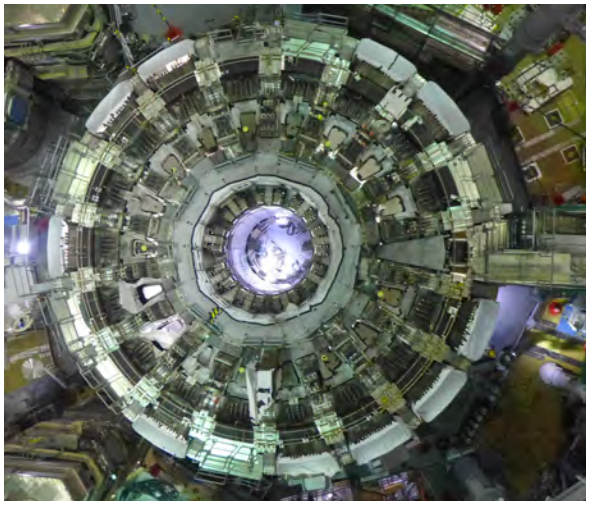
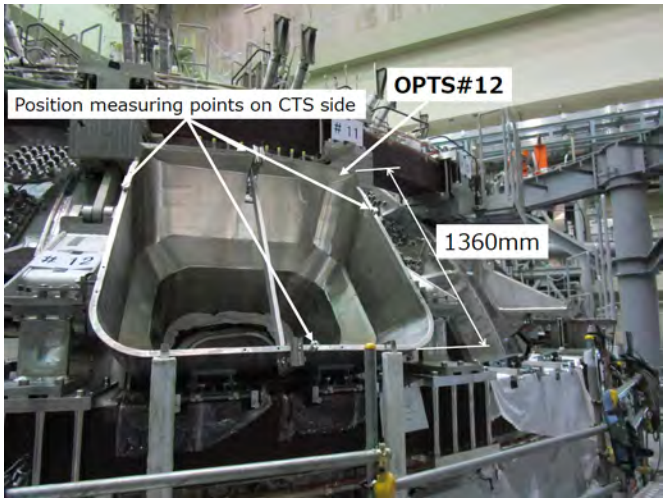
JT-60SA Newsletter

No. 105, November 2018

Headline

Installation of 10 OPTSs completed





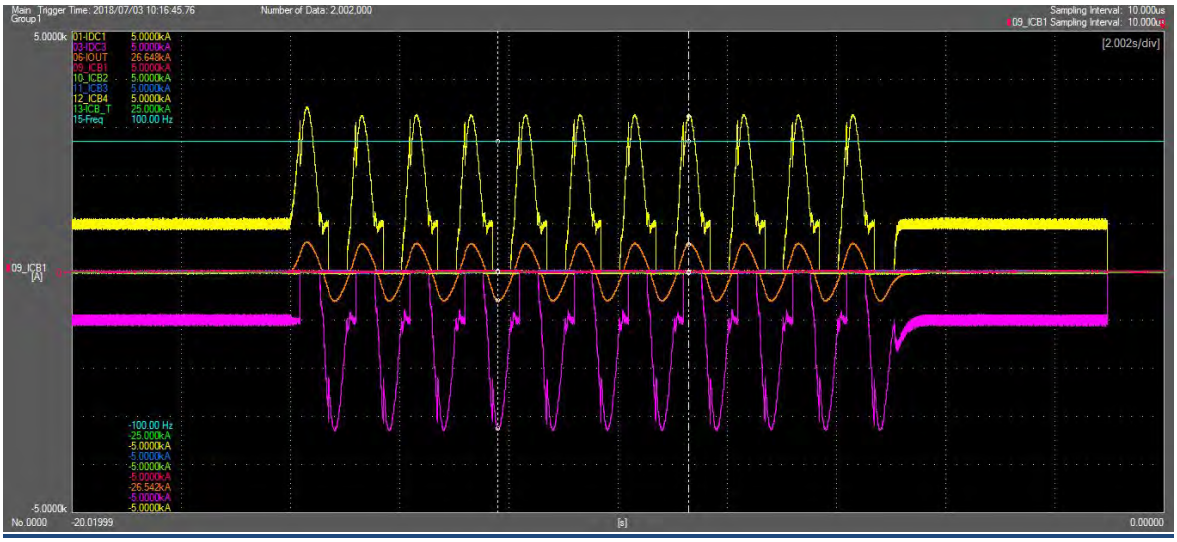
To install oblique port thermal shields (OPTSs), the OPTSs are welded to both the vacuum vessel thermal shield (VVTS) and the cryostat thermal shield (CTS) with a coupler.

