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Full-Scale Trial Results to Qualify Optimized Manufacturing Plan for ITER Toroidal Field Coil Winding Pack in Japan

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A heat-treated Nb3Sn cable-in-conduit conductor (CICC) must be inserted into a groove of a radial plate (RP), which is designed to maintain the mechanical and electrical reliability of the insulation of ITER Toroidal Field (TF) coil during its 20 years'operation. The difference between heat-treated conductor length and RP groove length must be controlled with accuracy of +/-0.05%. JAEA developed high accuracy winding system and procedure with the order of +/-0.01% in wound conductor length and performed full-scale winding trials. The target tolerance of +/-0.01% was achieved. In addition, very complicate procedure of RP insertion between upper and lower windings (pancakes), which consist of unit length conductor, is also qualified by using full-scale dummy conductor winding and trial insertion of wound dummy conductor into RP groove was performed, too. Furthermore, proto double-pancake (DP) was successfully heat-treated. These results justify validity of optimized manufacturing plan and allow us to start TF coil winding pack (WP) manufacture.

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