

## Headline

### Vacuum vessel assembly begins



Figure 1: VV sectors (VV-D03 and VV-D04) installed on the cryostat base



Figure 2: From left to right: Y. Ikeda (JA deputy PM), E. Di Pietro (EU deputy PM), Y. Kamada and P. Barabaschi in the torus hall

After the completion of the assembly frame (Newsletter [No. 51](#)), the vacuum vessel (VV) assembly was started at the end of May. The first and second VV 40° sectors (VV-D03 and VV-D04) were installed on the cryostat base (Figure 1). The ten completed VV sectors in total will be installed in a particular sequential order, to finally make the doughnut-shaped VV, with a height of 6.6 m and an outer diameter of 10 m.

This starting point was shown to the press on 4 June and the major Japanese news media came to witness the event. In addition, both European and Japanese Project Managers (PMs), P. Barabaschi and Y. Kamada (Figure 2), were interviewed. They explained the significance of the construction and operation of JT-60SA preceding that of ITER under the collaboration of Europe and Japan, and its important role.

### Change at the JT-60SA Project helm



H. Shirai (left) takes over as JT-60 SA Project Leader from S. Ishida (right)

The Project Leader (PL) of the Satellite Tokamak Programme (STP) project was changed on 1 July 2014. For this occasion, the former leader, S. Ishida, and the new leader, H. Shirai respectively summarised their career and ambitions for the JT-60SA construction.

At the 1st Broader Approach Steering Committee (BASC) in June 2007, S. Ishida took the role of STP-PL. He recalled a tough seven year job as follows: "The project had started facing significant problems on cost, schedule, performance and management with very limited human resources. In October 2007, the 1st Project Coordination Meeting (PCM) was held in chaos among the PL and Project Managers, but achieved a consensus that only a clear and common mission can hold an organisation as a single team together and enable it to produce results. The story following that PCM, on its 100th anniversary, is written in Newsletter [No.30](#). I am very proud that the problems have been overcome in that direction, and confident about the future. I would like to take this opportunity to express my sincere appreciation to all members of the Integrated Project Team (IPT) for their efforts and cooperation continued ever since the project began."

"The Project Team (PT) in support of the PL has been organised to be small but takes an essential and effective role in achieving the steady progress in project management and procurement coordination between the European and Japanese Home Teams. There have been also some problems which we could not manage completely at the project level. The steady progress of the project would not have been obtained unless there were not only our efforts but also strong support and encouragement by the Project Committee and the Steering Committee to navigate the project in the right direction. Thanks to the synergetic and coherent environments around the project, the project has successfully entered the tokamak assembly phase and now opened the door towards the first plasma with a kick-off of the integrated commissioning planning at the 20th Technical Coordination Meeting (TCM-20) in June. It would be reasonable for me to leave the project with a good momentum and hand over this role to the next PL at this point."

"From this April, I am working at the Planning and Co-ordination Office located at the JAEA Naka site for the management of fusion research and development including the ITER project and BA activities covering the Naka and Rokkasho Fusion Institutes. Of course I will continue to give full support to the JT-60SA project from that different position!"

The new PL, H. Shirai, was the group leader of the ITER Project Promotion Group in the JAEA Tokyo office from 2007 to March 2014. In 2012 and 2013 he was the chairman of the ITER Council preparatory working group (CPWG) and also took on the role of BASC Secretariat from June 2007 to October 2011. In anticipation of his new missions he said "I am looking forward to the day to come when the re-formed experimental team members enjoy and devote themselves to the JT-60SA experiments on the basis of innovative ideas they incubated during the intervening years. For this purpose, coordination and promotion of this project right on schedule is an absolute must."



