

R&D at BNL

GSI-INFN Meeting

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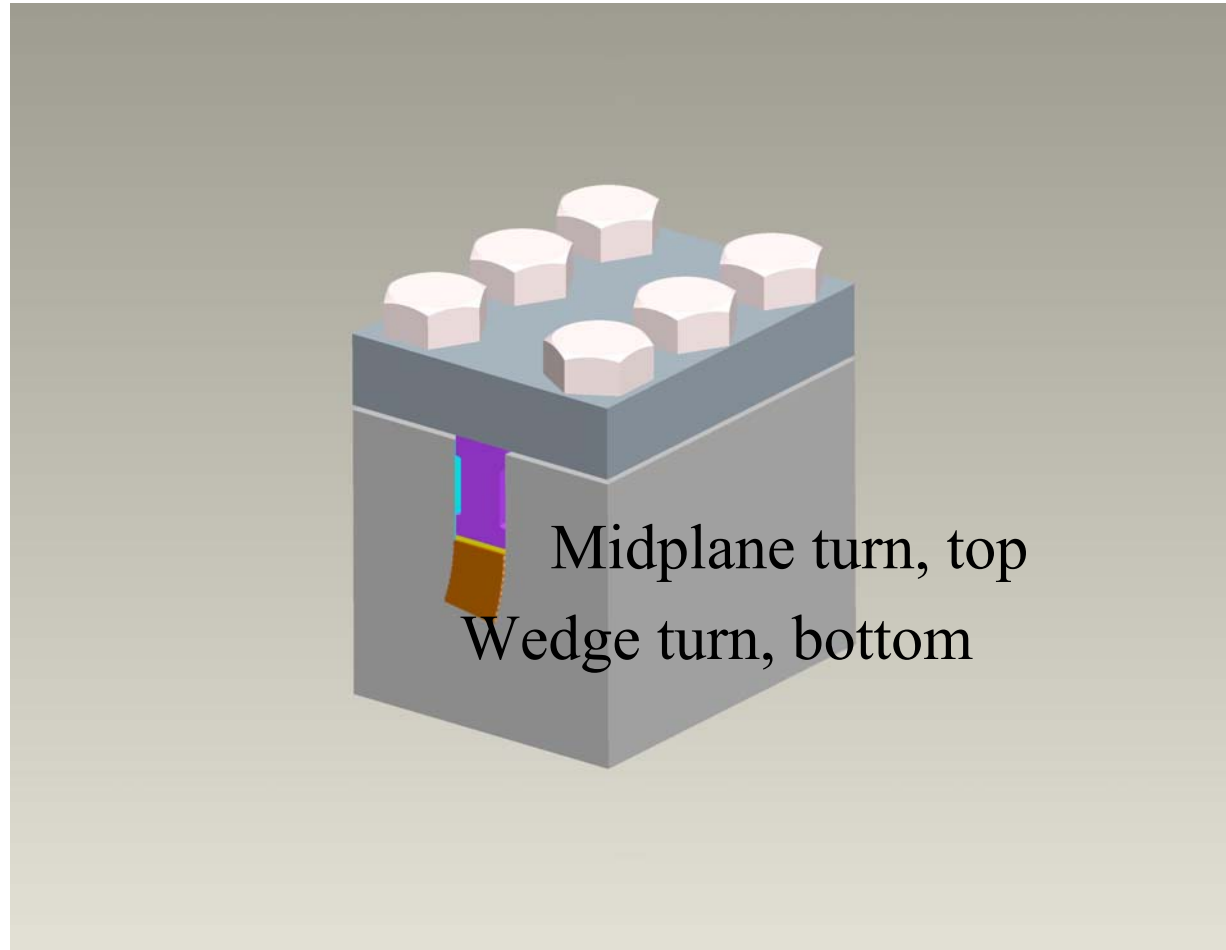
R_A Measurements at BNL



- Prepare standard R_A measurement sample (rectangular cable stack) & determine preanneal time to get desired R_A value in IHEP-built 6 T straight SIS 300 model dipole (inner layer cured twice, outer layer cured once)