For these installations, the OPTS mounting positions, with respect to the assembly centre, were carefully decided by measuring reference points on the OPTS with a laser tracker. The accurate positioning (± 10 mm) of these mounting points was achieved by using specific couplers aligned onsite.

All 10 OPTSs were installed in the same manner and the installation of all OPTSs has now been completed.

News

Installation of all SCMPSs completed



Analysis of triangular shape current waveform on oscilloscope

The site activities related to the superconducting magnet power supplies (SCMPSs) procured through the voluntary contributor ENEA, which are managed directly by Fusion for Energy (F4E), entered into their most important phase and are proceeding in full swing.

In fact the installation of the last SCMPS was completed in September 2018, but the commissioning phase was anticipated and already started. The choice to proceed simultaneously with installation and commissioning of different parts of the SCMPS has been made in order to expedite the completion of the individual commissioning phase that is mandatory in order to proceed with the combination test foreseen for spring 2019. The overlapping of installation and commissioning phases was possible thanks to the location of the different SCMPSs in different rooms, and particular attention has been given to the safety aspects with dedicated procedures to be followed during the energization phases.

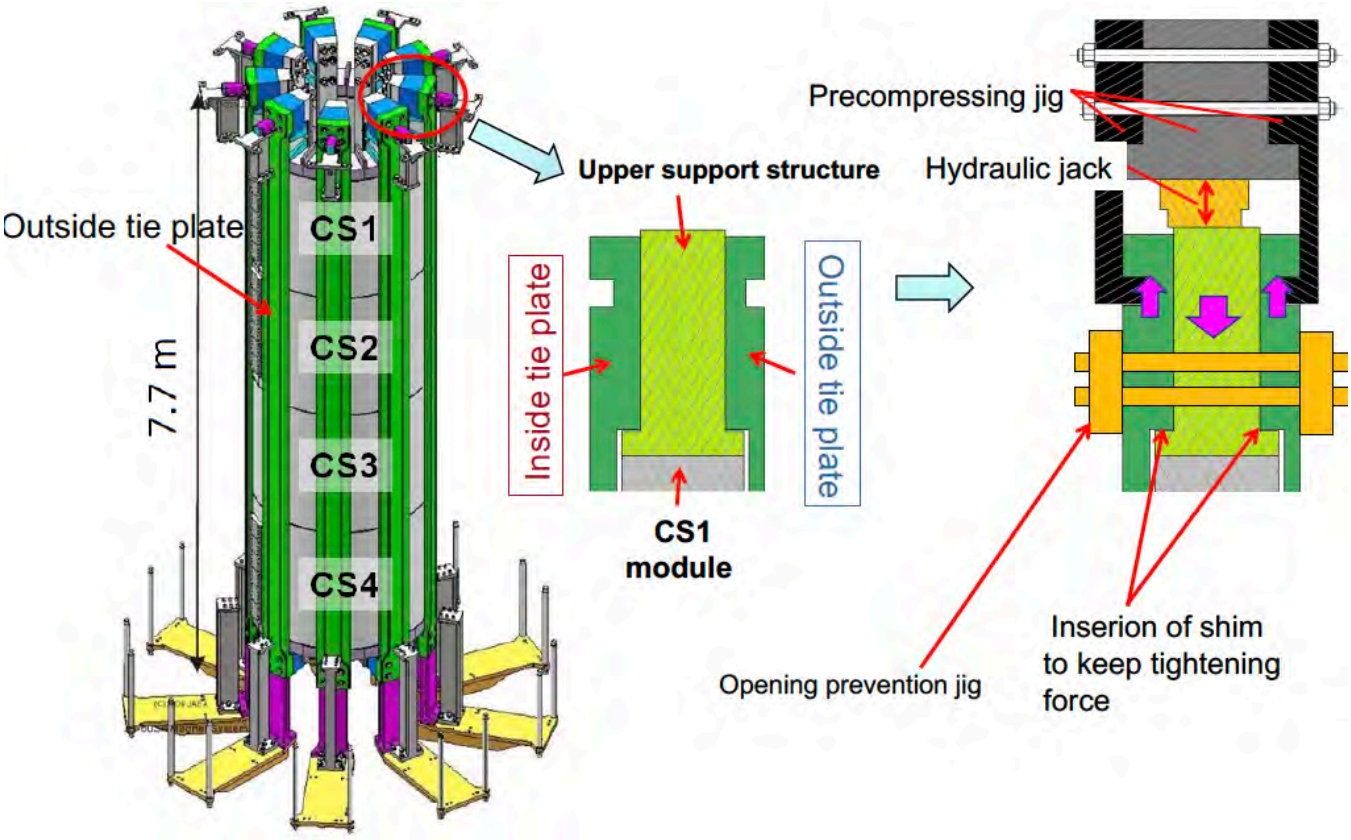
On 12 October 2018, power supplies for the fast plasma position control (FPPC)1, FPPC2, CS2 and CS3, located in the vacuum circuit breaker (VCB) room, passed successfully their power tests, while the power tests of the power supplies for the central solenoid (CS)1, CS4, equilibrium field (EF)1 and EF6, located in the rectifier room, are scheduled to be completed by the end of the year in order to allow the motor generator, essential for the power tests, to be made available for dedicated maintenance.

