

## FEM analysis of mechanical behaviour of coil support connections in Wendelstein 7-X fusion reactor (P1-E-429)

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The objective of Wendelstein 7-X project is the stellarator-type fusion reactor. In this device plasma channel is under control of magnetic field coming from magnet system of very complicated shape, made of 70 superconducting coils symmetrically arranged in 5 identical sections. Every coil is connected to central ring with two extensions which transfer loads resulting from electromagnetic field and gravity.

The aim of this work was to analyse mechanical behaviour of the bolted connections using detailed 3D finite element models. All simulations were performed assuming elasto-plastic behaviour of the materials, assembly stresses and friction contacts between different parts of the connections. Stress distributions, displacements, forces acting on the bolts and welds were studied using standard and submodeling routines. The results were subsequently used to optimize the design of critical central support elements.