



**U.S. MAGNET
DEVELOPMENT
PROGRAM**

MDPCT1b re-assembly summary

Igor Novitski



U.S. DEPARTMENT OF
ENERGY

Office of
Science

MDP general meeting

July 22, 2020



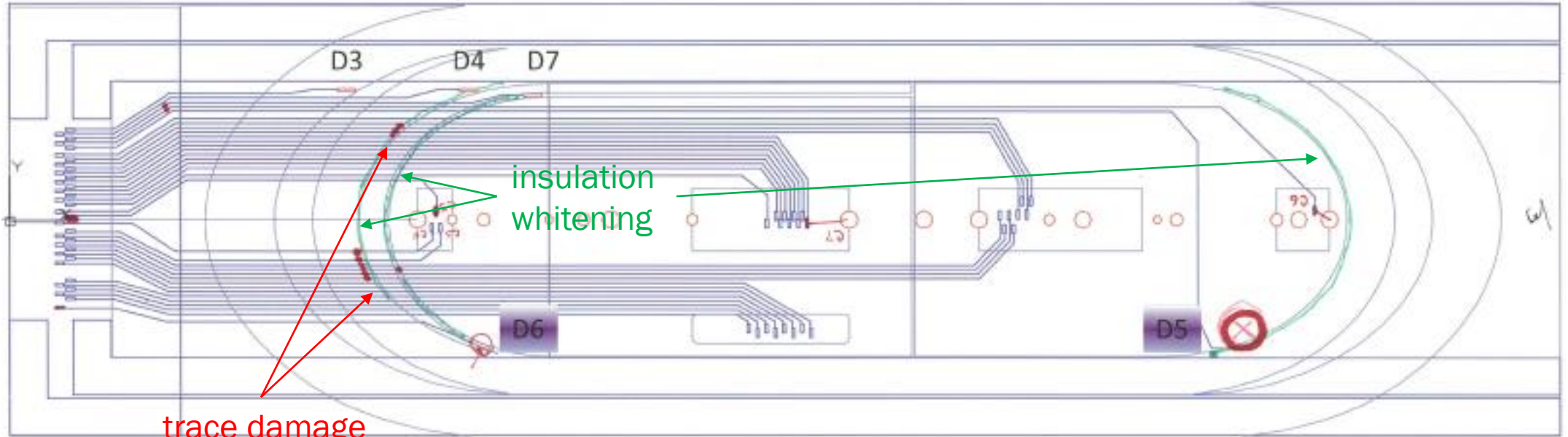
- **Coil instrumentation repair**
- **Az prestress increase**
- **Axial load modification**
- **Preliminary SG data**



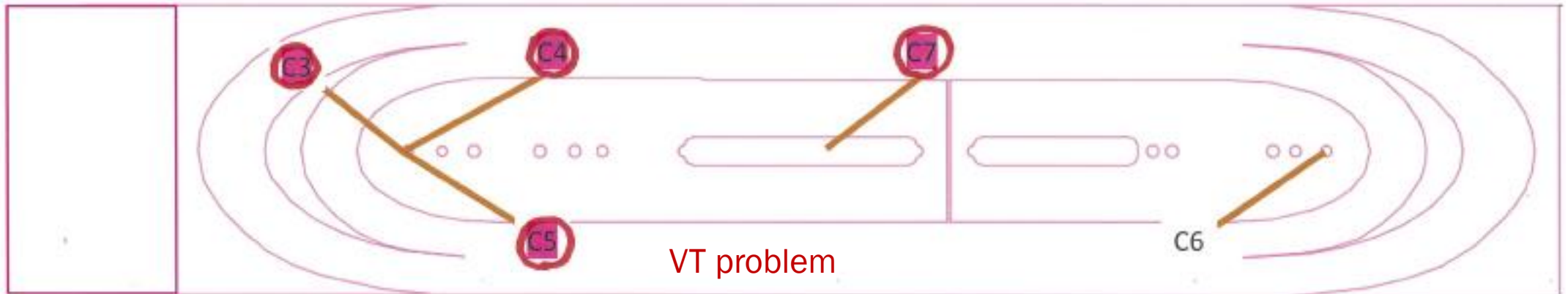
Traces damage after test#1

CL2-004

L4 out

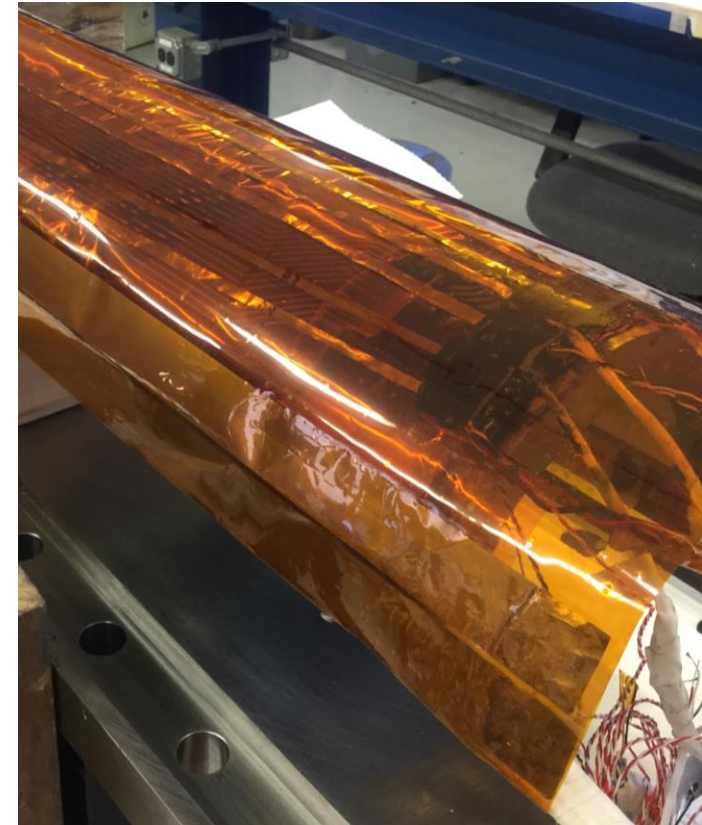
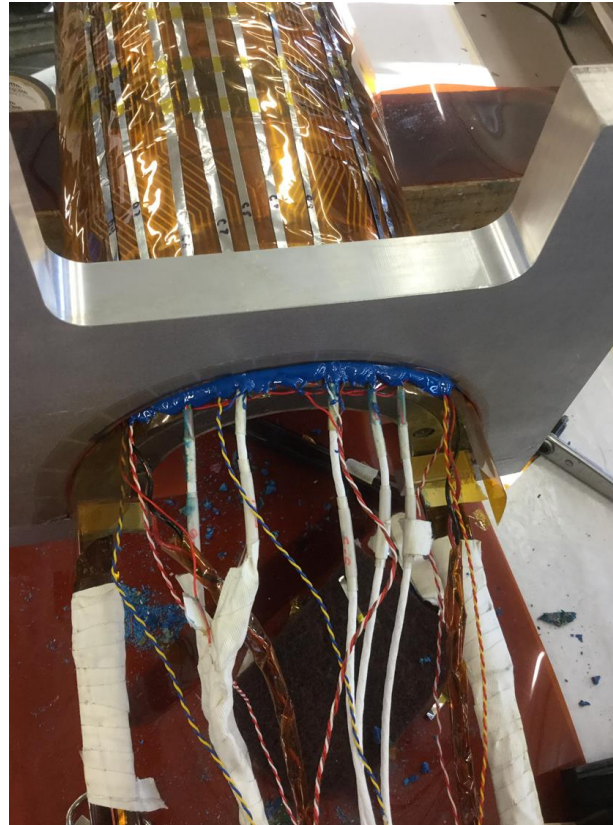
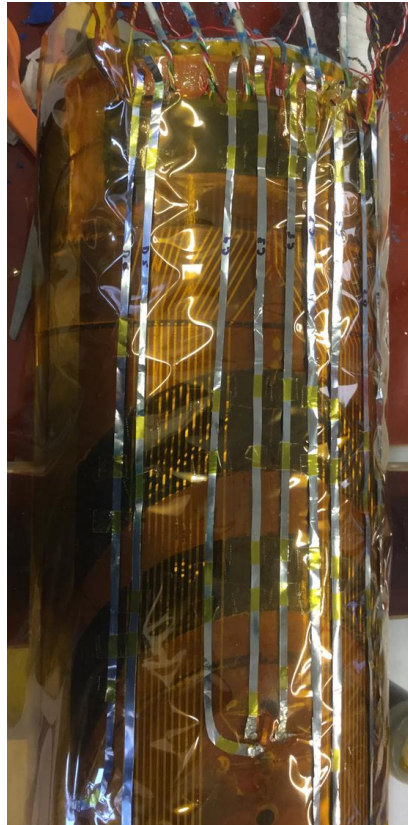
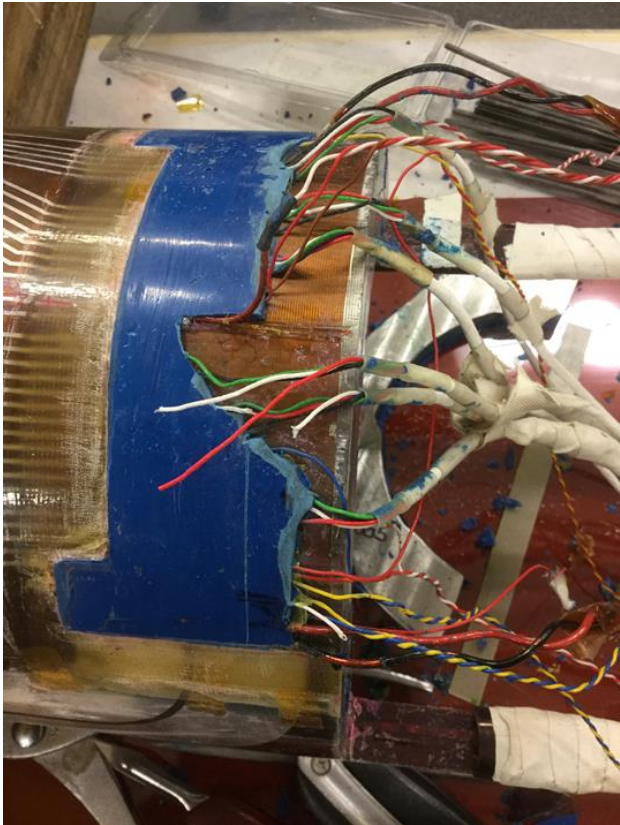


