Measurement of Field Direction in the Chicane Dipole No. 2 at the Foil Location

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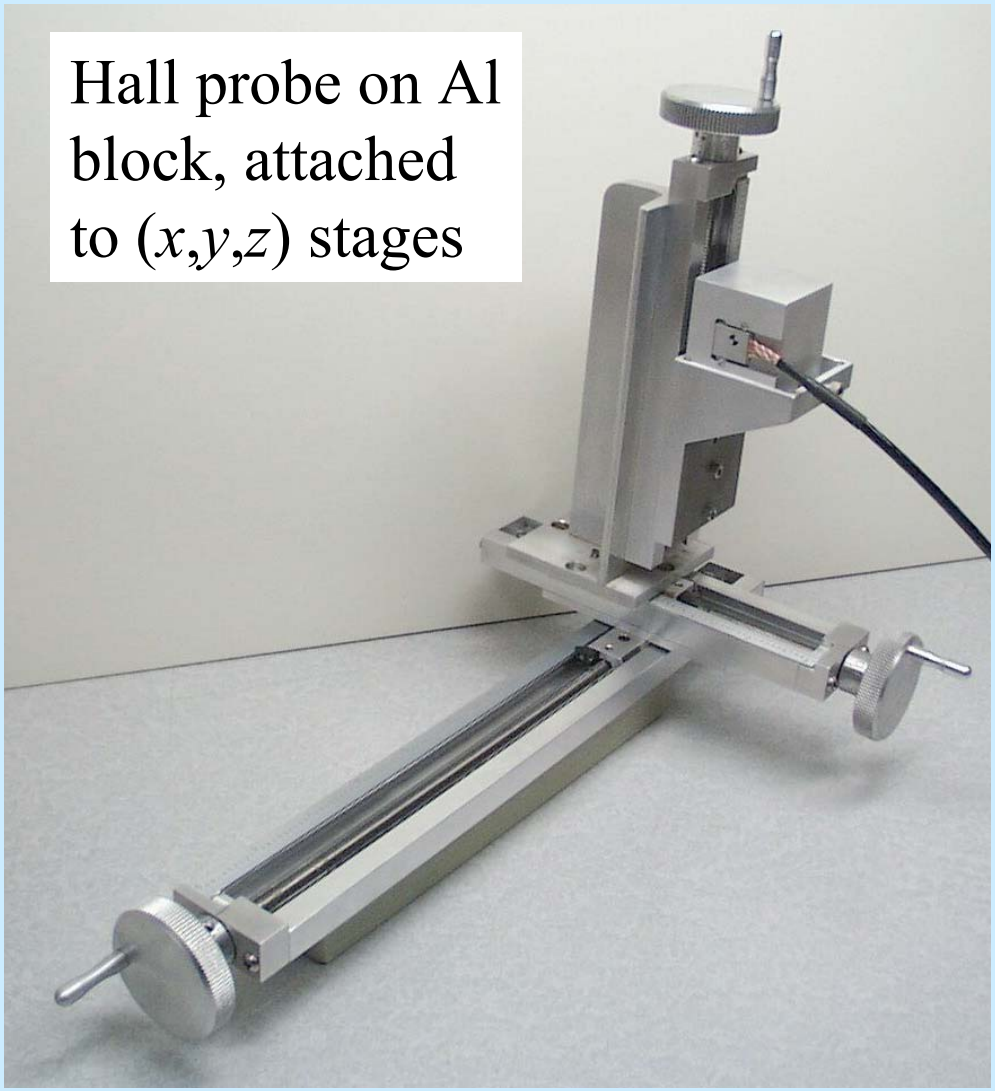
Chicane Measurement Set Up

- Chicane #2 & #3 set up on bench, as per design configuration
- Chicane #2 at 2154 A; #3 at 1734 A
- Foil location is at (40, 22, 307) mm with the center of Chicane #2 as the origin
- A single LPT-141 Hall probe was used to measure all the field components
- Measurements were repeated after flipping the probe 180 deg. to minimize errors due to Hall element position and orientation uncertainties.