Testing crew in action

View of the CS2 transformer energized

News

CS manufacturing finalised



Tightening method of CS modules

The four modules of the central solenoid (CS) would separate from each other when cooled and energised, leading to relative movement, if they were not strongly pressed together and fixed to each other. To achieve this, nine sets of metal plates (tie plates) are equi-spaced around the circumference of the four stacked modules. They were intended to be pulled tight using hydraulic jacks placed on the uppermost part of the CS modules, pressing the CS modules together (Figure).

In practice, the upper parts of the tie plates bend away from the coil as the applied forces are increased, and the required tightening force cannot be obtained. To prevent this, an opening prevention jig to hold together the inside/outside tie plates and upper support structure with a bolt was designed with a 3D Finite Element Method (FEM) calculation code, and was adopted.

In the tightening work, with a strain gauge installed in each tie plate, the force was confirmed to be uniformly applied at each position in a circumferential direction, and the force applied to the tie plates was gradually increased. As a result, the four CS modules were successfully tightened with the required tightening force (4.168 MN/Sector).

Meeting

23rd STP Project Committee Meeting

The 23rd Meeting of the Satellite Tokamak Programme Project Committee (STP-PC) was held on 19 October 2018. A total of 30 participants joined the meeting also by videoconference. There were 6 members from the Project Committee, the Project Leader (PL), 6 experts from the Project Team, and 17 experts from the EU and Japanese Home Teams (HTs).

At the meeting, the PL overviewed the project status and presented “Update of Project Plan” and “Work Programme 2019” to be submitted to the 23rd Steering Committee Meeting (SC-23) on 5 December 2018. The latest status of procurement and assembly was also reported in detail by the Project Managers of the EU and Japanese HTs.