The former PL, S. Ishida and JA participants at the PCM-132



EU participants at the PCM-132 (screenshot of the meeting)

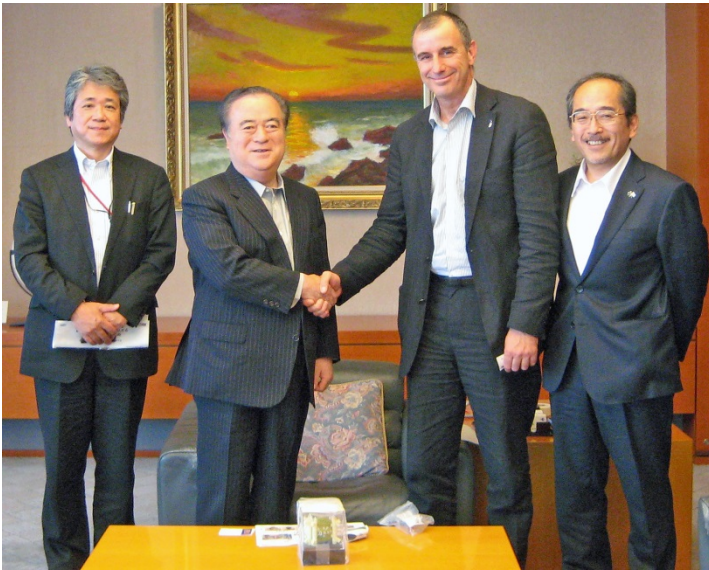
H. Shirai was a theoretical plasma physicist in the early phase of his professional career, “I was away from Naka for more than ten years. Although I am familiar with most of the people in Naka, as ever, aspects of activities on research and development have changed significantly during this period: JT-60 was shut down, dismantled and then the JT-60SA project started up quickly. I have to catch up with the ongoing activities here in a short time. Thanks to the assistance of the PT members, I am accommodating myself to the new work environment.” He continued “Coordinating to keep the schedule of this project is quite a demanding task. But I and the PT members are dedicated to fulfilling our responsibilities”.

The 132th PCM was held on 18 June, once again confirming the present status, progress and future plan of the project through discussion and information exchange. This meeting was the last one presided over by S. Ishida. At the end of the meeting, he recalled the long and strenuous path to keep the project on track with the strong support of the IPT, and looked forward to the further development of the project.



## News

### Courtesy call on Governor of Ibaraki Prefecture and Mayor of Naka



From left to right: M. Mori, M. Hashimoto (Governor), P. Barabaschi and Y. Kamada at the Governor's office



From left to right: M. Mori, E. Di Pietro, T. Umino (Mayor), T. Mastuzaki (Vice Mayor) and Y. Kamada at the Mayor's Office

European and Japanese Project Managers (PMs) of the Satellite Tokamak Programme project, P. Barabaschi and Y. Kamada, and the European deputy, E. Di Pietro, as well as the Director General of Naka Fusion Institute of JAEA, M. Mori, paid courtesy calls to the Ibaraki prefectural government's office and Naka municipal government's office in the margins of TCM-20. The PMs provided the overview and present status of JT-60SA including the recent hot topic of initiation of vacuum vessel assembly in the torus hall. Mr. Masaru Hashimoto, the Governor of Ibaraki prefecture, as well as Mr. Toru Umino, the Mayor of Naka City, have been strong supporters of fusion research and development. They were immensely pleased with the steady progress of JT-60SA and encouraged further development of the project.

## News

### **Test on the inverter prototype for the RWM-PS successfully accomplished**



Factory tests on the inverter prototype for the RWM-PS attended by JAEA, Consorzio RFX and F4E delegates

In JT-60SA, a set of 18 in-vessel coils are foreseen to control the particular type of plasma instability known as resistive wall modes (RWM). The Italian National Research Council (CNR), acting through Consorzio RFX (Padova, Italy), is in charge of providing the power supplies (PS) to feed these coils. After joint studies between Consorzio RFX and JAEA to improve the design of the whole system for RWM control, the coil design was finalised by JAEA in 2012 and the final set of PS requirements was agreed.

Each coil will be fed by a dedicated inverter (300 A, 240 V), which has to guarantee very high dynamic performance. In particular, a current bandwidth of 3 kHz and latency between output voltage and reference lower than 50  $\mu$ s are necessary. To prove the feasibility of the specifications and the availability of suitable power switches at reasonable cost, Consorzio RFX proposed to develop an inverter prototype.

