JT-60SA Newsletter
No. 74, 29 February 2016

## Headline

### Trial assembly of 40° Thermal Shield

Figure 1: Trial assembly of the 40° VVTS in the torus hall

Figure 2: Unloading the VVTS sectors

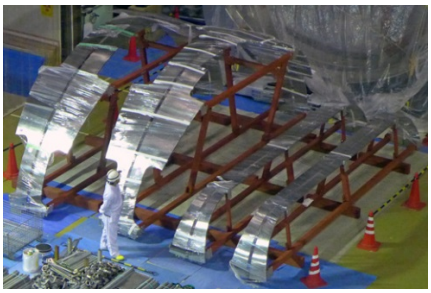

Figure 3: VVTS sectors on the transport jigs

Two prototypes of the vacuum vessel thermal shield (VVTS), which form a 40° sector, were installed around the 340° vacuum vessel (VV) to verify that the planned VVTS transportation and assembly scenario worked.

The 40° VVTS sector had been pre-assembled and inspected at the manufacturer. It was disassembled into 4 pieces (2 sets of 20° inboard and outboard sectors), mounted on special jigs, and transported to the JAEA Naka site (Figure 2 and 3). The jigs worked well protecting the sectors from any damage and deformation during the transport.

In the assembly hall, each set of 20° inboard and outboard sectors was dismounted from the transportation jigs, mounted on the assembly jigs prepared by the VV manufacturer, and jointed to each other by way of trial.

In the torus hall, firstly the 20° inboard sector was inserted through the 20° VV gap with the overhead travelling crane, moved round to the designated position with the rotary crane, and successfully installed around the VV and precisely positioned with a laser tracker. Then, the corresponding outboard sector was carried around similarly, and mounted on the opposite side. Finally, the adjacent set of 20° inboard and outboard sectors was installed in the same way (Figure 1).

Counter-measures have now been taken against the issues found during this verification, before the actual VVTS assembly starts in February.

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## News

### PL visits ALSYOM

On 8 December 2015, the JT-60SA Project Leader (PL), H. Shirai, accompanied by CEA representatives, visited ALSYOM in Tarbes, France, where the 18 gravity supports (GSs) for the toroidal field (TF) coils (Figure 3) are being manufactured.

In Tarbes, the PL was welcomed by Mr. Thierry Hovsepian, General Director of ALSYOM, who conducted the visit to ALSYOM's workshops where the GSs were being manufactured (Figure 1). Mr. Hovsepian also presented the activities in which ALSYOM had been involved for a while in connection with CEA's technological programme, in particular, the Laser Mégajoule (LMJ) of the inertial fusion facility developed and operated by CEA.

At the time of the visit, 4 GSs had been fully welded, and were being adjusted. The PL witnessed that ALSYOM, in a zero defects approach, kept improving their procedure in order to reach a perfect quality weld. Several samples were welded beforehand in order to find the best combination of the parameters to improve the weld quality of the GSs. In addition to the

welding at ALSYOM, half of the GS legs are being electron beam welded by pro-beam AG & CO. KGaA, in Germany for further robustness. The first pair of these legs had already been delivered to Tarbes.

All of the associated parts to be assembled on the 18 “V structures”, such as support clevises, pins, thermal anchors and so forth, had already been manufactured and were ready for assembly (Figure 2).

During the meeting, the PL presented the progress of the JT-60SA project in both Japan and Europe, and also the main milestones to be reached before the first plasma.

