

CMS cryogenics

work package agreement **WP_AT_ECR-N.4191.doc**

<https://edms.cern.ch/document/434394/2>

LEAF meeting on 03.07.2006

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Tasks of the CMS helium refrigeration system

- **Magnet cool-down**

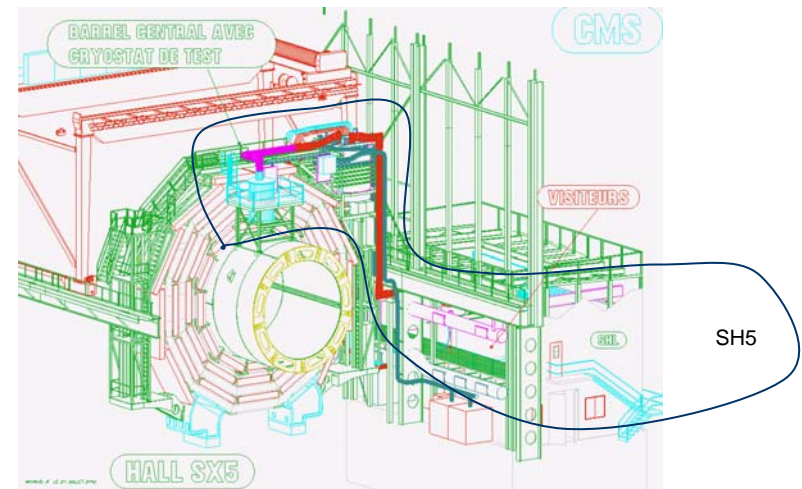
- The supply of refrigeration power for the cool-down of the solenoid cold mass from 300K to 4.45K,

- **Magnet operation**

- The supply of 800W refrigeration power for the normal operation of the magnet solenoid at 4.45 K,
- The supply of 4500W refrigeration power for the shield cooling of the magnet solenoid and the phase separator in between 60K and 80K,
- The supply of 4g/s helium liquefaction power for the current leads cooling,

- **Magnet protection and quench recovery**

- The emergency cooling in the case of cold box, compressor or control system failure,
- The thermal recovery after a fast discharge of the solenoid coil.



Status of the CMS helium refrigeration system

- **Installation**

compressor station and helium storage –
installed and operational in/next to SH5

cold box and LN2 storage –
installed and operational in preliminary
position in/next to SHL

transfer lines –
SH ↔ USC – 95% terminated
USC ↔ UX – 66% terminated



phase separator and
6000 l tank



cold
box



compressor
station



transfer line
segment



helium storage tanks

LN2 tank



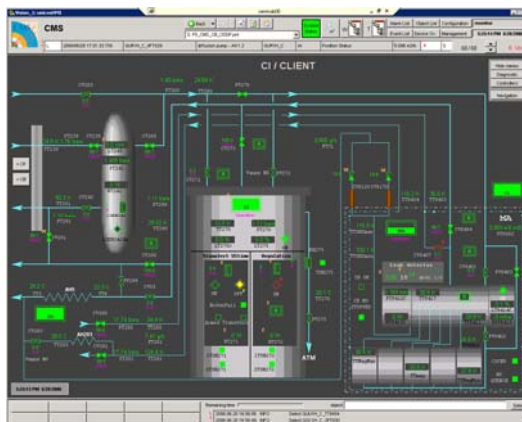
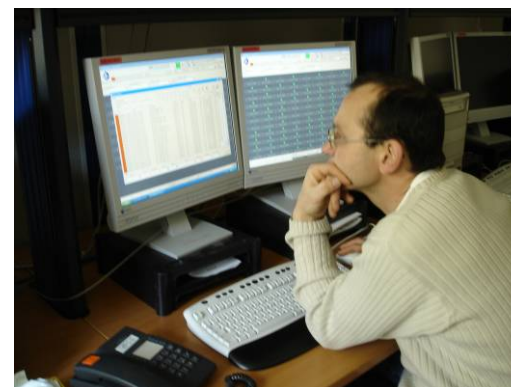
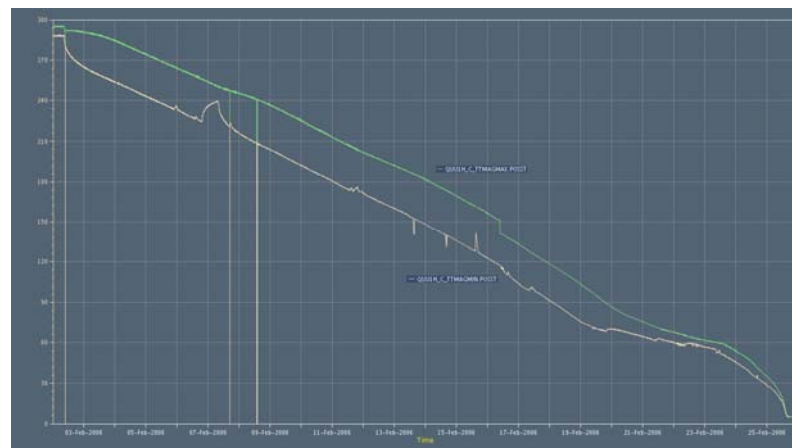
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Status of the CMS helium refrigeration system

- **Operation**

- First cool-down of the magnet in February 2006
- Refrigeration at nominal operation temperature since March 2006
- The operation and maintenance is covered by a service contract



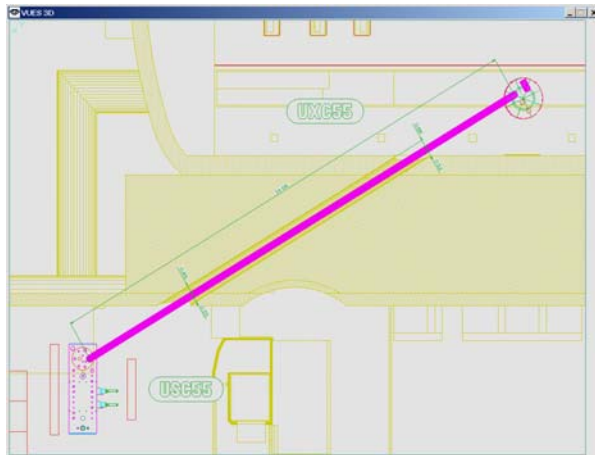
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Next steps - CMS helium refrigeration system

- Removal tasks

- disassembly of the cold box installation and removal to USC
- re-installation and commissioning of the cold box in USC
- transfer of the LN2 tank



- Possible consolidation tasks

- optimization of compressor station operation for reduced power consumption
- reduction of helium cost
- improvement of the compressor station oil removal capacity
- upgrade of cold box valve positioners