

<p>Press Release</p> <p>7:00AM KST July 15, 2008</p>	 <p>NFRI 국가핵융합연구소 National Fusion Research Institute</p>
 <p>Ministry of Education, Science and Technology Republic of Korea</p>	

KSTAR has successfully achieved its First Plasma Target!

The KSTAR, a fully superconducting tokamak device with advanced Nb₃Sn superconducting technology, has come a long way with all critical aspects resolved and successfully tested after “assembly completion” milestone in September 14, 2007. After full commissioning process started in February of this year, the National Fusion Research Institute officially announced that the KSTAR has successfully achieved the First Plasma on July 15, 2008.

[_ KSTAR \(Korea Superconducting Tokamak Advanced Research\)](#)

As KSTAR has succeeded in the First Plasma discharge with first cool-down trial, it is verified that the device was constructed and assembled with good quality assurance and superb quality engineering. Moreover, this shows that KSTAR has taken the first successful step toward the world-class fusion research for the upcoming decades of Operation Phase, in the era of ITER Construction and Exploitation.

The goal of the First Plasma discharge Test is to verify the operational capability in a new regime of plasma operation and to test if the integration of a newly-built fusion device proves to show its promised performance by generating expected plasmas even with limited ancillary system.

KSTAR has achieved the plasma current up to 130kA with pulse length about 400 ms at 1.5 tesla toroidal magnetic field, which has surpassed the original target parameters of the first plasma discharge.

※ Original Target Parameters of KSTAR's First Plasma : 1.5 tesla magnetic field, 100kA plasma current with 100ms pulse length (0.1 sec.)

The final commissioning of KSTAR has been implemented through the following 4 phases:

- _ Phase 1: Vacuum Commissioning
- _ Phase 2: Cryogenic Cool-down Commissioning
- _ Phase 3: Superconducting Magnet Commissioning
- _ Phase 4: Plasma Commissioning.

The commissioning results of KSTAR are as follows,

- _ In Phase-1, the vacuum environment and the leak tightness of all vacuum systems have been tested. The vacuum pressure of the vacuum vessel and cryostat are less than 3.0×10^{-8} mbar, meeting the requirement. Phase-1 has been completed on 2nd of April.

- _ In Phase-2, the system has been cooled-down to its operation temperature. Temperatures of all the superconducting magnets have successfully reached up to 4.48 K and maintained for more than 3 months. Phase-2 has been completed on 2nd of May.

- _ In Phase-3, the superconducting magnets were tested. All 16 TF coil current has been charged up to 15KA and maintained for 8 hours without any fault conditions. For PF coils, all 14 coils have been tested for their synchronized operation. Phase-3 has been completed on 6th of June.

- _ In Phase-4, the plasma production with specified parameters and characteristics have been pursued. The satisfying first plasma has been generated surpassing the original target parameters on 13th of June. The peak plasma current of 107 kA was achieved during 210 msec of pulse length. Successive trials could move the plasma current up to 133KA and the pulse duration up to 389ms. It is also important to recognize that the second harmonic ECH(Electron Cyclotron Heating) using 84 GHz gyrotron system is deployed successfully, so that it required less than 2 Volts of loop-voltage for plasma start-up. Phase-4 has been completed on 30th of June.

The most remarkable thing is that every commissioning phase has succeeded at the very first trial as designed, which proves that the engineering design, fabrication and construction of

