

## Headline

### TF strand and TF conductor production progressing



TFSL conductor integration in  
TFCS-2 upper terminal



TFQL-1 length after reception at CEA.  
The present package also includes 18 m of empty jacket

NbTi TF strand production by Furukawa Electric Company (FEC) in Nikko, Japan is progressing in line with the schedule. About 1400 km of strand have been approved by F4E, and a further batch of about 1000 km is under review before approval. The first NbTi critical performance cross-checks made by F4E confirmed that the key parameter of current sharing temperature in operational conditions will be above 6.2K. A visit of F4E to Nikko took place in early March, where the final strategy on another key parameter, TF Cu strand RRR (residual resistivity ratio), was agreed, allowing the re-start of the Cu mass production. A second batch of TF strands (~3 t) was delivered mid-February to the cabling company, Tratos in Italy while a third one (~2.5 t) is close to arrival.

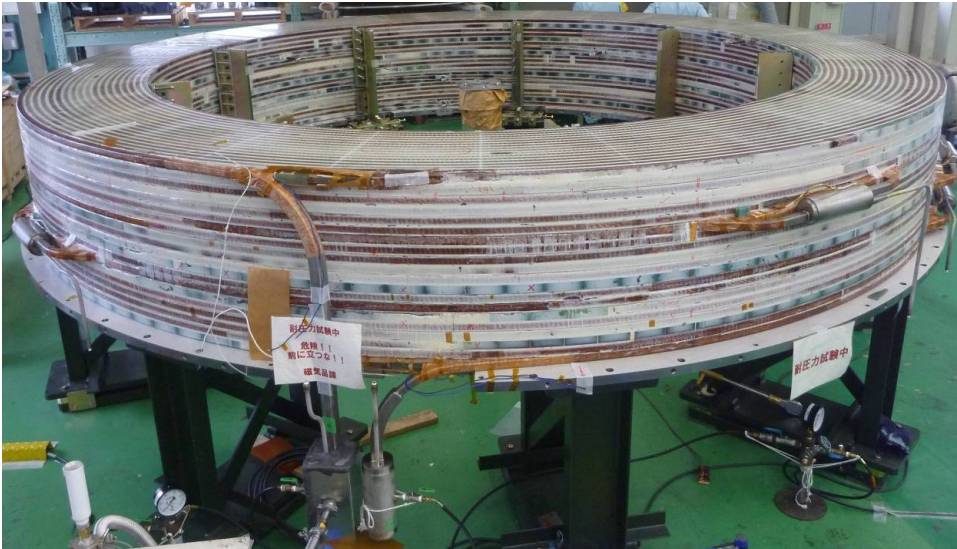
Regarding TF conductor, the first qualification lengths produced by ICAS (Italian Consortium for Applied Superconductivity) were delivered to their final destinations:

- 20 m-long "TFSL" lengths including NbTi production strand from FEC were received at CEA in France, and integrated in the fabrication process for two full-size SULTAN test facility samples
- an 80 m-long "TFQL-1" length was delivered to CEA for hydraulic pressure drop tests after final testing at Criotec in Turin, Italy at the end of February. The length includes NbTi strand from Luvata compliant with JT-60SA specifications and thus relevant for electrical tests.
- two 2.5 m lengths ("TFQL-JA1" and "TFQL-JA2") were extracted from the TFQL-1 length and were delivered to JAEA in mid-February for HTS CL (high temperature superconductor current lead) jumper fabrication.

The installation of the jacketing line in its production configuration is progressing toward its completion, expected before the end of the first quarter of 2012. The completion of the two first "superdummies" ("JTF-1" and "JTF-2"), to be used by the winding manufacturing companies for mechanical process checking, are planned within the second quarter of 2012. Those two unit lengths are the ones that will close the TF conductor qualification phase and allow it to enter the production phase.

## News

### **Winding module completed for equilibrium field coil No. 4**



Ten double pancakes required for forming the equilibrium field coil No.4 (EF4) were all stacked, and a winding module for the EF4 was successfully completed. The last set of 274 jackets for the EF conductors were delivered to the Naka site, and all the 2,526 jackets in total required for the EF coils are now ready.