Hall Probe Holder

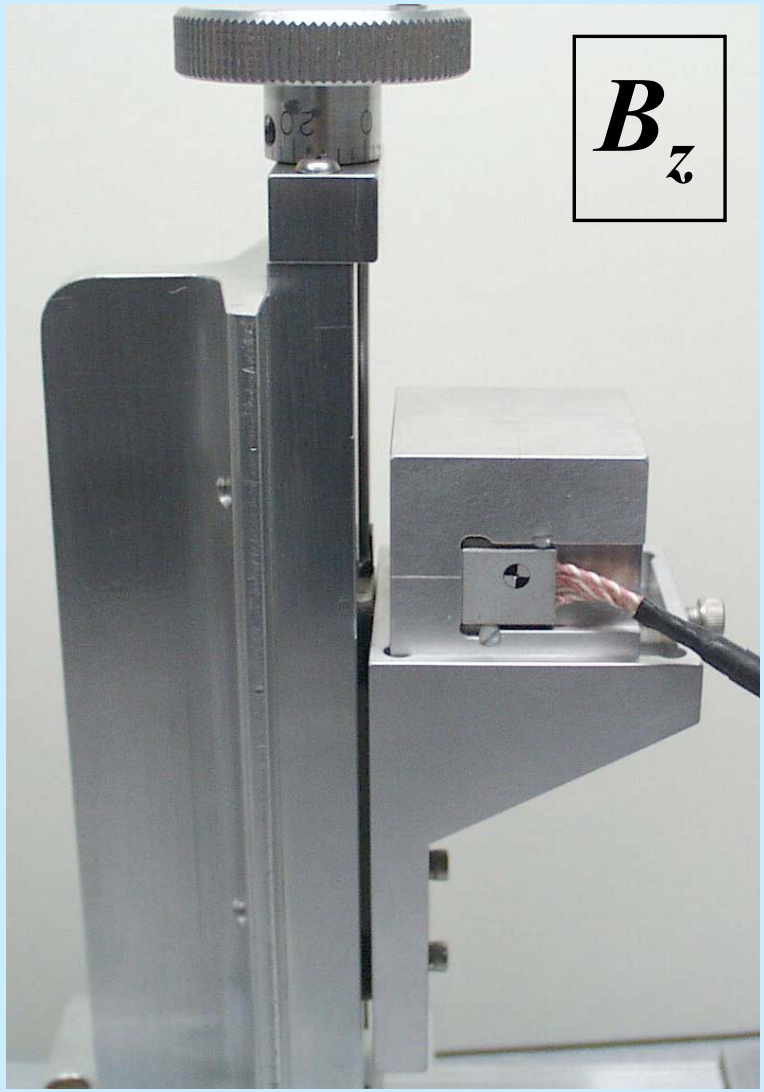


Hall probe is mounted on a precisely machined 1.5″ Al cube.

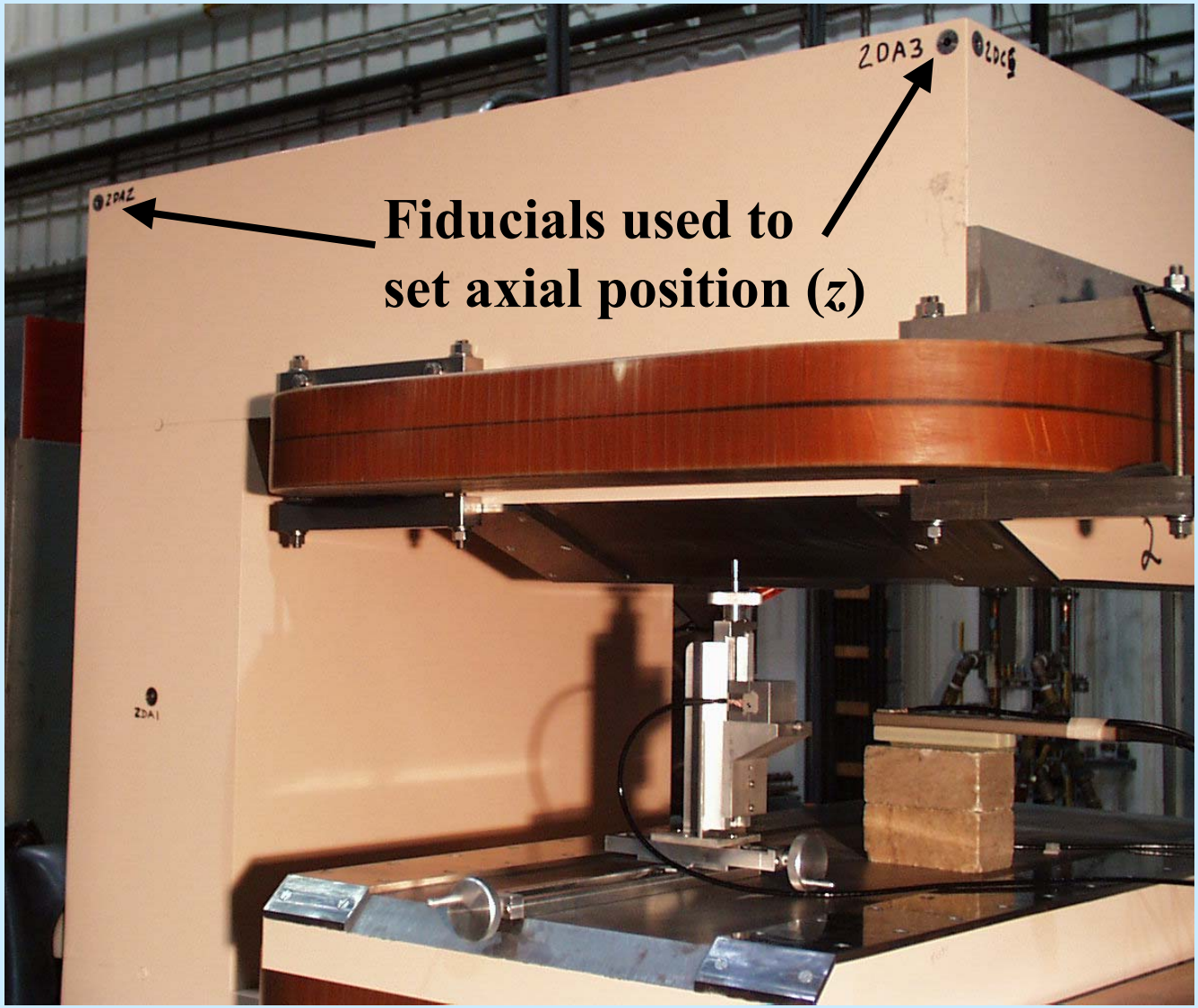
Readings, taken before and after rotating the cube by 180 deg. around the axis being measured, are averaged.

For each reading, the holder is adjusted such that the probe marker is at the foil location.

Probe Orientations for B_y and B_z Meas.