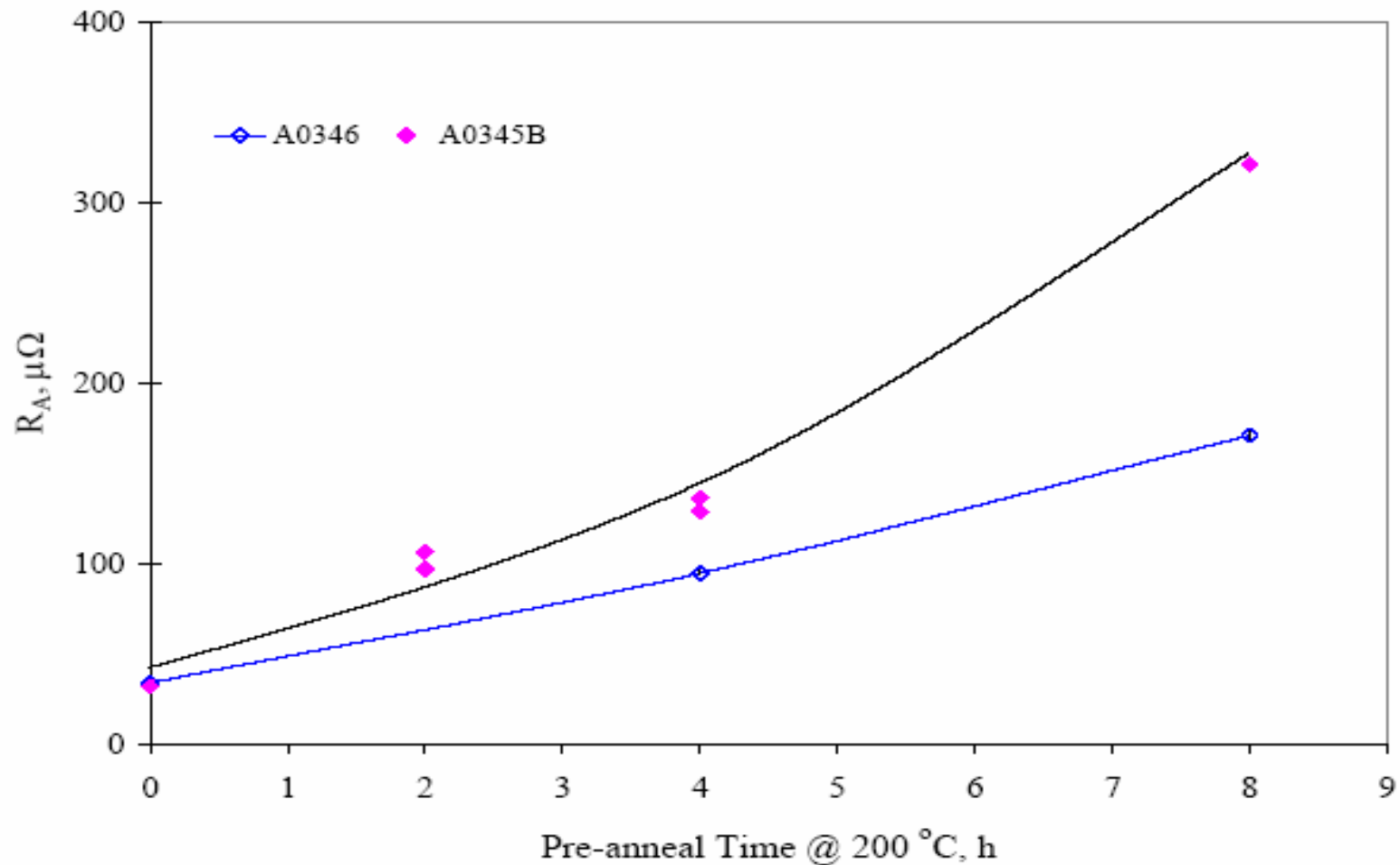
- Prepare R_a measurement samples for curved sample holder, to determine sample geometry and pressure effects on R_a .
Vary azimuthal pressure on sample

