

International Thermonuclear Experimental Reactor (ITER)



ITER Facility France

ITER (International Thermonuclear Experimental Reactor) is an international fusion reactor being constructed under the collaborative efforts of seven participating countries, including India. This experimental and collaborative research aims to create sustainable energy for the world by harnessing nuclear fusion to solve the world's energy requirements. ITER nuclear fusion research and engineering megaproject is the world's largest magnetic confinement plasma physics experiment.

Conceived as the last experimental step to prove the feasibility of fusion as a large-scale and carbon-free energy source, ITER will be the world's largest tokamak, with ten times the plasma volume of the largest tokamak operating today.

ITER India is contributing to the project in numerous areas. The Cooling water system was a significant part of the Design and Manufacturing Activities which India had to supply to ITER. Cooling Water System has two main parts, viz. Tokamak Cooling Water System and Cooling Water System, out of which Cooling Water System was a part of India's Design, Procurement and Supply Scope. ITER-India entrusted TCE the responsibility of detailed engineering for the project for the Cooling Water System. TCE was a part of the conceptual design and preliminary design phases, forming the foundation for their final design.

In 2011-12 TCE was involved in the Process, Electrical, I&C and Civil Design of the complete Cooling Water System. This involved Hydraulic Analysis, Process Equipment Selection, PFD, P&ID, Piping Layout and 3D Model in CATIA, Stress Analysis, Support Qualification as per Euro Codes, FMEA and RAMI Analysis, Design Compliance, Procurement Specification and Preparation of documents associated with analysis and Procurement Specification.

TCE was also involved in building up an AVEVA E3D Model from CATIA and generating all the detailed engineering

documents, viz. Design Isometrics, Fabrication Isometrics, BOM, General Arrangement Drawings and Support Drawings. Additional Requirements were included in the contract, which was beam joint verification calculation of the re-qualified supports as per EURO Codes and Hybrid Flange (CS with SS) Connection Analysis

Currently 50+ TCE engineers from different specialisations are working at site to help ITER deliver the engineering work packages to the construction team for erection.

TCE is involved in updating the stress re-analysis and support re-qualification to confirm the piping qualifies with three times higher spectrum. The main challenge was to qualify the system of already procured piping and already constructed embedded plates at the site. The margin for changes was almost negligible. TCE successfully qualified the system and its corresponding supports with the Euro Codes.

TCE is also supporting ITER through offshore projects being executed by delivery teams in India. One such recent engagement was on the preparation of the engineering work packages for the mechanical and piping installations of heat rejection systems and the component cooling water system, involving re-qualification and 3D modeling of piping in the cooling water system building in AVEVA E3D as per Euro codes.