L3 in





New VT's traces and PHs



SS foil strips with 25micron thickness

Magnet target prestress was selected based on 2D FEA Results

AVERAGE AZIMUTHAL STRESS IN SELECTED TURNS

Position in coil	Average Azimuthal Coil Stress, MPa			
	Clamping	Skin welding	Cool down	B=15T
Pole 1	44	88	138	9
Pole 2	27	46	75	21
Pole 3	35	64	97	36
Pole 4	37	62	95	62
Mid-plane 1	33	64	95	153
Mid-plane 2	35	65	107	127
Mid-plane 3	36	62	92	153
Mid-plane 4	38	66	103	153

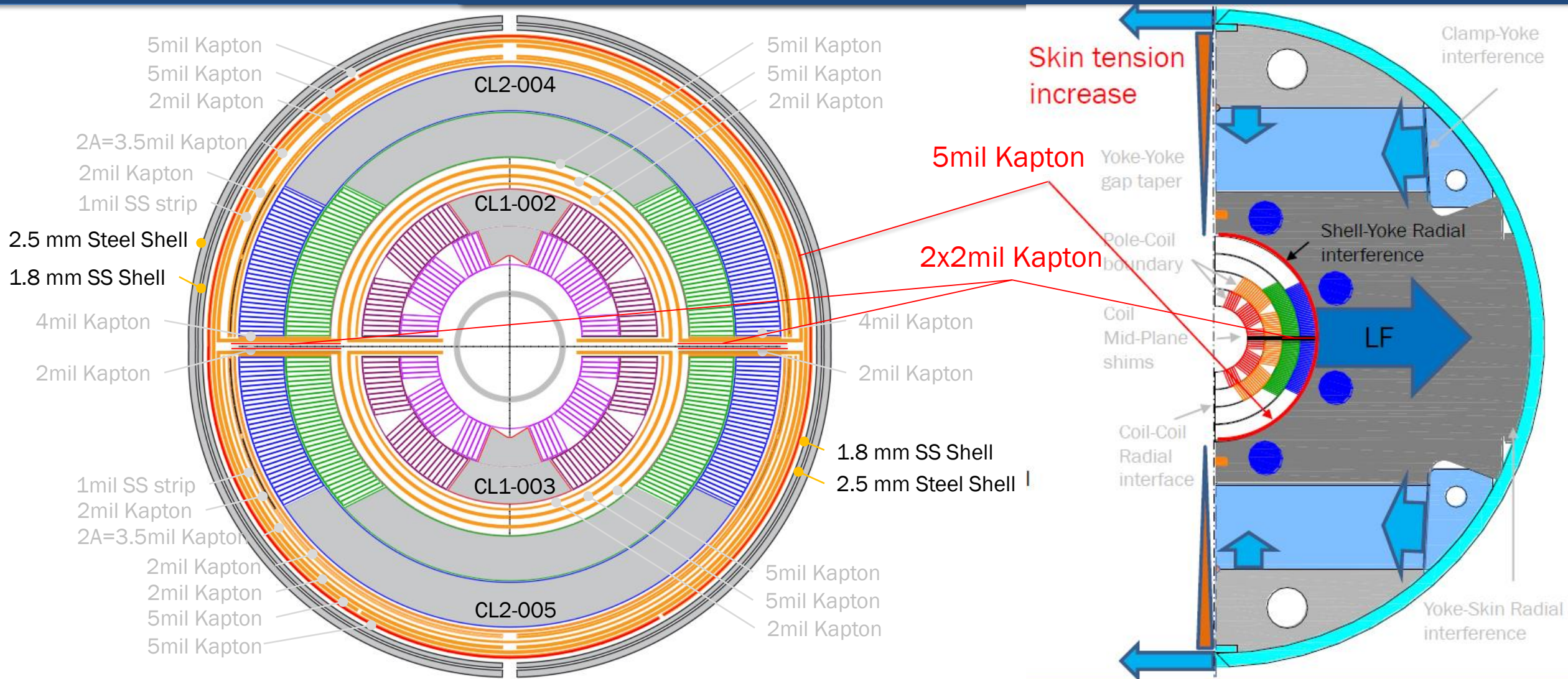
MAXIMUM EQUIVALENT STRESS IN KEY STRUCTURAL ELEMENTS
(MPa).

Structural element	Baseline design		
	Assembly	Cool down	B=15 T
Coil	133	176	168
Yoke	115	353	448
Clamp	118	280	292
Skin	280	404	428

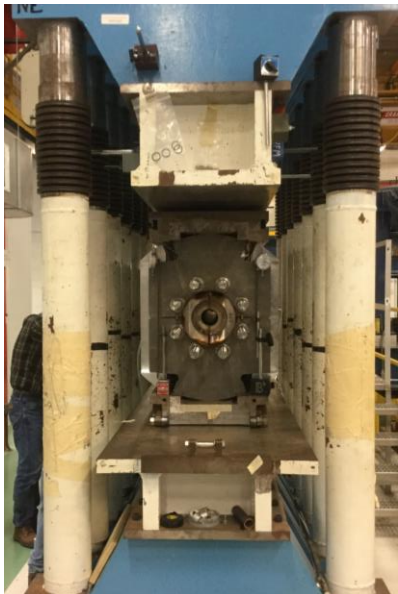
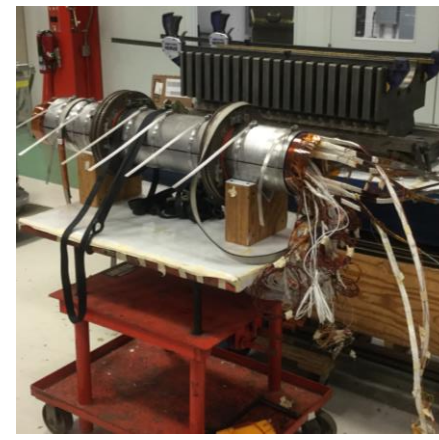
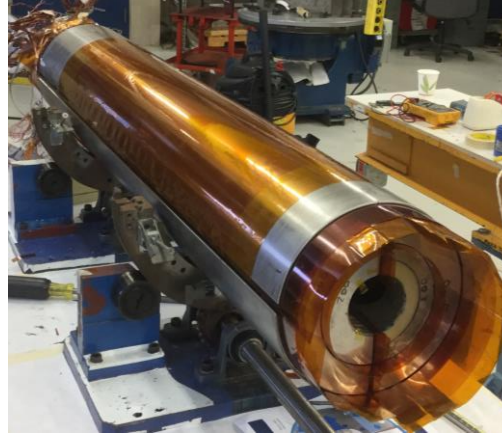
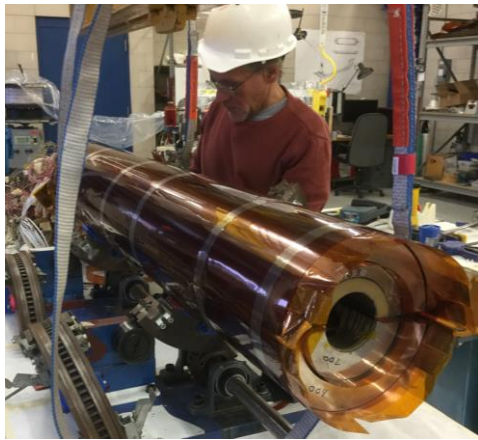
Target prestress after assembly for 15T => **increase ~20MPa wrt 1st test**



Radial Shim Plan for the Coil Block



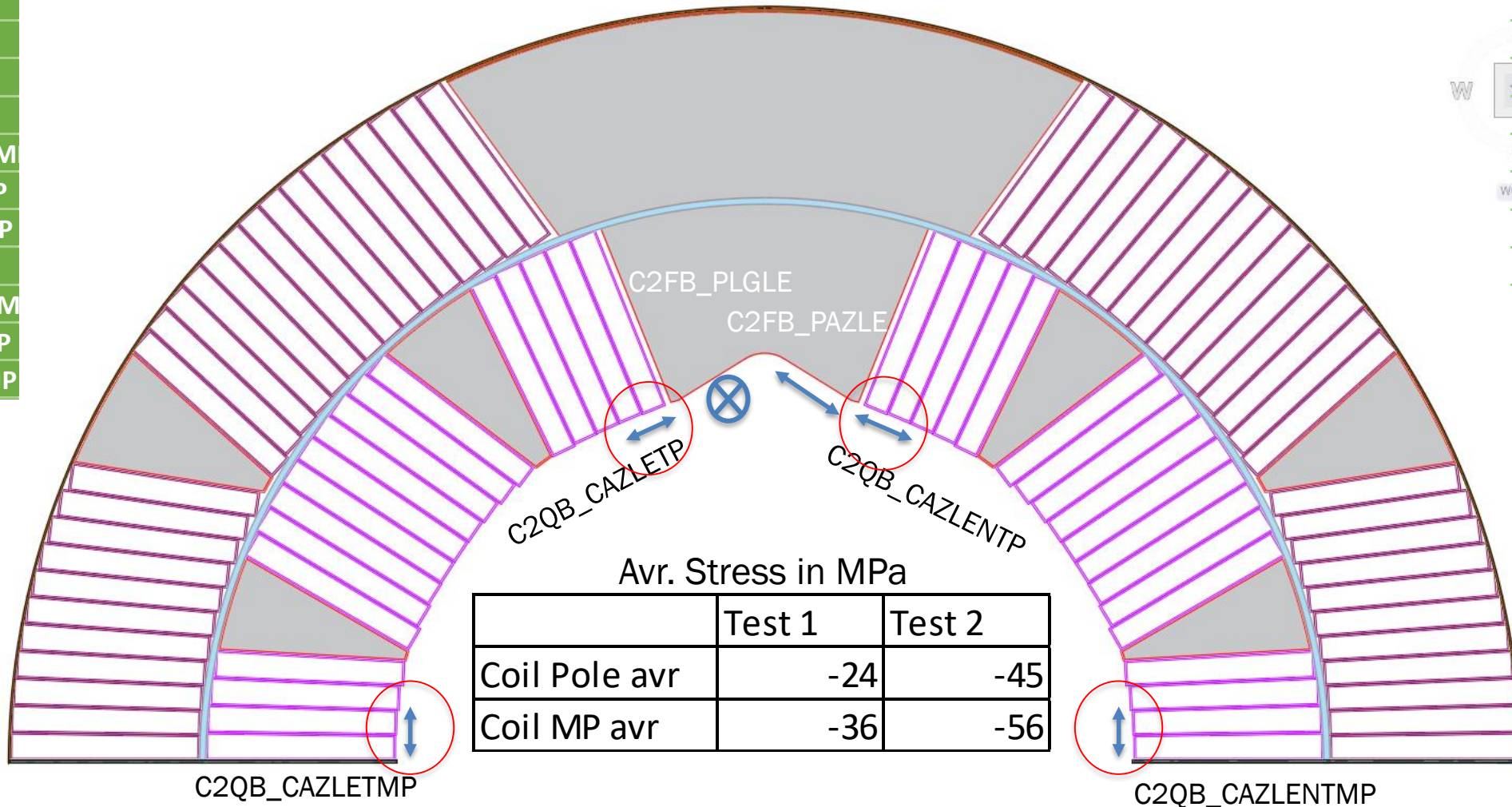
GI wrapping, coil block yoking and skinning