- Use same (already measured at BNL) cable with EAS wire for all tests



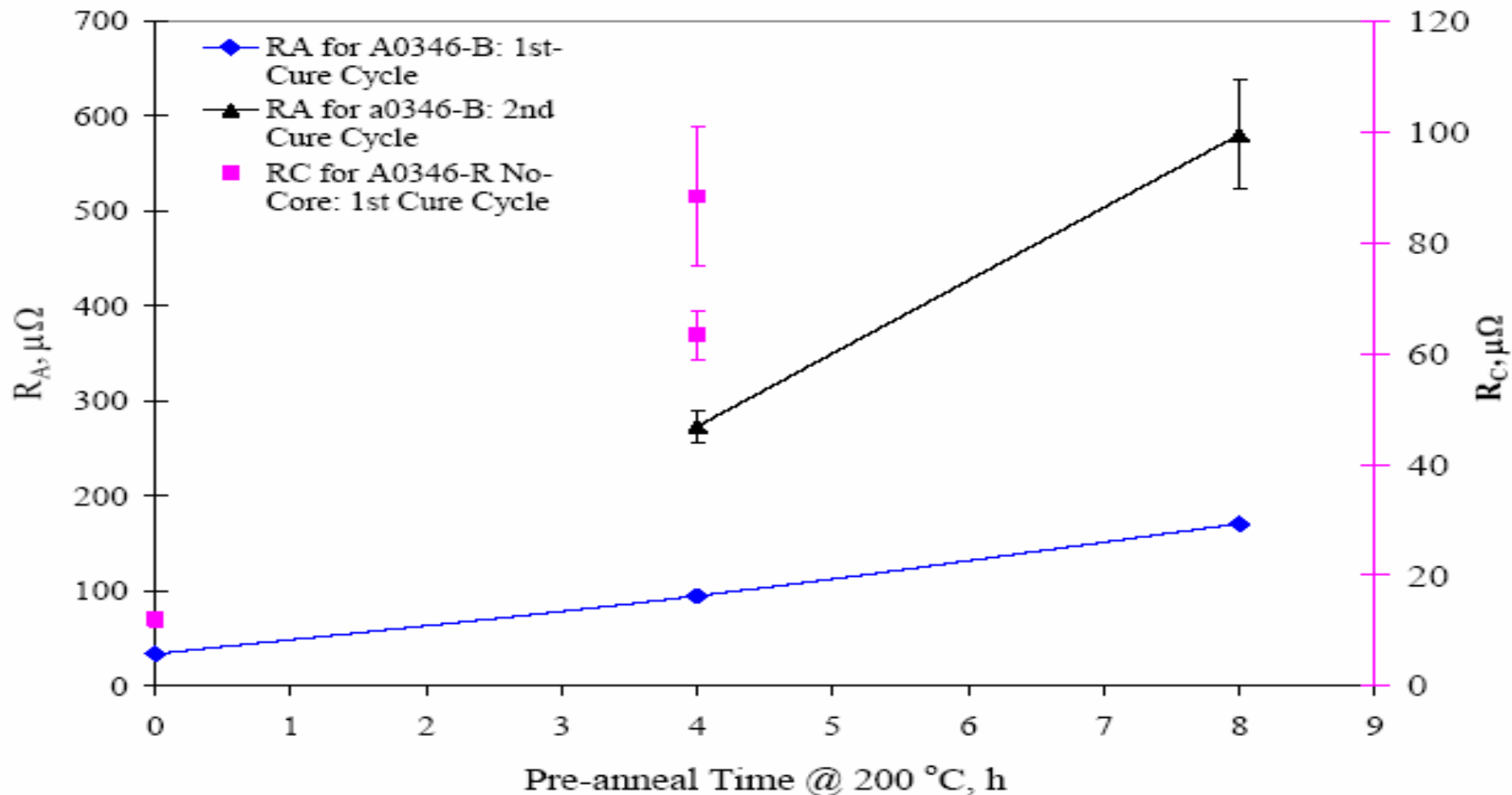
Midplane block of the SIS 300 6 T straight dipole