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## News

### **QPC pyrobreaker type tests successfully completed**



Figure 1 – The pyrobreaker during the tests at the NIIEFA facility with the device developers and the head of the Power Supply Division

Another important step has been achieved in the procurement of the quench protection circuits (QPC) of the JT-60SA

superconducting magnets: the type tests of the second prototype of the pyrobreaker, were recently completed.

This device is manufactured by the Efremov Scientific Research Institute of Electrophysical Apparatus (NII EFA), a subcontractor of the company Ansaldo Sistemi Industriali (ASI). The pyrobreaker is an explosively actuated circuit breaker - it is connected in series to the hybrid mechanical-static circuit breaker (CB) and acts as a backup protection. In normal operation the hybrid CB and the pyrobreaker are closed and the coil current flows through them. In case of failure of the hybrid CB during the QPC operation, the pyrobreaker is operated. An explosive charge rapidly opens the current path inside the pyrobreaker, assuring the commutation of the nominal current of 25.7 kA into the discharge resistor in less than 1 ms. The prototype tests have been performed at the NII EFA test facility (see Figure 1).

The first set of tests on the first prototype were performed last year. In particular, during this first campaign, the interrupt capability and the voltage holding capability after intervention were verified. Also the temperature rise test was executed with the circulation of a constant current higher than the nominal one for more than 1 hour.

Recently, at the end of January 2012, a second test campaign has been performed, including additional current interrupt tests and the verification of the electro-dynamic resistance of the pyrobreaker with current higher than 100 kA. Figure 2 shows the current generator used to perform the electro-dynamic resistance test, developed in the NII EFA laboratory and able to supply currents up to 0.5 MA.



Figure 2 – The homopolar generator able to supply current up to 0.5 MA, developed in the NII EFA laboratory

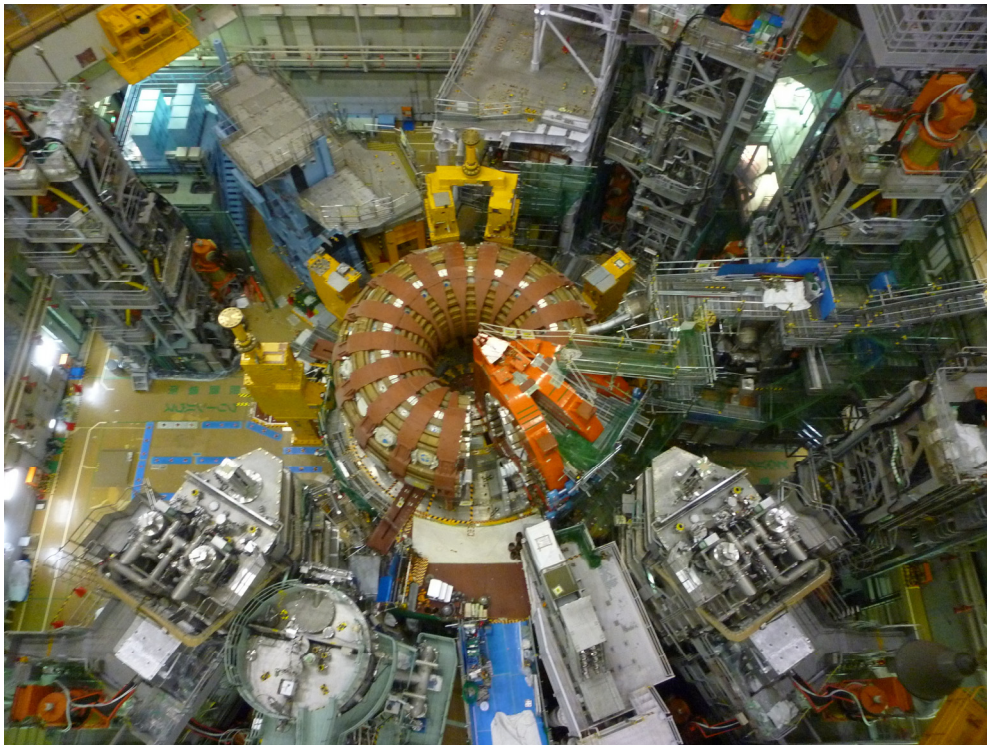
In both test campaigns the tests were successfully passed in the presence of ASI, and representatives of Consorzio RFX, F4E and JAEA.

