CMS Superconducting Solenoid

MAGNETS FOR FUSION

MAGNETS FOR HIGH ENERGY PHYSICS

MAGNETS FOR MEDICAL APPLICATIONS

SYSTEMS FOR ENERGY

SERVICES & REPAIRS

CMS is a high-performance general-purpose detector for the LHC collider. The magnet, delivered in 2005, consists of a 4 T superconducting coil having a free bore measuring 6 m in diameter and a total length of about 13 m. It is wound in five separate coil modules which are joined along a common axis, before being inserted in the vacuum tank.
The main characteristics of the CMS solenoid are:

- active length: 12.5 m
- outer diameter: 6.9 m
- weight: 225 t
- operating temperature: 4.5 K
- operating current 19500 A
- indirect cooling.

Each coil module consists of a four layer winding, VP impregnated with epoxy resin. The conductor is realized in four parts: a 32 strands Rutherford superconducting cable co-extruded inside a high purity aluminum matrix, plus two Al 6082 bars, electron-beam welded, to mechanically reinforce the conductor itself. This magnet was successfully commissioned in autumn 2006, showing no training behaviour.

Cylinder vertical milling machining

Module winding

Preparation of a module for VPI impregnation

Module assembly at CERN