



U.S. MAGNET
DEVELOPMENT
PROGRAM

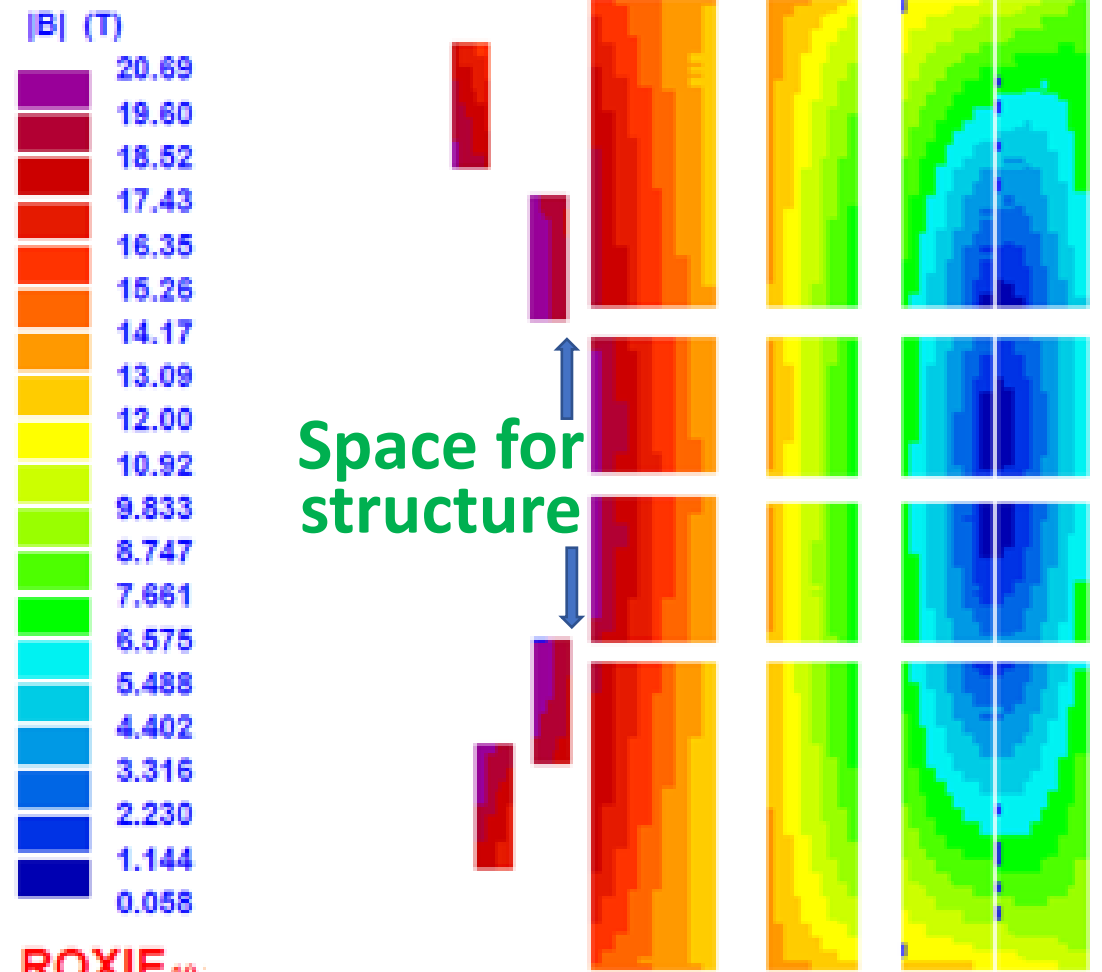
Relevance of the BigBox Test to Common Coil Design

Ramesh Gupta

USMDP General Meeting
May 2, 2023

Pole coils are needed for an efficient field quality design of the common coil magnet. They have never been tested before. BigBox test provided a partially simulated test of one configuration.

