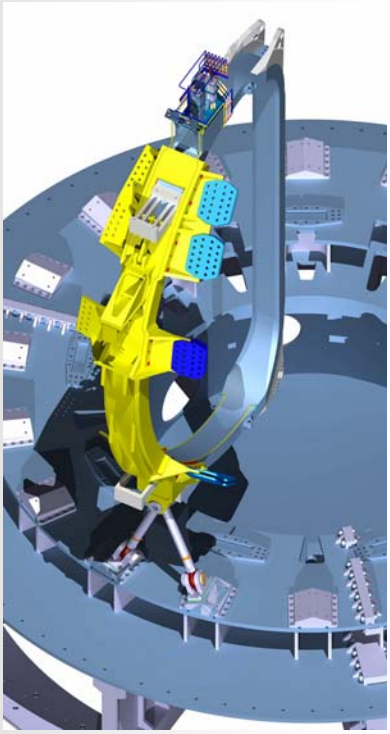
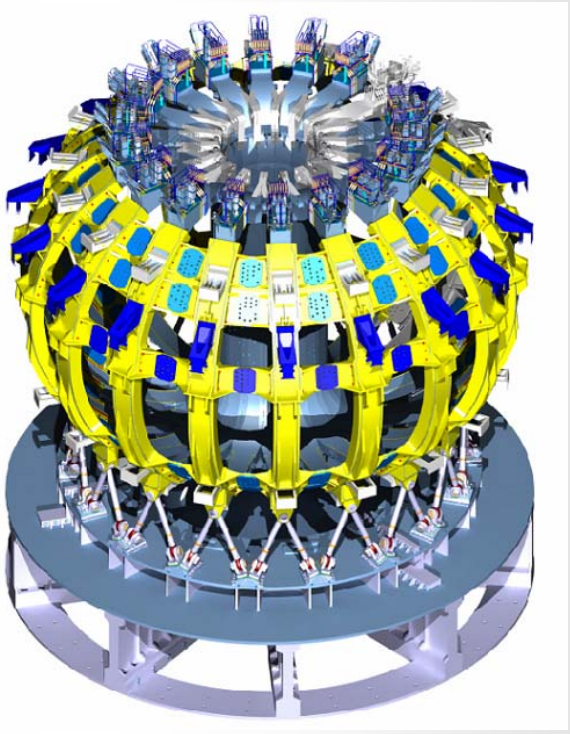
JT-60SA Newsletter
No.4, 30 April 2010

Technical specification of TF coil finalised



One TF coil on cryostat base



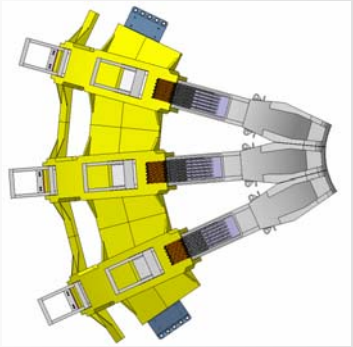
Bird's eye view of TF Magnet

The technical specification of the toroidal field (TF) coil, a major component of the JT-60SA device, was finalised. The TF coil will be procured by CEA (French Atomic and Alternative Energy Commission) in France and ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) in Italy.

The complete TF coil consists of eighteen D-shaped superconducting coils, driven at a nominal current of 25.7 kA, and producing a maximum magnetic field on the conductor B_{max} ~ 5.65 T, with a B_TR ~ 6.66 T•m. The complete magnet system will be able to store an overall energy of 1.06 GJ.

Each TF coil is wound from a rectangular steel jacketed Cable-In-Conduit Conductor (CICC) which is cooled by a forced flow of supercritical helium. The conductor relies on twisted, multi-filament NbTi composite strands.

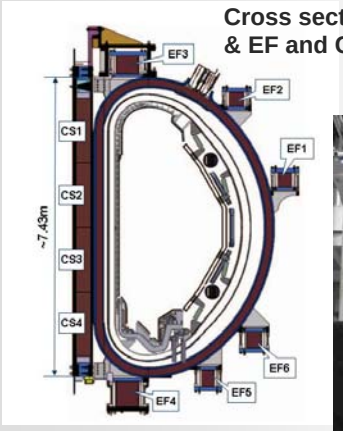
The structural principle of the magnet, shown in the picture on the right, is rather innovative when compared to other tokamaks. In fact, the inner legs of all of the coils are wedged, supporting each other during operation in a similar fashion to ITER. In contrast to ITER, the outer legs are free to expand radially and are laterally supported by the outer intercoil structures, like in JET (the Joint European Torus).



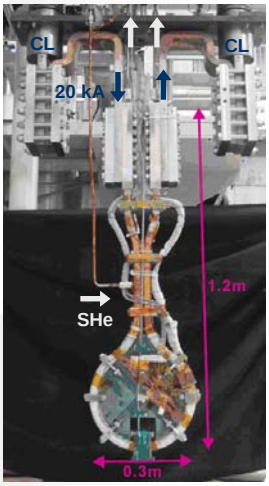
Three wedged coils with outer intercoil structure

Result of current sharing temperature test met specification

A current sharing temperature (T_{cs}) test was performed using a sample of the EF- H conductor (EF3 and EF4 shown in the figure below) using a large conductor testing device in cooperation with the National Institute for Fusion Science (NIFS). The picture below shows the sample with the testing device in NIFS.



