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## Applied metrology in the production of superconducting model magnets for particle accelerators

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The production of superconducting magnets involves tight tolerances and high precision assemblies, in order to achieve the requirements for their appropriate performance. It is therefore essential to have a strict control and traceability over the geometry of each part of the system, and also to be able to compensate possible inherent deviations coming from the production process. The objective of this paper is to present the experience from systematic geometrical measurements and their analysis, using a portable Coordinate Measurement Machine (CMM) at CERN. First, the methodology for the data acquisition and its ulterior analysis is explained. Then, the results obtained during the on-going production of model magnets for the HL-LHC upgrade and other R&D magnets will be commented, mainly focusing on coil and final magnet geometry. The link between coil and fabrication tooling geometry will be also studied, showing the tooling influence on systematic coil deviations. Furthermore, the integrated effect on coil geometry of assembly operations, cool down and powering of the magnet is investigated, looking at measurements before and after cold tests.

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