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## Fabrication Status of ITER Central Solenoid Modules

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The fabrication of the modules for the ITER Central Solenoid (CS) is in progress at General Atomics (GA) in Poway, California, USA. This purpose built facility has been established with the requisite tools and machines to fabricate the seven 110 tonne CS modules (six required plus one spare). GA's project responsibility is completing the fabrication design, developing and qualifying the fabrication processes and tools, and fabricating the seven modules, and testing the modules at 4.7 K with full current. The current schedule has the first module's fabrication completing in 2018 followed by electrical insulation and full current testing. Upon completion of testing, the modules will be shipped to the ITER site for assembly into the CS stack.

The Central Solenoid is a key component of ITER, providing the inductive voltage to initiate and sustain the plasma current, and position and shape control of the plasma. When completed, the CS is a 900 tonne assembly, which will be lowered as a single unit into the core of the tokamak. The design of the CS has been a collaborative effort between the US ITER Project Office, the international ITER Organization and GA.

GA has completed the fabrication of a qualification coil, simulating all of the processes and exercising all of the tooling required to fabricate a production module. This qualification coil was recently completed and will undergo a cool down cycle for verification of the electrical insulation and to commission the final test station. Many lessons were gained from the production of the qualification coil and these were incorporated into the module fabrication processes.

GA currently has three production modules in fabrication, all in different stages of the process. The first module is currently being insulated, a process that requires more than 4 months. The second module is completely wound and the seven segments are being joined together into a continuous 6km long conductor. For the third module, the 900 and 600m lengths of conductor are currently being wound into six and four layer pancakes respectively.

The fabrication process for a module is approximately 22 months, start to finish, and followed by five months of testing, which includes preliminary electrical testing followed by high current (48.5 kA) tests at 4.7K and concluding with final electrical tests including a room temperature Paschen test at 30kV. The first module undergoes critical current sharing temperature measurements as well.

This presentation describes the processes and status of the fabrication and testing of the CS Modules for ITER. This work was supported by the US DOE Energy Office of Science and UT-Battelle/Oak Ridge National Laboratory under DE-AC05-00OR22725 and 4000103039.

### Eligible for student paper award?

No

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