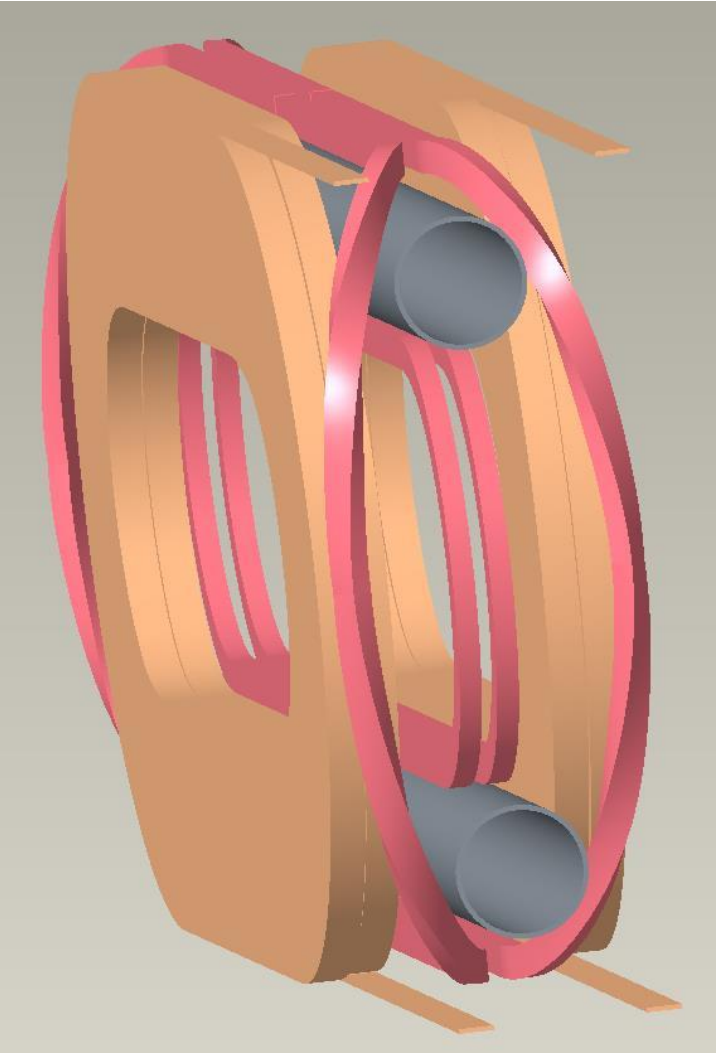
Pole coils



Pole coils

ROXIE₁₀

Pole coils clearing the beam tube



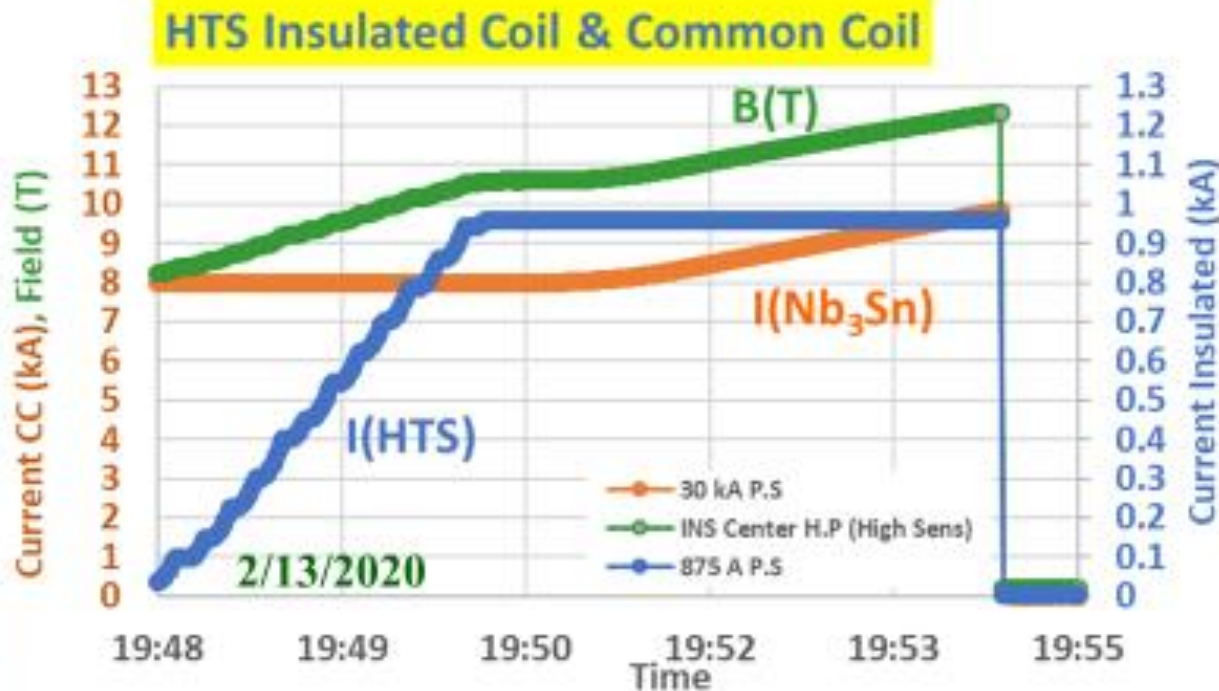
Practice winding of flared ends



Not tested Phase II was not funded

12 T HTS/LTS Hybrid Dipole Test Results

**Ramesh Gupta, K. Amm, P. Joshi,
S. Joshi, W. Sampson, A. Ben Yahia**
LTSW/HFSW2020, Berkley, CA



Several combinations of the currents in HTS and LTS coils were tried. Hybrid performance was not limited by HTS coil but by the Nb₃Sn coils.

Smaller HTS coils were in direct contact with the larger Nb₃Sn coils with no structure in between. This meant a local discontinuity or stress/strain from the pressure of HTS coils on Nb₃Sn coils.

