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SC magnet fabrication + testing I

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The production of superconducting magnets for accelerators is a complex and not yet fully industrialised process. Ensuring the reliable performance of these magnets in accelerators requires meticulous engineering across a diverse range of specialties. In this lecture, after a brief historical overview of accelerator magnets design and construction, we review the main manufacturing steps for the construction of an accelerator magnet, from the strand to the cryostat. We take as examples the NbTi 8.3 T dipoles for the LHC and the Nb3Sn 11.3 T quadrupoles for HL-LHC, putting in evidence the differences in between the two technologies. The main features of the magnets are reviewed, showing how the design and component quality impact on construction and why the final product calls for a total-quality approach. Finally, we briefly review why, what, and how we test superconducting magnets, underlining the close connection with the design validation and with the manufacturing process.

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