Hall Probe Holder in Chicane #2

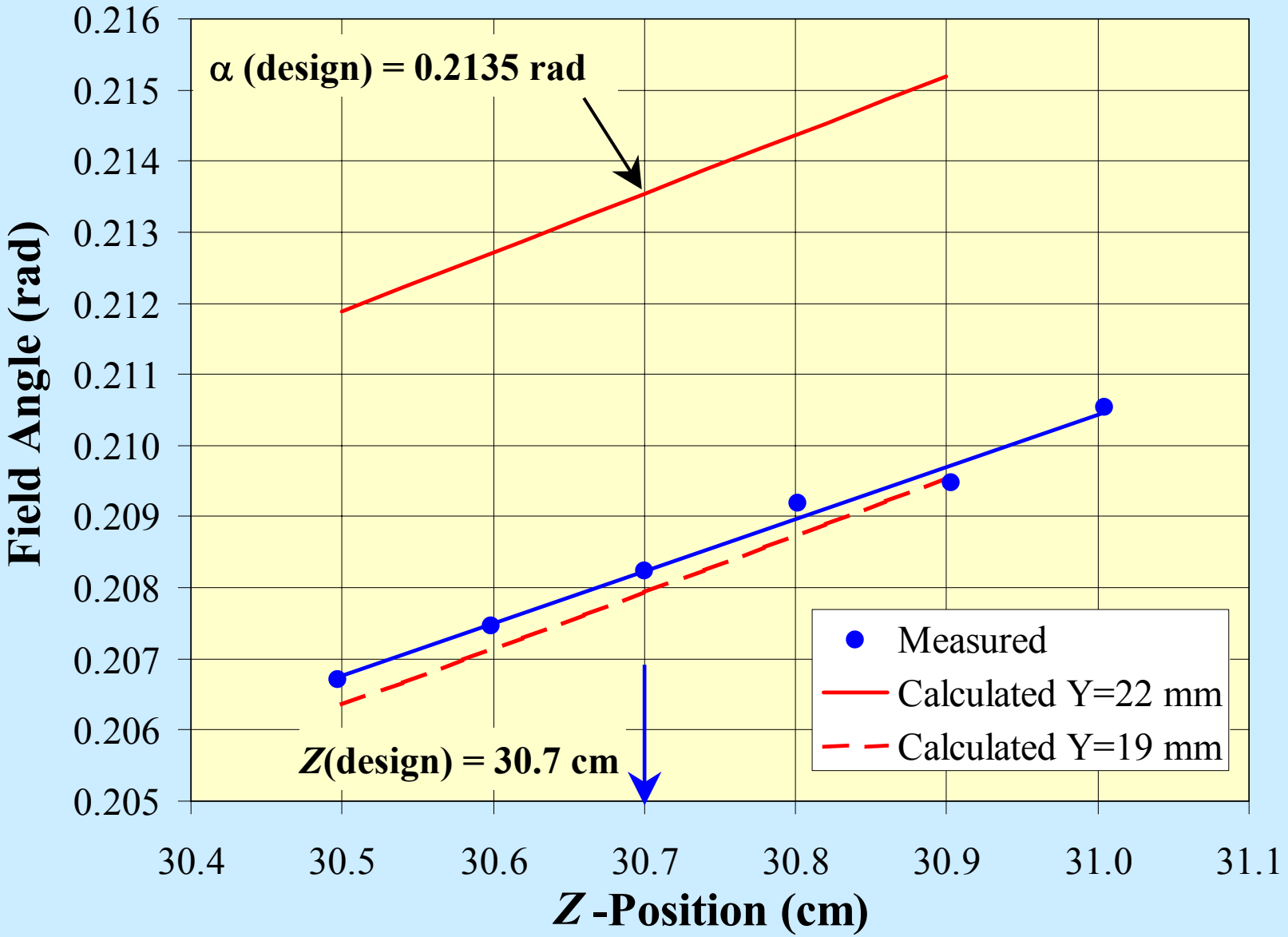


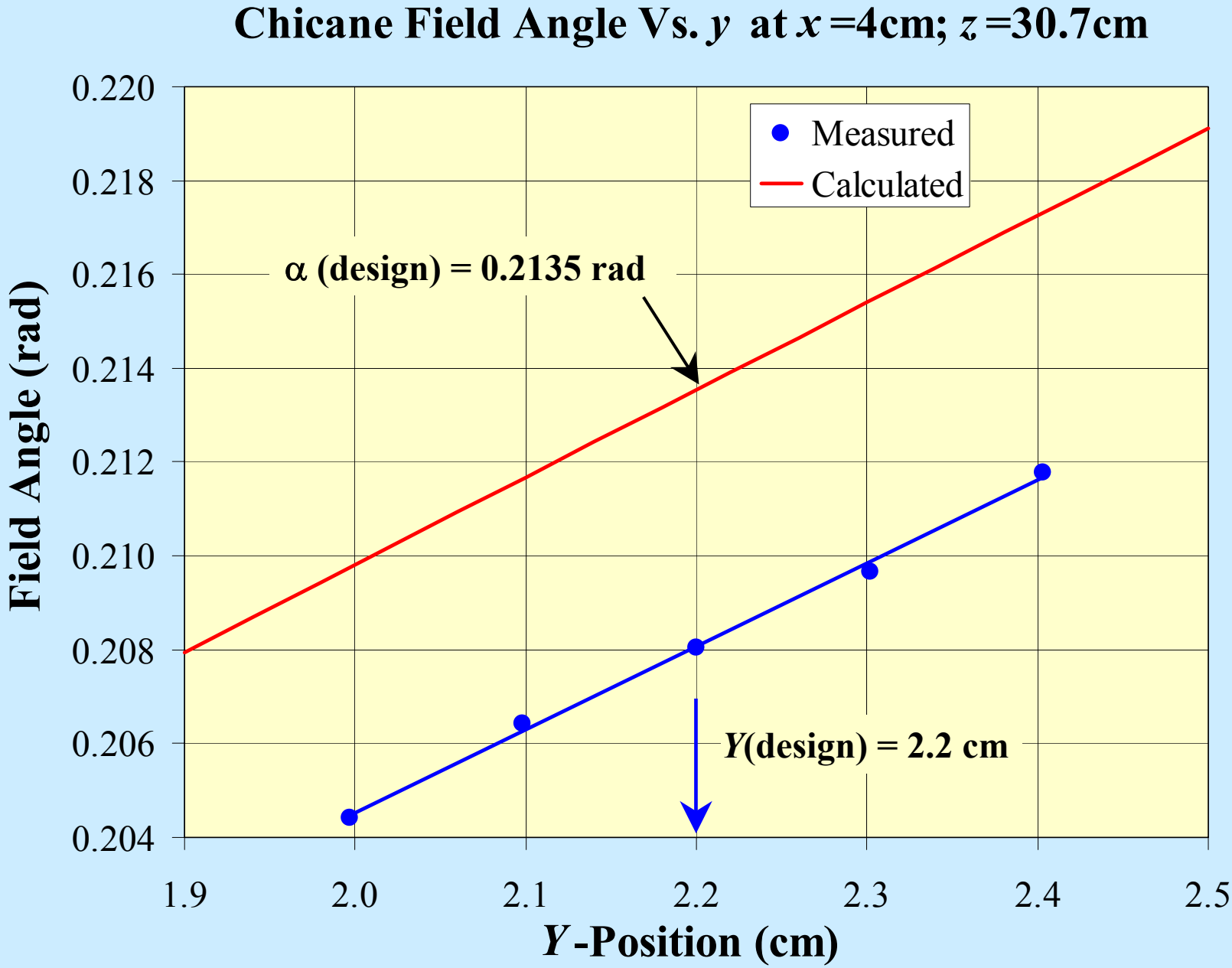
Measured Vs Calculated Fields

Component	Calculated (T)	Measured (T)	Difference (%)
B_z	0.05428	0.05299	2.4%
B_y	0.25031	0.25087	0.2%

Hall probe calibration checked to be better than 0.1% at 0.1 T to 0.3 T

Chicane Field Angle Vs. z at x =4cm; y =2.2cm




Chicane Field Angle Vs. y at x =4cm; z =30.7cm
Measured
Calculated
α (design) = 0.2135 rad
Y(design) = 2.2 cm
Field Angle (rad)
0.220
0.218
0.216
0.214
0.212
0.210
0.208
0.206
0.204
1.9
2.0
2.1
2.2
2.3
2.4
2.5
Y-Position (cm)

Measured Vs. Calculated Field Angles

- Measured field angle at the foil location is **~ 5.5 mrad off from the calculated value.**
- Measurement uncertainties:
  - Probe calibration 0.1% $\Rightarrow$ Error < 0.4 mrad
  - Probe position < 0.1 mm $\Rightarrow$ Error < 0.2 mrad (Y-position is the most critical)
  - Probe orientation < 2 mrad $\Rightarrow$ Error < 2 mrad
  - Other errors averaged out by 180 deg. flipping
  - **Overall error estimated to be < 3 mrad**