- SG_C2FB_PAZLE
- SG_C2FB_PAZRE
- SG_C2FB_PLGLE
- SG_C2FB_PLGRE
- SG_C2QB_CAZLENTM
- SG_C2QB_CAZLENTP
- SG_C2QB_CAZLETMP
- SG_C2QB_CAZLETP
- SG_C2QB_CAZRENTM
- SG_C2QB_CAZRENTP
- SG_C2QB_CAZRETMP

- SG_C3FB_PAZLE
- SG_C3FB_PAZRE
- SG_C3FB_PLGLE
- SG_C3FB_PLGRE
- SG_C3QB_CAZLENTM
- SG_C3QB_CAZLENTP
- SG_C3QB_CAZLETMP
- SG_C3QB_CAZLETP

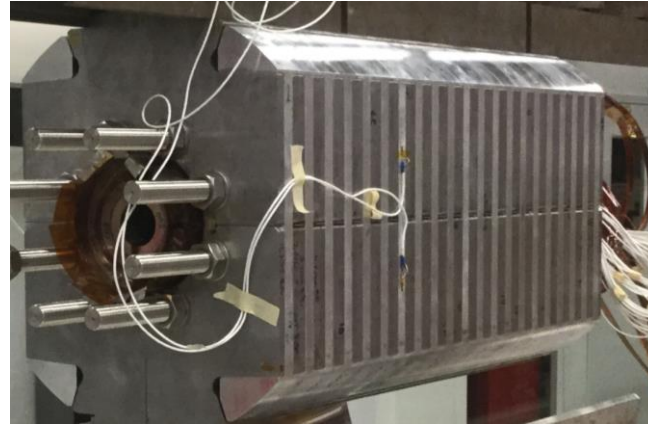


Aluminum Clamp SGs



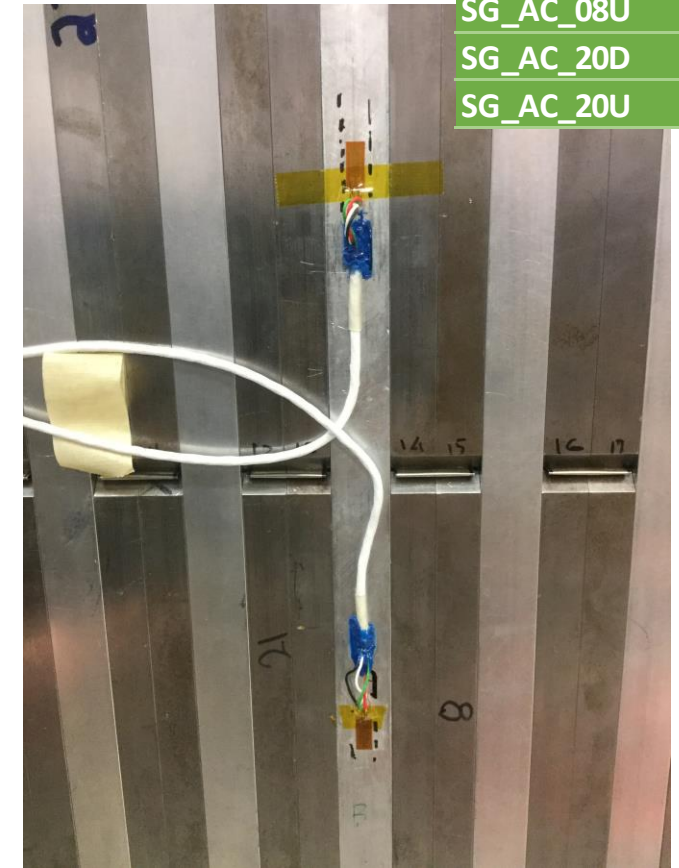
AC 08 U

AC 08 D



Avr. Stress in MPa

Test 1	Test 2
55	99



SG_AC_08D

SG_AC_08U

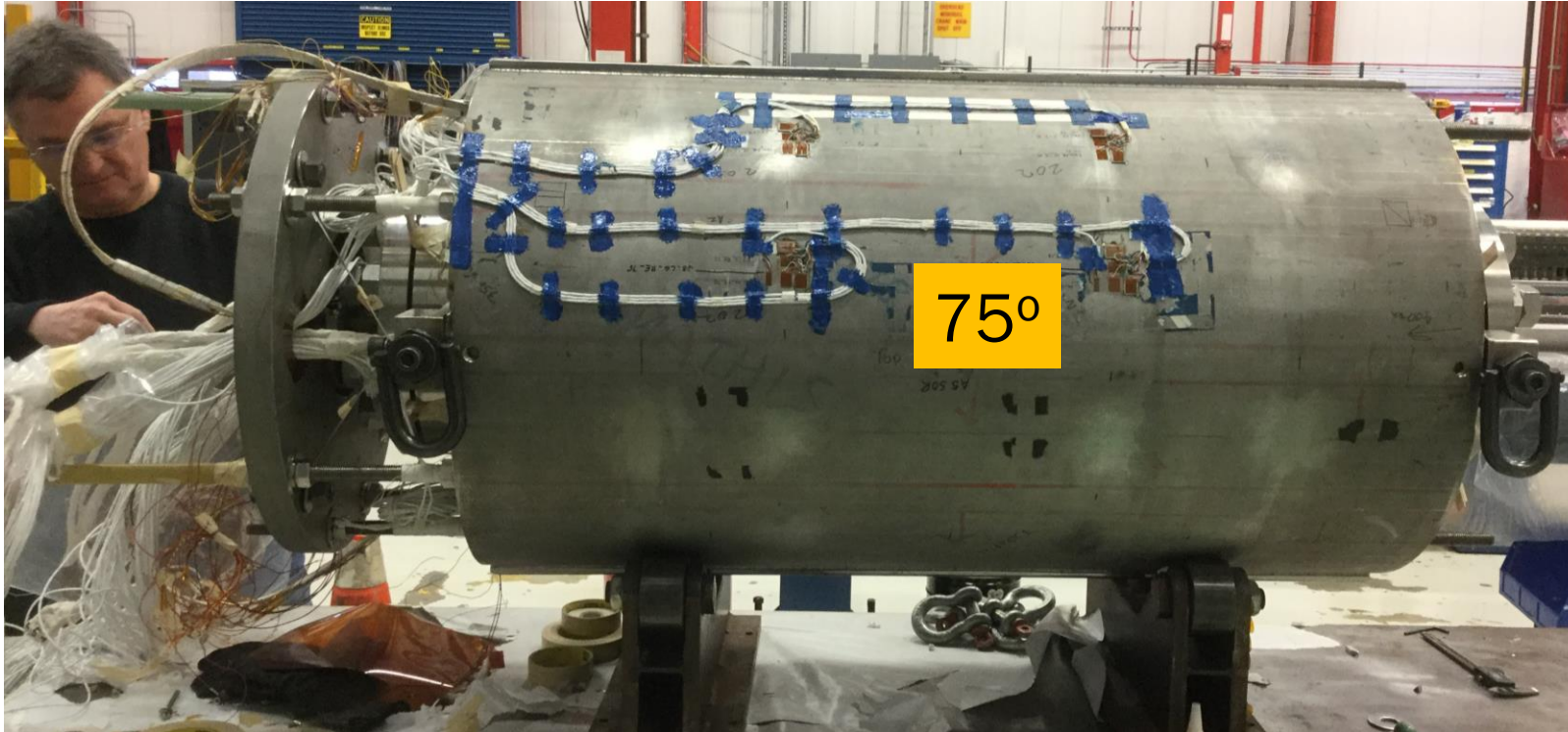
SG_AC_20D

