



Feedback from experts after the 5th meeting of the 11T Dipole Task Force

F. Savary



11T Dipole Task Force Meeting #7 - CERN – 2018-02-07

Findings 1

- **Invited experts:** L. Rossi, G. Spigo, H. Ten Kate, A. Yamamoto
- The **analysis presented by the Task Force**, which is pointing out uncontrolled stress, particularly during collaring but also during excitation, **seems reasonable, and is substantiated by the various presentations**
 - Even the magnets that worked well have shown signs of permanent degradation; however, the degradation is above the ultimate current; so, they have been considered, and are, good
 - The training towards maximum current for all magnets is in line with other Nb₃Sn coils
 - The critical point seems the cable degradation due to excessive stress (since the 11T works at high fraction of critical current, above 80% along the load line, I_C degradation may easily become a limiting factor)
- The **reasons of the overstress that have been put through seem correct**, although it is **difficult to say if they are exhaustive**
- The **quality of the coil seems adequate**, there appear no dependence on coils quality and performance inside magnet
- Thermal contraction and stress-displacement **characterization at cold temperature would need to refined**
- The **range of longitudinal variation of the azimuthal coils size is worrying**

Findings 2

- Having **stoppers during collaring seems to be a correct way to proceed**
- The tapered keys technique would allow limiting peak stresses seen by the coil during collaring
- The task force program includes, among many actions:
 - The qualification of a new insulation scheme
 - A series of measurements on ten-stacks aiming at better knowledge of the actual mechanical properties of the coil blocks
 - The simulation of the mechanical behavior of the key stages collaring, cool down, and energization with a refined FE model
 - The construction of two model magnets to validate the new insulation, and the new collaring parameters/procedures (once determined)
 - This program includes many other points like a deep re-analysis of the existing data, and the utilization of new instrumentation, whenever possible
- **Close collaboration between the teams of the Large Magnet Facility in 180 and the Magnet Laboratory in 927 is necessary** to achieve the goals of the 11T Dipole Task Force
- **Collaboration between the contractor GE in charge of the coil/collared coils production, and the CERN team, is of utmost importance**

Recommendations

- The **experts support the task force program that is well conceived** (considering also the boundary conditions, especially in time), and recommend that it is carried out with high priority
- The **experts recommend giving the green light to the industrial contract to produce the coils with the new insulation scheme**
- However, they **recommend waiting to have the results of the cold tests, hopefully successful, of at least the first new short model, to carry out the first collaring of the series**