JT-60SA Newsletter
No.17, 31 May 2011

Headline

First 40°sector of VV arrives at Naka Fusion Institute

First arrival of VV parts – Inboard segment of 40°sector
with notice “First VV 40°sector for JT-60SA” by Toshiba, and message “Ganbaro! Nippon!! (Let’s go! Japan!!)”

The first inboard and outboard segments forming a 40° sector of the Vacuum Vessel (VV) were fabricated, and their inner surfaces were treated with a glass bead blaster, and the outer surfaces were buffed at the company’s factory in Japan.

The first completed inboard and outboard segments arrived at the JAEA Naka Fusion Institute in Japan on 22 and 23 April, respectively, and were safely brought in and stored in the Vacuum Vessel sector assembly building at the site as shown in the pictures below.

Inboard segment of 40° sector on assembly jig in VV sector assembly bldg.

Outboard segment of 40˚ sector being unloaded at Naka

Outboard segment on assembly jig in VV sector assembly bldg.

News

Technical Specification of Cryogenic System finalized

Experimental loop HELIOS installed at CEA Grenoble, France

For JT-60SA, CEA (France) is in charge of the Cryogenic System, which includes several different subsystems.

- A warm compressor station which will be installed ~100 m away from the tokamak hall in a new compressor building (17 m x 35 m).
- Storage for gaseous helium.
- A refrigerator and an auxiliary cold box with a diameter of about 3.6 m and a length of about 13 m. These vacuum

insulated coldboxes will be installed in an existing building adjacent to the tokamak hall. They produce the cryogenic refrigeration and distribute the cold helium to the different circuits of JT-60SA.
- Pneumatic and vacuum systems to operate the cryogenic circuits.

Following extensive thermal analyses, the JT-60SA Cryogenic system calls for an equivalent of about 9 kW refrigeration at 4.5 K, to provide cryopumps with helium at 3.7 K, magnets and structures with supercritical helium at 4.4 K, high temperature superconducting current leads with helium gas at 50 K, and the thermal shields with helium between 80 K and 100 K.

Pulsed tokamak operation generates variable cryogenic heat loads which exceed the stationary loads significantly. They result primarily from the inductive loads induced in the toroidal and poloidal field coils, and the neutron load from DD reactions.

Thermodynamic analyses performed at CEA helped to define the heat load profile at the interface between the Cryogenic System and the cooling circuits of JT-60SA. In order to study the smoothing of the heat pulses through a buffer volume of liquid helium, a dedicated experimental loop HElium Loop for high LOads Smoothing (HELIOS) has been set-up at CEA Grenoble (see above pictures).

The procurement technical specifications have been finalized. A call for interest resulted in a number of candidates with whom a competitive dialogue tendering procedure will be launched in June 2011.

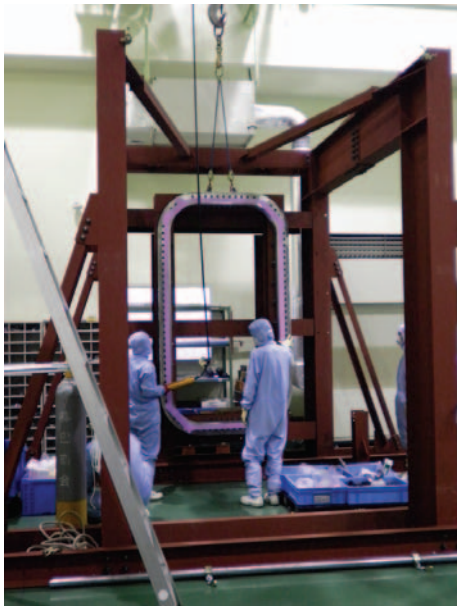
Key parameters of the Cryogenic System:

- 9 kW equivalent refrigeration power at 4.5 K.
- 400 g/s of gaseous helium flow between 80 K and 100 K for the thermal shields
- 876 g/s and 960 g/s of liquid helium flow at 4.4 K respectively for Toroidal and Poloidal Field coils
- 270 g/s of superfluid helium mass flow at 3.7 K for cryopanels
- 25 g/s of gaseous helium at 50K for current leads.

This is one of the largest cryogenic systems dedicated to a superconducting tokamak, and is realized by a collaboration between CEA-Grenoble and CEA-Cadarache.

News

Success on vacuum seal test for large port



A double seal structure will be adopted for the vacuum seal for the large port flange of the VV, 2.5 m x 1.4 m, using Helicoflex with 10 mm diameter and a rubber O-ring with 6.8 mm diameter. In order to examine the feasibility of the vacuum seal, a trial large port flange was prepared at the company's factory in Japan, and tested by applying a 4 t·m moment. The vacuum leak rate measured was lower than $\sim 10^{-10}$ Pam^3/s, and successfully met its specification.

Meetings

EFDA meeting on JT-60SA Research Plan

The activity of revision of the JT-60SA Research Plan by the European fusion physicist community has now officially started, under EFDA coordination, inside a collaboration between the F4E and EFDA.

Following a call for interest issued by EFDA, about 60 physicists, from 8 countries and 15 research institutes, have joined in the work. In this working team there are 11 ITPA members, 4 JET Task Force leaders or deputies, 8 leaders or deputies of various EFDA groups, responsible for ITPA Topical Groups, the Heating & Current Drive Coordinating Committees, and ITER Scenario Modelling.

A meeting was organized by ENEA in Frascati, from 23-24 May 2011, with the main aim of starting this activity. About 20 participants were present in Frascati representing CEA-Cadarache (France), EFDA-Garching (Germany), EFDA-JET (Culham, United Kingdom), ENEA-Frascati (Italy), ENEA-RFX (Padova, Italy), ENEA-IFP (Milano, Italy), CCFE (Culham, United Kigdom), IPP-Garching(Germany), CIEMAT (Madrid, Spain) and many more connected remotely from various EU laboratories.

