

## Headline

### **Cryoplant arrives at the JAEA Naka Site**

After the successful discharge at the port of Hitachi on 21 March 2015, the refrigerator cold box (RCB) and the auxiliary cold box (ACB), the main components of the cryogenic system, were transported to the JAEA Naka site. This was done in the middle of the night (1 am - 2 am) on 7 and 9 April, because the transfer of such huge and heavy components, 12 m x 3.6 m x 3.6 m, and 65 t and 60 t respectively, required complying with major traffic and safety regulations, with special permission for public road usage. The RCB and the ACB have components in each cylindrical container which require a high level of pressure control and air tightness. Therefore, they could not be disassembled for delivery, without running the risk of damage, once their fabrication and testing had been finished in the factory workshop in Europe.

It was also a very delicate and stressful operation exploiting the cm-range clearances with the narrow entrances as they were moved into the cryogenic hall, avoiding contact with the many valves, rails and legs sticking out from the main body. They were successfully lifted into the hall as planned (see figure right bottom), and were then connected to each other with multiple lines.



The RCB arrival at the Naka site



Carrying the RCB to the cryogenic hall



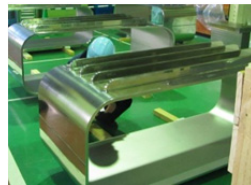
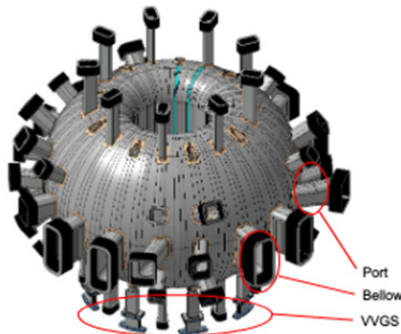
The RCB and the ACB in the cryogenic hall

## News

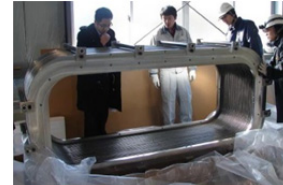
### All VV components delivered

The last delivery of vacuum vessel (VV) ports, bellows and vacuum vessel gravity supports (VVGs) arrived at the JAEA Naka site on 27 March 2015. In total 55 ports, 55 bellows and 9 sets of VVGs were manufactured. Including the 10 VV sectors already delivered, the procurement of the VV and related components over a period of 7 years was finally complete.

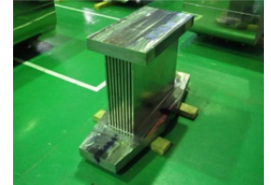
The ports with bellows are to be connected to the VV and the cryostat at the outer ends mainly in order to be able to install the plasma diagnostics. The ports need to achieve major dimensional tolerances within  $\pm 2$  mm to ensure a good seal with the vessel. The role of the bellows is to manage the displacement loads caused by 200°C VV baking, plasma disruption and earthquake. The VVGs are to be installed after the assembly of the toroidal field (TF) coils. The ports with bellows will be mounted after the assembly of the cryostat vessel body.



Horizontal ports



A bellows for a horizontal port



The VVGs lower spring plates



A VVGs upper stem

## News

### EF coils superconductor production completed

6 superconducting coils are to be installed on the JT-60SA device in order to control the equilibrium poloidal magnetic field. On 11 March 2015, all 64 superconductors for the equilibrium field (EF) coils were finally completed after a 5 year production run begun in 5 March 2010. The superconductors consist of niobium titanium (NbTi) strand, and were manufactured at a specially constructed 680 m long jacketing line at the JAEA Naka site. The 6 EF coils will eventually consume 26,389 m cable in total.

Using these superconductors, the lower side EF coils (EF4, EF5 and EF6) had already been fabricated and installed temporarily on the cryostat base in January 2014. The fabrication of the upper side EF coils (EF1, EF2 and EF3) began in June 2014. The 9th and 10th single pancakes (SPs) of the EF1 (12 SPs in total) are now being finished after their curing process. The last pancake (SP1) of the EF2 coil has just been provided with its superconductor for coil winding. All of the EF2 coil pancakes (12 SPs in total) will be completed once the SP1 winding and curing is finished. The EF3 coil manufacturing is going to start in June 2015.



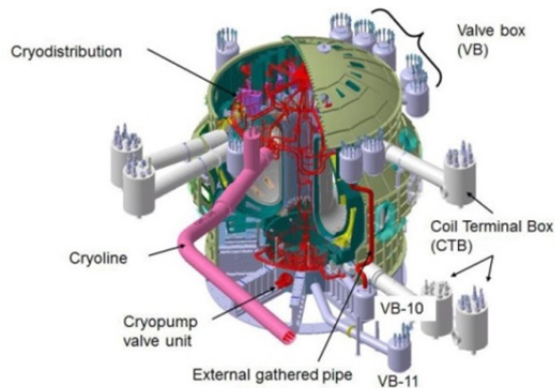
The JAEA winding team celebrates the completion of the EF conductor manufacturing

## News

### In-cryostat cryodistribution line layout fixed

The layout of cryodistribution lines inside the cryostat has been completed section by section through discussions with the manufacturer in order to minimize complicated assembly work on site.

The cryodistribution lines consist of branch pipes with 7 different diameters from 10 mm to 100 mm, as well as headers which collect branch pipes. They are to be cut up into parts with transportable length of about 8 m at the manufacturer's premises. Due to the complex configuration, however, there are still about 700 points in total which require on-site welding. The most precise welding work is required, because a tiny dimensional variation at one joint might lead to a considerable gap at another. Therefore, the layout of cryodistribution lines was carefully considered also taking into account the accessibility of the welding tools and work efficiency. Finally, the distribution layout was fixed to ensure enough working space for in-cryostat welding.