Figure 1: The PL with the ALSYOM and CEA representatives in front of the GS completed welding

Figure 2: The PL with an ALSYOM representative having a look at the thermal anchors and nuts of the GS

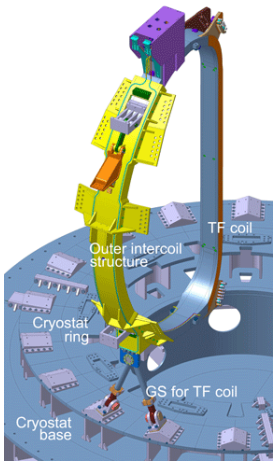
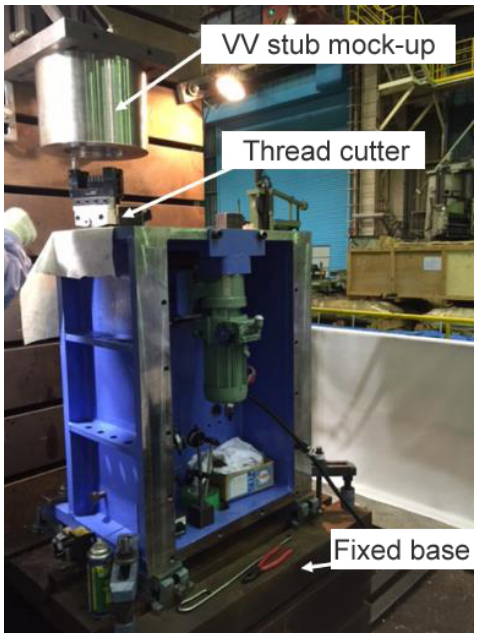



Figure 3: TF coil and GS

## News

## M200 thread cutter for VVGS tested




Factory test of the M200 thread cutter

The entire vacuum vessel (VV) load to the torus hall floor, including that of the in-vessel components and so forth, is supported by 9 sets of vacuum vessel gravity supports (VVGSs). Furthermore, the spring plates of the VVGS release stresses due to thermal deformation of the VV during baking. Therefore, the VVGSs must be precisely installed square with the radial plane through the VV centre.

The VVGSs will be attached to the bottom of the VV with M200 screws. The tapped holes will be prepared for them according to the 360° VV position actually measured. Since there is not much clearance for this thread cutting between the VV and the floor, a special thread cutter with accuracy and portability has been designed. It was completed and inspected at the manufacturer recently. A test with a VV stub mock-up demonstrated its precise threading capability and good portability. The M200 thread cutting has started in February.