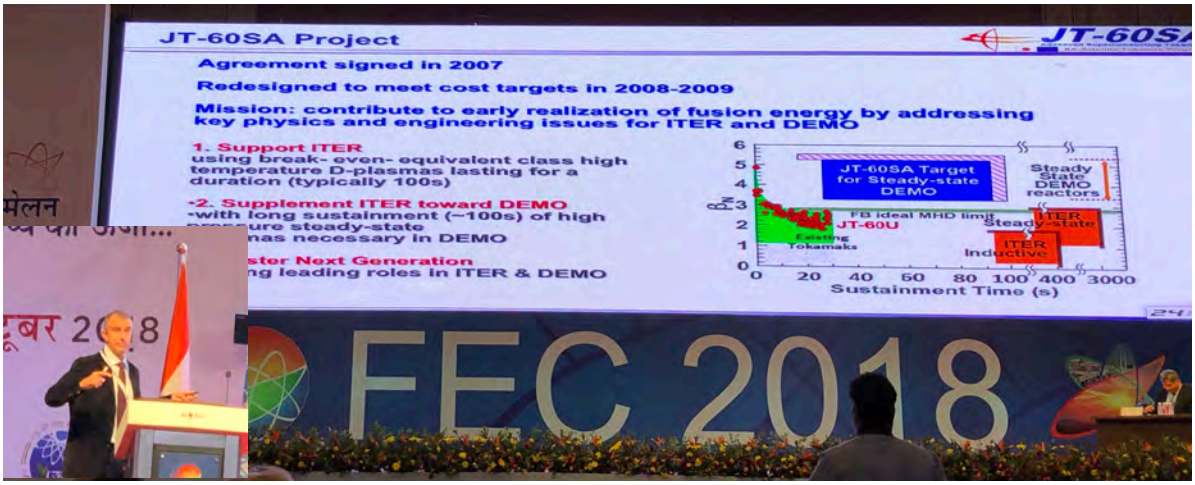
The STP-PC expressed satisfaction with the achievements and the progress in both EU and Japanese procurements as well as the assembly, installation and commissioning activities since the last STP-PC. These include delivery of one spare toroidal field (TF) coil (TFC#19) and resistive wall mode power supply (RWM PS) to the Naka site, progress of installation and commissioning of superconducting magnet power supplies (SCMPS), progress of electron cyclotron range of frequency (ECRF) PS component fabrication, progress of the central solenoid (CS) stacking and precompression, progress of fabrication of Coil Terminal Boxes, Cryostat Thermal Shields, Port Thermal Shields, and Cryostat Top Lid, and the steady progress of the assembly work of all 18 TF coils, upper equilibrium field (EF) coils, and the VV final sector. The STP-PC appreciated the completion of the TFC Pre-assembly Procurement Arrangement (PA) as scheduled as well as conclusion of the EDICAM PA. The STP-PC commended the strenuous efforts of both Implementing Agencies (IAs) for the assembly acceleration activities with two shift assembly work at the EU assembly cost.

The STP-PC recommended the “Update of Project Plan” and “Work Programme 2019” for approval by the SC.

The STP-PC decided that the next STP-PC meeting (PC-24) would be held on 13 March 2019.

Meetings

IAEA FEC 2018



P. Barabaschi making his invited talk

The 27th IAEA Fusion Energy Conference (FEC 2018) was held from 22 through 27 October 2018 in Ahmedabad, India. The International Atomic Energy Agency (IAEA) fosters the exchange of scientific and technical results in nuclear fusion research and development through its series of Fusion Energy Conferences. The FEC 2018 aims to provide a forum for the discussion of key physics and technology issues as well as innovative concepts of direct relevance to the use of nuclear fusion as a source of energy. The programme consisted of plenary sessions, oral and poster presentations. Over 700 participants attended the conference.

P. Barabaschi , JT-60SA Project Manager of the EU Home team affiliated to Fusion for Energy (F4E), presented an invited talk on the status of the JT-60SA project: toroidal field (TF) coils tested, delivered, last sector assembled, overall delivery mostly completed, 90% of the credit value accepted, torus assembly nearly completed, commissioning underway for the first plasma planned in September 2020, successful Integrated Project Team (IPT) management model, JT-60SA research plan elaborated, and onward plans under approval. The audience listened with interest and several questions were asked.

