TE-MSC-Test Facility 2010

mandate

Performance tests of Sc magnets, analysis of the tests and the measurements data. Organization of testing with public and accessible data base. Organize analysis of data in collaboration with other sections and groups, with feed back to design, production and machine operation. Managing SM18 facility and merging of Block-4 equipment in SM18.
Activities 2010

- **LHC Consolidation**
  - Spare parts test (LHC dipoles and SSS, Diodes for LHC main magnets)
  - Thermal amplifier: proof of principle
  - Shunted interconnect: qualification test + feedback for modeling
  - 6 kA “parying hand” connection fatigue test

- **SC Magnet Test Facility Consolidation (B4.to SM18)**
  - Vertical test station
    - Civil Engineering, Cryogenics integration, Control and Daq, Powering, Cryostats
  - Horizontal test station
    - New daq system, Revision of hardware and software and adaptation to new daq, Pilot system test on 1 cluster

- **HFM**
  - TQS03 powering test, powering cycle test, Ac loss measurements
  - SMC first Nb3Sn magnet test

- **FCM**
  - Integration of a test station in SM18

- **Sclink**
  - MGB2 wire and cable test, Integration of a test station in SM18

- **PS Booster magnet test**
  - Integration to Sc magnet test bench, Cycling test campaign

- **CLIC**
  - Test of a wiggler from BNIP, Test of 1 module of a superconducting DR wiggler built at CERN

- **HIE-Isolde**
  - Test of Sc solenoide with (A. ceramic insulation, B. with epoxy insulation)

- **R&D for low temperature sensor developments with optical fibbers**
  - Test at 77K, at 4.2 K and at 1.9K

- **External collaboration with Karlsruhe**
  - Test of a superconducting undulator for ANKA

- **External collaboration : OSQAR experiments**
  - 4 weeks of running

People 2010

- Marta Bajko
- Christian Giloux
- Maryline Charrondiere
- Patrick Viret
- Jerome Feuvrier
- Gaelle Dib
- Guy Deferne

Industrial support:

- Christian Bontaz
- Franck Bedendo
- Frederic Flamand
- Michael Ky
- Bertrand Mouches
- Frederic Rougemont
LHC dipoles:

On Oct. 28th 2010, 19/44 had been tested with several thermal cycles (total of 23 tests) and qualified as “OK for the tunnel”

Diodes for LHC main magnets: qualification at 77K and 4.2K is undergoing. 7/28 tested diode type MDA qualified “OK for assembly on dipole”
A 4 cm defect was introduced in a 5m long copper bar of cross section 20X10mm. The bar was put in a cryostat and the bath temperature could be adjusted between 4K and 40K. A DAQ system could log the voltages while a power converter could supply a current between 800 and 6000A.

V4_5 contains the defect. V2_3 and V3_4 are perfect busbars.
Test in realistic conditions of a worst case scenario, with a non-soldered shunt length of 8 mm and low RRR values. Looking after the thermal runaway with 13 kA and 100 seconds decay time.

**TEST SET UP:** 2 Special SSS spare magnets were connected to the testbench in SM18 on cluster D, where D2 bench was adapted to this specific test.

In total 35 m of RQ busbar and 35 m of RB busbar. No magnets in the test-circuit.

**Results:** In the condition a quench starts in the interconnection itself a continuous current of 13 kA does not show any sign of a thermal runaway in the first 180 seconds.

**Qualification:** In terms of thermo-electrical stability the shunt is overdesigned.
**LHC Consolidation**

6 kA “parrying hand” connection fatigue test in Block 4

*Test* in pessimistic conditions (12,000 cycles between 0.7 and 9 kA with resistance monitoring. Factor 1.5 on current, 2.25 on forces and about 10 on lifetime) with and without reinforcement (belt) between the interconnected cables. 3 connections in series.

Test results:

- No degradation of electrical resistance after cycling

Results: No degradation of electrical resistance after cycling
SC Magnet Test Facility Consolidation
(Block4 to SM18)

Civil engineering in SM18 started in March 2010

Integration Project

Status in October 2010

In total 35 m of RQ busbar and 35 m of RB busbar. No magnets in the test circuit.

Civil engineering in SM18 started in March 2010.
SC Magnet Test Facility Consolidation
(Block4 to SM18)

Dismounting Block 4 started on 15th of October 2010

Staring of vertical test station in Sm18 planned for March 2010
PROJECTS. TESTS in SM18 and Block 4

**HFM:** SMC Nb$_3$Sn  
Component qualification at cold, test with dummy and real coils

**FCM and Sclink**  
Test station Integration in SM18

**Fibber Optic Sensors**  
R&D for applications in magnet technology at low temperature

**OSQAR EXPERIMENT**  
(Optical Search for QED vacuum magnetic birefringence. Axions and Photon Regeneration). 4 weeks run

**SC Link:** MgB$_2$  
Sample test x 10

**HIE Isolde:** Solenoid Nb$_3$Sn 4 test

**Undulator for Anka**  
3 runs with repairs between

**PS Booster** magnet  
in SM18 for endurance test

**CLIC Undulator**  
Built by BIP