## **OVERVIEW OF MAIN-MECHANICAL-COMPONENTS AND CRITICAL MANUFACTURING**

## ASPECTS OF THE WENDELSTEIN 7-X CRYOSTAT

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Wendelstein 7-X (W7-X) will be the world's largest superconducting helical advanced stellarator. This stellarator fusion experiment is at present in the assembly phase at the Max-Planck-Institut für Plasmaphysik (IPP). Wendelstein 7-X is deemed to be a desirable alternative for a future power plant like DEMO. The main advance of the static plasma is caused by the three dimensional shape of some of the main mechanical component inside the Cryostat.

The toroidal plasma with a ring diameter of 11m and an average plasma diameter of 1.1 is contained within the plasma vessel. Its form is dictated by the shape of the plasma. Its geometry is formed around the three dimensional shape of the plasma. The form of the plasma is controlled by the coil system configuration. To control the plasma form it is necessary that all the 20 planar and 50 non planar coils are positioned within a tolerance of 1.5 mm. To meet this requirement a complex coil support structure was created, consisting of the Central Support Ring and the different inter coil supports. The coils and the support structure are enclosed within the Outer Vessel with its domes and openings. The space between the outer and the Plasma Vessel is called Cryostat because the vacuum inside provides thermal insulation of the magnet system which is cooled down to 4 K. Due to the different thermal movements the Plasma Vessel and the Central Support Ring have to be supported separately. The Central Support Ring is held by 10 cryo legs. The Plasma Vessel supporting system is divided into two separate systems, allowing horizontal and vertical adjustments to centre the Plasma Vessel during thermal expansion.

This paper aims to give an overview of the main components in the cryostat like the plasma vessel, the outer vessel, the ports and the different support systems. It describes the current manufacturing and assembly status and the associated critical problems during the manufacturing.