Measurements in 30Q44 Before and After Yoke Trimming

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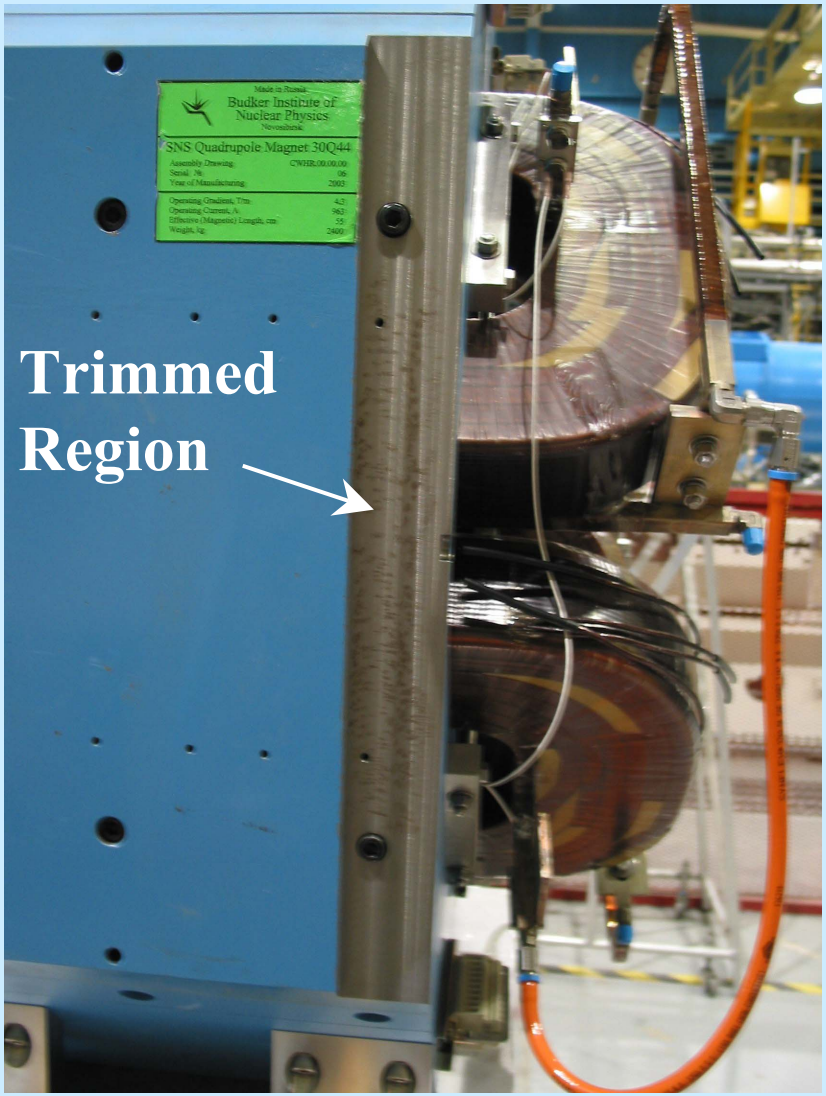
