



Contribution ID: 636

Type: **Poster Presentation of 1h45m**

Winding Deformation Caused by Reaction Heat-treatment for ITER TF coil

Wednesday, August 30, 2017 1:15 PM (1h 45m)

National Institutes for Quantum and Radiological Science and Technology (QST) has responsibility as Japanese domestic agency (JADA) to procure 9 Toroidal Field (TF) coils in the ITER project. The high mechanical and electrical reliabilities have to be ensured for the operation of the ITER for 20 years. For this objective, the Radial Plate (RP) structure is employed to avoid accumulating the electromagnetic loading to the insulation material. Since Nb₃Sn is brittle, the bending strain exceeding 0.1% cannot be applied after the reaction heat-treatment. Thus, the conductor is wound to D-shape and then heat-treated before it is transferred into the RP groove. To transfer the heat-treated conductor into the RP groove, the accuracy of $\pm 0.02\%$, which is ± 7 mm on 1-turn of 34 m, in conductor length is necessary after the winding and the heat-treatment. In addition, the winding deformed by the reaction heat-treatment has to be transferred into the RP groove within the bending strain of $\pm 0.1\%$. The winding deformation caused by the reaction heat-treatment was evaluated. This paper shows the evaluated winding deformation and the bending strain calculated to transfer the winding into the RP grooves.

Submitters Country

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Session Classification: Wed-Af-Po3.02

Track Classification: B1 - Superconducting Magnets for Fusion