

Progress of ITER-India activities for ITER deliverables: Challenges & Mitigation Measures

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The responsibilities of ITER-India include a mix of precision, heavy, R&D intensive and interface intensive systems, under built-to-print and functional systems category. In several systems, components fall under the category of first of its kind or of the largest kind. The uniqueness of specifications lead to a challenging situation –namely that neither the existing labs or potential suppliers have ever done or encountered such scale-up (either in size/volume, capacity, precision etc.) and do not have even the R&D infrastructure to match the requirements. Under a graded approach a full-scale prototype or at an appropriate scale needs to be developed apart from the testing infrastructure.

Facilities have been established to demonstrate the integrated and functional performance in the first of its kind and R&D intense systems, as a risk mitigation strategy.

These include, for IC system, an extension of the successful prototype results to demonstrate the production of 2.5 MW in a double chain configuration with a combiner at the output.

For Neutral Beams, development of the ion source to realize the stringent parameter space for DNB and development of special technologies, involving special copper alloy Cu-Cr-Zr and special manufacturing technologies, involving high precision of <50 micron over ~ 1 m, as the first of its kind. Additionally, development of SIC compliant isolators and ultimately, setting up of a test facility with a unique attribute to test for the beam transmission

Setting up of a special cryogenic test facility to test the performance, against the designed performance for the 4 K, 50 K and 80 K Helium lines with multi process pipes.

Development of a SIC compliant 140 kV class feed-through to feed 100 kV for the DNB High voltage power supplies.

It is demonstrated that engineering efforts invested at the stage of prototyping have led to a significantly reduced effort in the resolving the technical issues encountered at the stage of production and manifests as a primary risk mitigation strategy in the management of ITER-India procurement.

The paper presents the technical achievements and the overall status with an emphasis on the special developments for the first of its kind components to meet the challenging specifications.

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Author: CHAKRABORTY, Arun Kumar (ITER-India, Institute for Plasma Research)

Co-authors: Mr KUMAR, Ajith (Iter-India); Mrs MUKHERJEE, Aparajita (Institute for Plasma Research); Mr GUPTA, Girish (ITER-India); Mr PATHAK, Haresh (ITER-India); Mr VAGHELA, Hitensinh (ITER-India); Dr PANDYA, Hitesh (ITER-India); Dr BANDYOPADHYAY, Indranil (ITER-India, Institute for Plasma Research); Mr RAO, S.L (Iter-india); Prof. DESHPANDE, Shishir (ITER-India); Mr BARUAH, Ujjwal (Iter-India); Dr KUMAR, Vinay (Iter-India)

Presenter: CHAKRABORTY, Arun Kumar (ITER-India, Institute for Plasma Research)

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