R_A after one RHIC-II cure cycle versus pre-anneal time



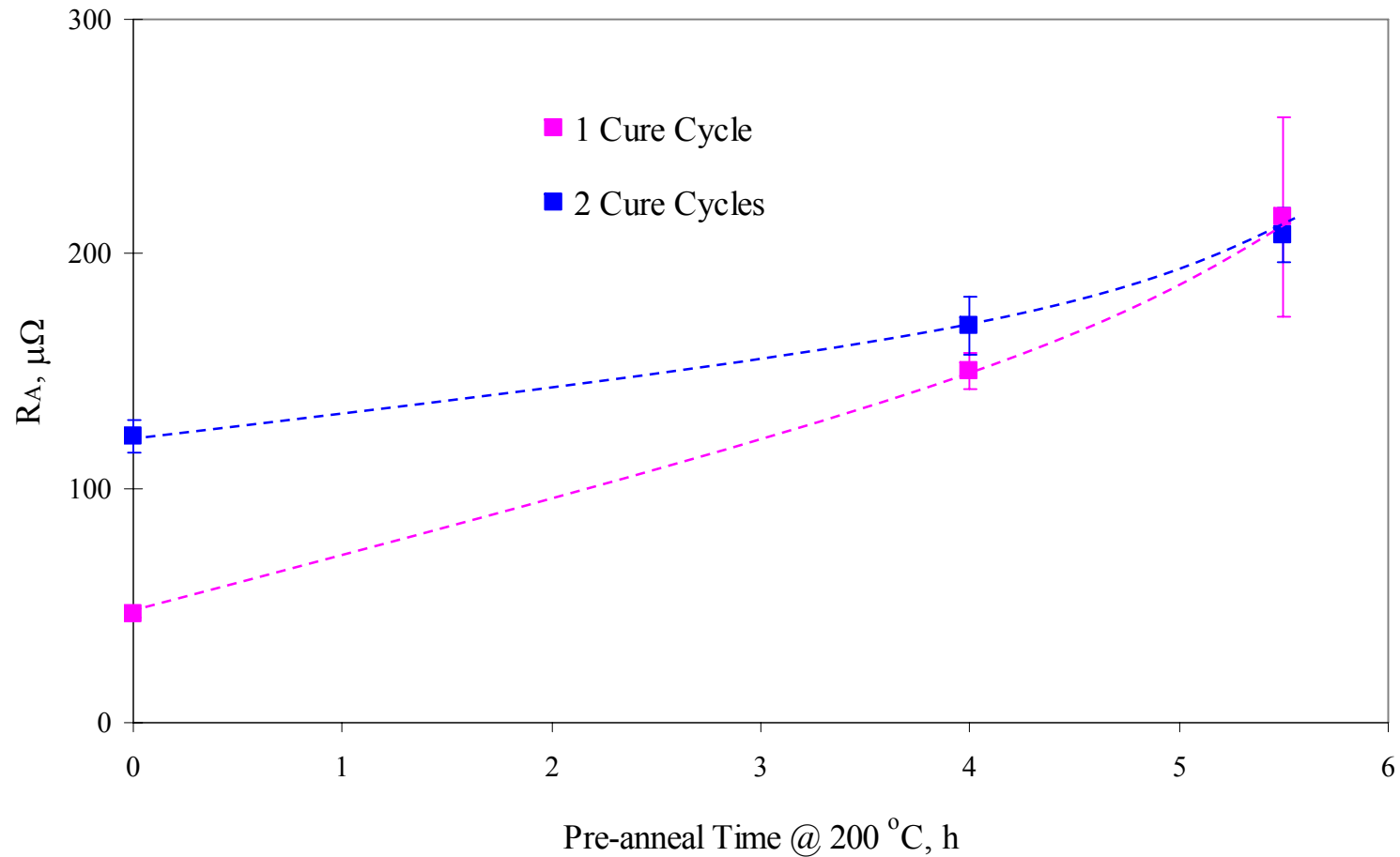
A0345B ~ 0.34 μm AgSn coating (Alstom)
A0346B ~ 0.57 +/- 23 μm AgSn coating (EAS)

R_A after 1 & 2 RHIC-II cure cycles versus pre-anneal time



Note: these results are for earlier tests (BNL Report 651-35 (AM-MD-350))
in standard straight fixture

R_A of 6 T straight SIS 300 model dipole



Results for 2nd measurement set, with new cable samples from same cable, straight fixture

Effect of room temperature pressure cycling on Ra straight sample



Pressure
at
Measure-
ment
(MPa)

