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## Recent Development in Structural Design and Optimization of ITER Neutral Beam Manifold

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The Neutral Beam (NB) manifold is a major sub-system of ITER fueling system with complex combination pipes with the aim at distributing the working gases for NB and Diagnostic NB injector. During the final design (FD) phase, NB manifold design has been completed based on configuration management model defined to use in FD. After the FD review, the design of NB manifold suffered several design changes so as to meet the different manifold routing requirements. Additional, structural integrity assessment during FD revealed that the NB manifold design has potential for more robust structure performance, as well as potential for a significant simplification of the support layout by redefining the constraint form of the support and the whole structural architecture. This paper describes the new design of NB manifold based on a more optimized support system. The former complex manifold supports and internal pipe supports have been compacted and replaced with an alternative scheme in order to more effective, decreasing about 90mm of structural deformation. Detailed analyses on internal pipe support layout are dedicated to confirm both the structural reliability and feasibility. Comparative analyses between two typical types of manifold support scheme, with emphasis on space feasibility, embedded plate location and etc., have been performed. All relevant results of thermo-mechanical analyses for different operation scenarios and fault conditions are presented as well as the mechanical behaviors and manufacturing aspects. Future optimization activities are described, which shall give useful information for a refined setting of components in the next phase.

### Eligible for student paper award?

No

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