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JT-60SA TF magnet assembly

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JT-60SA will be the world's largest superconducting tokamak when it is assembled in 2020 in Naka, Japan ($R=3\text{m}$, $a=1.2\text{m}$). It is being constructed jointly by institutions in the EU and Japan under the Broader Approach agreement. The assembly of its 400-tonne toroidal field (TF) magnet, designed for an on-axis field of 2.25T, will be completed in summer 2018.

After cryogenic testing in Saclay, France each of the D-shaped TF coils (7.5m high and 4.5m wide) was pre-assembled with its Outer Intercoil Structure (OIS) which supports it against out-of-plane loads. After arrival at the assembly site in Naka, Japan the first 17 coils have been rotated around the previously installed toroidal vacuum vessel and its thermal shield. The final, 18th, coil was inserted together with the final 20° sectors of the vacuum vessel and the thermal shield.

All the mechanical features on each coil casing were machined with respect to the winding pack centreline. Each coil has been placed within approximately 1mm of its nominal position. Customized shims along the inboard straight legs, customized splice plates between adjacent shear panels of the OIS and rotatable offset bushings for the shear pins between coils on the inboard side allow the mechanical interfaces to be adjusted.

The Inconel fasteners between coils were tightened hydraulically as each coil was positioned. After all 18 coils were connected, the weight of the assembly was transferred to kinematic supports equipped with spherical bearings.

This presentation will summarize the design features of the coils that facilitated their accurate assembly and the processes used during the pre-assembly of the OIS, the positioning of the coils in the tokamak and the assembly of the joints between adjacent coils.

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