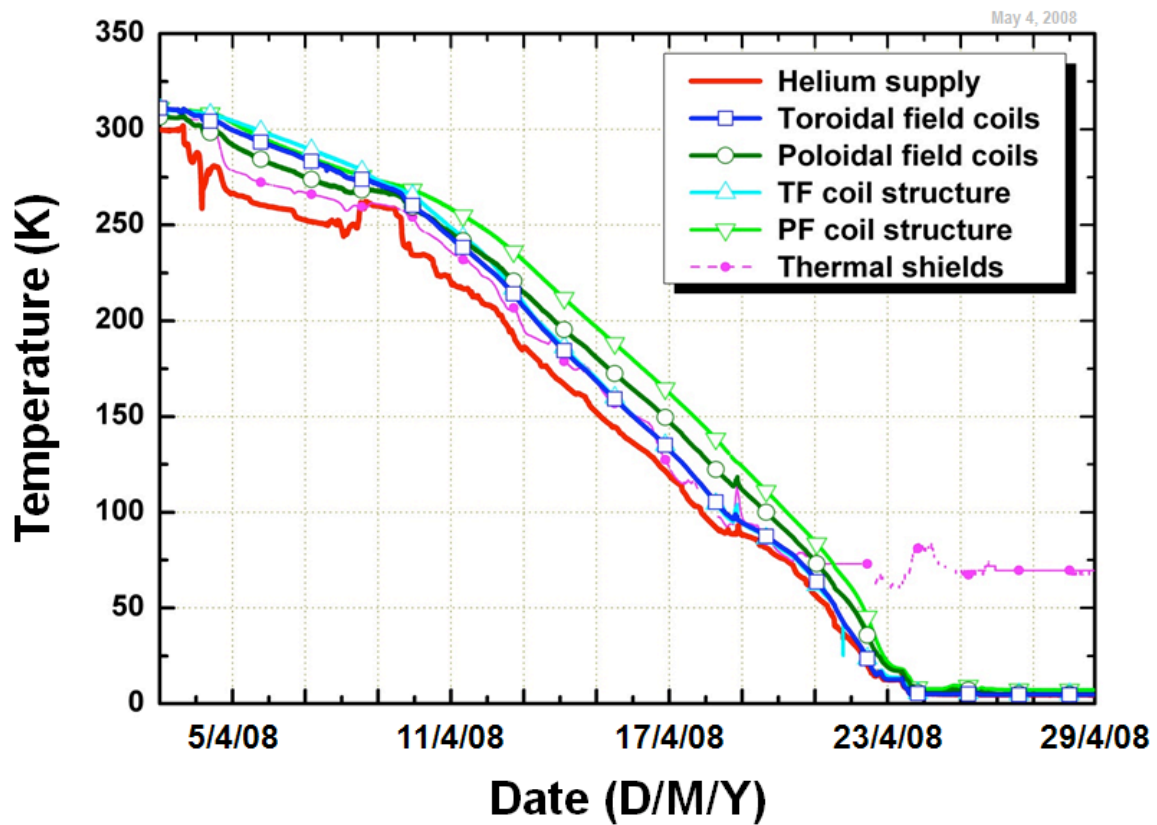
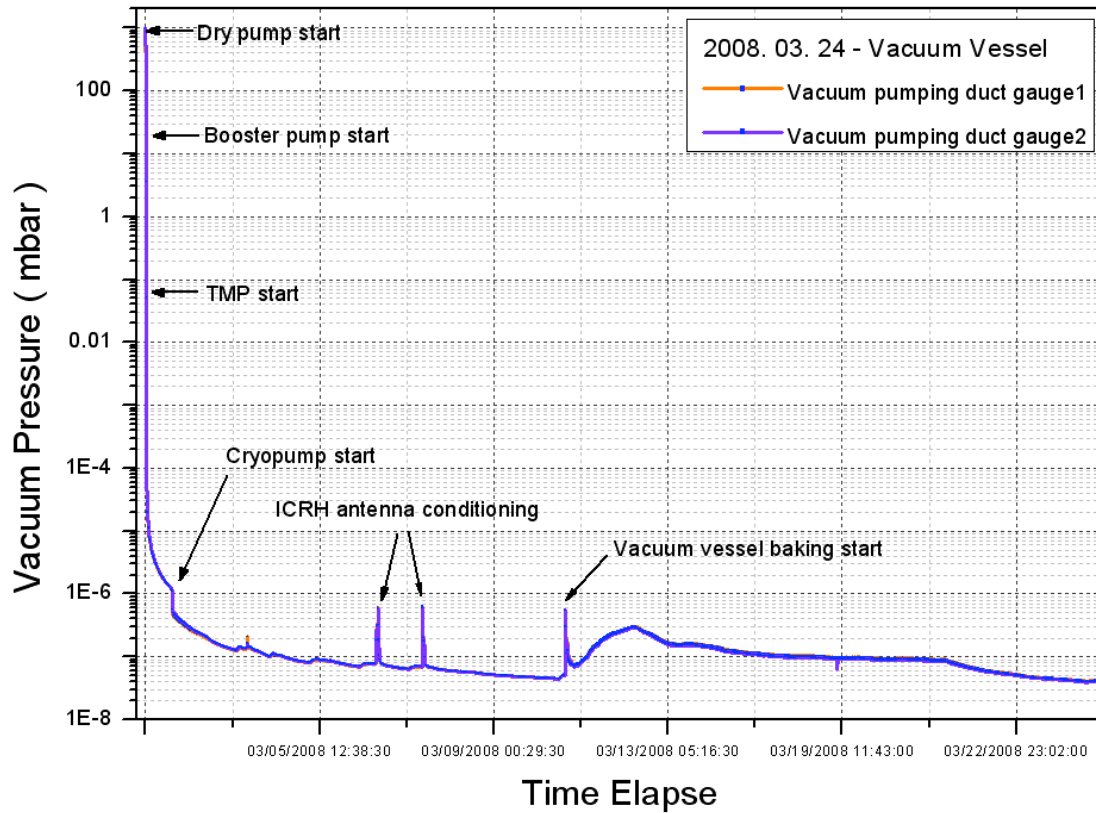
KSTAR are almost immaculately done and this fact deserves to receive special attention from the international community of fusion engineering.