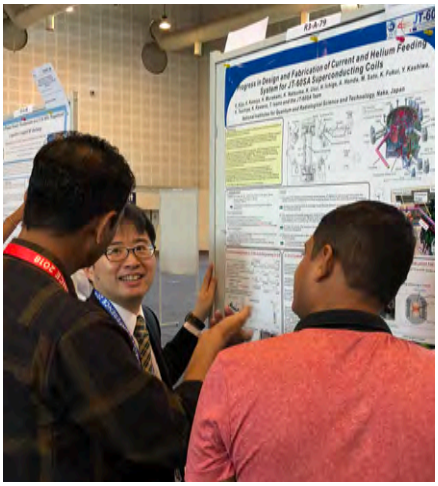
Presentations related to the JT-60SA project from the JT-60SA EU and Japanese Home Teams are as follows (only presenters and titles are shown):

- Overview presentation (1)
  1 P. Barabaschi, Progress of JT-60SA Project.

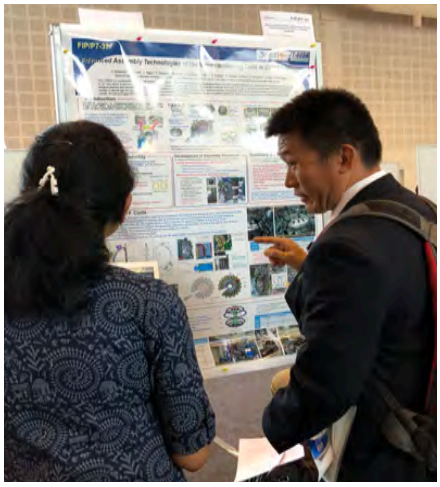
- Oral presentations (1)
  1. N. Hayashi, Predictive Integrated Modelling of Plasmas and their Operation Scenarios towards Exploitation of JT-60SA Experiment.

- Poster presentations (6)
  1. T. Kobayashi, Progress in Development and Fabrication of the JT-60SA ECH/CD System;
  2. E. Gaio, Consorzio RFX Contribution to the JT-60SA Project in the Frame of the Broader Approach Agreement;
  3. G. De Tommasi, 2D and 3D Modelling of JT-60SA for Disruptions and Plasma Start-Up;
  4. L. Pigatto, Resistive Wall Mode Physics and Control Challenges in JT-60SA High-β_N Scenarios;
  5. K. Kizu, Progress in Design and Fabrication of Current and Helium Feeding System for JT-60SA Superconducting Coils;
  6. Y. Shibama, Advanced Assembly Technology of the Superconducting Coils in JT-60SA Tokamak;

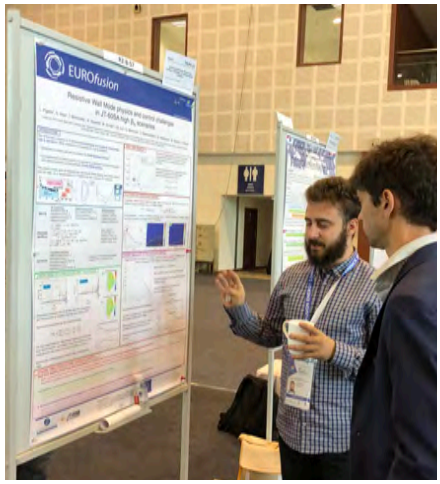
The next IAEA FEC will be held in Nice, France, on 12–17 October 2020.



K. Kizu with his poster presentation



Y. Shibama with his poster presentation



L. Pigatto with his poster presentation

News

Welcome back, Mr. Kleiner

D. Kleiner in front of the JT-60SA key contributor panels

My name is Davide, I come from Friuli in Italy and work in Fusion for Energy (F4E) as a technical officer. I have an academic background in aerospace engineering, followed by a balanced mixture of applied research and industrial experience in the fields of materials engineering and heavy equipment manufacturing, generally for the energy market. I have experience in design and manufacturing of mechanical systems and workshop automation, joining technologies, inspection and material testing campaigns.

