Revised Q2pF Lead End for updated turn-to-turn spacing

Ramesh Gupta
April 9, 2024
Updated Lead End

- Cross-section was updated to accommodate a significant change in turn-to-turn spacing (from 0.12 mm to 0.0965 mm).
- Therefore, the end design needs to be updated. “Return End” was presented last time. This one is for “Lead End”.
- Need to assure a good field quality (end harmonics) and low peak fields with desired layout of end turns (Min. tilt angle 70 degrees).

Final optimization after the feedback from the single turn winding trials
Revised X-section with Symmetric Wedges

- Uses EIC Quad Cable
- Field Quality Optimized
- Peak field Optimized
- Poles of Outer and Inner aligned
- Wedges made exactly symmetric
- Collaring process should provide a good pre-stress (note: wedge shape at poles)

Same number of turns as before: inner 35 and outer 34, but turn distribution in outer layer changed (from 21+13=34 to 19+15=34)
Lead End for updated turn-to-turn spacing (min tilt angle 70°)

- End turns of the outer layer and the inner layers aligned

Interlayer Splice
Renderings of the Outer Layer of the Lead End

Looks reasonably ok; to be examined more carefully
Renderings of the Inner Layer of the Lead End

Looks reasonably ok; to be examined more carefully
Renderings of Both Layers of the Lead End

Looks reasonably ok; to be examined more carefully
Field along the z-axis at a radius of 100 mm on the horizontal axis and vertical axis
Field harmonics $B_6$ and $B_{10}$ along the $z$-axis

$B_6$

$B_{10}$
Field harmonics $B_6$ and $B_{10}$ along the z-axis

$A_2$ and $A_6$
Summary

- Initial lead end design completed for the updated turn-to-turn spacing
- Next: Update with the lead end and return end combined
- Final finer optimization of both lead end and return end to be performed after the winding trials (just in case the parameters have to be adjusted)
Extra Slides
Cross-section (ROXIE)

Symmetric wedges

Magnet Division
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