The first day was devoted to a series of summaries and initial discussions on the various chapters and Appendices of the Research Plan.

The second day started with a joint videoconference session with the JA HT, in which a general presentation of the status of the JT-60SA project was given by Y. Kamada (JA Project Manager), followed by a specific presentation of the requirements and guidelines for the Research Plan revision. This gave an opportunity to the EU physicists to ask questions and clarifications to the Japanese colleagues.

After the end of this joint session, a short presentation was given by the France-Japan Magnetic Fusion Laboratory, a joint research institute that constitutes a good example of cooperation between EU and Japan Universities in the field of fusion.

The final session of the meeting was devoted to a discussion of the guidelines, working method and practical organization of the Research Plan revision work in Europe.

The following steps should be: 1) nomination of EU Technical Responsible Officers (TROs) for the various chapters, 2) separate meetings of the EU experts on the different chapters, including discussion with the Japanese corresponding TROs, 3) collection of comments and elaboration of written proposals for extensions of the Research Plan with additional research items, 4) writing, discussion and agreement of a common version of the Research Plan, to be publicly issued by the end of 2011.

Meetings

Design Review Meeting on remote handling tool for JT-60SA divertor cassettes

The 1st Design Review Meeting (DRM) on the remote handling tools for JT-60SA divertor cassettes (DRM-RH01) was held by video conference on 25 May 2011, and 10 experts in total attended the meeting remotely from Germany (Fusion for Energy) and Japan (Naka Fusion Institute).

The design and R&D of RH tools for divertor cassettes was explained by the JA HT members, and the drafts of the Procurement Arrangement and Technical Specification for RH tools prepared by the JA HT were also reviewed and discussed. At the end, the meeting successfully reached an agreement to finalize the documents.

Meetings

24th Project Leaders Meeting

On 20 May, the three BA Project Leaders, P. Garin (IFMIF/EVEDA), N. Nakajima (IFERC) and S. Ishida (JT-60SA), and experts from each Project Team, got together for the 24th Project Leaders Meeting (PLM-24) of the Broader Approach activities at the JAEA Aomori Research and Development Centre in Rokkasho, which was in the beautiful season with fresh green leaves and various flowers in full bloom.

The PLM is held almost every month in order to coordinate and give direction to the projects by discussing common issues and sharing latest information together. At the PLM-24, the participants had discussions through the day mainly on common issues on document control tools, networks, public websites, and site preparation.

At the Rokkasho site, a canteen was opened in April. The Project Leaders and experts enjoyed a conversation and exchanged information with researchers working there at lunch in the new canteen.

Calendar

June 13-17, 2011
Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC/ICMC2011)
Spokane Washington, USA

June 26-30, 2011
38th IEEE Int. Conf. on Plasma Science (ICOPS2011) and 24th Symp. on Fusion Engineering (SOFE2011)
Chicago, USA

June 27-July 1, 2011
38th European Physical Society Conference on Plasma Physics (EPS2011)
Strasbourg, France

September 11-16, 2011
10th International Symposium on Fusion Nuclear Technology (ISFNT-10)
Portland, USA

September 12-16, 2011
22nd International Conference on Magnet Technology (MT-22)
Marseille, France

September 21-22, 2011
12th Technical Coordination Meeting (TCM-12)
Naka, Japan

October 25, 2011
9th Meeting of the BA Steering Committee
Europe

December 6-7, 2011
13th Technical Coordination Meeting (TCM-13)
Karlsruhe, Germany

Local

Grenoble, capital of the French Alps

Located in the south-eastern part of France, Grenoble, technological and student city, is surrounded by 3 beautiful alpine mountain chains reaching up to 2,977 m. Stendhal, a famous French writer, once wrote that "… there is a mountain at the end of each Grenoble street…". Nevertheless, Grenoble is the flattest city in France and sits at an altitude of 213 m.

An urban cable car, the first of its kind, has been taking visitors up to the Bastille (a small fortified mountain), 263 m above the city, since 1934. There is an exceptional panoramic view of the Alps up to the massive Mont Blanc (highest Mountain in Western Europe at 4,810 m).

Key figures:

- 157,000: Population of Grenoble city
- 532,000: Population of greater Grenoble
- 1968: Grenoble hosted the Winter Olympic Games
- 20 ski resorts surrounding the city
- 30 minutes by car to the winter ski resorts
- 65,000 students in the universities, engineering and business high schools including 9,000 foreign students from 160 different countries
- 17,000 researchers

Industry and research

Many international industries and research centres are to be found around Grenoble working mainly in Information Technology (microelectronics, network and telecommunications, computers). Grenoble (2nd research centre after Paris) is understandably proud of its academic and scientific environment, with a long tradition of partnership between research and industry. Every year sees a large number of technology transfers to industry, innovative research and development projects. CEA-Grenoble (one of the 9 CEA research centres) is a major actor in transferring knowhow from research to industry with about 250 patents per year and 37 start-ups created. CEA-Grenoble has more than 4,200 people on site including more than 2,300 CEA permanent employees.

Research Institutes: CEA, CNRS, ESRF synchrotron, ILL reactor, INRIA etc.
Industries: ST Microelectronic, Schneider electric, Caterpilar, Alstom, Soitec, HP, Xerox, IBM, Bull,
Sun Microsystem, Yahoo etc.
Mountaineering equipment companies: Rossignol, Petzl, Poma

CEA is the French Alternative Energies and Atomic Energy Commission, and a Voluntary Contributor to the JT-60SA project.

Web sites and references
Dailymotion
Grenoble tourism
Wikipedia

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/