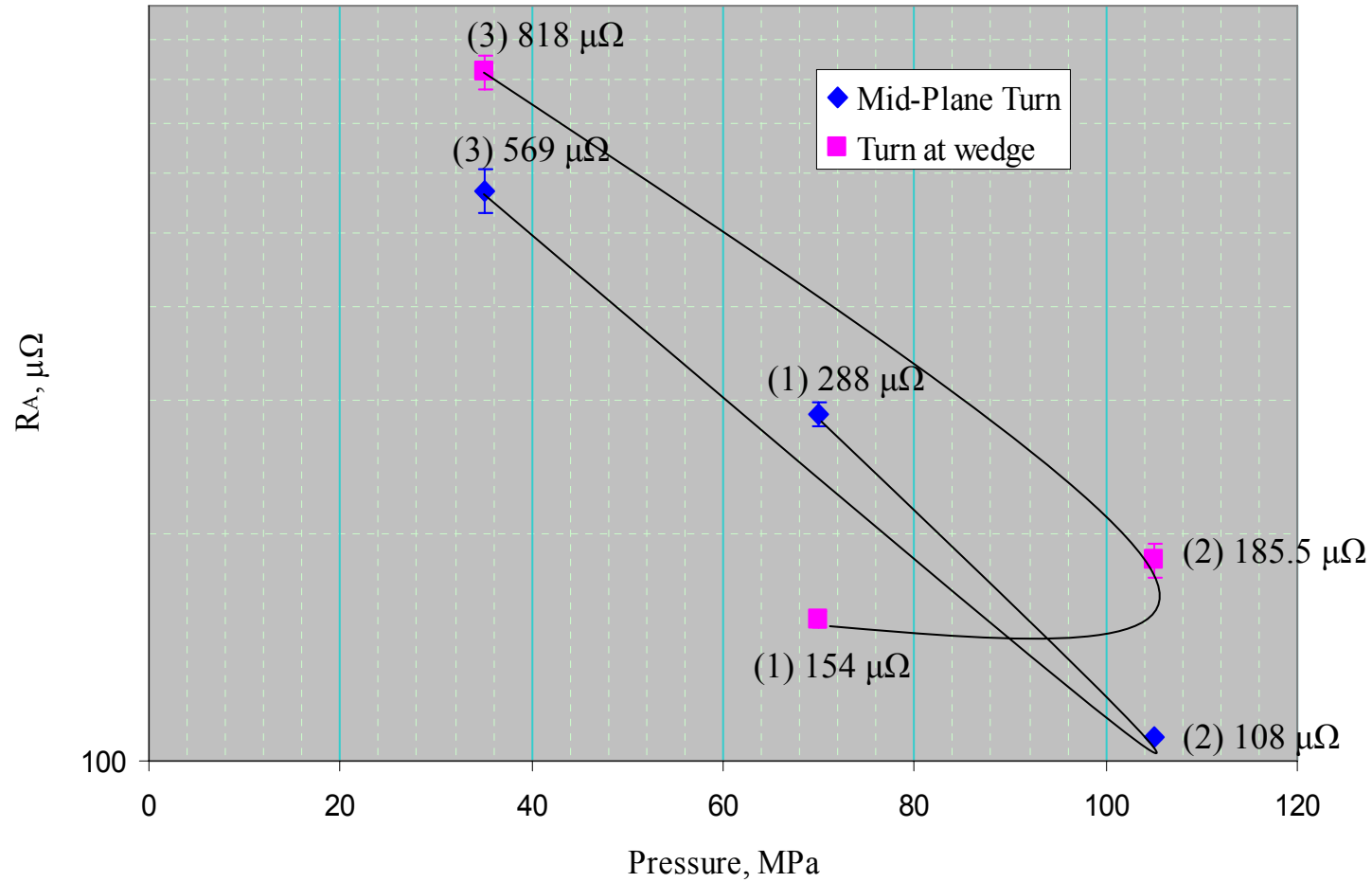
Sample	Run #	Preanneal Temp, time, (C) (h)	Cycle type	Temp (C)	Pressure @ D (MPa)	Ra ($\mu\Omega$)	+/- σ
08287	2754	200 5.5	2 nd -II	195	34	208	11.3
08287	2756	200 5.5	2 nd -II-A	195	34	183.6	12.2
08287	2771	200 5.5	2 nd -II-B	195	34	242.4	21.3
08287	2775	200 5.5	2 nd -II-C	195	34	303	28.4

Thermal Cycle and pressure cycle (release, let sit, and then reapply)

Thermal Cycle and pressure cycle

Thermal Cycle and pressure cycle

Effect of room temperature cycling on curved sample



Test pressures ~ 70, 105, 35 MPa , succesively applied

Present Status of Testing



BNL (Arup Ghosh) plans to measure pressure on the sample yet with cryogenic strain gauges

Conclusions



- Ra results are not very reproducible for samples from the same cable
- There appears to be a pressure dependence of Ra, i.e. decrease of Ra with increasing operational pressure inside the magnet coil
- Need to pre-anneal for at least 6 hours, to get $R_a > 200 \mu\Omega$
- Ra should be large enough so field quality is not affected by it and AC loss contribution is small. Then, it's variability will not matter