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## Magnetic alignment and mechanical analysis of superconducting bending section for proton therapy

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The last bending section of a proton therapy beam line is mounted on a rotating gantry to target the cancerous cells of the patients from all possible angles. Such capability can increase the effectiveness of cancer treatment as the tumors would receive the appropriate amount of radiation dose with a minimum impact on the surrounding healthy tissue. Superconducting magnets with their high energy density can provide a large reduction in weight and some reduction in size for the components that need to be installed on the rotatory gantry. In the following work, a magnet configuration is presented using combined function magnets. It includes two conventional electromagnets and three superconducting magnets operated at 4.2 K. For such assembly, an alignment procedure is carried out to guaranty a large beam momentum acceptance. Furthermore, 3D mechanical Finite Element analysis was conducted to check that the structural support of the superconducting magnets and their thermal shields could handle their weigh as well as the momentum due to the rotation.

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