

Technical specification for SCMPS finalized

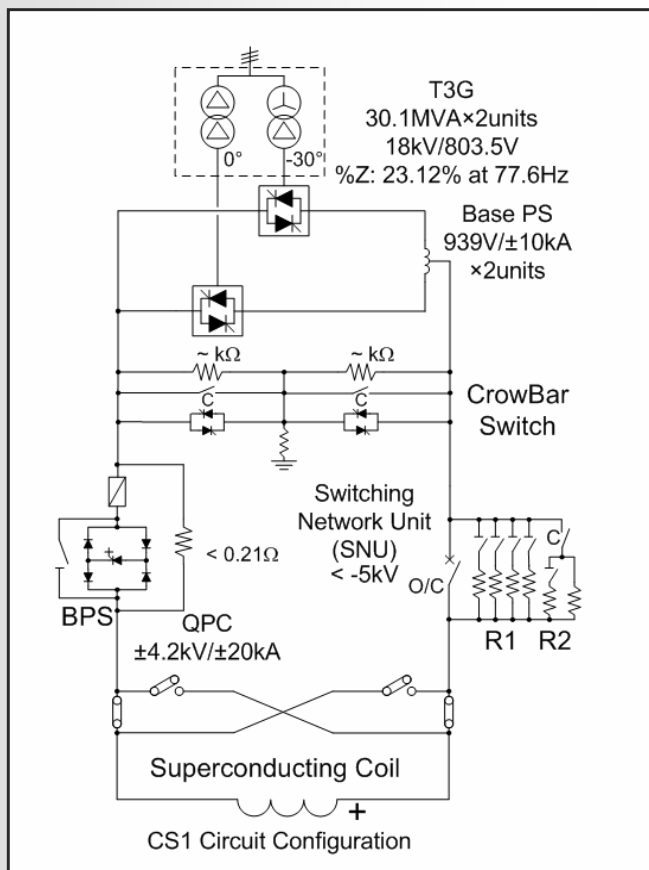


Fig. 1

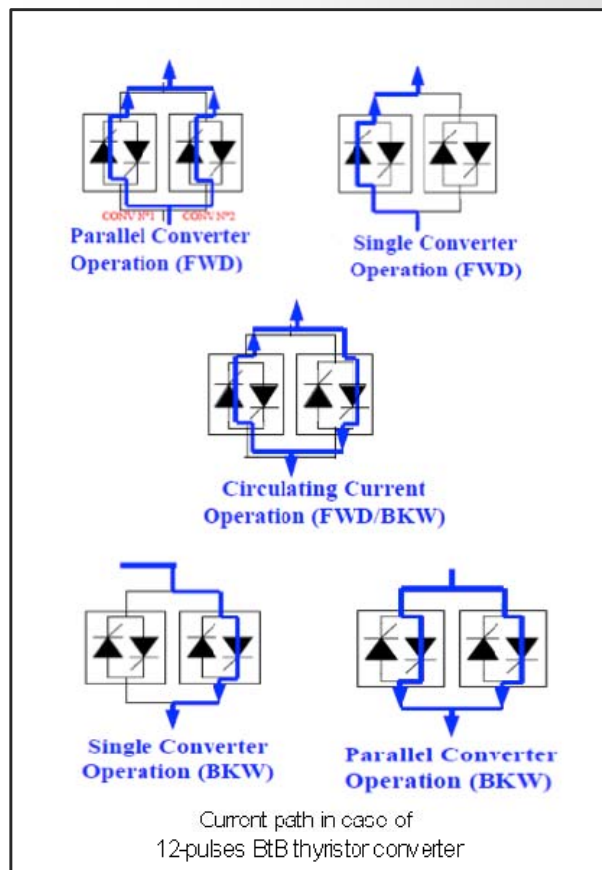


Fig. 2

The JT-60SA Super Conducting Magnet Power Supply (SCMPS) consists of the following power supply systems: Toroidal Field Coil Power Supply (TFC PS), Poloidal Field Coils Power Supply (PFC PS), and Fast Plasma Position Control Coils Power Supply (FPPC PS). These power supply systems drive current in the conductors in order to produce a magnetic field to confine and control the plasma inside the Vacuum Vessel (VV). All the technical specifications of the SCMPS were finalized and its procurement arrangement will be concluded shortly.