SG_AC_20U

AC 20 U

AC 20 D

SG

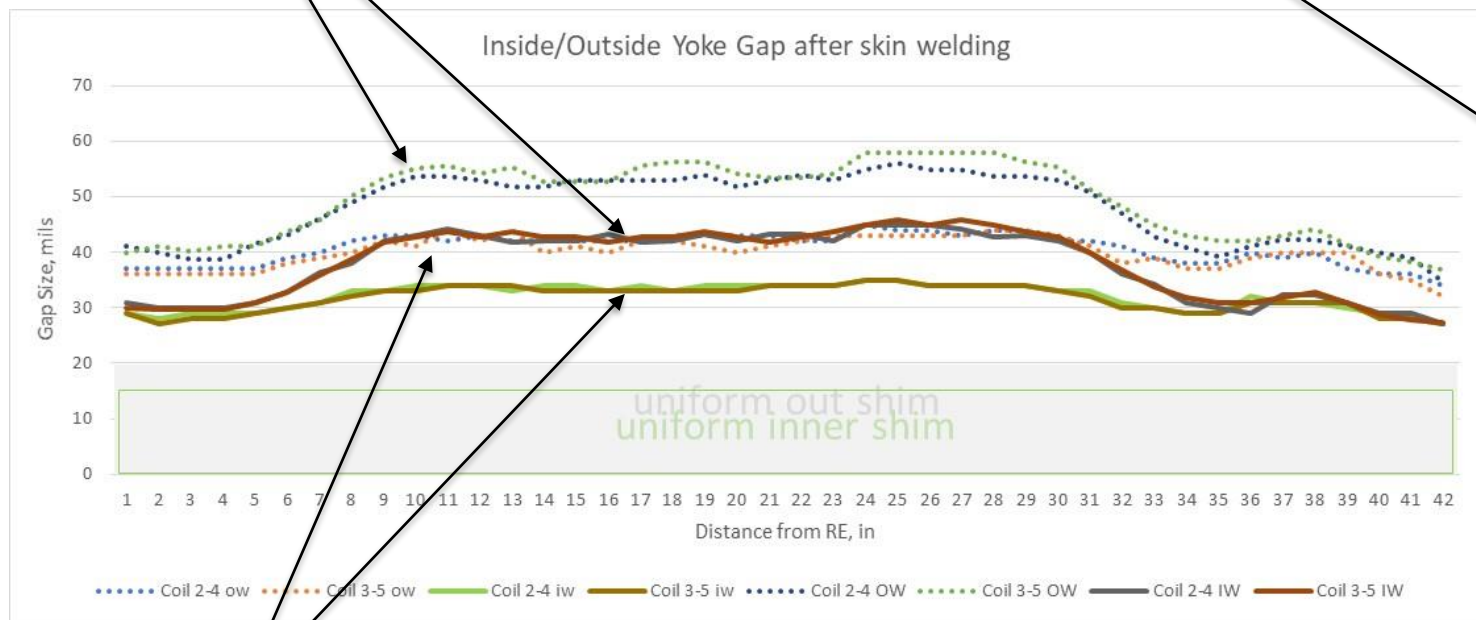


Avr. Stress in MPa

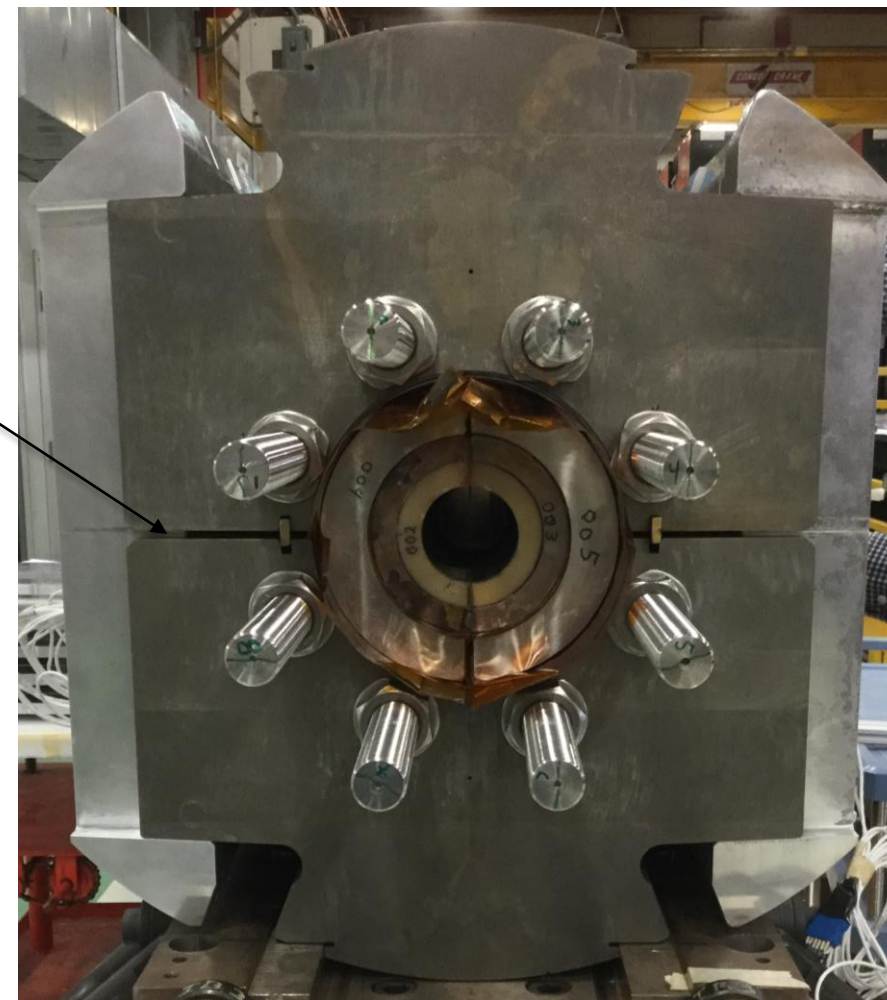
	Test 1	Test 2
Skin F Az 75	80	211
Skin F Lg 75		-70
Skin Q Az 75		194

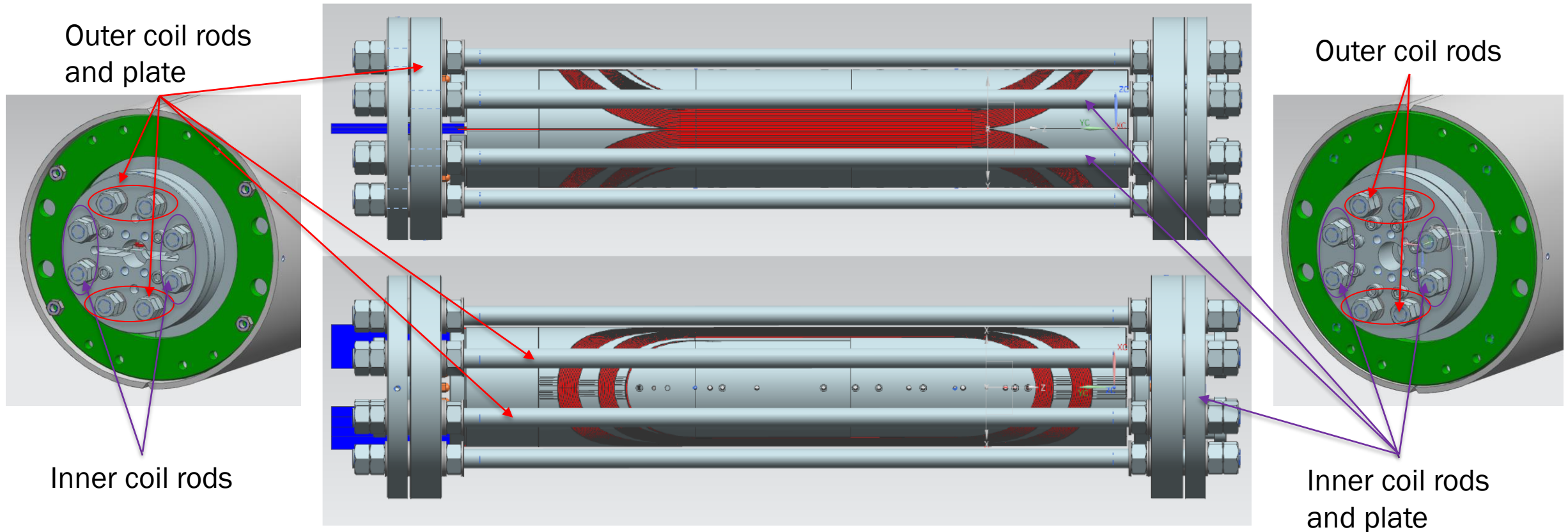
Yoke gap controls coil stress after CD

Test 2



Test 1





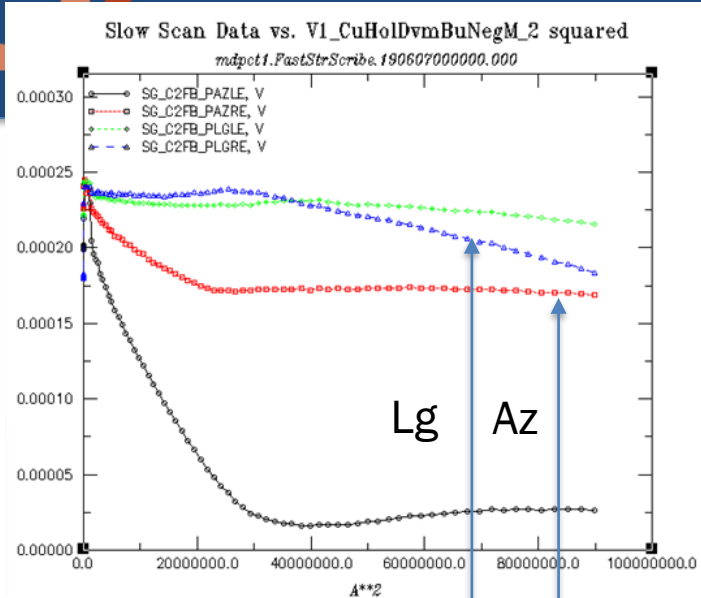
LE

2 cages to support inner and outer coils separately: 2 end plates + 4 rods per cage
 50-mm thick end plates for the outer coils and 32 mm thick for the inner coils w 4x30 mm rods
 small load at room temp: ~4kN per bullet/bolt

