JT-60SA Newsletter
No. 71, 30 November 2015

Headline

VIPs visit JAEA Naka site


Mr. Carlos Maldonado (right)


Mr. Ralf Kaiser (centre)


Mr. Stefan Kaufmann


Ms. Carmen Vela (right)

In September and October 2015,

- Mr. Carlos Maldonado, the Embassy of Spain Minister Counsellor Deputy Head of Mission (24 September);
- Mr. Ralf Kaiser, Head of Physics Section, IAEA (22 October);
- Mr. Stefan Kaufmann, Member of German Parliament (23 October);
- Ms. Carmen Vela, Secretary of State for Research, Development and Innovation, Ministry for Economy and Competitiveness, Spain (24 October (the second visit since 2 October 2013)),

visited the JAEA Naka site to see the progress of JT-60SA construction, which has been supported by European and Japanese collaboration.

Representatives of JAEA and F4E welcomed and guided them on a tour of the JT-60SA device, including the vacuum vessel (VV) in the torus hall, the equilibrium field (EF) coils in the superconducting coil winding building, the cryogenic system in the compressor building and cryogenic hall, and the magnet power supplies in the rectifier building.

PL visits ALSTOM, SDMS and MI

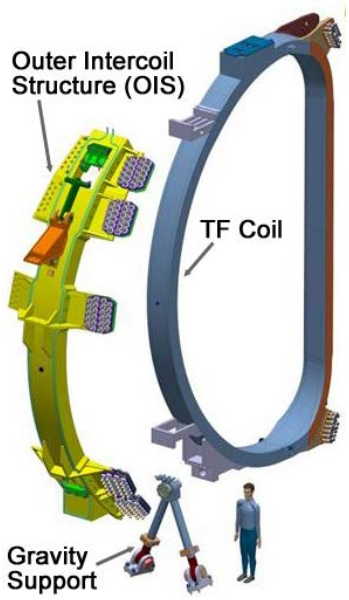


Figure 1: TF coil components

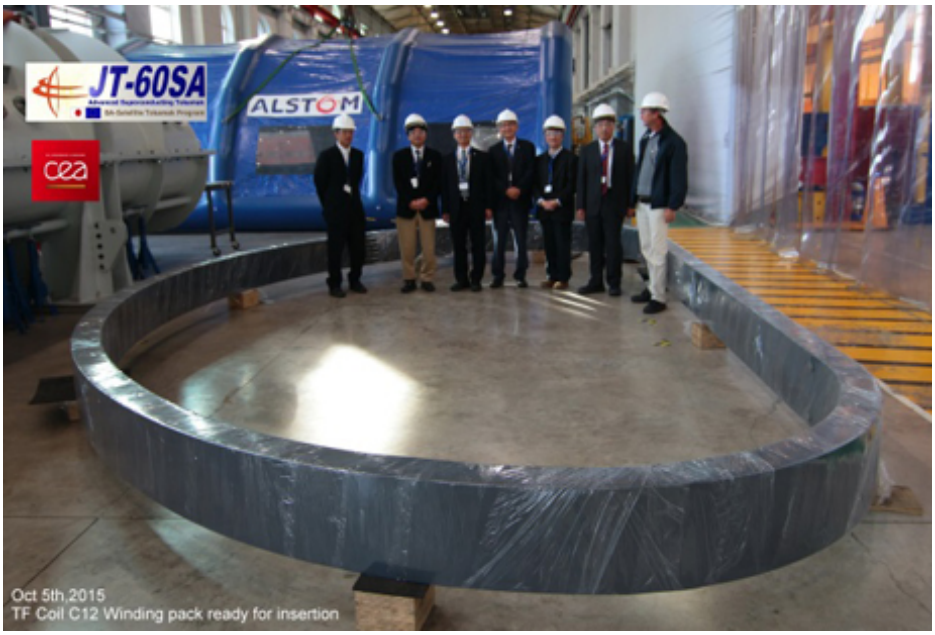


Figure 2: Inside the C12 WP, which is ready for insertion in the coil casing

Figure 3: With ALSTOM's project manager and project leader in front of the C11 ready for welding closure

On 5 and 6 October 2015, the JT-60SA Project Leader (PL), H. Shirai, accompanied by JAEA, F4E and CEA representatives, visited Alstom S.A. (ALSTOM) and SDMS technologies (SDMS) in France, where, respectively, 9 +1 toroidal field (TF) coils and the 18 outer intercoil structures (OISs) are being manufactured (Figure 1).