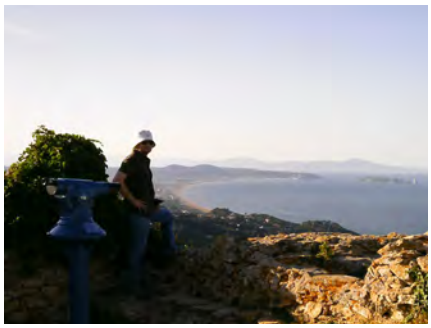
Currently, I would normally be based at F4E Barcelona, working on the International Thermonuclear Experimental Reactor (ITER) heating antennas. However, I used to be part of the TF coil team and hence visited the Naka site a number of times for the EU-Japan cooperation on the ITER TF coils. I also have some best friends in Tokyo, whom I have known for more than 20 years, and as a result I tend to travel to Japan almost every year.

Earlier this summer, I learnt by talking to my Broader Approach (BA) colleagues that help would be welcomed on a work package on the JT-60SA TF coils during the autumn; what a great occasion to gather some experience on a real tokamak and visit once again this beautiful country! I volunteered, and well, you can guess the rest of the story.

In the ‘80s and ‘90s, Italy was a major importer of Japanese anime (Mito Kōmon being a specifically appropriate example, given my current location); as a result, my generation became fascinated by the tales of distant heroes and villains, technology, and of course ramen. That is clearly a very narrow vision of Japan. As the years went by, visit after visit, I thankfully had the opportunity to widen that vision to all sorts of aspects of culture, customs, historical heritage, and the fascinating coexistence between traditional and modern Japan. This may be my eighth time here and yet I feel that I have only seen the tip of the iceberg. I will only be here for three months on this occasion, but I have already planned weekend trips to various parts of Japan I have not visited yet, starting with a tour of Ibaraki prefecture.

Travelling the world is indeed one of my favourite activities; there is always so much to see and to learn from other cultures, and so many places still to explore regardless of how much we have already seen. In any spare time left from work and travel, I enjoy outdoor activities with friends when possible, such as motorcycling, diving or flying gliders.

Secret beach in Durness, Scotland



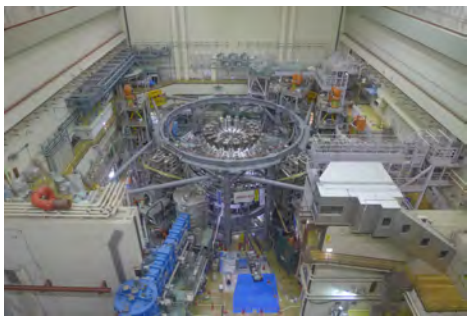
View of the Medes Islands from Begur, Spain

Training on a Schleicher ASK 13 glider

News

Naka Fusion Institute opened to the public

JT-60SA tour reservation desk



JT-60SA torus hall

Power supply of the heating system

Naka Fusion Institute was opened to the public on Sunday 21 October 2018, 11:00 AM to 15:30 PM, and welcomed the public. It was a fine day and a total of 1,254 people visited the institute, which is the highest since 2009.

Twelve groups of 20 persons participated in a 40-minute tour in sequence beginning with the explanation of the outline of the JT-60SA construction, followed by an introduction to the full view of JT-60SA on its way to completion in 2020 and the observation of the power supply of the heating system. The tour won popularity among visitors and attracted favorable comments such as “It is overwhelming!” “When will it be accomplished?″ and “Good luck to you!!″ It is a pity that the tour was so popular that all the applicants were not able to join it. Other events included “Course on nuclear fusion by Dr. Naka” held in the square near the entrance, as well as the tours of the ITER engineering facility and central substation.

Naka Fusion Institute was filled with a relaxed atmosphere.

Enjoy science experiments

In the open square

QST responsible persons

Play with Naka City mascot character ‘Sunflower Ambassador’

Let’s ask questions

Study about radio waves

Calendar

5 December 2018
23rd Meeting of the BA Steering Committee (SC-23)
Grenoble, France

5–7 March 2019
32nd Technical Coordination Meeting (TCM-32)
Padua, Italy

13 March 2019
24th Meeting of the STP Project Committee (PC-24)
Naka, Japan

2–6 June 2019
28th IEEE Symposium on Fusion Engineering (SOFE 2019)
Georgia, USA

22–27 September 2019
14th International Symposium on Fusion Nuclear Technology (ISFNT-14)
Budapest, Hungary

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.