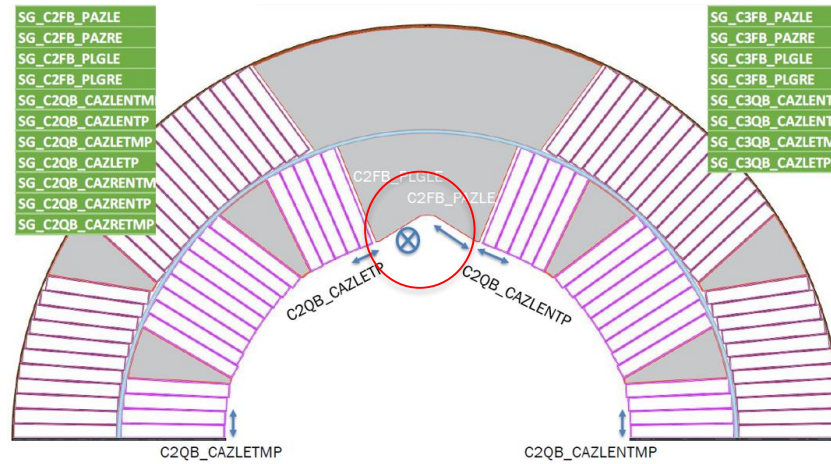
RE



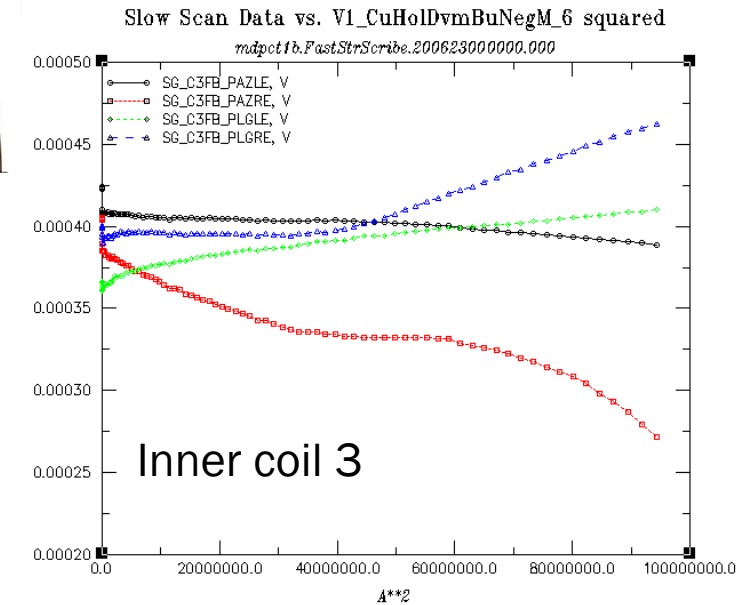
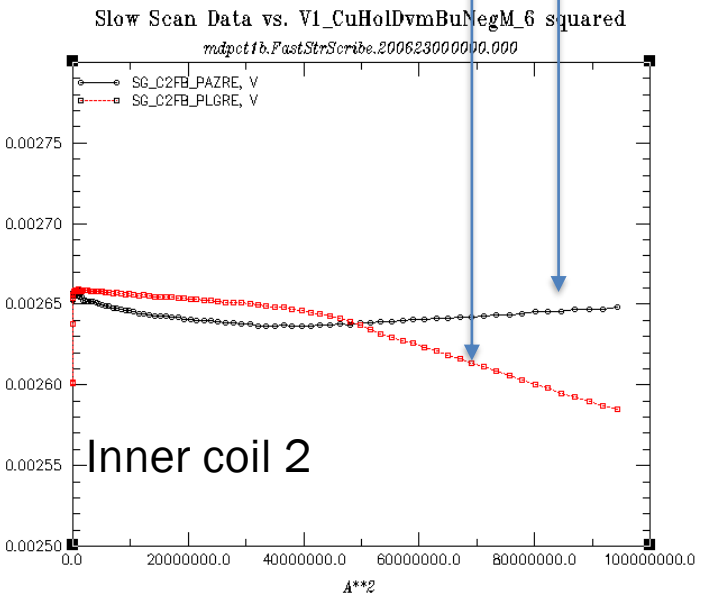
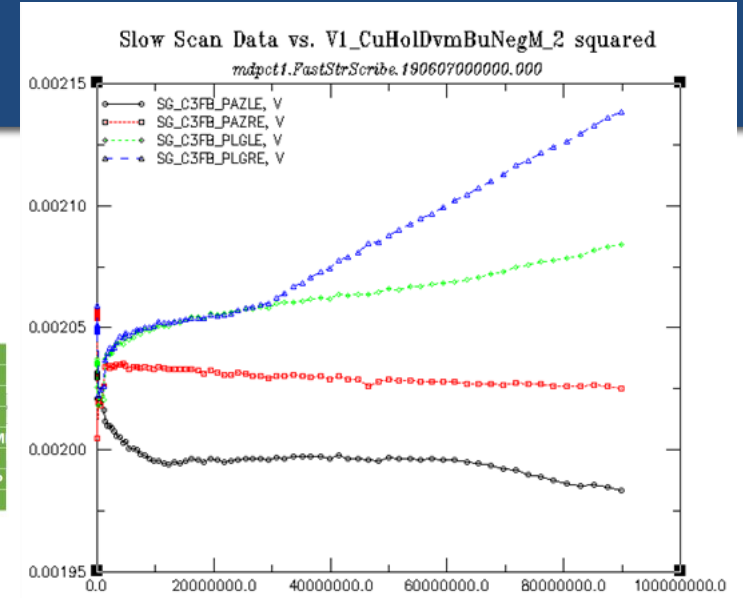
L1 Pole SG station

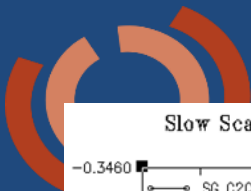


Test 1, Ramp #17,18

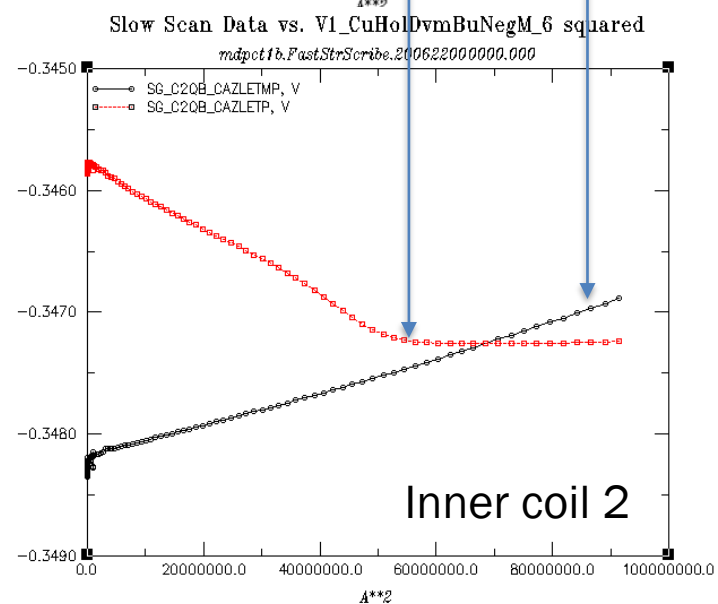
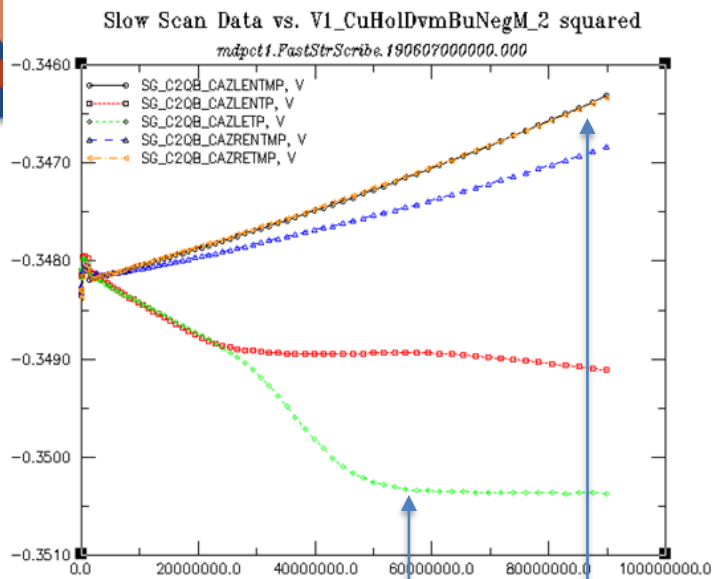


Test 2, Ramp #44



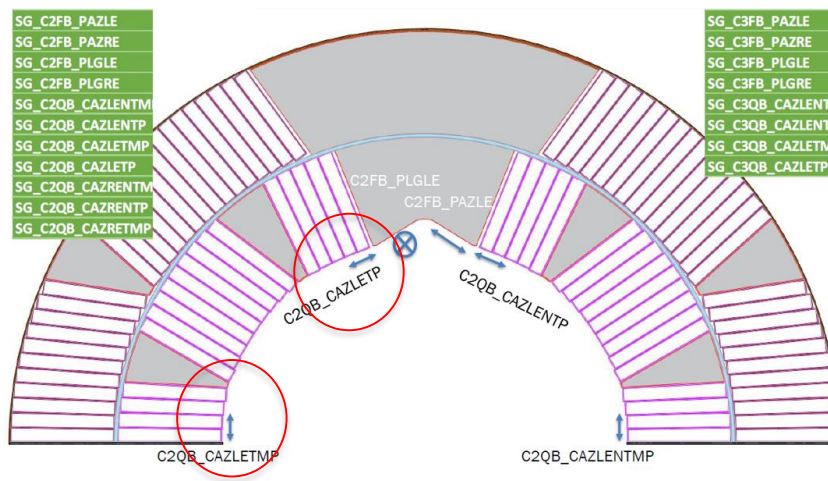


L1 Coil SGs

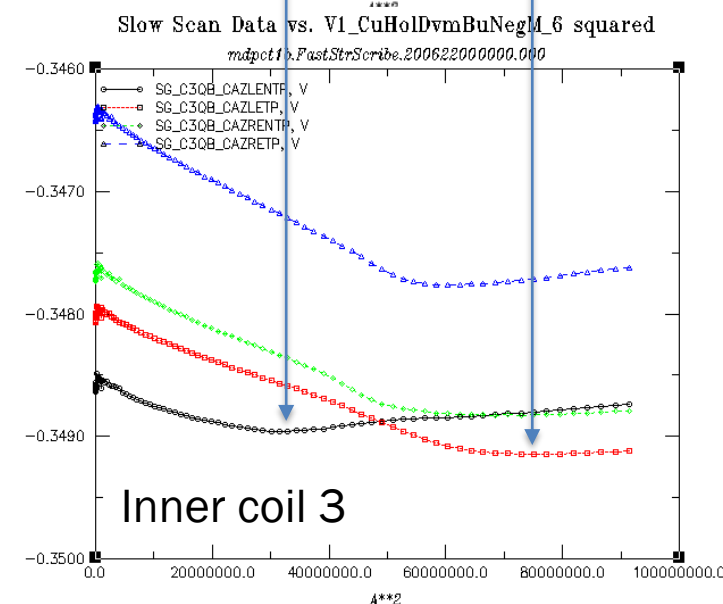
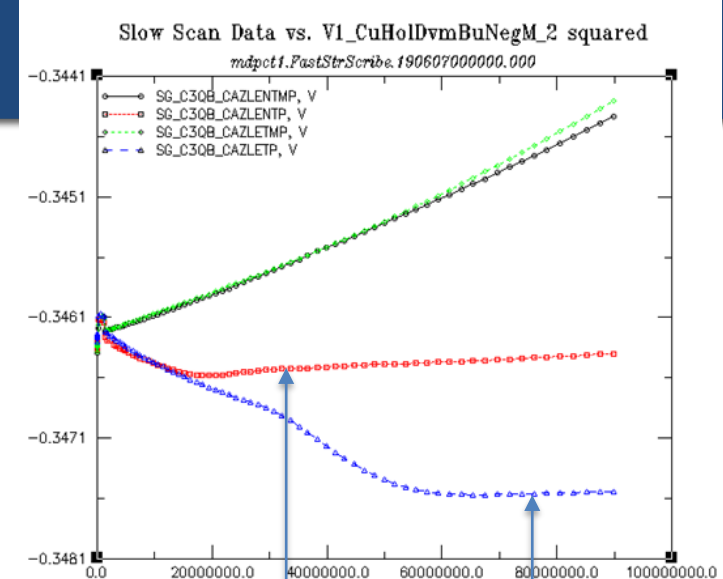