Cross section of vacuum vessel & EF and CS coils



Sample of EF- H conductor

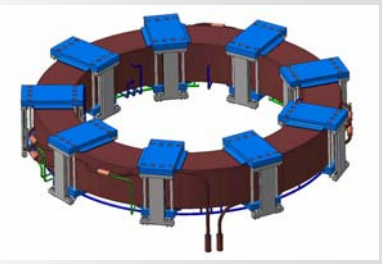
This sample was set into a cryostat, which contained coils for applying magnetic field to the sample, and the sample was cooled to approximately 4 K by using controlled-temperature supercritical helium (SHe) and a magnetic field of 6.2 T was evenly applied to the rounded part of the sample, 0.3 m in diameter. 20 kA was then applied to it through the current lead (CL) and its T_{cs} was measured while increasing the temperature of SHe gradually.

The measured T_{cs} was 6.24 K at the maximum magnetic field of 6.2 T and current of 20 kA, and met the required value of ≥5.82 K specified in the PA. Mass production of the EF-H conductor was started following the test result.

Trial product of part of support structure for EF4 completed

A trial product of a part of the support structure for the EF4 was fabricated at the manufacturer's facility in order to confirm process feasibility. It was found that curving of the clamp and machining the supporting leg were performed well, and further examinations are being carried out on the method of applying load and the consequent pressure distribution on the coils.

Trial product of part of support structure



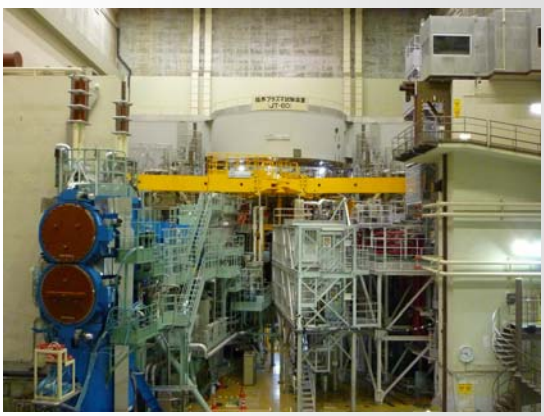
Bird's eye view of EF4 and its support structure

Neutron shield wall removed

Disassembly of the neutron shield wall in the JT-60 assembly hall, started in February, was completed at the end of March, and these disassembled wall materials were stored in eight open-top 20 ft. freight containers and one open-top 40 ft. container. These containers were stored in the storage place No.1 at Naka Fusion Institute.

These materials are going to be re-used as the neutron shield wall for JT-60SA.

January 2010



March 2010

Meetings

The 8th Technical Coordination Meeting (TCM-8) was held at ENEA in Frascati, Italy from 12 to 14 April 2010. A total of 52 members, including 35 members from the EU HT, 12 members from the JA HT and 5 members from the PT, participated in the Meeting, and other members concerned also participated in the meeting through video conference connection.

The JA PM, Y. Kamada, also gave a presentation regarding the JT-60SA Plasma Regimes and Research Plan for the physics unit session. A lot of members of ENEA joined the session as well, and they all listened intently to the presentation and joined in a vigorous discussions afterwards.

Calendar

April 12-14, 2010
8th Technical Coordination Meeting,
Frascati, Italy

April 28, 2010
7th Meeting of the BA Steering Committee,
Rokkasho, Japan

May 24-28, 2010
19th Int. Conf. on Plasma Surface Interactions in Controlled Fusion Devices
San Diego, USA

June 19-23, 2010
Int. Cryogenic Engineering Conf. 23 - Int. Cryogenic Materials Conf. 2010
Wroclaw, Poland

June 21-25, 2010
37th EPS Conf. on Plasma Physics,
Dublin, Ireland

August 1-6, 2010
Applied Superconductivity Conf.
Washington, D.C., USA

September 14-16, 2010
9th Technical Coordination Meeting
Naka, Japan

October 19, 2010
7th Meeting of the STP Project Committee
Japan and EU (Remote)

Local

Villa Aldobrandini & Atlas statue in the Villa's garden

Frascati is a city located 20 km south-east of Rome on the Alban Hills close to the ancient city of Tusculum. Frascati is mainly renowned for its white wine, but it is also very important for its historical and artistic centre. Very famous are its notable villas, built since the 16th century Renaissance period by Popes, cardinals and Roman nobles as "status symbols" of Roman aristocracy. The villas are substantially well preserved, or have been carefully and authentically restored following damage during World War II. The most celebrated is by far Villa Aldobrandini, erected in the first half of 1550 and lately donated to Pietro Aldobrandini who modernized and remodelled the house. It is colloquially known as villa Belvedere because it is located on the top of a hill from which it is possible to see all the surroundings; the villa features remarkable frescoed vaults in its interiors and luscious gardens, with fountains and casinos.

Frascati is also a scientific pole. In fact, during the latter half of the 1950s, the first Italian accelerator was developed in Frascati where at present the ENEA Research Centre is located. Frascati hosts also the INFN (National Institute of Nuclear Physics) and the ESA (European Space Agency) laboratories.

Contact Us

The JT-60SA Newsletter is released monthly by the JT-60SA Project Team. Suggestions and comments are welcome and can be sent to masayasu.sato@jt60sa.org.

For more information please visit the website: http://www.jt60sa.org/