A call for tender was placed and won by the Italian company Equipaggiamenti Elettronici Industriali (E.E.I.) in May 2013. E.E.I. designed the prototype based on very fast and innovative hybrid silicon-insulated gate bipolar transistor (IGBT) / silicon carbide diode modules, switching at 30 kHz. The preliminary tests with the complete inverter and a dummy load provided by JAEA were carried out in May 2014 at the E.E.I. premises in Vicenza (Italy) in the presence of JAEA, Consorzio RFX and F4E delegates. The test results were very good and demonstrated the full compliance with the very demanding requirements.

## Manufacture of spring plates for VV gravity supports started

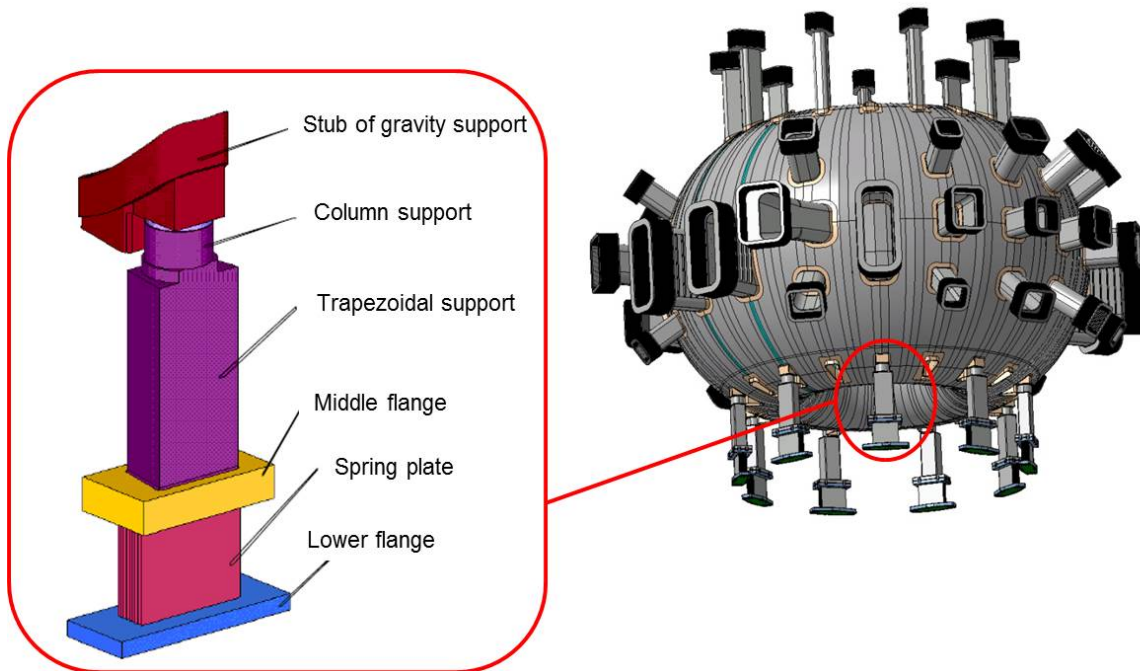


Figure 1: Detail of VV gravity support



Figure 2: Electrical discharge machined spring plate

The gravity supports for the vacuum vessel (VV) sustain the weight of the VV and operational loads. There are nine gravity supports in total which will be installed under the VV at regular intervals in the toroidal direction (Figure 1).

In addition, the gravity supports also absorb thermal expansion during baking and have a unique characteristic that the stiffness is high in the vertical direction and low in the radial direction. To meet the needs of the characteristic, the spring plate is manufactured using forged material in an electric discharge machining process.

The electrical discharge machining of the first spring plate has just been completed (Figure 2). After that, the spring plate will be welded to the flanges using an electron beam to make the structural member of the spring plate, and finally it will be joined to the column support and trapezoidal support to form the complete gravity support.