Inner coil 2

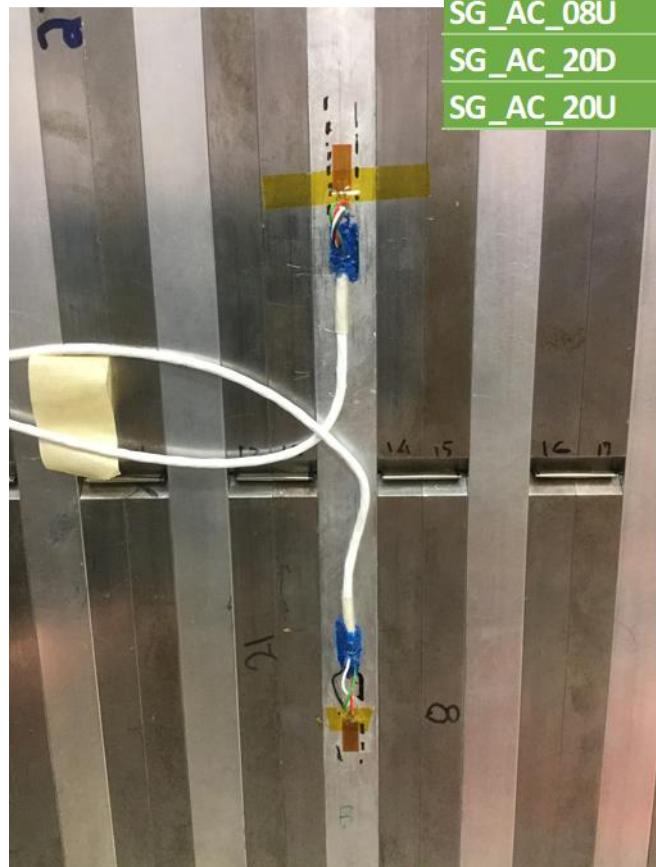
Test 1



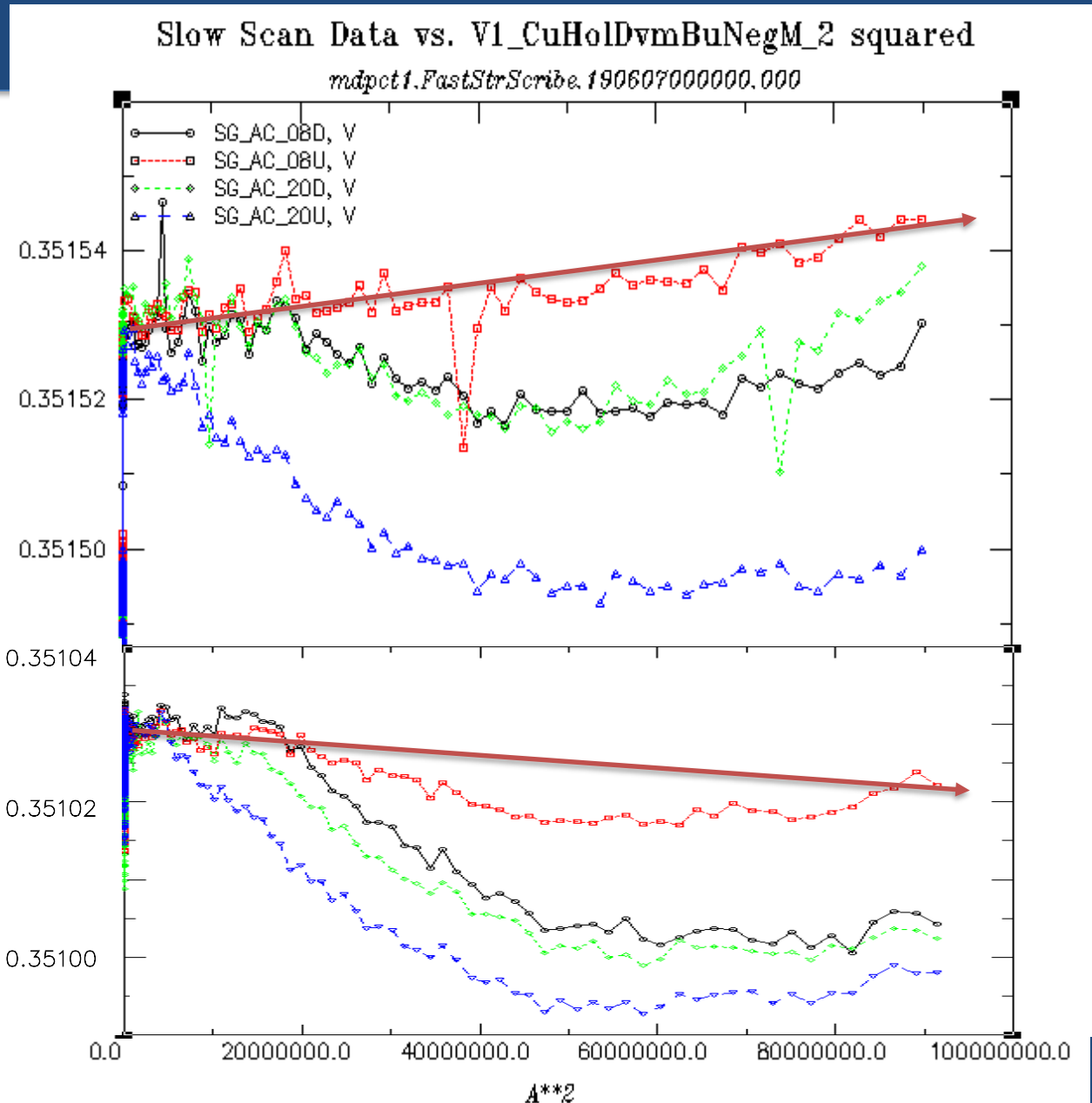
Test 2, Ramp #44



Inner coil 3



- SG_AC_08D
- SG_AC_08U
- SG_AC_20D
- SG_AC_20U



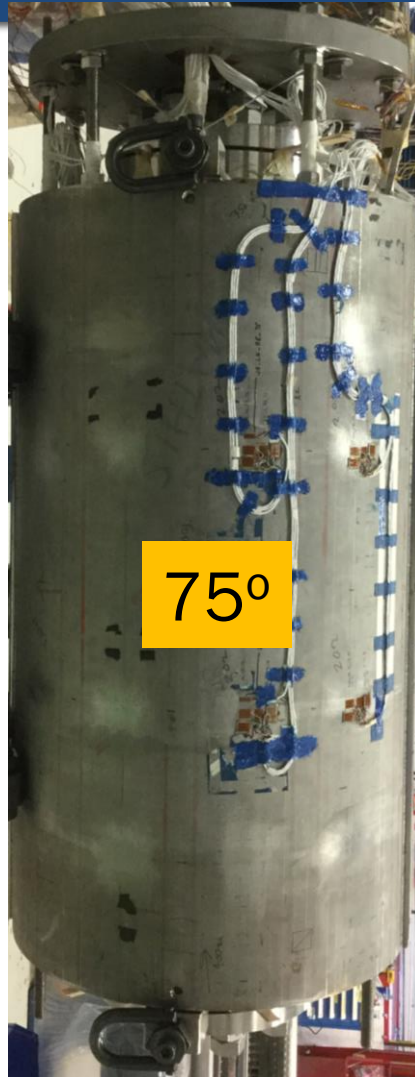
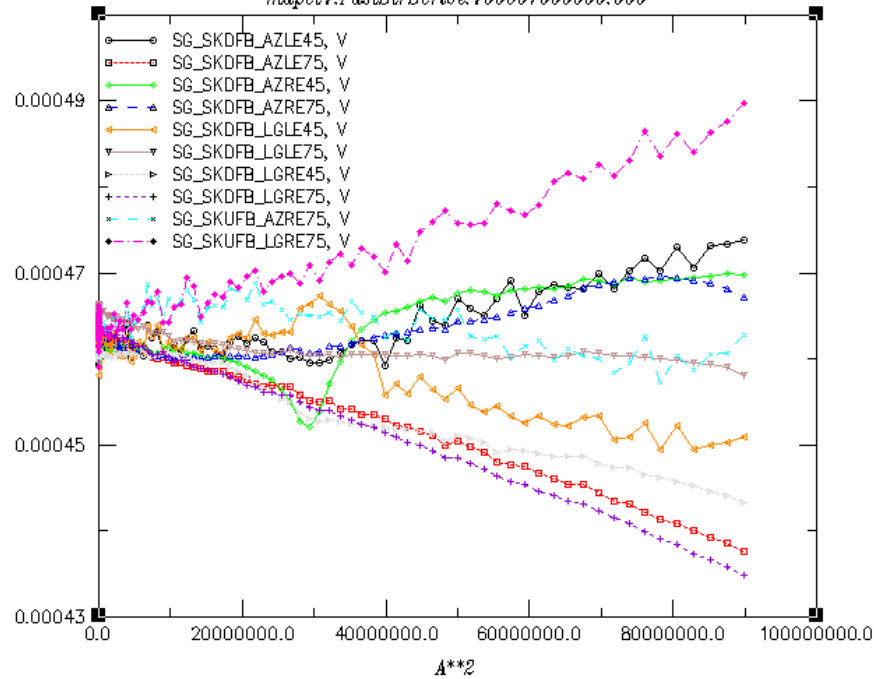
Test 1

