

US R&D EFFORT ON ITER MAGNET TASKS

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The US IPO is responsible for supplying the Central Solenoid (CS) with preload and support structure and nine lengths of the TF conductor for ITER machine, currently under construction in Cadarache, France. Several design features that are used in the CS design needed to be developed and qualified during the development and testing activity prior to the completion of the design and entering fabrication stage. This is necessary because the CS is a unique and challenging solenoid, a significant step forward from the past achievements. Industry does not have experience in many aspects of the CS design.

The tolerances on the CS turn location are very tight, especially in the joggles region and therefore the winding machine and auxiliary tools need to be developed in order to assure feasibility of the design. The helium inlets are located in the area of the highest stress and magnetic field, in the area of the lowest temperature margin; therefore they represent a significant fabrication and performance risk. The insulation for CS needs to withstand up to 30 kV and remain structurally robust, a very challenging task, never addressed in fusion magnets in the past.

The paper presents status of these development tasks, including winding development, inlets and outlets development, internal and bus joints development and testing, insulation development and qualification, vacuum-pressure impregnation, breakout regions, bus supports, TF conductor fabrication development, intermodule structure and materials characterization.