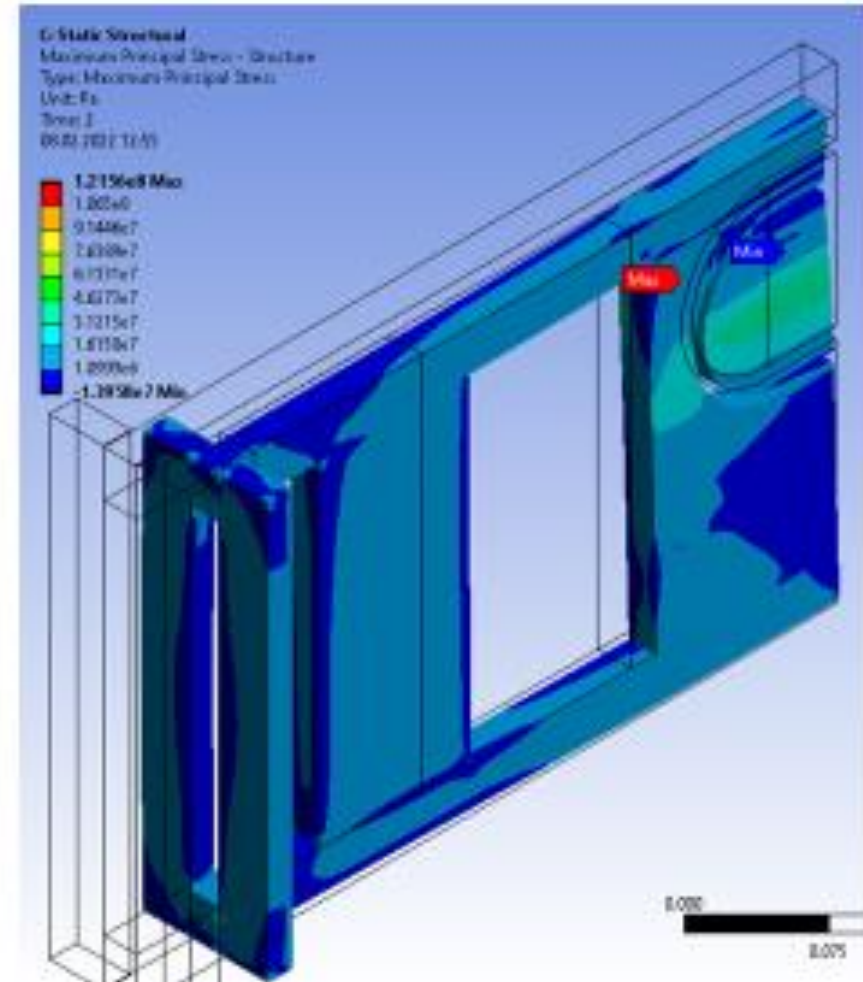
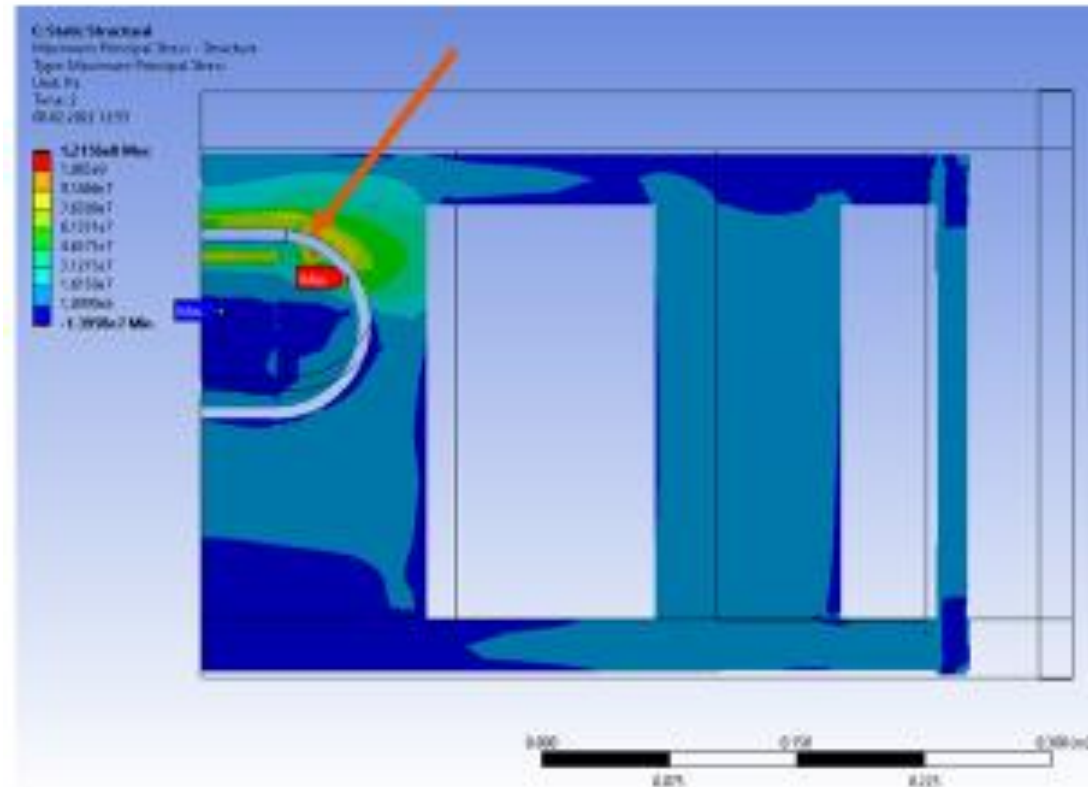
Intermediate structure reduces local stress/strain on DCC017

Courtesy:
Douglas
Martins



Mechanical Coupling – BigBOX results

- SS structure - Max Principal Stress
- Peak of about 300 MPa



Side benefits (demo) of the recent PSI tests

While we wait for a formal presentation from PSI, a few points related to the common coil:

- Demonstration of:
1. Pole coils with hard-way bend tested in common coil
 2. Intermediate structure worked
 3. Highest field in "React & Wind" dipole or common coil dipole achieved