Skin SGs

Test 1

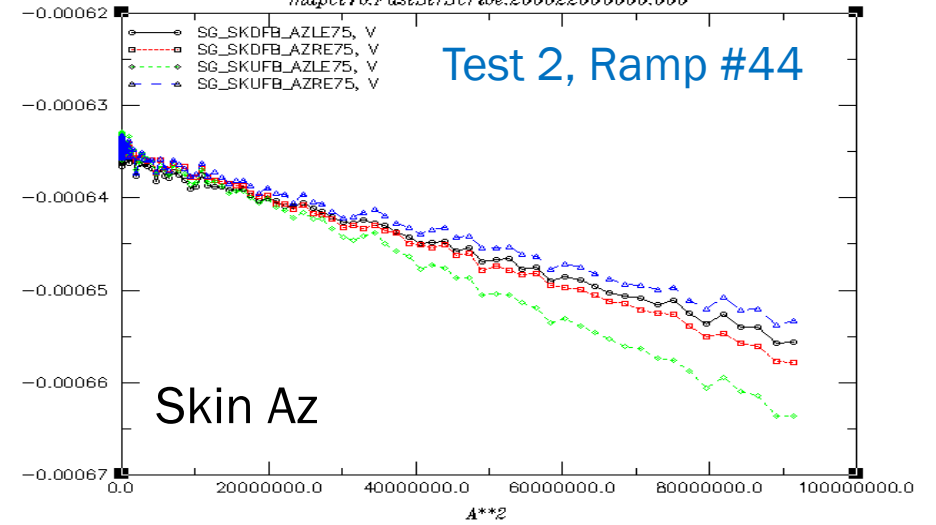
Slow Scan Data vs. V1_CuHolDvmBuNegM_2 squared

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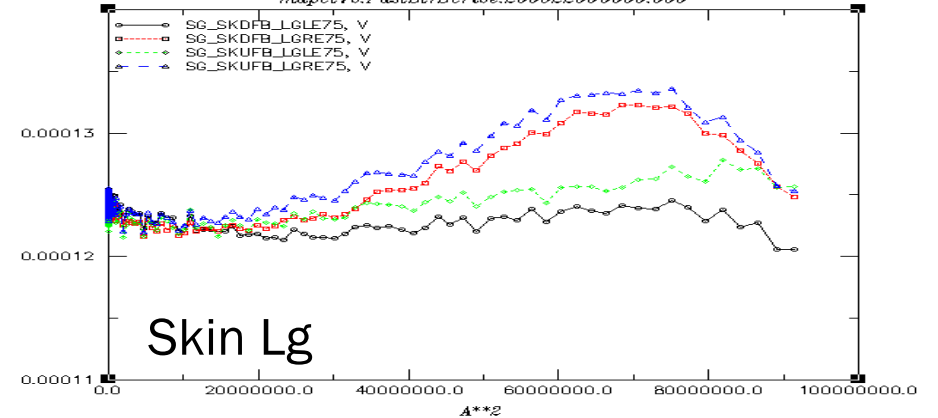
Slow Scan Data vs. V1_CuHolDvmBuNegM_6 squared

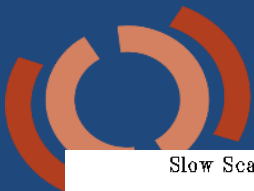
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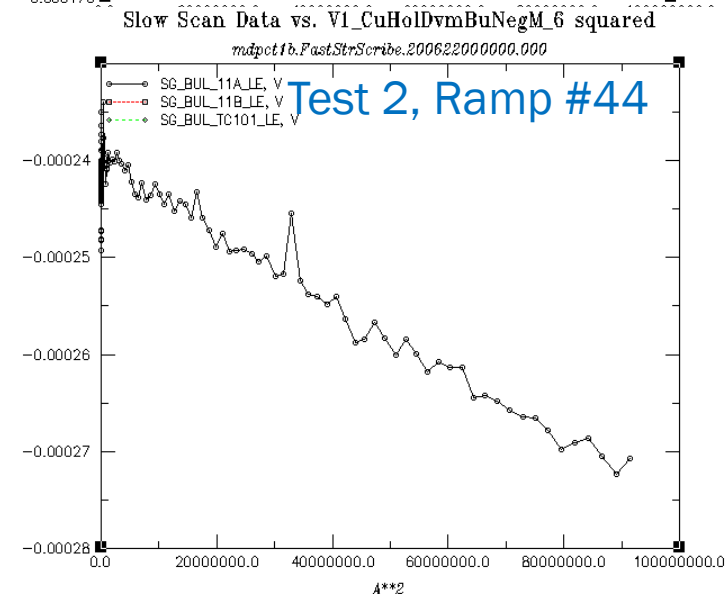
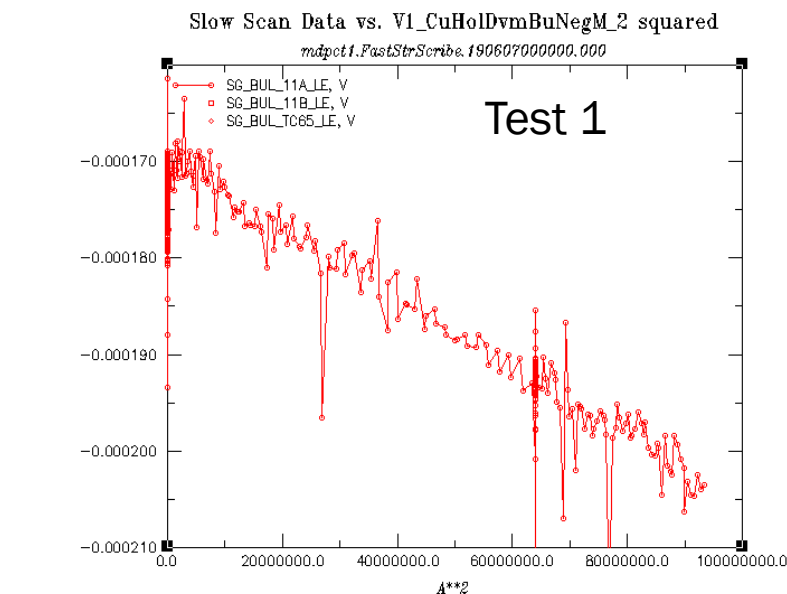
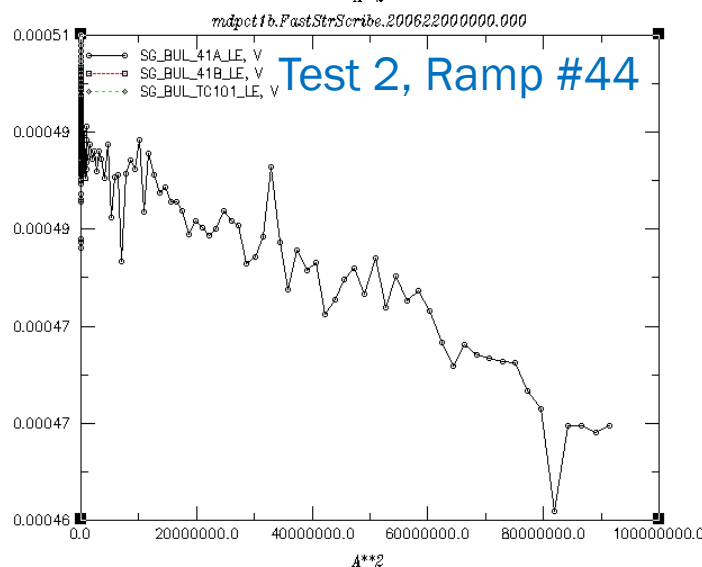
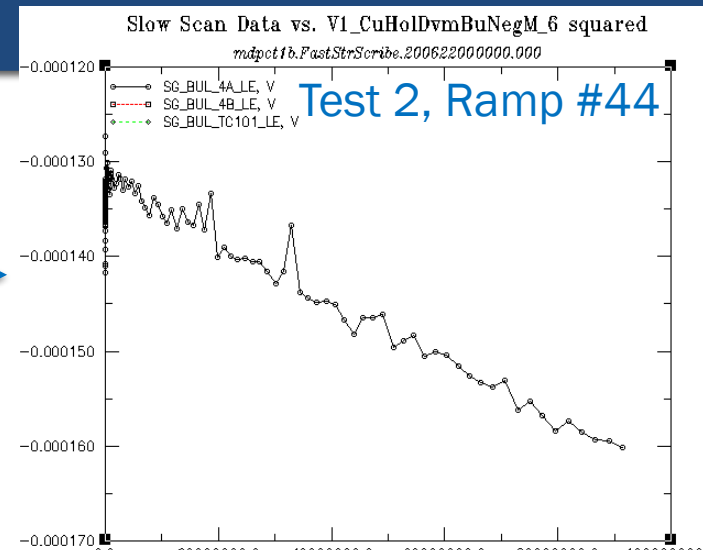
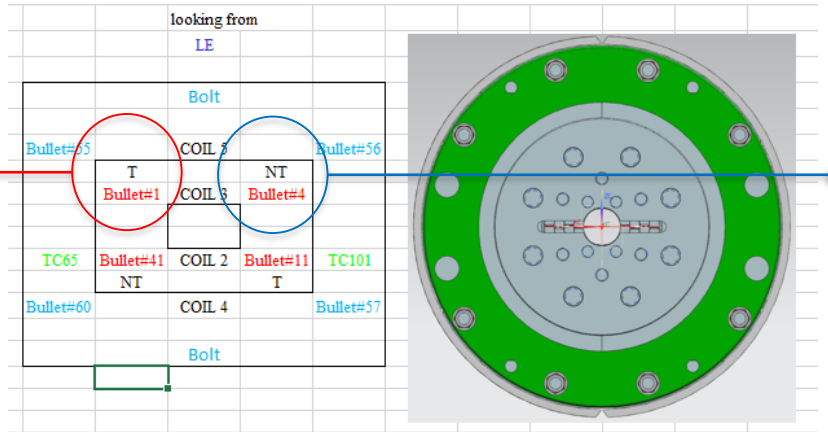
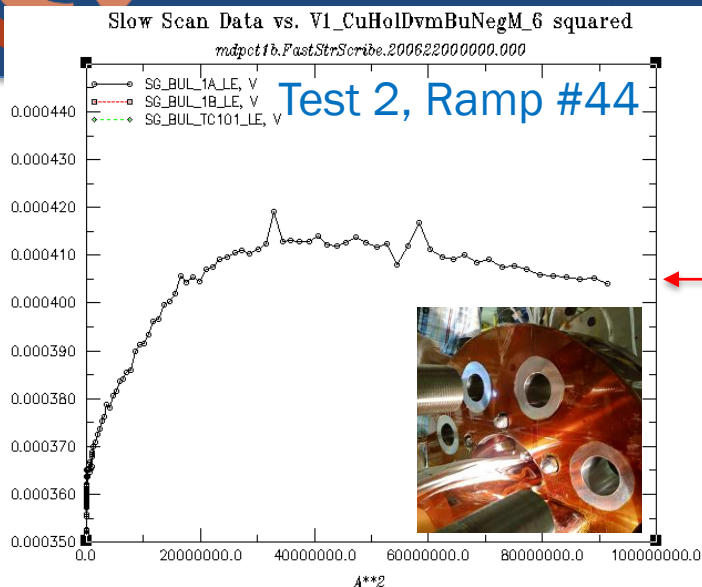
Slow Scan Data vs. V1_CuHolDvmBuNegM_6 squared

