

## KATRIN CPS



MAGNETS  
FOR FUSION



MAGNETS FOR HIGH  
ENERGY PHYSICS



MAGNETS FOR  
MEDICAL  
APPLICATIONS



SYSTEMS  
FOR ENERGY



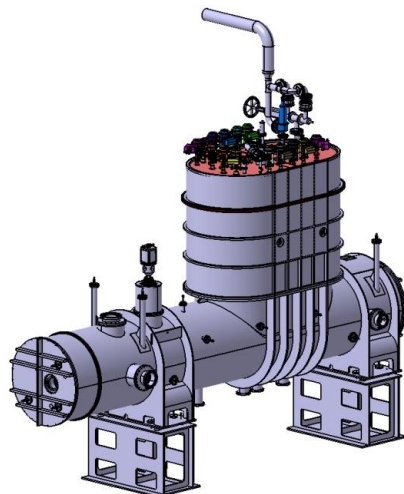
SERVICES & REPAIRS

In 2008 ASG has been awarded a contract for the design, manufacturing, cold test and commissioning of the CPS magnetic system unit, one of the main component of the KATRIN experiment under construction at KIT. The CPS' function is that of achieving a reduction of the tritium concentration in a beam of particles before it reaches a detector. Inside the CPS beam line, a magnetic flux of  $191 \text{ T cm}^2$  tube is created and sustained by a set of 7 superconducting solenoids (cooled in He pool boiling @ 4.5 K) along the beam trajectory. Each magnet belongs to one of the seven sections composing the system, all supported by a common stainless steel cold mechanical structure and housed in a common cryostat. Following a procedure already tested during the DPS2-F assembly phase, the relative position of the various components is assessed using a laser tracker system. Each section of the beam tube passing through the seven sections is operated at distinctive temperature levels, depending on the function of the section and the mode of operation of the CPS.

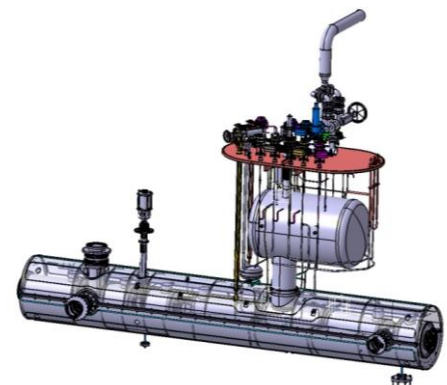
The CPS geometrical characteristics are the following: overall length 6.85 m, overall height: 4.4 m (beam entrance at  $h = 1.8 \text{ m}$  to ground). The magnetic field at coil centre is 5.6 T, for a magnetic stored energy of 3.7 MJ. The operational temperatures of the different sections of the beam tube range between  $3.5 \div 620 \text{ K}$ .

Eight cryogenic operating modes are envisaged. The temperature uniformity along the beam tube in standard mode must be better than 0.5 K

The cryostat vessel, the He circuit and the beam tube are made of stainless steel components welded together both by ASG's certified personnel and sub-suppliers. In particular all pressurized vessels have been envisaged manufactured under AD2000 - HP0 regulations. All pressurized vessels in the systems undergo HP0 and AD2000 quality regulations. The He and N<sub>2</sub> systems must be tested to a leak rate lower than  $10^{-9} \text{ mbar}\cdot\text{l/s}$ .



*CPS Cryostat assembly*



*CPS cold mass with main helium tank*



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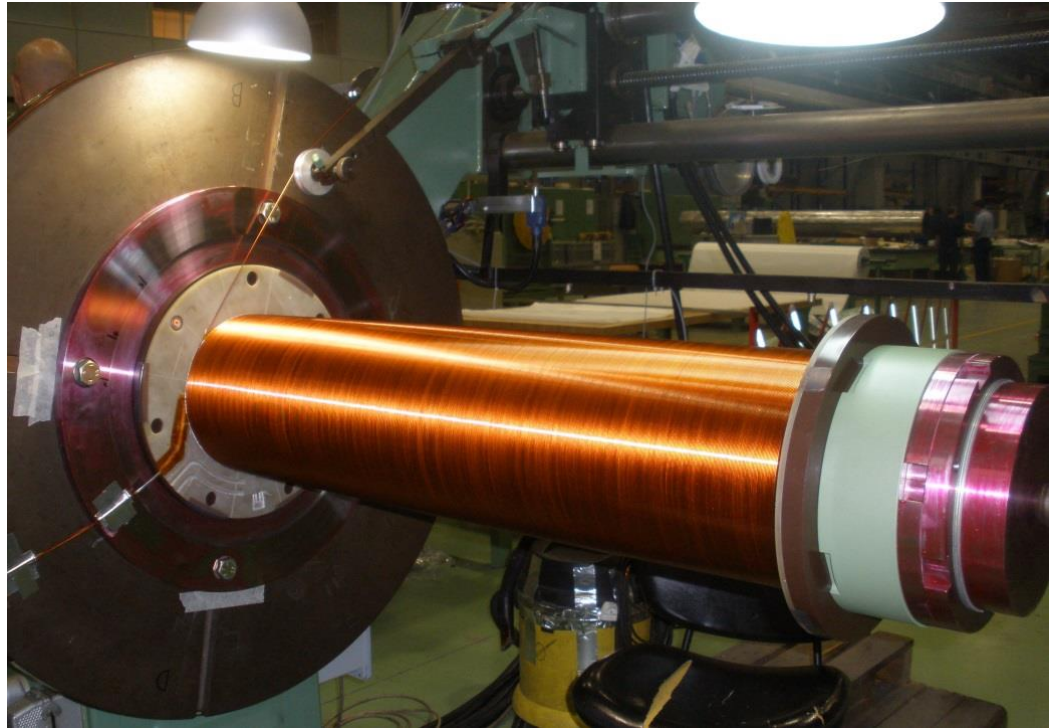
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SERVICES & REPAIRS



*Coil winding*



*Vacuum Vessel*