

DESIGN AND CONSTRUCTION OF THE SUPERCONDUCTING BUSSYSTEM FOR THE STELLARATOR W7-X

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In the framework of cooperation between the Max-Planck-Institut for plasma physics (IPP) and the Forschungszentrum Jülich (FZJ) essential work packages of the stellarator **Wendelstein 7-X** (which is presently under construction at Greifswald, Germany) have been taken over. For the superconducting bussystem an overall concept of the project was elaborated with the goal to optimize working steps and to simplify the system assembly. The technical specifications are the basis for the design, construction, qualification, manufacturing and assembly of the buses and their appropriate supports. To compensate of the magnetic fields due to the bus currents and to facilitate buses assembly, a new bus topology was developed. No collisions with other parts, reduced space for integration and easy transportation were provided. For checking the geometry of the bent buses and to examine the buses assembly a 1:1 model of one W7-X section (72°) was manufactured and assembled. A suitable insulation set up was developed and a qualification program based on different samples have been elaborated and the insulation was examined as follows:

- high voltage insulation checks including measurements of the Paschen firmness,
- thermal tests under cryo-temperatures at 77 K,
- mechanical bending and high pressure tests to check quench situations, and
- vacuum compatibilities of the materials and methods used.

The design will be shown, calculation of magnetic fields and forces are presented, fabrication steps are explained and samples of the superconductor and its holders are displayed.