In Belfort, the PL was welcomed by Mr. Marc Nusbaum and Mr. Gerard Billotte, the project manager and the project leader for the JT-60SA activities at ALSTOM, who conducted the visit to the TF coil production line. At this stage, the coil production is running at full capacity with 6 coils (C11 to C16) in production at ALSTOM's premises and 1 coil (C10) in the final machining

step at CMO, ALSTOM's machining subcontractor, located in Obemay (150 km away from Belfort). The current status of each coil was as follows:

- C16 on the winding table for the winding of the last double pancake (DP);
- C15 at the joints area for the joints and terminals completion;
- C14 in the final impregnation stage of the winding pack (WP);
- C13's WPs completed having passed the Paschen test successfully;
- C12 ready for casing integration (Figure 2);
- C11 in the step of casing closure welding after WP and casing integration (Figure 3).

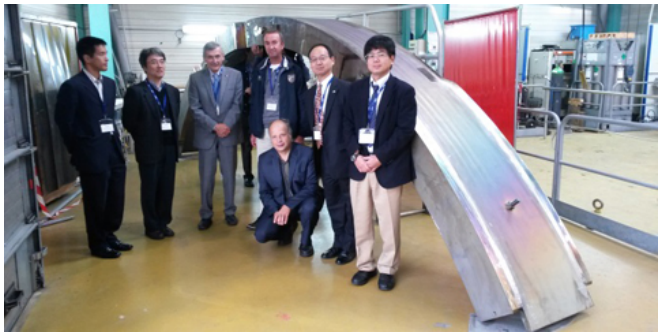


Figure 4: With SDMS's CEO in front of the OIS02 U-shape body after EB welding

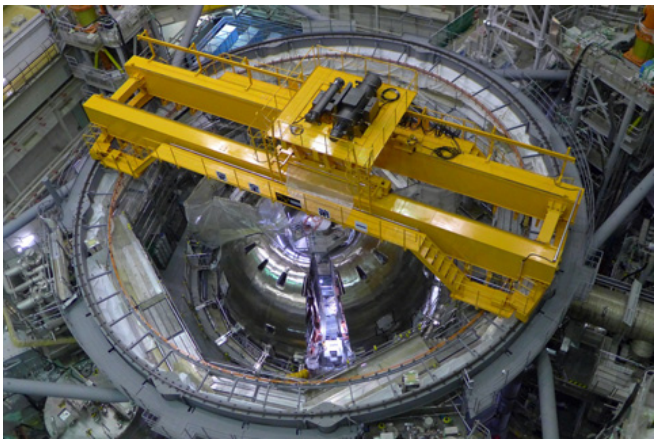
Figure 5: With SDMS and MI representatives in front of the OIS01 in its final machining stage.

In Saint Romans, the PL was welcomed by Mr. Olivier Besançon, the chief executive officer (CEO) of SDMS, who conducted the visit to SDMS's workshops, where the OISs were being manufactured. Mr. Besançon also presented the activities of SDMS on recent fusion developments for CEA. In Saint Romans, the PL was able to witness that all the subcomponents for the 18 OISs, including EF1 supports, tie rods, and splice plates, had been delivered, and that their assembly had started. The electron beam (EB) welding of the side walls was ongoing. 6 back plates had already been rolled and were ready for machining. As for the OIS02 (Figure 4), the EB welding of the side walls and back plate had been completed, and it had been prepared for machining. The PL could also see the OIS01 (Figure 5) in the very last stage of final machining at Marcel Industrie (MI), a sub-contractor of SDMS, located 15 km away from Saint Romans.

During the meetings with F4E, CEA and manufacturer's representatives both in Belfort and in Saint Romans, the PL presented the progress of the JT-60SA project both in Japan and in Europe, and also the main milestones to be reached before the first plasma.