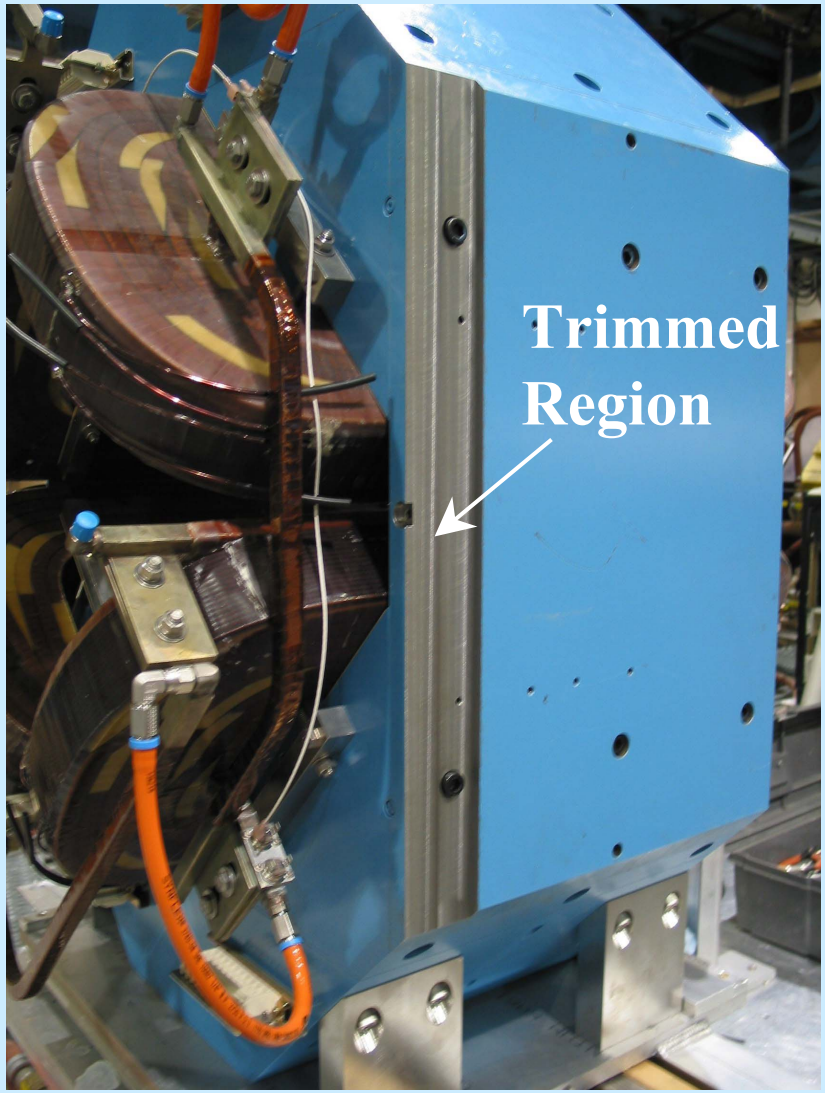
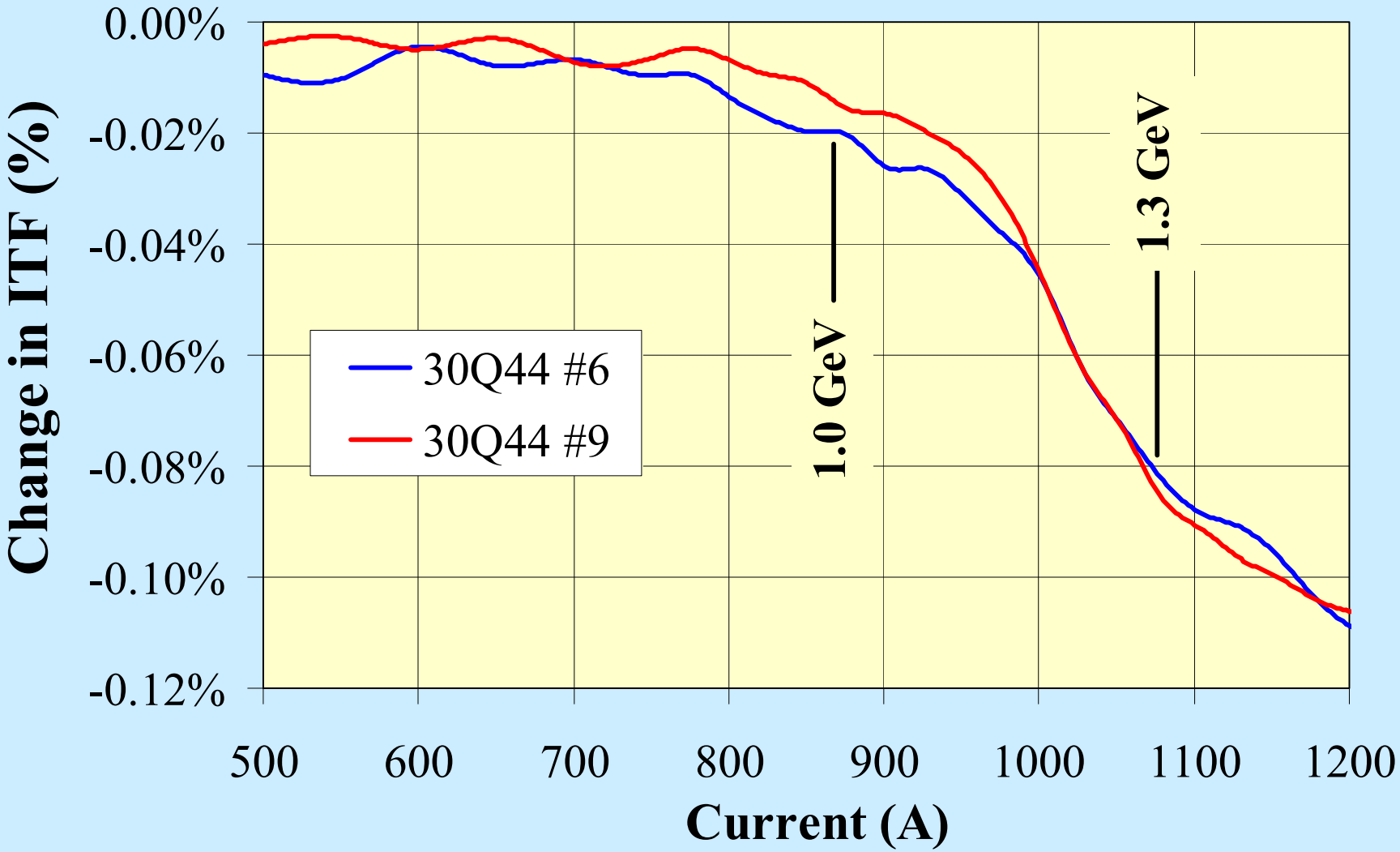
Trimming of Yoke in 30Q44

