacturing for CEA and the WEST project and how CEA provides expertise in some CNIM fusion projects.

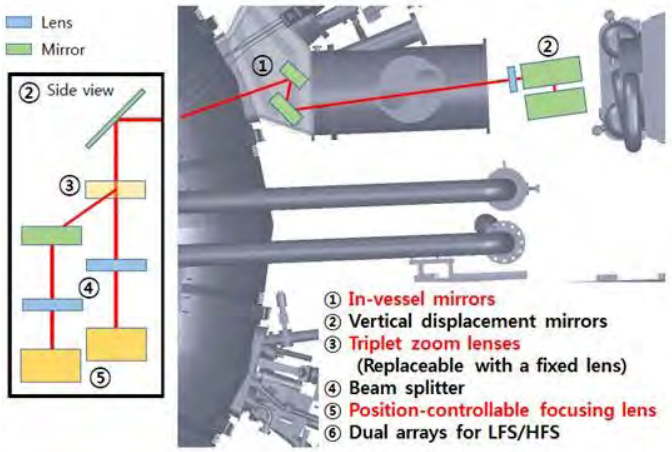
Meeting between industrialists and CEA researchers
Gardanne, 30th October 2014

The morning finished with presentations concerning fusion business and planned call for tenders for WEST and ITER. Industrial participants were able to exchange with CEA staff during an informal lunch. A lot of useful contacts were established.


Presentation of the WEST project to the industry players - Gardanne 30th October 2014

An ECE Imaging diagnostic provided by Korea, one of the WEST partners

Following the framework agreement signed between UNIST (Ulsan National Institute of Science and Technology) and CEA in last September, the Korean team will provide an ECE Imaging diagnostic for WEST.



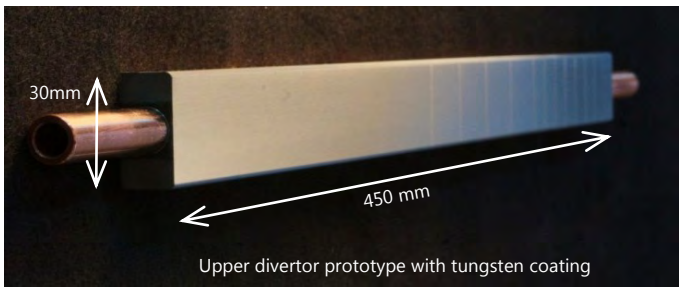
Integration of the ECE imaging diagnostic into WEST

Such a diagnostic, which collects the electron cyclotron emission (ECE) coming from the plasma, already exists in the KSTAR tokamak. It measures the fluctuations of the electron temperature, and will allow precise observations of MHD modes (sawteeth, neoclassical tearing modes, Alfvén modes, fishbones, ELMs...) and their asymmetries in the poloïdal plane. It will bring a significant contribution to the WEST scientific program by improving the information provided by the other diagnostics.

The Conceptual Design Review of the ECE imaging diagnostic for WEST was held on 7th October 2014 at CEA with the participation of four colleagues from Korea. The design and the fabrication of the diagnostic will be performed in Korea, while IRFM team will be in charge of its integration into the machine. In parallel, a joint effort between UNIST, POSTECH and IRFM will be undertaken on plasma MHD modelling to interpret the future measurements on KSTAR and WEST. Physicists from Korea will then come to CEA and will be in charge of the diagnostic operation on WEST.

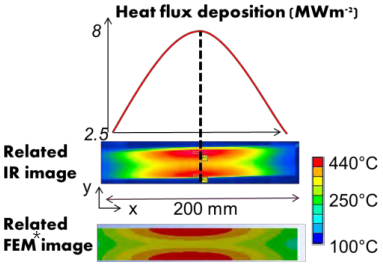
Performance of upper divertor target prototypes validated in the high heat flux facility GLADIS at IPP Garching

The upper divertor target prototypes tested in GLADIS, fulfilled the required heat thermal exhaust capability. The actively cooled heat sink production has been launched.



Upper divertor prototype with tungsten coating

The WEST upper divertor target is designed to exhaust 4 MW of conducted power in steady state with a maximum local heat load of 8 MW/m². The actively cooled heat sink of the 456 elements constituting the target is made of CuCrZr. It is covered with a tungsten coating (30 µm thickness). In order to evaluate the thermomechanical behavior under thermal cycling of the target element, high heat flux tests were performed in the GLADIS facility at IPP Garching on three upper divertor prototypes. CuCrZr machining was performed at IRFM while tungsten coatings either by Plasma Vapor Deposition or Chemical Vapor Deposition were realized by two companies after one year of development. Target elements were cyclically loaded at the expected nominal heat flux of 8 MW/m² and up to 10.5 MW/m². Transient thermal load (400kJ/m²), similar to those expected during Edge Localised Modes (ELMs) were also performed. The tested component showed a good thermal behavior and fulfilled the required heat thermal exhaust capability. Having confirmed the required performance of the target element, series' production of the CuCrZr heat sinks has been launched in November with SDMS (French) company. The tungsten coatings will be performed later on in 2015.



Temperature maps during high heat flux testing

*FEM: Finite Element Modelling

The 2nd Governing Board will be held on Tuesday, 24th February 2015, in Cadarache castle

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