Pictures courtesy NII EFA / ASI



## News

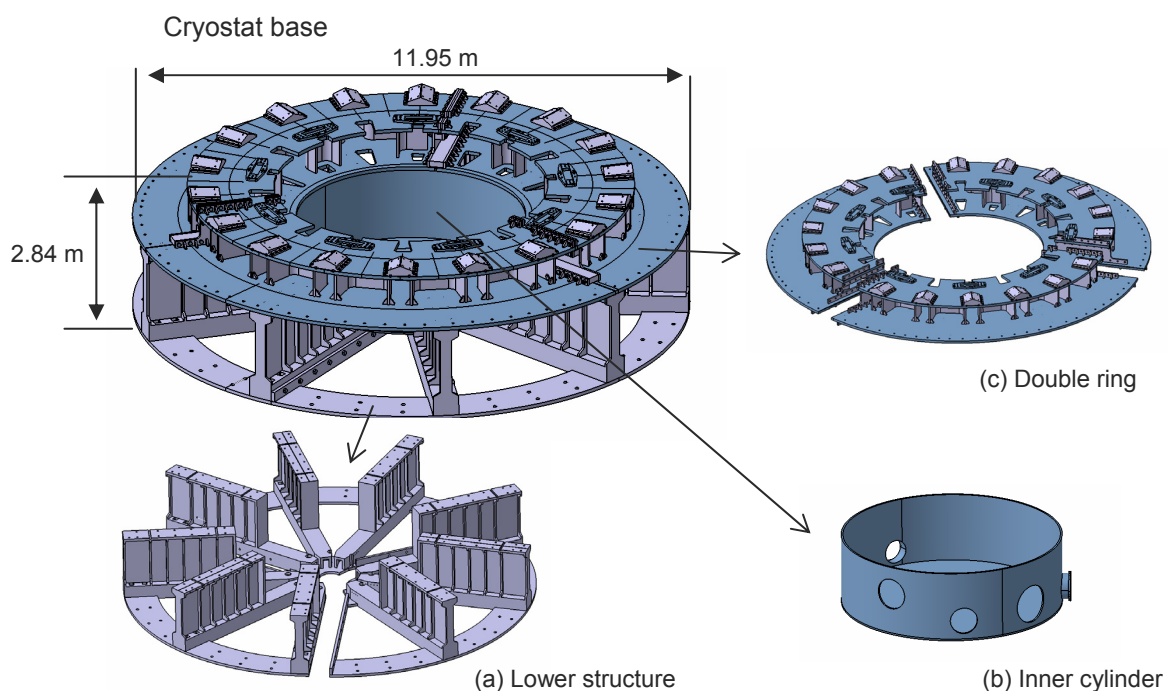
### Removal of fifteen toroidal field coils completed



Disassembly of the toroidal field coils has been progressing, and fifteen coils were already removed by the end of February, and only three more coils were left. In the torus hall, the support structure for the toroidal field coil feeder, waveguides between the torus hall and the RF amplifier room, and piping for cooling and gas circulation were also disassembled.

## News

### Procurement arrangement signed for assembly of cryostat base



The Procurement Arrangement for the assembly of the cryostat base for the Satellite Tokamak Programme was signed on 28th February. The cryostat base is the first large component to be delivered from the EU, and assembled in the torus hall at the Naka site. It comprises seven parts, (a) three lower structures, (b) one inner cylinder, (c) three double rings, to pass a limitation for the transport in Japanese roads. The seven parts have been manufactured by IDESA in Avilés, Spain, and will be delivered to Japan in the middle of December 2012. The cryostat assembly will start promptly after the delivery of the parts.