## Meetings

### 3rd Research Coordination Meeting



Figure 1: Group photo at the lobby of the JT-60 control building



Figure 2: Discussion during the RCM-3



Figure 3: Participants in the torus hall, viewing the state of JT-60SA assembly

The 3rd Research Coordination Meeting (RCM) was held at the JAEA Naka site on 19-23 May (Figure 1). 41 experts in total (26 from Japan, 13 from Europe, and 1 expert and the Project Leader from the Project Team), participated in the meeting, including 2 experts via videoconference. The participants actively and constructively discussed the revisions in the JT-60SA Research Plan considering the recent progress in Japan and Europe, the long term plan to expand collaborative studies, and DEMO designs and issues as a part of the collaboration with the DEMO Design Activities (DDA) for the IFERC project (Figure 2). In addition, the meeting was followed by breakout sessions where plasma simulation, data and operation, divertor configuration, fuelling and pumping, diagnostics, electron cyclotron resonance heating (ECRH), strategy, and organisation were discussed.

During the meeting, the participants visited the torus hall to see the installed cryostat base, equilibrium field coils and a sector of the JT-60SA vacuum vessel, and were informed about the progress with JT-60SA assembly (Figure 3).

The participants agreed with proposals for each chapter revision and subjects of possible collaborative work towards the new version of the “JT-60SA Research Plan”. The next meeting is planned to be held in May 2015.

## Meetings

### 20th Technical Coordination Meeting held in Naka



Figure 1: Discussion during the TCM-20



Figure 2: Screenshot of the TCM-20 videoconference



Figure 3: Opening talk by the DPL, H. Shirai

The 20th Technical Coordination Meeting (TCM-20) was held at the JAEA Naka site on 4 and 5 June 2014. About 80 experts in total (the JA / EU Home Teams, the Project Team and 4 invited attendees) participated in the meeting including those from France, Germany, Italy and Spain via videoconference (Figures 1 and 2).

On the first day, the meeting was opened by the deputy Project Leader (DPL), H. Shirai (Figure 3), and the agenda of TCM-20, the action list to be updated, and Plant Integration Document (PID) updating plan were briefly presented. Information on the JT-60SA project progress, i.e. status and issues of European and Japanese procurements and Home Team activities, were summarised. This was followed by discussion on detailed issues of procurement arrangements for toroidal field coil (TFC) manufacture, the cold test facility for the TFCs, poloidal field (PF) conductor and PF coil manufacture, fabrication of the central solenoid and equilibrium field coils, the magnet shared components, the thermal shield, and the cryostat vessel body cylindrical section. Progress could be seen in the cryostat top lid design, the vacuum vessel (VV) manufacture and VV assembly in the torus hall.

On the second day, participants visited the torus hall and witnessed the progress of on-going activities of JT-60SA assembly (Figure 4). Thereafter the research collaboration on the divertor pumping between EUROfusion and JAEA was reported. Recent activities related to the revised assembly procedure, the error field correction coil design, cryogenic system, the high-temperature superconducting current leads, various systems of power supplies, and supervisory control system and data acquisition system, were also presented. The kick-off of the Integrated Commissioning Team was initiated by the JA Project Manager, Y. Kamada. Finally the PID was reviewed and updated toward the new version. The Project Leader, S. Ishida, confirmed that the next TCM-21 would be held at CEA Saclay on November 12-13.





Figure 4: Group photo in front of the JT-60SA assembly frame

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## **Calendar**

September 26 - October 3, 2014  
28th Symposium on Fusion Technology (SOFT-28)  
San Sebastian, Spain

October 7, 2014  
15th Meeting of the STP Project Committee (PC-15)  
Naka, Japan

October 13-18, 2014  
25th Fusion Energy Conference (FEC 2014)  
Saint Petersburg, Russia

November 4, 2014  
15th Meeting of the BA Steering Committee (SC-15)  
Karlsruhe, Germany

November 12-13, 2014  
21st Technical Coordination Meeting (TCM-21)  
Saclay, France

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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 [hisato.kawashima@jt60sa.org](mailto:hisato.kawashima@jt60sa.org).

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