

LESSONS LEARNED FROM DESIGNING AND MANUFACTURING OF THE COIL SUPPORT STRUCTURE OF W7-X

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Wendelstein 7-X (W7-X) is a fully optimised low-shear stellarator and shall demonstrate the reactor potential of this fusion plant. It is presently under construction at the Greifswald branch institute of IPP. The superconducting magnet system will allow continuous operation, limited only by the plasma exhaust system whose capacity is designed for 30 minutes full power operation.

The Wendelstein 7-X (W7-X) coils and structures are part of the largest superconducting fusion device being constructed at present. They represent a technical challenge at industrial level and the need for proven techniques and manufacturing processes in accordance to the highest quality standards. The production of these components requires a management of monitoring for quality and tests.

The coil system consists of 20 planar and 50 non planar coils. They are supported by a pentagonal 10 m diameter, 2.5 m high coil support structure (CSS). The CSS is divided into 5 modules. Each module consists of two equal half modules. The full central ring structure had been completed and delivered to IPP since October 2009. Currently, the three first modules were successfully assembled with the coils meeting the tight manufacturing tolerances.

The designing and manufacturing process and the main project management and technical challenges will be presented. The lessons learned in the large scale production of this difficult kind of support structure will be presented as relevant experience for the realization of similar systems for future fusion devices, such as ITER.

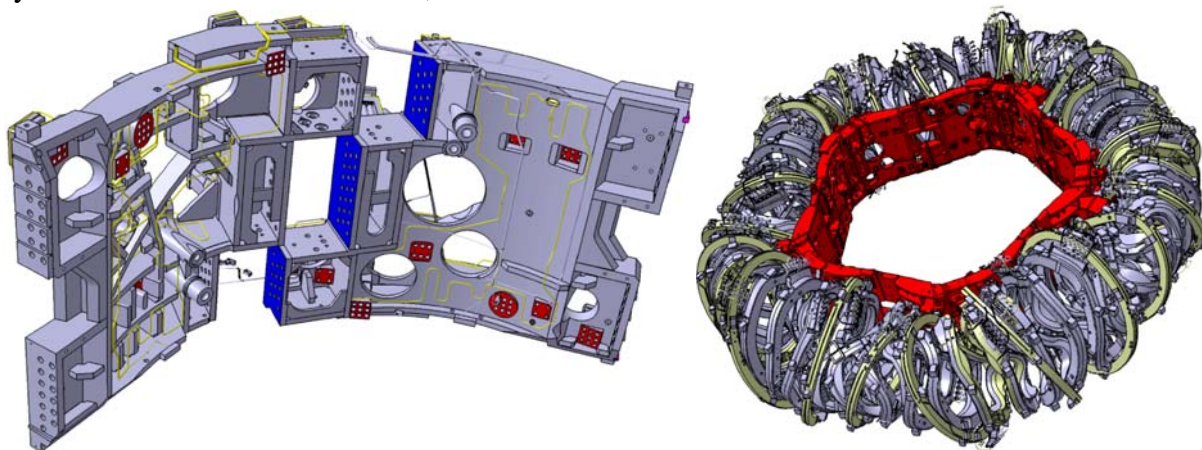


Figure 1: 3 D view of half-module assembly and coil support structure of W7-X.