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## **Meetings**

### **Preparatory working group creating overall plan for ITER Remote Experimentation Centre**



Under the Broader Approach Agreement, the preparatory working group (PWG), chaired by the Project Leader of IFERC, was set up to prepare for establishing the ITER remote experimentation centre (REC) in Rokkasho, Aomori Japan, and a PWG meeting has already been held three times this year. Because demonstration of remote experimentation using JT-60SA is planned prior to ITER remote experimentation, experts from JT-60SA have also been joining to the PWG, and discussing the overall plan on the REC.

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## **Local**

### **Navigating along Padua waterways amid colors of spring**



Riviera Fiorita feast. Courtesy [www.rivieradelbrentaturismo.com](http://www.rivieradelbrentaturismo.com)



In the past, inside its walls, the old Padua was crossed by lively inland waterways called “naviglio interno”. Trade traffic entered the city passing through its old bridges, along the winding Rivas. Navigating the Brenta river, the Venetian nobles and patricians reached their estates and villas built along the fluvial bends and banks.

Although the whole naviglio interno is no longer navigable, as it was covered up in the 1950's, authentic inner waterways still flow along the Renaissance wall - twelve kilometres of walls and ramparts completed in 1544. Canals and rivers still link the town radially, leading towards either the Venetian lagoon ending in the magic of St. Mark's basin, or the thermal springs at the foot of the Euganean hills, or leading towards castles and villas along the Euganean river.



Navigating along the green banks towards Dolo  
Courtesy [www.battellidelbrenta.it](http://www.battellidelbrenta.it)

In town, the inland itinerary starts at Portello Gate, known as Venezia Gate, passes the University campus reaching the Gardens of the Roman Area with the famous Scrovegni Chapel painted by Giotto and the Eremitani Church with works by Mantegna. The noise of the town covers the movement of the water when the boat passes the Corso Bridge and reaches the lock at Porte Contarine, in the town centre, that was built in 1526 to control the difference in levels between canals. The boat passes a series of bridges up to the old Mill Bridge and the Leonardo Bridge that was the former way into the Jewish ghetto. The Carrarese Castle is overlooked by what was originally its defensive tower, and successively became an astronomical observatory named the Specola, now site of the University Astronomy Department.

Famous all over the world is the itinerary from Padua to Venice along the Brenta River. The motorboats are commonly called “burchielli”. Some boats are rather modern - others are traditional wooden barges. The navigations pass through villages along the river allowing one to admire the facades of more than 70 Venetian villas, and ends in St Mark's Square in Venice.



Villa Pisani – Stra - Courtesy [www.rivieradelbrentaturismo.com](http://www.rivieradelbrentaturismo.com)



In these days the riviera is blooming with the colours of spring and you may come across lively markets, festivals, carnivals and fairs of flowers.



Roses in bloom, Courtesy [www.compagniadelgiardinaggio.it](http://www.compagniadelgiardinaggio.it)

For more information about Padua:

<http://www.padovanet.it>

<http://www.turismopadova.it>

## **Calendar**

April 18-19, 2012  
14th Technical Coordination Meeting (TCM-14)  
Naka, Japan

April 24, 2012  
10th Meeting of the BA Steering Committee (SC-10)  
Naka, Japan

May 6-10, 2012  
19th Topical Conference High-Temperature Plasma Diagnostics  
Monterey, USA

May 7-10, 2012  
17th Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating  
Deurne, Netherlands

May 14-18, 2012  
International Cryogenic Engineering Conference 24-International Cryogenic Materials Conference 2012  
(CEC 24 - ICMC 2012)  
Fukuoka, Japan

July 2-6, 2012  
39th European Physical Society Conference on Plasma Physics & 16th International Congress on Plasma Physics  
(EPS/ICPP)  
Stockholm, Sweden

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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 [masayasu.sato@jt60sa.org](mailto:masayasu.sato@jt60sa.org).

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