Statistical Analysis of the Nb₃Sn Strand Production for the ITER TF Coils

Superconductor Science and Technology

The toroidal field magnet system for the ITER fusion reactor is the largest superconducting magnet system ever built. In this paper, we analyzed the performance of the 500 tons of Nb₃Sn superconducting wires produced for ITER. With eight wire manufacturers from six countries participating in this first-ever large scale Nb₃Sn procurement, we focused on establishing statistical measures for process uniformity and reliability, and on assessing deviations from the manufacturing plans of the various wire companies. A benchmarking and cross-checking program between vendors was also carried out and assessed. Our work helped ensure that this complicated international effort produced a reliable magnet conductor for ITER, which is attempting to demonstrate sustained net-energy-positive fusion for the first time in human history.