Status of B1pF Inner Yoke 2d and Coil End Geometry

Ramesh Gupta
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Results of the optimized yoke (presented earlier)

Large cutouts for 3d structure accommodated in inner yoke (~30 sq inch, more than ~20 sq inch originally requested).

➢ Tuning shims for 4 to eight geometric harmonics.
➢ Also, shown tuning for saturation induced harmonics.

All harmonics remain low (<1/2 unit) in the entire range of operation.
Revised Request (cutout at 6 places)

Cutout at pole is expected to make a significantly negative impact on saturation
Impact of Cutout on Iron Saturation

New pole cutout

Terrible, as anticipated!
Impact of Cutout on Iron Saturation (size of pole cutout reduced by 2/3)

Slightly better, but still bad
Impact of Cutout on Iron Saturation (size of all cutouts reduced by 2/3)

In between, but still very bad
Large cutout at pole has a major negative impact on yoke saturation!

Needs more work to find a solution which satisfies the demanding requirements of both mechanical (3d) and magnetic (2d) design.
Free Winding of the Midplane Turn (strain naturally minimized)
Winding of the Midplane Turn on Mandrel

(optimized with ROXIE and BEND)

Tilt angles:
~54° (ROXIE) &
~25° (BEND)

*36 degree in ROXIE INPUT since it is defined differently
In all cases, natural layout gives tilt angles much smaller than those used in ROXIE and smaller than in BEND.

There is almost no change till 7.5”. May be acceptable even beyond that.

Cable stays on the tube (in some cases a gentle push is required)

Reference: ROXIE/BEND ~9.25”
Photos for A-length = 7.5”
A-length 9.25” (ROXIE B/A=1), Tilt 54° (ROXIE BETA =36)

ORIGINAL CASE – ENDS optimized with ROXIE
A-length 7.5” (ROXIE B/A=0.81, Tilt 9° (ROXIE BETA = 81))

Check how it looks in a CAD Model
Variations in layout for A-length = 7.5”

Study of what happens if we are not able to follow the natural path in ROXIE (plus a limited study of changes in cable path during curing, collaring, energizing, etc.)