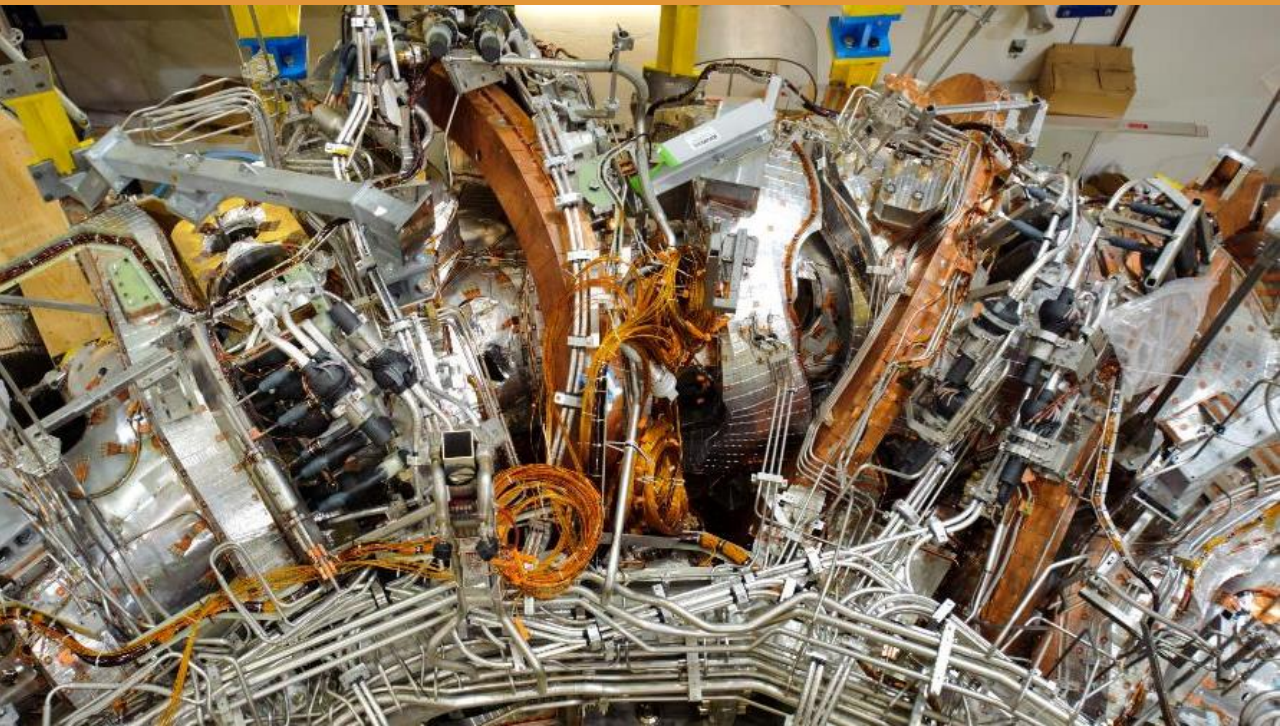


PROJECT

Structural Health and Condition Monitoring System for the Wendelstein-7X Nuclear Fusion Reactor



CUSTOMER
Max Planck-Institut für Plasmaphysik

COUNTRY
Germany

APPLICATION
Structural Health and Condition Monitoring

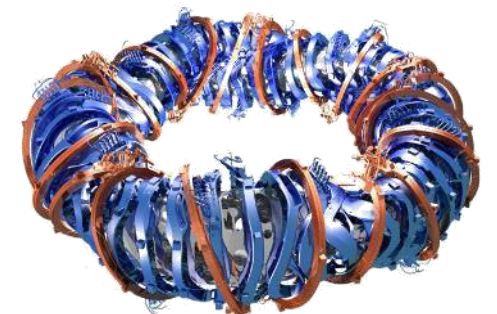
MARKET
Nuclear

SHORT DESCRIPTION
Q.bloxx DAQ modules deployed on the Wendelstein-7X experimental nuclear fusion reactor to ensure optimal performance and safety. The system includes the following measurements:

- Temperature Sensors: 1500 channels (Pt100, CERNOX, and TVO) for precise cryogenic temperature measurement.
- Strain Gage Rosettes: 530 channels for accurate structural health monitoring.
- Displacement Sensors: 110 channels for displacement monitoring.
- Proximity Sensors: 100 channels.

Gantner
instruments

IPP Max-Planck-Institut
für Plasmaphysik



PROJECT

Nuclear Fusion Reactor Monitoring

APPLICATION

At the Max Planck Institute for Plasma Physics in Germany, we provided a comprehensive structural health and condition monitoring system for the Wendelstein 7-X stellarator. The system included over 1,500 temperature sensors (Pt100, Cernox®, and TVO), 530 strain gauge rosettes, and various displacement and proximity sensors, all integrated using our Q.bloxx modules.

REASON FOR SELECTION

The project's requirements included precise measurements across a wide temperature range, resistance to strong magnetic fields, and minimal sensor self-heating. Our intermittent measuring modes reduced power to the sensors, minimizing self-heating and thermal voltages, which was crucial for accurate measurements in the challenging environment of a fusion reactor.

SYSTEM DESCRIPTION

A total of 5 instrumentation cabinets equipped with Gantner Instruments Q.bloxx measuring modules:

- 240 x Q.bloxx A101 IPP, 2 strain gage inputs per module
- 24 x Q.bloxx A104, 8 thermocouple inputs per module
- 210 x Q.bloxx A105 CR, 4 RTD inputs per module

TASKS

Intermittent measuring modes to reduce power to the sensor
minimizing sensor self-heating

Benefits of intermittent measuring method:

- Influence of thermal voltages is suppressed
- Sensor self-heating effect is reduced by a factor of 40
- EMF suppression when the magnetic coils are excited
- Minimize lead wire temperature effects