This achievement is the first success story on the operation of a superconducting fusion research device using Nb₃Sn magnet, the same superconducting magnet technology as ITER. Furthermore, this means that Korea has become one of the leading countries operating a prominent experimental facility for the world fusion researches for preparing ITER Operation.

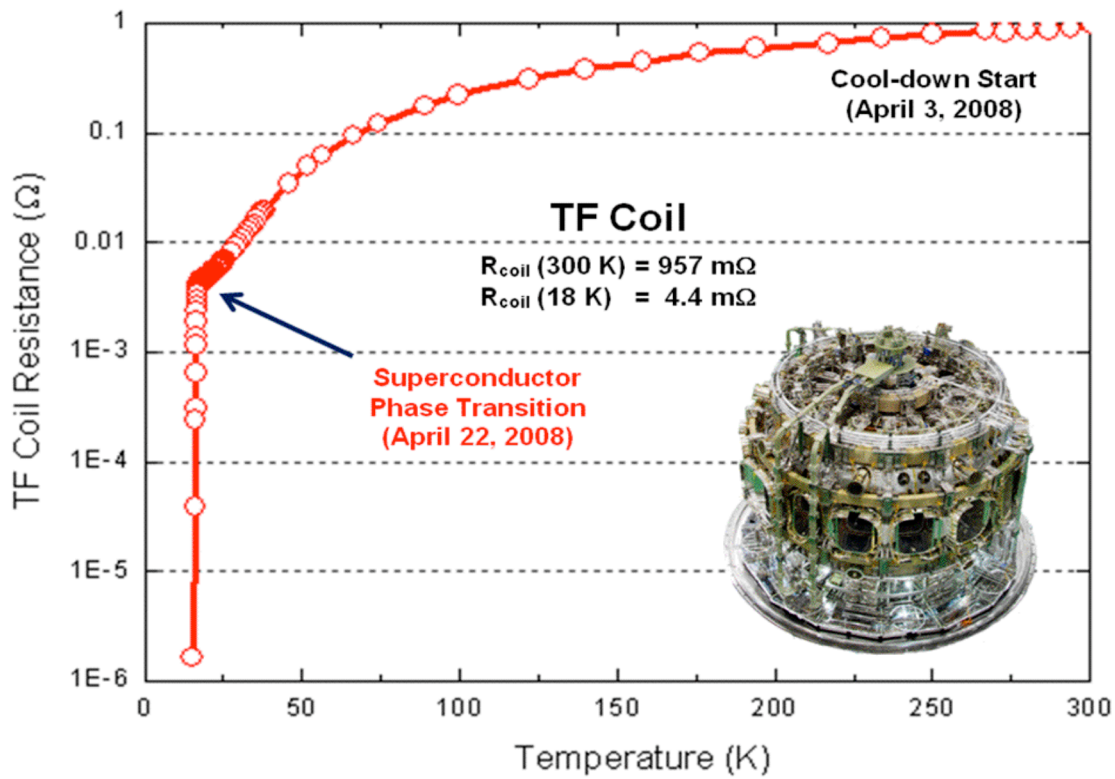
The Ministry of Education, Science and Technology has constituted a "KSTAR First Plasma Review Committee" in order to perform a scientific verification process in June 4, 2008. This Committee has finished the verification process consisting of three on-site inspections on the achievement of the first plasma discharge and its performance analysis.