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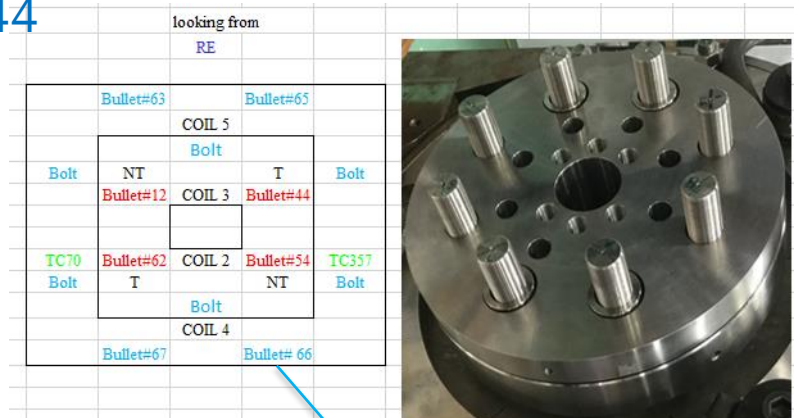
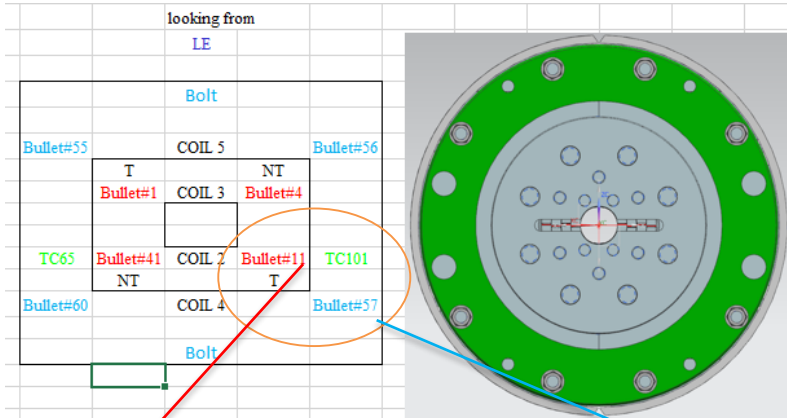
LE Inner Coil Bullets



LE

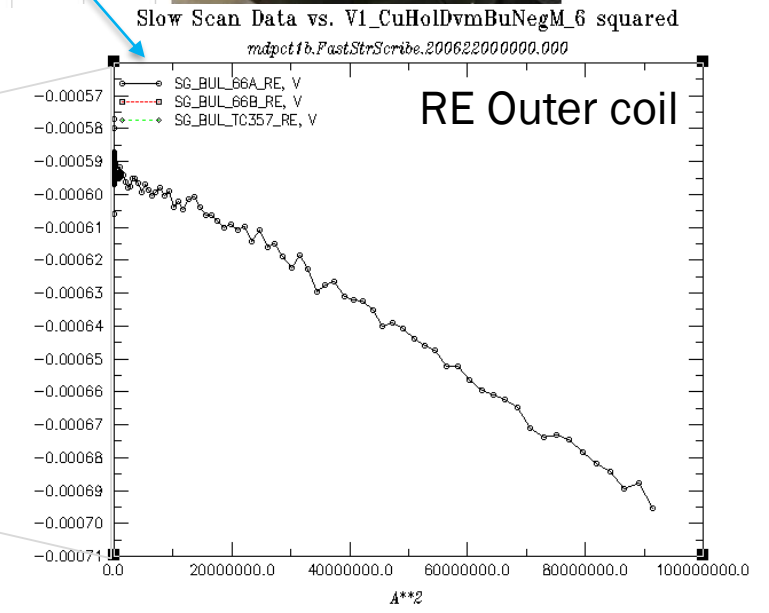
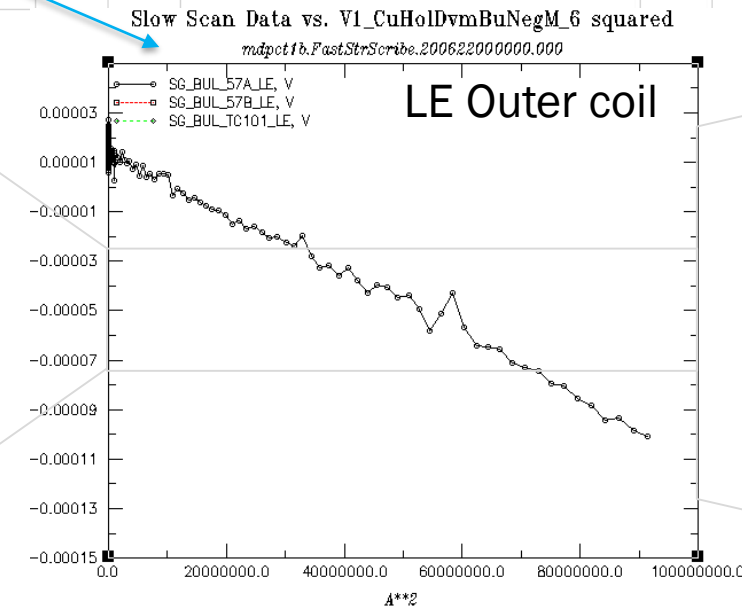
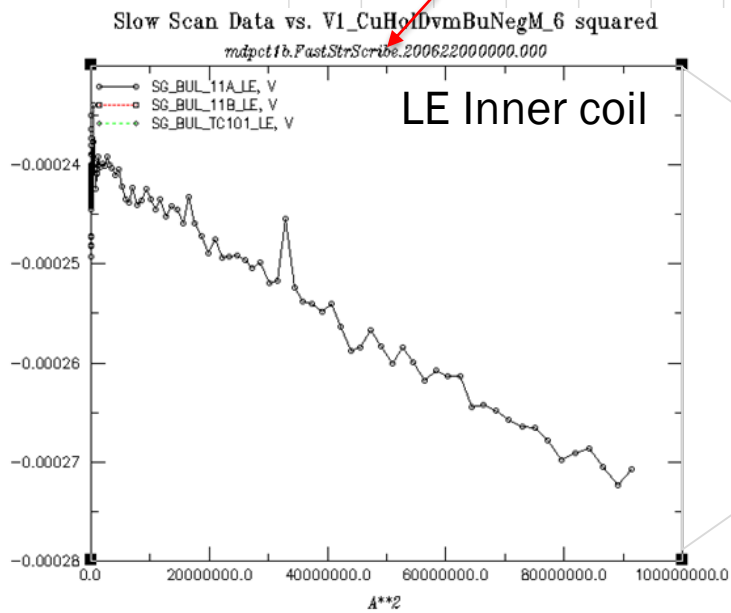


Test 2, Ramp #44

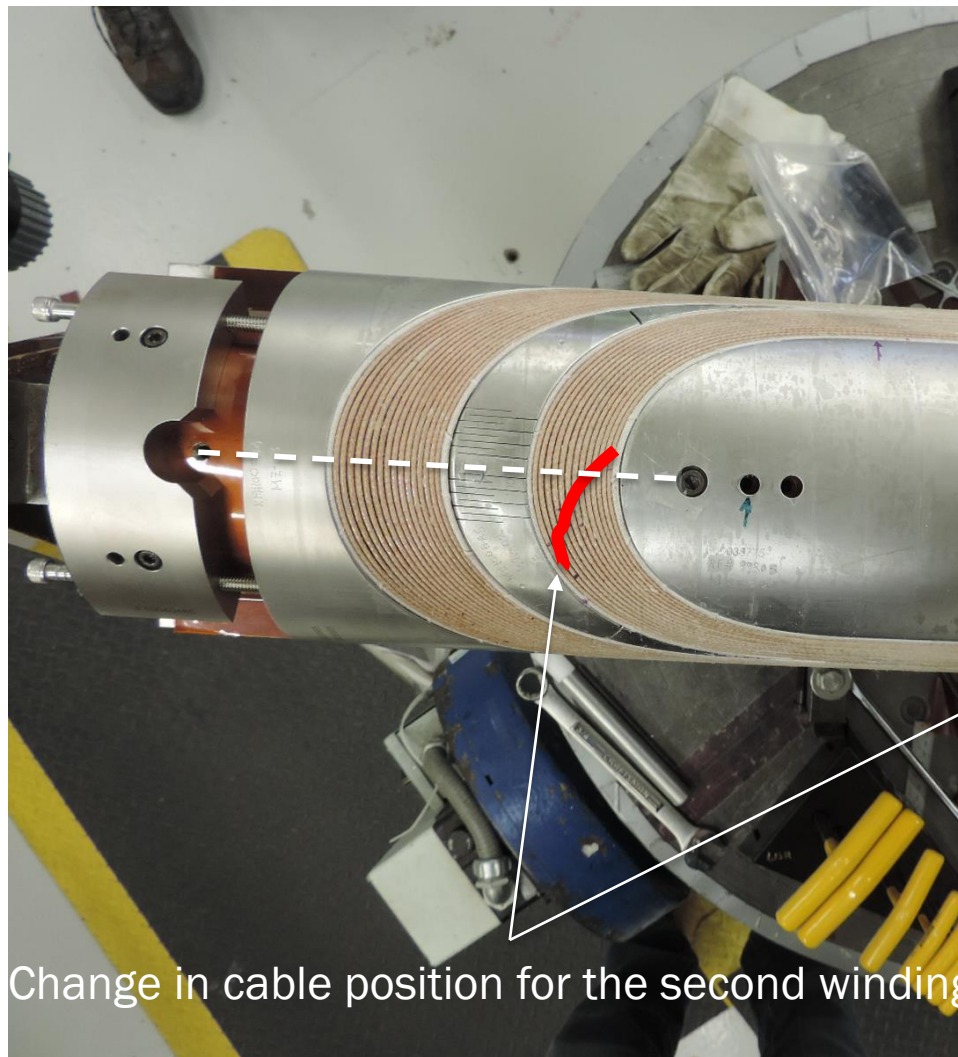


LE

RE



RE



Change in cable position for the second winding

LE