News

VV assembly progress: rotary crane installed

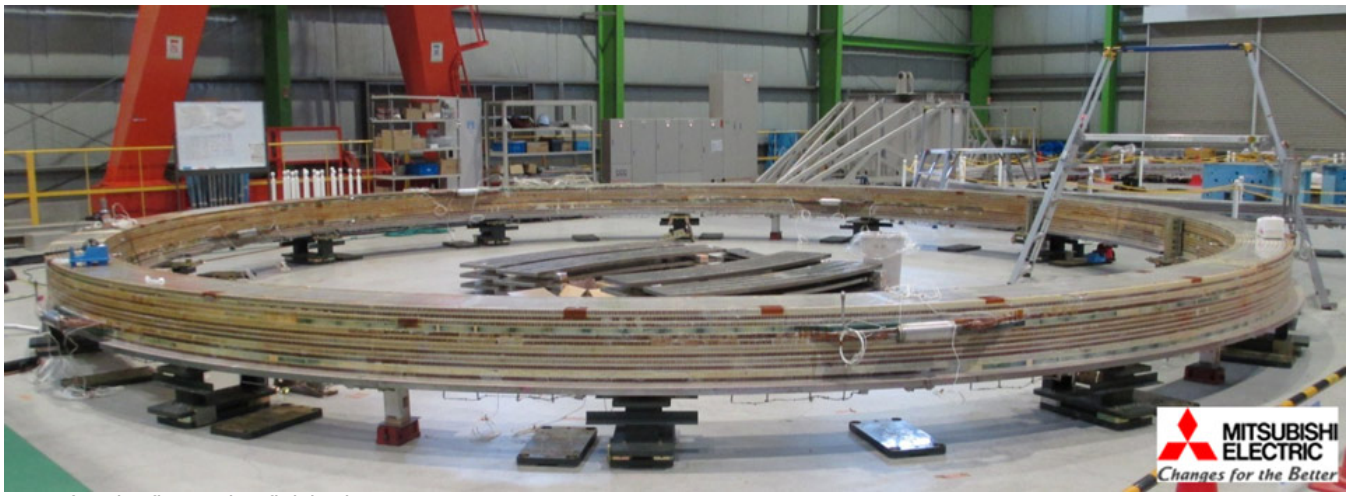


The 340° VV torus completed its assembly and welding in the end of August 2015. The vacuum tightness at its weld points was confirmed through non-destructive tests - including a radiographic test, an ultrasonic test, and a liquid penetrant test - which had been performed up to the end of October.

In the meantime, the installation of the rotary crane started in September, mounted on the surrounding support structure. The crane passed a completion test and finished installation in October (see figures). It will be used to insert the VV thermal shield and the TF coils through the 20° gap for the final VV sector, threading them over the VV into their designated positions.

News

EF coils manufacturing status updates



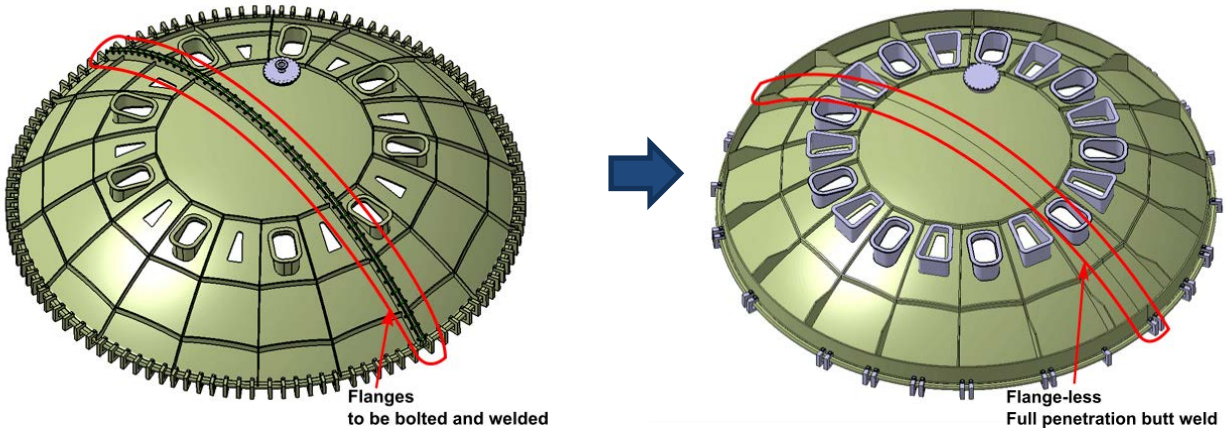
EF2 after the first curing finished

The manufacturing of the EF coils No. 1 – 3 is progressing steadily.

For the EF1 coil, with a diameter of 12 m and 12 single pancakes (SPs) in total, 6 of the SPs have finished the stacking stage. For the EF2 coil, with a diameter of 9.6m and 12 SPs in total, all of the SPs have been stacked (see figure) and it has ended its curing as a whole. As for the EF3 coil, with a diameter of 4.4 m and 7 DPs in total, the fourth DP has been prepared for the first curing (the resin impregnation before taping the ground insulation film), while winding of the fifth DP has started.

News

Assembly and transport scenario of cryostat top lid revised



The cryostat top lid has a toro-spherical shape with a diameter of 11.6 m.

Because it was difficult to transport the completed lid on a public road and carry it into the assembly hall through the existing service entrance (7 x 9 m) of the assembly hall at the JAEA Naka site, the lid was originally intended to be fabricated, transported and assembled by:

1. producing the lid in 2 halves in the manufacturer's workshop;
2. transporting the 2 halves from the manufacturer to the JAEA Naka site;
3. carrying them into the assembly hall through the existing service entrance;
4. bolting and welding the flanges to each other to complete the assembly.

However, the newly constructed entrance (2.6 x 14 m), which was used for the EF5 and EF6 in January 2015, now permits a better solution. It was found that the entire lid would pass through the new entrance if it is erected like the EFs were. Therefore, the design and assembly of the lid have been revised. The new scenario involves:

1. producing the lid in 2 halves at manufacturer's workshop;

2. transporting the 2 halves from the manufacturer to the JAEA Naka site;
3. carrying them into the superconducting coil winding building instead of the assembly hall;
4. joining and welding them to each other with a full penetration butt weld of 34 mm thickness;
5. transporting the completed lid from the superconducting coil winding building, setting it up vertically, and carrying it into the assembly hall through the new entrance.

