

## **ASSEMBLY TECHNOLOGY FOR THE W7-X STELLARATOR**

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Wendelstein 7-X (W7-X) is a superconducting stellarator being constructed in Greifswald, Germany. The technology needed to assemble W7-X requires a complex integration of engineering disciplines from the accuracy of the manufacture through to the metrology techniques and equipment to successfully assemble the machine. The spiral shape of the Stellarator vacuum vessel means the 70 coils must be threaded individually over the vacuum vessel. To avoid damage to the thermal insulation 5 axis lifting devices have been designed to thread coils into their final position that are now in use.

The distance between the coils is fixed by a series of radial and axial supports. For each of these supports, narrow support elements, lateral support elements, central support elements and planar support elements, the assembly technology is being developed and tested by an extensive test programme.

W7-X is equipped with 299 ports for diagnostics and supply to the in vessel components; they connect the ICRH, ECRH and neutral injection systems to the plasma vessel. All ports must be positioned accurately at various angles around the vacuum vessel, ranging in weight from 100 kg up to 900 kg. For the ports this requires close integration of the manufacturing, metrology and assembly technologies. At present it is planned to use a powered ramp. It is planned that this ramp and its support structure will also be used to insert the thermal insulation of the port, the 'plug in' in-vessel component supply bundles and possibly diagnostics.

The bus bar system links all coils to the power supply system. Space constraints within the machine cryostat require compact superconductor joints which, have been designed and tested with resistance in the range of 1nOhm.

The paper will give an overview of the various technologies being used to solve the assembly problems on the mentioned components and a status on the assembly of the machine.