During the commissioning, about 24 researchers from the US, Japan, Russia, and ITER Organization have participated with sharing their knowledge and experiences, which gave an even more objective view on the test process and results.

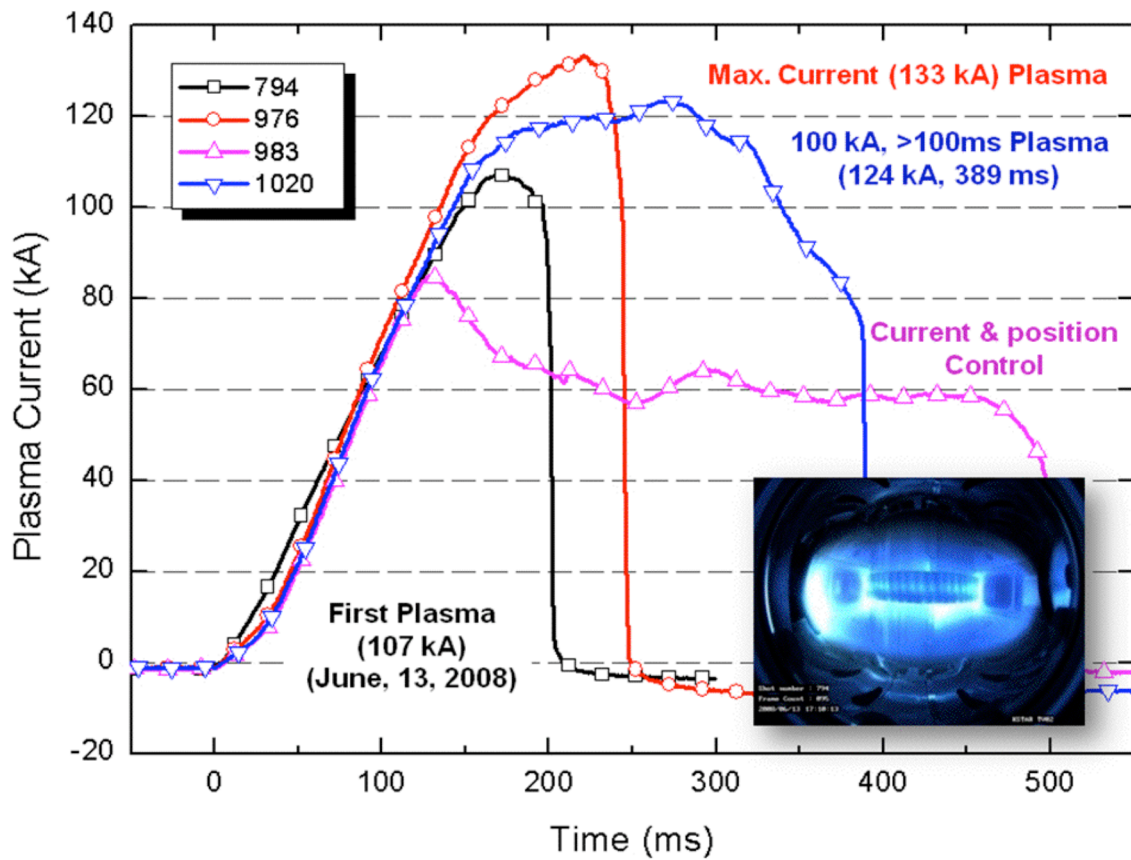
The Minister of Education, Science and Technology assured that the success of the First Plasma discharge in KSTAR is the first step for the long-pulse plasma operation, which is essential for the commercialization of a fusion power plant and thus the upcoming a few decades of KSTAR researches would definitely contribute to the world, facing serious energy problems, with a clean energy source, named Fusion.