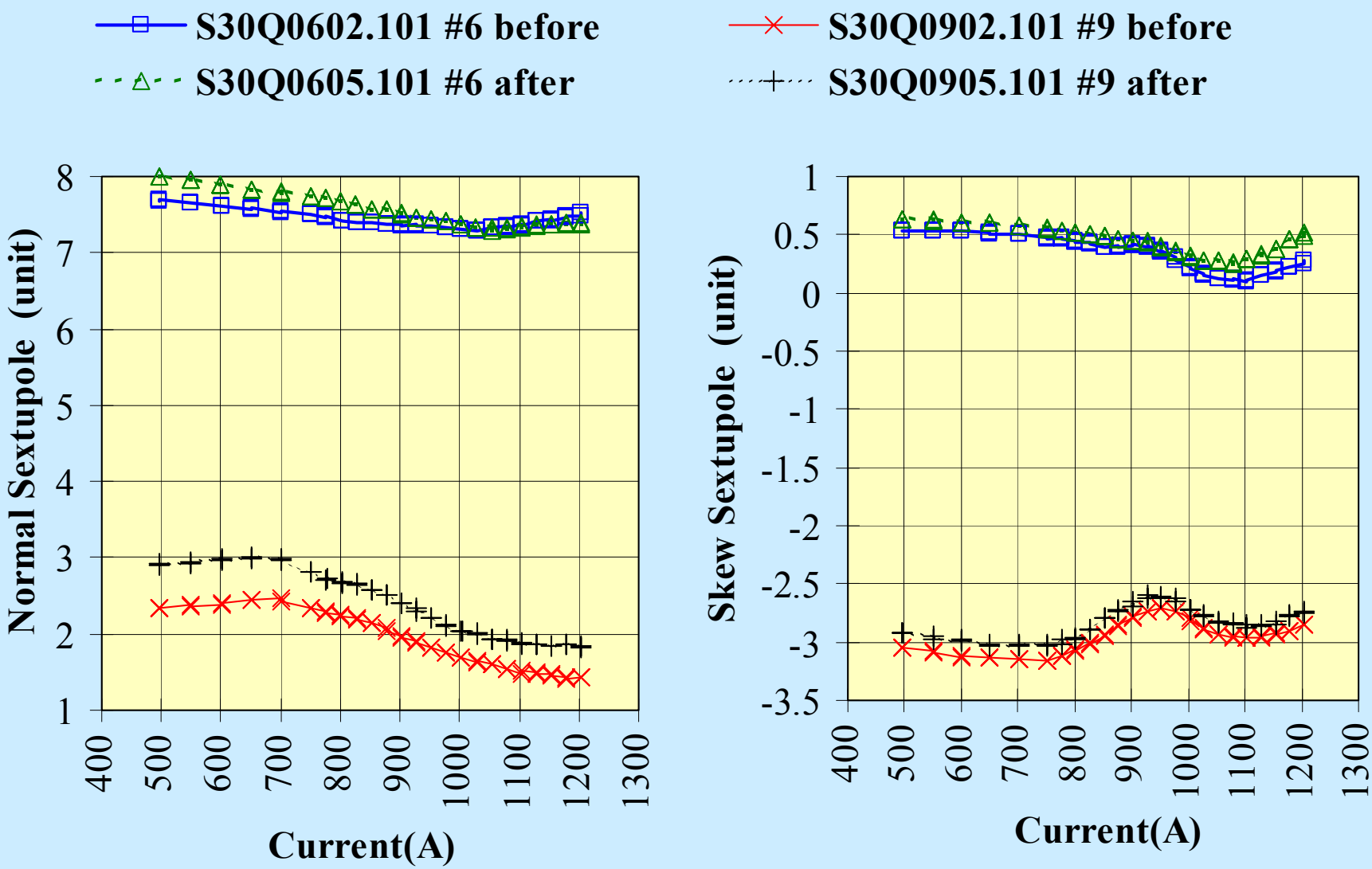




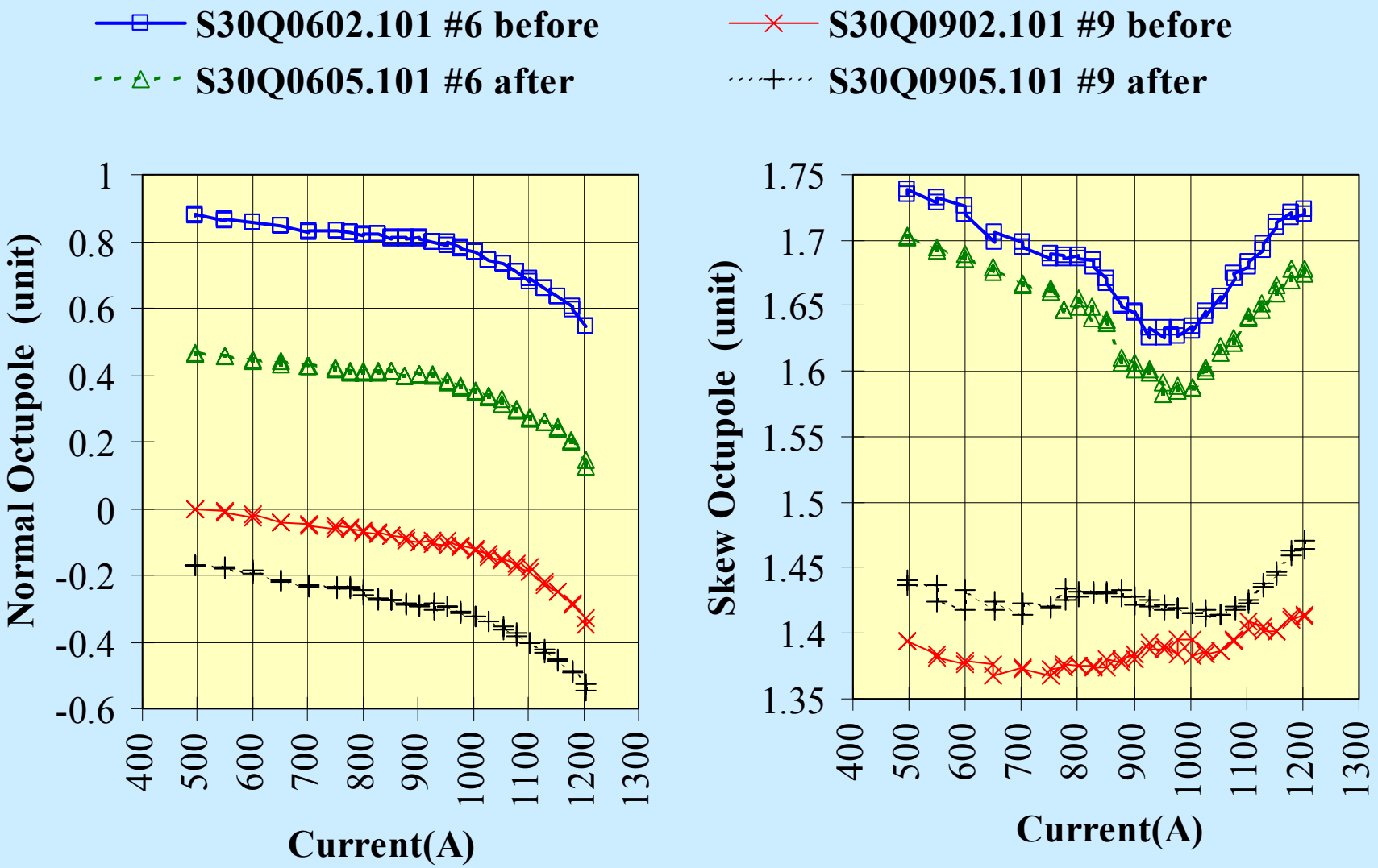
Change in ITF after yoke trimming



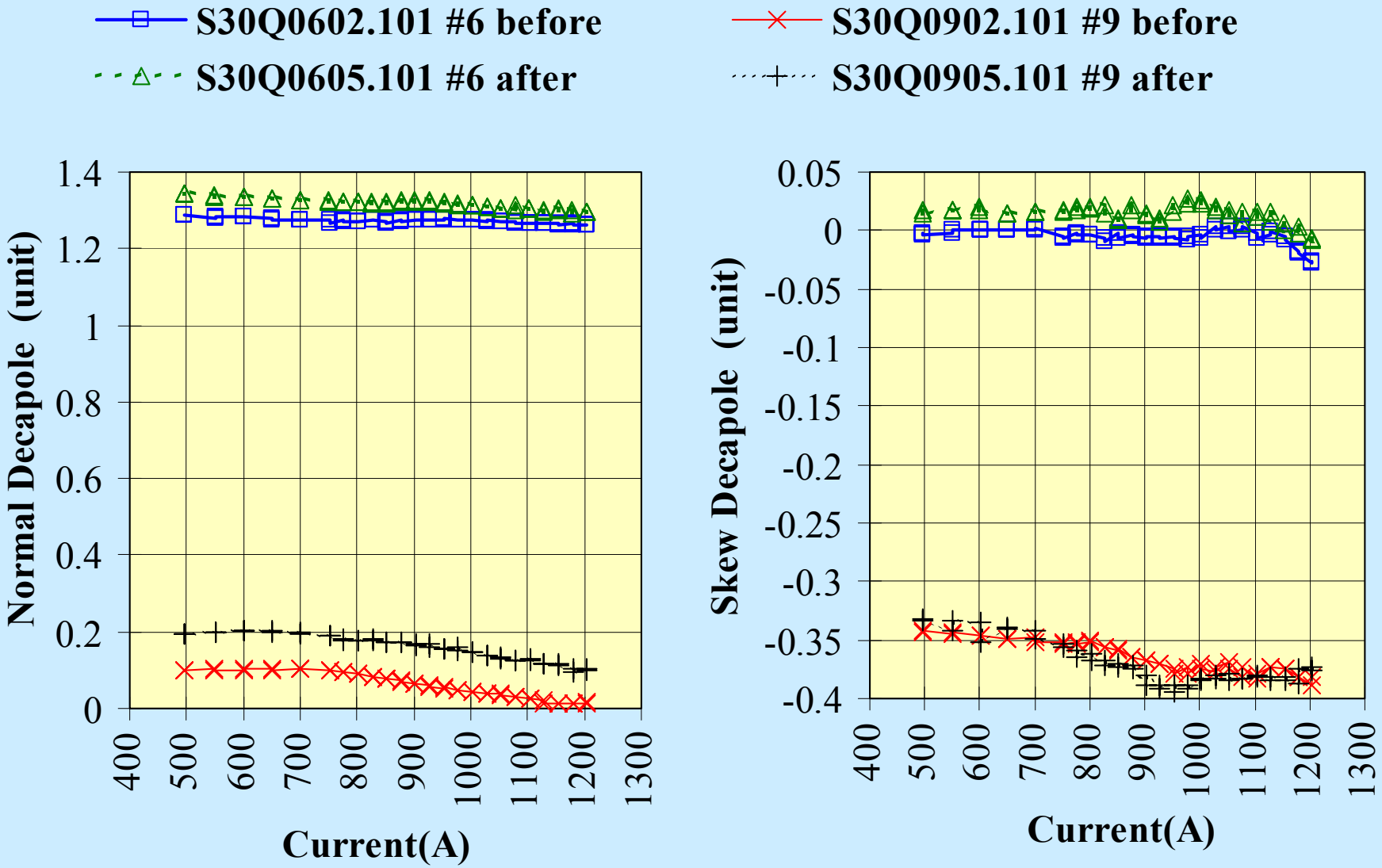
Change in Harmonics after yoke trimming



