

THE CHALLENGES AND SUCCESSES OF DESIGNING AND BUILDING THE WORLD'S LARGEST VACUUM SYSTEM (ITER)

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ITER is under construction in the south of France and is one of the biggest and most ambitious engineering projects in the world today. The ITER Members (China, the European Union, India, Japan, Korea, Russia and the United States) are collaborating to build the world's largest tokamak to demonstrate the feasibility of fusion as a clean power source. The installation of the very large vacuum vessels, in-vacuum components and vacuum piping networks has started.

The ITER vacuum system will consist of a number of large volume vessel systems including the Cryostat (~ 8500 m³), the Torus (~1330 m³), the Neutral Beam injectors (~180 m³ each) and a large number of lower volume systems. The Vacuum System forms an integral part of the Fusion Fuel Cycle, streaming all gas originating or injected into the tokamak, through the Roughing Pumping System, to the other Tritium Plant processing systems.

The design of the Vacuum Systems is particularly driven by ITER's fusion power operational phases, where gas streams dominated by hydrogen isotopes will be pumped in a magnetic and ionizing radiation environment. More than 90% of the vacuum system will however be installed and operational for the First Plasma phase.

The paper will show the final design and manufacturing progress of key pumping technologies and present the spectacular progress in the construction of ITER.