

## Manufacture of the Central Support Structure for Wendelstein 7-X

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WENDELSTEIN 7-X (W7-X) is a superconducting helical advanced stellarator which is presently under development and construction at Max Planck Institut für Plasmaphysik in Greifswald.

The superconducting magnet system consists of 50 non-planar-coils and 20 planar-coils, connected to a 10 meter diameter and 2.5 meter high central support structure. Following the symmetry of the magnetic configuration the central support structure is composed of five almost equal modules forming a pentagon. Each module is again divided into two half modules.

The construction of each half-module has been designed as a welded construction, the half-modules and the modules being connected with a high strength stud system. The coils are attached by bolting to a total of 14 extensions blocks welded on each half module.

The extensions are produced by casting (DIN 1.3960), carefully welded to the ring and precisely machined. Cooling tubes are connected to all extensions and the structure for cooling with liquid helium. The tubes are attached to the steel structures using copper stripes. The manufacturing of the central support ring has been particularly challenging because the requirements on the positioning of the extensions are very high and the manufacturing tolerances are very stringent particularly for the mating surfaces of two adjacent half-modules. The final machining had to be carried out under temperature control and several metrology measurements were performed at defined machining steps. In some case drilling operations had to be performed in three steps using different tools.

The presentation reports about the design and the machining activities and gives a short description of problems occurred during the fabrication of the central support ring.