The PFC PS, the most complicated and challenging power supply in the SCMPS, consists of AC/DC converters (PS-CS), Switching Network Units (SNUs), and Quench Protection Circuits (QPCs) for four Central Solenoid (CS1-4) and two Equilibrium Field coils (EF3-4). For the rest of the Equilibrium Field coils (EF1-2,5-6), booster power supplies are used instead of SNUs.

Each PFC base PS system includes: one 12 or 24 pulse / 4 quadrant thyristor converter (Fig. 1). In order to reuse the existing JT-60 transformers, a Back-to-Back (BtB) thyristor converter scheme allowing bipolar operation has been selected. BtB bridges are connected to the secondary side of the transformer.

In order to maintain a minimum level of current in converters and avoid a time delay in reversing the current direction, 3 operating modes (Parallel Converter Operation, Single Converter Operation and Circulating Current Operation) are needed. A typical example is reported in Fig. 2. When $I_d > 5$ kA (I_d is the current in the superconducting coil), BtB bridges are operating in parallel. When $I_d \leq 5$ kA, half the BtB are switched off and the others carry I_d . When $I_d \approx 2$ kA, circulating current operation starts in order to reverse the load current without any discontinuity while crossing zero. When $I_d < 0$ a symmetric sequence is followed.

To perform this procedure, the power supply control system has to generate specific reference signals for the BtB thyristor converters. In order to optimize this, a model of the converter has to be realized by the manufacturer to fully test the power supply regulation.

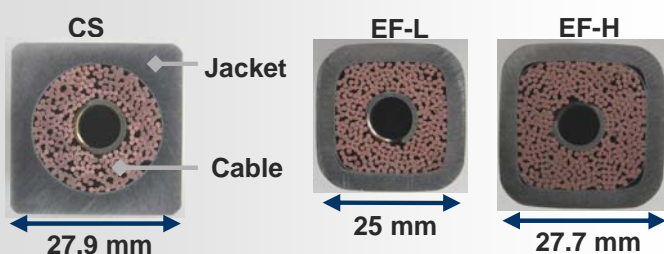
The TFC PS will be featured in the next issue.

Manufacturing process of conductors for PF coils established



Manufacturing of the dummy conductors for the Central Solenoid (CS), and Equilibrium Field (EF) coil at the Lower field (L), 466 m and 551 m respectively, was completed, following the one for the EF coil at the high field (H), and thus the manufacturing processes of the three types of superconducting conductors to be used for JT-60SA have now been successfully established.

The dummy conductor for the CS was wound around a drum 3m in diameter, and shipped to the manufacturer to allow them to adjust manufacturing machines of the CS and validate their manufacturing processes.



The CS and EF coils, together recognized as the Poloidal Field (PF) coils, will be made of three superconducting conductors shown above.

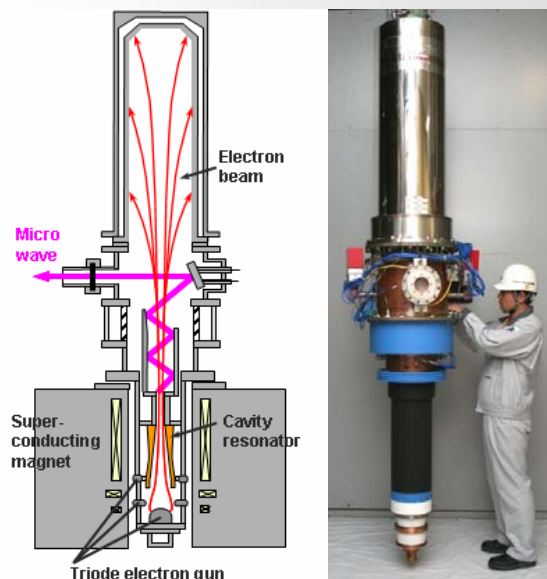
The PF coils will provide suitable magnetic fields for the plasma equilibrium inside the VV, and maintain the plasma's shape and stability to confine it effectively.

Contract for strands for TF coil awarded

The contract for strands for the Toroidal Field (TF) coils was awarded by Fusion for Energy (F4E).

Visit F4E's website for more information.

