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ITER Central Solenoid Module Fabrication

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The fabrication of the modules for the ITER Central Solenoid (CS) has started in a dedicated production facility located in Poway, California, USA. The necessary tools have been designed, built, installed and tested in the facility to enable the start of production. The current schedule has first module fabrication completed in 2017, followed by testing and subsequent shipment to ITER.

The Central Solenoid is a key component of the ITER tokamak providing the inductive voltage to initiate and sustain the plasma current and to position and shape the plasma. The design of the CS has been a collaborative effort between the US ITER Project Office (US ITER), the international ITER Organization (IO) and General Atomics (GA). GA's responsibility includes completing the fabrication design, developing and qualifying the fabrication processes and tools, and then completing the fabrication of the seven 110 tonne CS modules. The modules will be shipped separately to the ITER site, stacked and aligned in the Assembly Hall prior to insertion in the core of the ITER tokamak.

A dedicated facility in Poway, California, USA has been established by GA to complete the fabrication of the seven modules. Infrastructure improvements included thick reinforced concrete floors, a diesel generator for backup power along with cranes for moving the tooling within the facility. The fabrication process for a single module requires approximately 22 months followed by 5 months of testing, which includes preliminary electrical testing followed by high current (48.5kA) tests at 4.7K. The production of the 7 modules is completed in a parallel fashion through ten process stations. The process stations have been designed and built with most stations having completed testing and qualification for carrying out the required fabrication processes.

The final qualification step for each process station is achieved by the successful production of a prototype coil. Fabrication of the first ITER module is in progress. The seven modules will be individually shipped to Cadarache upon their completion.

This paper describes the processes and status of the fabrication of the CS Modules for ITER.

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