## News

### Cryostat top lid installation reviewed

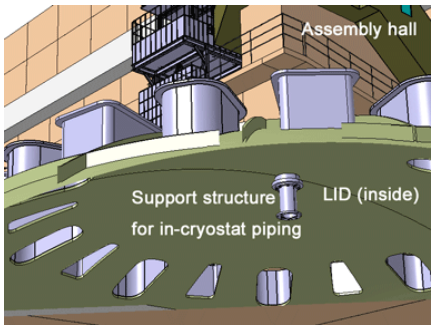


Figure 1: Support structure for in-cryostat piping attached to LID

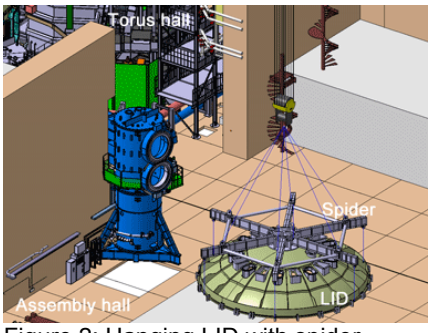


Figure 2: Hanging LID with spider

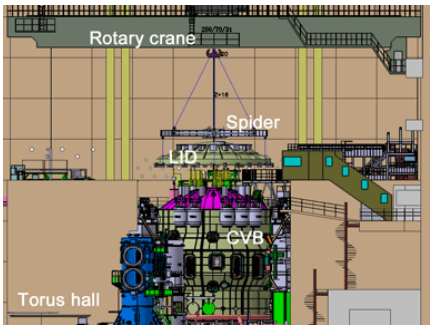


Figure 3: Transporting LID above CVB

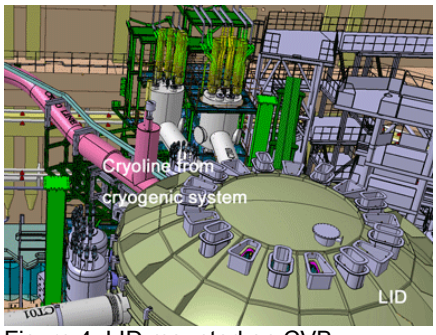


Figure 4: LID mounted on CVB

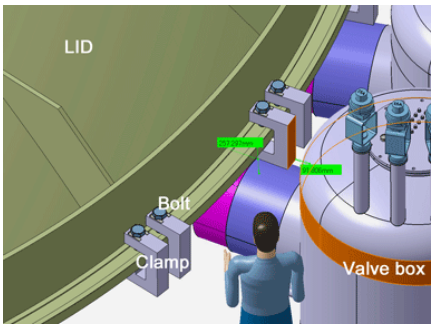


Figure 5: Bolts and clamps to connect LID and CVB

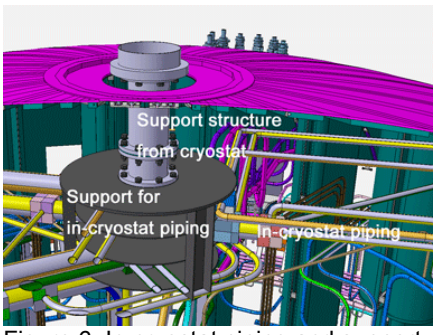


Figure 6: In-cryostat piping and support

The installation procedure of the cryostat top lid (LID) has been planned and verified. This covers the processes after the assembly and transport of the LID into the assembly hall up to the completion of the tokamak device. The figures above and the corresponding text below show the sequence that has now been decided.

1. attaching a part of the support structure for upper in-cryostat helium piping to the LID inside;
2. hanging the LID with a spider (hanging jig) to transport it from the assembly hall to the torus hall;
3. calculating the centre of each port opening from the measurements with a laser tracker set on the catwalk of the surrounding assembly frame, determining the final mounting position of the LID on the top of the cryostat vessel body (CVB), and carrying the LID thereto;
4. mounting the LID on the CVB, and jointing and welding the outer flanges of the LID and CVB;
5. connecting the LID and CVB with bolts and clamps;
6. installing the support for the in-cryostat piping to the support structure inside the LID, following which the tokamak device assembly will be finally completed.

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## Meeting

### 10th Asia Plasma and Fusion Association Conference

All participants at APFA 2015

The 10th Asia Plasma and Fusion Association Conference (APFA 2015) was held in Gandhinagar, India, on 14 - 18 December 2015. The main aim of the conference was to assemble the researchers and students working in the field of fusion plasma science and technology, especially, in the Asia region. In this conference, a total of 269 people participated, and a total of 265 presentations (34 orals and 231 posters) were given. All of the presentations planned by Chinese scientists were cancelled due to a delay in the visa procedure.

Y. Ikeda, Deputy Project Manager of the JA Home Team, gave an invited oral presentation with the title of “Progress of the JT-60SA Construction and R&D of its Heating Systems”. During this conference, he was frequently asked when the JT-60SA device would start its operation. This indicated that the JT-60SA project attracted significant interest from the participants.

The progress of the ITER project was presented by Mr. J. Jacquinot as the agent of Mr. B. Bigot. The current status of superconducting tokamak projects, such as SST-1, K-STAR and WEST, was also presented (the presentation of the EAST was cancelled due to the absence of the Chinese presenter). According to the presentation, the Indian superconducting tokamak, SST-1, started its operation in 2013. Though it had troubles with helium leakage in the cooling pipes and DC breakers in the initial assembly, it had been working well since it was repaired.

The next APFA will be hosted by NIFS, and held in November 2017 in Toki, Japan.