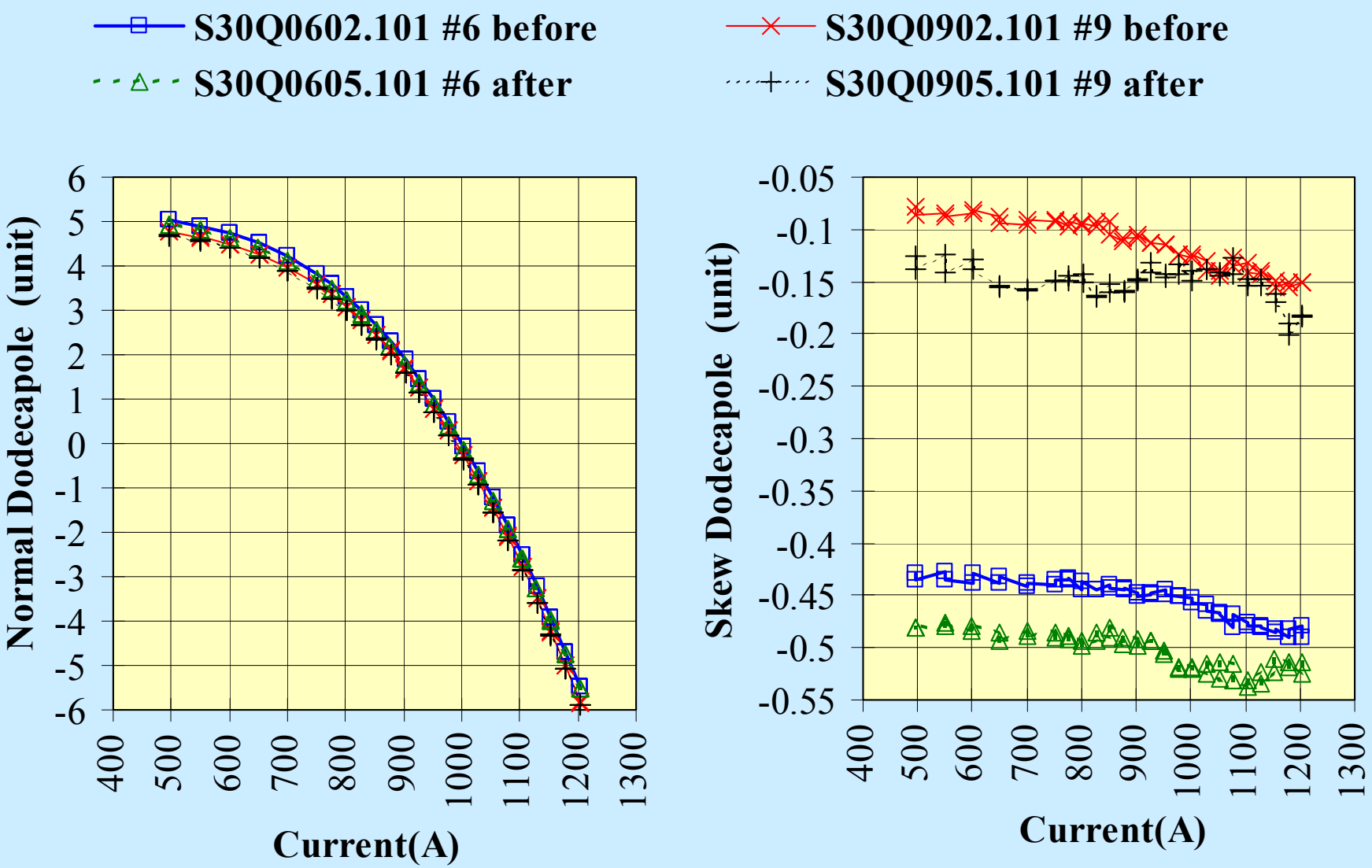
Change in Harmonics after yoke trimming



Change in Harmonics after yoke trimming



Change in Harmonics after yoke trimming



Conclusions

- Change in ITF is negligible at 1.0 GeV
- Change in ITF is ~ 0.08% at 1.3 GeV
- No significant changes in harmonics
- Attempts are underway to recoup loss in ITF at 1.3 GeV by adding iron