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## 3D mechanical design and analysis of 20-T twin-aperture common-coil accelerator dipole magnet

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Conceptual 3D mechanical design for 20-T common-coil dipole magnet has been carried out to meet our previous magnetic design for SppC dipole magnet. In accordance to the previous magnetic layout, the most inner two top and bottom HTS racetrack coils bend outward to provide space for the beam pipes instead of using flared ends. Specifically, the 75 mm thick Shrink-fit Multilayered Aluminum Shell (SMAS) is used to support the superconducting coils; the split iron yokes are used to transfer the preload and orientate the inner HTS coils bending outward. The coils are firstly preloaded by a bladder pressure of 80 MPa and then further preloaded after cool-down for the horizontal direction. The required preload in the vertical direction can be provided after the bladder operation in the horizontal direction and cool-down. In the axial direction, four aluminum tie rods are pre-tightened to provide axial preload to the coils. This paper will present the details of the dipole magnet's 3D configuration and the loading procedures, with special care on the stress distribution in the coil straight section and the coil ends at different load steps.

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