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## News

## New panels of 8 contributors displayed


Panels hung on the display board in the JT-60 entrance hall (new ones are shown in red frame)

The panels of the JT-60SA key contributors have been hung on the wall in the JT-60 entrance hall. Eight contributors for the fabrication and assembly of the JT-60SA facilities have recently provided their panels. Their panels and names are shown in the figure and the following list in red:

1. Japan Atomic Energy Agency (JAEA)
2. Fusion for Energy (F4E)
3. Hitachi, Ltd.
4. Mitsubishi Electric Corporation
5. Toshiba Corporation
6. Commissariat à l'Énergie Atomique (CEA)
7. Ente per le Nuove Tecnologie, l'Energia e l'Ambiente (ENEA)
8. Centro de Investigaciones Energicas, Medioambientales y Tecnolicas (Ciemat)
9. Metal Technology Co., Ltd. (MTC)
10. Hitachi Power Solutions Co., Ltd.
11. Furukawa Electric Co., Ltd.
12. Consorzio RFX
13. Karlsruhe Institut für Technologie (KIT)
14. Belgian Nuclear Research Centre (Studiecentrum voor Kernenergie – Centre d'Étude de l'énergie Nucléaire: SCK • CEN)
15. ALLOY Corporation
16. Toyo Tanso Co., Ltd
17. Nippon Advanced Technology Co., Ltd. (NAT)
18. ALSTOM
19. Jema Energy S.A.
20. AIR LIQUIDE
21. Hitachi Chemical Co., Ltd.
22. Kawasaki Heavy Industries, Ltd.
23. IRIE KOKEN Co., Ltd.
24. ALSYOM
25. SDMS
26. Ingeniería y Diseño Europeo S.A. (IDESA)
27. Kusakabe Electric & Machinery Co., Ltd.
28. Fuji Electric Co., Ltd.
29. Furukawa C&B Co., Ltd.
30. OCEM
31. A Silva Matos Metalomecânica S.A.
32. Italian Consortium for Applied Superconductivity (ICAS)
33. Hitachi Transport System, Ltd.
34. ARGO GRAPHICS Inc.
35. IBIDEN Co., Ltd.
36. POSEICO S.p.A.
37. Nidec ASI S.p.A.
38. KIND GmbH
39. Kobe Special Tube, Co., Ltd.
40. Okazaki Manufacturing Company

41. MTT Corporation
42. ASG Superconductors S.p.A.
43. Walter Tosto S.p.A.
44. Asturfeito, S.p.A.
45. Nuclear Engineering, Ltd. (NE)
46. TOSHIBA ELECTRON TUBES & DEVICES Co. Ltd.
47. KITASHIBA ELECTRIC Co., Ltd.
48. Les Ateliers de la Meuse
49. MIRAPRO Co., Ltd.
50. SUKEGAWA ELECTRIC Co., Ltd.
51. Koudensha Co., Ltd.
52. Special Plate from B. Spears (F4E)

Please check them out when you visit the JAEA Naka Fusion Institute.

## Local

## Swans at pond Kotoku




The pond Kotoku is located about 9 km away from the JAEA Naka site. This old artificial reservoir, with a size of approximately 5 ha, has long been used for farming by local people (for more than 200 years at least).

In 1966, three swans were found here for the first time. Thanks to the careful preservation of the environment, the number of swans appearing per winter has increased to more than 100 in recent years. The most swans, 238, was observed during the winter of 1990. They come flying over thousands of km from Siberia, crossing the Sea of Japan to escape from the severe cold in Siberia and spend a warm winter in Japan.

The pond is one of the most famous bird-watching sites in Japan. On weekends, more than 2,000 people, including photographers, tourists and families, visit to see the swans as well as wild geese and ducks.

## Calendar

16 March 2016
18th Meeting of the STP Project Committee (PC-18)
Naka, Japan

22 April 2016
18th Meeting of the BA Steering Committee (SC-18)
Rokkasho, Japan

30 May – 3 June 2016
22nd International Conference on Plasma Surface Interactions in Controlled Fusion Devices (PSI 2016)
Rome, Italy

4 – 8 July 2016
43rd European Physics Society Conference on Plasma Physics (EPS 2016)
Leuven, Belgium

5 – 9 September 2016
29th Symposium on Fusion Technology (SOFT 2016)
(Prague, Czech Republic)

## Contact Us

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

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