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Mon-Mo-Or3-01: Methods for performance diagnostics for Nb3Sn accelerator magnets in the CERN superconducting magnet test facility

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Superconducting Nb3Sn accelerator magnet technology start to reach maturity and the 11 T dipole magnets based on that technology are prepared to be installed in the LHC. Performing detailed diagnostics on Nb3Sn model magnets has been vital for giving feedback on the design and fabrication of the magnets and for the conductor performance in that particular configuration. In the last few years, tens of Nb3Sn magnets have been tested in the SM18 test facility at CERN, including flat racetrack models, $\cos\Theta$ dipoles, $\cos\Theta$ quadrupoles, and block-coil dipoles. The large and different type of instrumentation of the model magnets allowed precise measurements of superconducting-normal transition, voltage measurements on quenching segments, mechanical transients, vibration spectra measurement with different methods. Diagnostics are completed by using quench patterns following ramp rate studies, temperature dependencies, and current cycles.

The methods to interpret and conclude on the performance of relatively large size magnets, with a relatively small amount of instrumentation are discussed using the instrumentation and diagnostic tools.

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