Detail of cryoline layout (red lines)

## Meetings

### 16th BA Steering Committee Meeting

On 20 April, the 16th Broader Approach Steering Committee (BASC) meeting was held at the JAEA Naka site with attendance of representatives and experts from Europe and Japan. The Annual Report 2014 and the Project Plan for the 3 projects (IFMIF/EVEDA, IFERC, and Satellite Tokamak Programme (STP)) were discussed and approved. For the STP Project, the Project Leader (PL), H. Shirai, reported that the project had been progressing quite well with the delivery and commissioning of the quench protection circuit components as scheduled, the steady progress of the TF coil winding pack fabrication in Italy and France as well as the high temperature superconductor (HTS) current leads in Germany, and the welding work on VV sectors on the cryostat base in the JT-60SA torus hall. The SC expressed satisfaction with the progress of the STP Project. The next BA Steering Committee meeting will be held in Padua, Italy on 11 December 2015.

A site tour was carried out during the BASC. The BASC participants directly inspected the progress of installation, commissioning and assembly of JT-60SA components.



Discussions at the BASC-16 meeting





A group photo of the BASC participants in front of the ACB

## Meetings

### TCM-22 held in Naka

The 22nd Technical Coordination Meeting (TCM-22) was held at the JAEA Naka site on 22 and 23 April 2015. 73 experts in total (24 from the JA Home Team, 36 from the EU Home Team, 7 from the Project Team and 6 invited attendees) participated (Figure 1). While 12 EU Home Team members joined via video-conference from France, Germany and Italy, 24 of them attended in person, because most of them also joined the ceremony celebrating delivery, installation and assembly of for JT-60SA components held prior to this meeting. A group photo was taken in front of the "Kurogane holly (ilex rotunda)" planted in memory of that occasion (Figure 2).

On the first day, the PL reported the outcome of the 16th BASC organised on 21 April, reviewed the progress of the "Work Programme 2015" milestones, and encouraged both EU and JA Home Team to complete their procurement as scheduled. The EU Deputy Project Manager, E. Di Pietro, and the JA Project Manager, Y. Kamada presented the overall procurement status of the European and Japanese sides respectively. Other topics on this day were as follows:

- achievements and progress in manufacturing of the poloidal field (PF) conductors, the PF coils, the cryostat vessel body cylindrical section and the thermal shield;
- final acceptance and declaration of the VV procurement arrangement fulfilment, under which 10 VV sectors, ports, bellows and VVGs had been provided;
- status of the VV assembly in the torus hall and the conclusion of the final sector's assembly procedure specification;
- status and issues of the TF coils pre-assembly;
- the activity of F4E, CEA and ENEA related to the TF coil manufacturing;
- present status of the TF coil test facility.

A technical tour took place on the same day to inspect the first pair of HTS current leads delivered to Naka, and the EF coils, in the poloidal coil winding building, the commissioning of the quench protection circuit in the power supply building, the installation of the cryogenic system in the compressor building, and the assembly of VV sectors in the torus hall (Figure 3).

On the second day, the following topics were covered:

- status and issues of procurement of the in-vessel coils, the cryogenic system, the magnet shared components and the power supplies;
- project integration activities such as on-site work, transportation of the cryogenic system;
- the future work of the Integrated Commissioning Team;
- present status of the configuration control model;
- updates to the Plant Integration Document.

At the end of meeting, the PL confirmed that the next TCM-23 would be held in Genoa, Italy on 29 and 30 September 2015 and the TCM-24 in Naka, Japan in early February 2016.



Figure 1: Discussions during the TCM-22



Figure 2: A group photo taken after the tree planting ceremony



Figure 3: Technical tour

## Local

### **Double cherry-blossoms festival**

The Shizumine Home Town Park in Naka city is known as one of the 100 best cherry blossom viewing spots in Japan. The "Yaezakura festival" was held there from 25 April to 6 May 2015.

The "Somei Yoshino" (or the "Yoshino Sakura") is a popular species of cherry tree in Japan and well known worldwide as a typical Japanese "Sakura" flower. It has pale rose-coloured single flowers in full bloom in early April in the Tokyo area. However, "Yaezakura" collectively means double-flowered cherry, which usually comes into bloom several weeks later than the "Somei Yoshino" and has more than double the blossoms, which are also richer in colour and larger in size.

It was a gorgeous sight to see the more than 2,000 Yaezakura trees in full bloom. With special lighting from above and Japanese lanterns hung under the trees by night, the result was dreamy and fantastic. Kids were racing around the park and amateur photographers took shots again and again. Street food such as fried noodles, dumplings and crushed ice, as well as local performing arts and concerts, added to the atmosphere.





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## Calendar

May 31 - June 4, 2015  
26th Symposium on Fusion Engineering (SOFE-26)  
Austin, USA

June 22 - 26, 2015  
42nd European Physical Society Conference on Plasma Physics (EPS-42)  
Lisbon, Portugal

September 9 - 11, 2015  
15th International Workshop on Plasma Edge Theory in Fusion Devices (PET-15)  
Nara, Japan

September 14 - 18, 2015  
12th International Symposium on Fusion Nuclear Technology (ISFNT-12)  
Jeju Island, Korea

September 29 - 30, 2015  
23rd Technical Coordination Meeting (TCM-23)  
Genoa, Italy

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## 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 [newsletter@jt60sa.org](mailto:newsletter@jt60sa.org).

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