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## **JT-60SA: status of Cryogenic System and focus on Cryogenic Rotating Machines**

*Wednesday 9 July 2014 17:30 (15 minutes)*

The Cryogenic System for JT-60SA must provide cold power to 5 circuits of the Tokamak: Toroidal Field coils (TF) and structures at 4.4K, Central Solenoid and Equilibrium Field coils (CS+EF) at 4.4K, cryopumps at 3.7K, thermal shields (TS) at 80K and current leads at 50K. The process choice was driven by the decision to feed the first two circuits (TF and CS+EF) using two supercritical helium independent loops equipped with cryogenic circulators, and the third circuit (cryopumps) is directly supplied with the process flow. The two cryogenic circulators are identical and have been designed in order to supply the helium flow rates to the circuits. Another important feature of the refrigerator is to deal with pulsed heat loads. Thanks to the allowable temperature increase during recovery period between plasma pulses, a thermal damper has been implemented to reduce the size of the plant. A cold compressor, located at the outlet of this damper, is used to lower the pressure (initial pressure about 1.1 bar abs) in order to meet the final temperature requirement and to keep a constant flow during pulse mode while letting the damper pressure increase.

After reaching the "Detailed Design" milestone, the JT-60SA Cryogenic System is currently under assembly in Air Liquide Advanced Technologies workshops. The Refrigeration Cold Box and the Auxiliary Cold Box (12m long and 3m diameter each) are assembled in the manufacturing hall with a Factory Acceptance Test scheduled in September 2014.

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