Gyrotron achieved new record again



In order to produce power from fusion, heating the plasma inside the VV to several hundred million degrees Celsius is essential. For JT-60SA, two different external heating systems will be used: Neutral Beam Injection (NBI) and Electron Cyclotron Resonance Heating (ECRH). Gyrotrons, power sources for the ECRH, are large vacuum tubes that accelerate the electron beams in a strong magnetic field, and convert the energy to microwaves inside.

Recently, one gyrotron achieved a new record again: 1 MW with a pulse duration of 31 s, exceeding this fiscal year's target. By modifying cooling systems of its transmission lines, and repetitive trial operation, this record was finally achieved.

The final target is to extend the pulse duration to 100 s, and further research and development will be carried out in order to achieve it.

Meetings

International conferences held in October

The 26th Symposium on Fusion Technology (SOFT) was held in Oporto, Portugal from 27 September to 1 October to exchange information on design, construction and operation of fusion experiments and on the technology for present fusion machines.

The Project Manager (PM) of the EU Home Team (HT), P. Barabaschi, gave an invited talk about the status of the JT-60SA activities, and 17 other papers were presented from the Satellite Tokamak Programme (STP).

From 11 to 16 October, the 23rd International Atomic Energy Agency (IAEA) Fusion Energy Conference, as renowned as the Olympics in the nuclear fusion field, was organized by the IAEA in Daejeon, Republic of Korea.

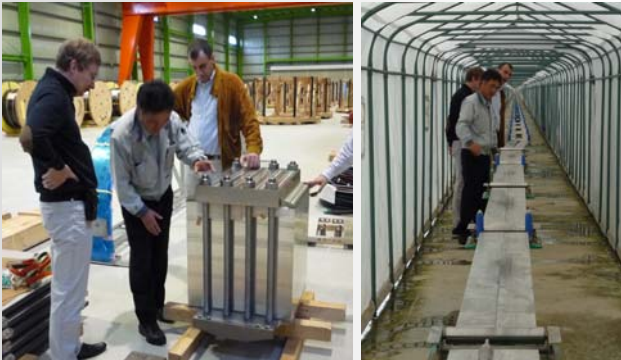


The Project Leader, S. Ishida, gave an overview presentation about the project, and the PM of the EU HT also made an oral presentation on engineering design evolution of the project. Four other members from the STP also had presentations about their work on the project.

Seventh meeting of STP Project Committee held in Tokyo, Japan

The 7th meeting of the STP Project Committee was held in Tokyo, Japan on 19 October, and participants joined the meeting from ten different places in Europe and Japan by video conference. The current status and progress of the project was reported from the PL and PMs from the EU and JA HTs.

Visits



On 21 October, the Assistant to the Director of CEA (French Atomic and Alternative Energy Commission), F. Staley, and the PM of the EU HT, visited Naka Fusion Institute and had a site tour of the new buildings of the VV sector assembly, superconducting conductor jacketing and superconducting coil winding, and also viewed JT-60 in the torus hall.

Calendar

November 7-11, 2010
 19th Topical Meeting on the Technology of Fusion Energy (TOFE)
 Nevada, USA

December 9-10, 2010
 10th Technical Coordination Meeting
 Cadarache, France

December 15, 2010
 8th Meeting of the BA Steering Committee,
 Madrid, Spain

March 23, 2011
 8th Meeting of the STP Project Committee
 Naka, Japan

April 13-14, 2011
 11th Technical Coordination Meeting
 Japan

Local



From 15th to 24th October, Munich celebrated the 700th birthday of its traditional fair, the "Auer Dult".

The history of this popular fair with its folkloric flair can be traced back to the Middle Ages. The fair takes place three times a year at a quarter of the town called the "Au" which means "meadow" or "pasture". People walk around at leisure, shop for bargains, and enjoy traditional Bavarian food and beverages. Children are eager for the bumper cars, the boat-like swings, the merry-go-round or the Ferris wheel.

The "Auer Dult" is Europe's largest market for tableware and all kinds of pots and pans. New-fangled household products are proudly praised as "kitchen marvels". The junk dealers' wares conceal many a treasure, sometimes art and sometimes kitsch. Whether glass or porcelain, wax or wicker, cloth or leather, whether it's candy or an old-fashioned herbal remedy you're looking for: your heart's desire awaits you at the Dult.

Munich is about 20 minutes drive away from the EU Home Team headquarters of JT-60SA in Garching, Germany.

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.

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