Overall Development of CLAM Steel for Fusion Application in China

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A fusion reactor structural materials program, supported by the Ministry of Science and Technology from 2002, is highly expected to satisfy the material requirements of blankets for ITER, China fusion engineering test reactor (CFETR) and fusion demonstration reactor (C-DEMO) in China. The program was called as the China Low Activation Martensitic (CLAM) program, undertaken by INEST (Institute of Nuclear Energy Safety Technology, Chinese Academy of Science) under wild domestic and overseas collaborations.

And now CLAM steel has been chosen as the primary structure material CN helium cooled ceramic breeder (HCCB) test blanket module (TBM) for ITER. Much progress of the CLAM project has been achieved in the past thirteen years, including larger fabrications, series irradiation experiments up to 20dpa, long term corrosion experiments, TBM mockup fabrication and material database.

Licensing a pressurized nuclear equipment e.g. the ITER TBMs and the blankets for DEMO, requires presenting to the Regulator (ESP/ESPN) and the Agreed Notified Body, along with design and safety analyses, supporting data like consolidated materials data and design limits, qualified fabrication procedures specifications. A lot of efforts are being devoted on the development of CLAM steel in material fabrication in the fusion systems. So far, the properties database basically meets the requirement of the qualification for ITER-TBM.

The status and strategy of the CLAM steel project are reviewed in the presentation.

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