[Phase 2: Cryogenic Cool-down Commissioning]



[Phase 3: Superconducting Magnet Commissioning]

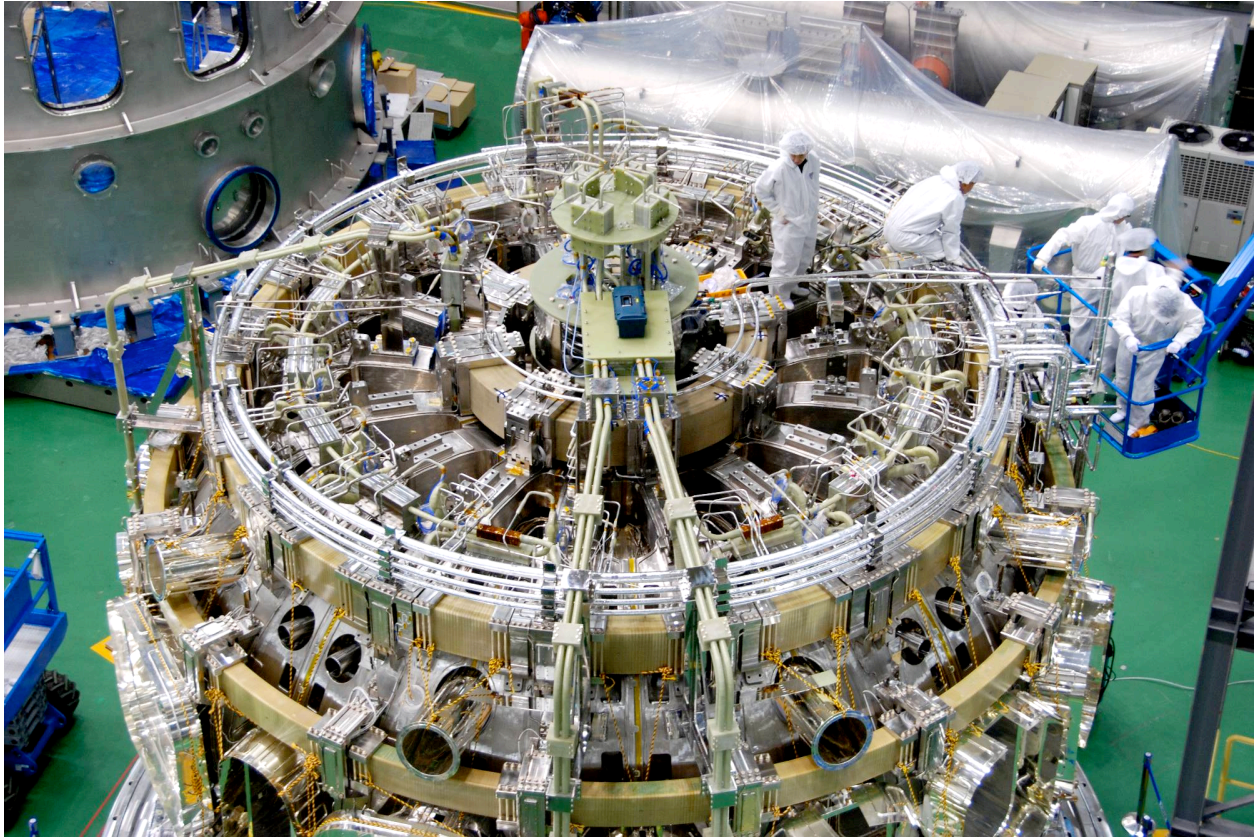


[Phase 4: Plasma Commissioning]

[KSTAR Experimental Building, Daejeon, KOREA]



[KSTAR in final Assembly]



[KSTAR Experimental Hall]