The newly designed lid without flanges makes its assembly simple and its structure stronger. It has been confirmed that the lid, jointed with weld and clamps, will maintain its vacuum seal tightness either in normal operation, and even in an emergency with an accidental overpressure up to 0.12 MPa.

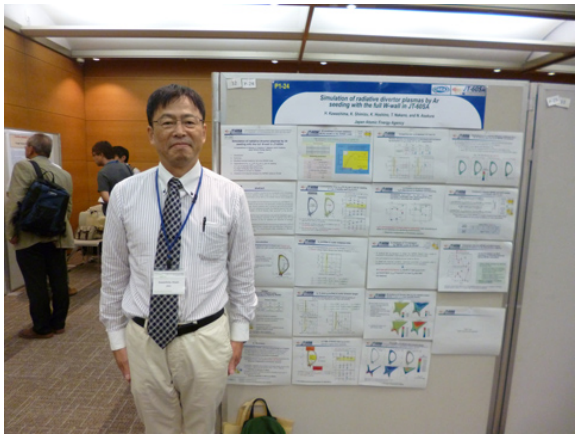
Meeting

PET15

The 15th International Workshop on Plasma Edge Theory in Fusion Devices (PET15) was held at Nara Kasugano International Forum IRAKA in Nara, Japan on 9 - 11 September 2015. During this workshop, a total of 94 presentations (6 invited, 14 orals and 74 posters) were performed.

H. Kawashima from JAEA presented "Simulation of radiative divertor plasmas by Ar seeding with the full W-wall in JT-60SA" on a poster (see figure). This paper described results of the SONIC code simulation of the plasma behaviour in the scrape-off layer and divertor region on the assumption of a full tungsten wall in JT-60SA. In the simulation the amount of deuterium and argon gas was optimized to increase radiation power at the divertor and to reduce heat load to the divertor plate. The simulation revealed that tungsten ions sputtered from the divertor plate would reduce the effect of argon radiation, suppressing the sputtering. In addition, a Monte-Carlo module implemented in SONIC revealed that the spatial distribution of argon ions is predominantly determined by the atomic shell structure of argon ions.

This presentation attracted many participants and was well received.



Meeting

ISFNT-12

Figure 1: PL giving an invited oral presentation of the JT-60SA project

Figure 2: C. Gleason-González (right) at the award ceremony

Figure 3: Closing ceremony

The 12th International Symposium on Fusion Nuclear Technology (ISFNT-12) was held at the International Conference Centre JEJU in Jeju Island, Korea, on 14 - 18 September 2015. During this symposium, a total of 668 presentations (72 orals and 596 posters) were given.

There were 2 presentations from the Satellite Tokamak Programme (STP) Project Team (PT) and the JT-60SA EU Home Team as follows:

- Invited oral presentation (1)
  - H. Shirai from STP-PT, on “Progress of JT-60SA Project: EU-JA Joint Efforts for Assembly and Fabrication of Superconducting Tokamak Facilities and its Research Planning”;
- Poster presentation (1)
  - C. Gleason-González from Karlsruhe Institute of Technology (KIT), on “Simulation of Collisional Effects on Divertor Pumping in JT-60SA”.

H. Shirai, PL of the STP Project Committee, orally presented an overview of the JT-60SA construction, and remarked that the JT-60SA project was progressing steadily towards the objective to achieve “first plasma” in 2019 (Figure 1). The audience listened with interest, and the presentation was well received.

On 17 September, the winners of the “Fusion Engineering and Design (FED) Student Award at ISFNT”, sponsored by Elsevier B.V., were announced. This award acknowledged outstanding contributions to the field of fusion nuclear technology, presented at the conference by a Masters or PhD student and either by poster or oral session. Cristian Gleason-González, PhD student at KIT, was chosen as one of the two winners from hundreds of presenters (Figure 2). His research focuses on the numerical modelling of neutral gas flow in the sub-divertor region of tokamaks. He adopted the “Direct Simulation Monte Carlo (DSMC)” method for gas description, which can cover a wide range of collisionality flow regimes from JT-60SA to ITER and DEMO.

The next ISFNT will be held on 25 - 29 September 2017 in Kyoto.

Calendar

11 Dec 2015
17th Meeting of the BA Steering Committee (SC-17)
Padua, Italy

14 - 18 Dec 2015
10th Asia Plasma and Fusion Association Conference (APFA 2015)
Gandhinagar, India

24 - 25 Feb 2016
24th Technical Coordination Meeting (TCM-24)
Naka, Japan

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

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

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/.