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Progress in ITER Construction, Manufacturing and R&D

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The ITER project is a critical step in the development of fusion energy: its role is to confirm the feasibility of exploiting magnetic confinement fusion for the production of energy for peaceful purposes by providing an integrated demonstration of the physics and technology required for a fusion power plant. Rapid progress is being made in the design, manufacturing, construction and R&D activities, and the facility is now taking shape at St-Paul-lez-Durance.

Supported by impressive achievements in fusion technology R&D, manufacturing of ITER components is in full swing. The international collaboration formed around the production of superconducting magnets for ITER has produced over 600 t of Nb3Sn and almost 250 t of NbTi superconducting strand. 80% of the superconductors required for the ITER magnets are complete, and coil fabrication activities are underway in 6 of the 7 partners'factories. Fabrication of the vacuum vessel is moving forward, with structures being manufactured under the responsibility of four contributing Domestic Agencies, manufacturing of the thermal shield is also in progress, and the first elements of the cryostat (˜29 m diameter × ˜29 m height) have been delivered to the ITER site.

Substantial progress has also been achieved in prototyping and R&D activities in areas such as plasma facing components, in-vessel coils, H&CD systems, remote handling and power supplies in preparation for manufacturing. A wide-ranging physics R&D programme, closely integrated with the ITPA and the major fusion facilities in the ITER Members, is also addressing key issues impacting on finalization of the ITER design and preparations for operation. These R&D activities encompass studies of disruption mitigation, analysis of ELM control by magnetic perturbations, characterization of heat loads in stationary and transient plasma phases, plasma-wall interactions with all-metal PFCs, and studies of plasma scenarios for non-active and nuclear phases of the ITER experimental programme.

The paper will review the progress made in developing the advanced technologies required for ITER and in the manufacturing activities for major tokamak components, discuss advances made in experimental and modelling studies of key physics issues, detail measures taken to establish a more effective project organization and present the status of construction of the ITER facility.

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