U.S. MAGNET DEVELOPMENT PROGRAM

Off-centered CORC Coil in DCC017

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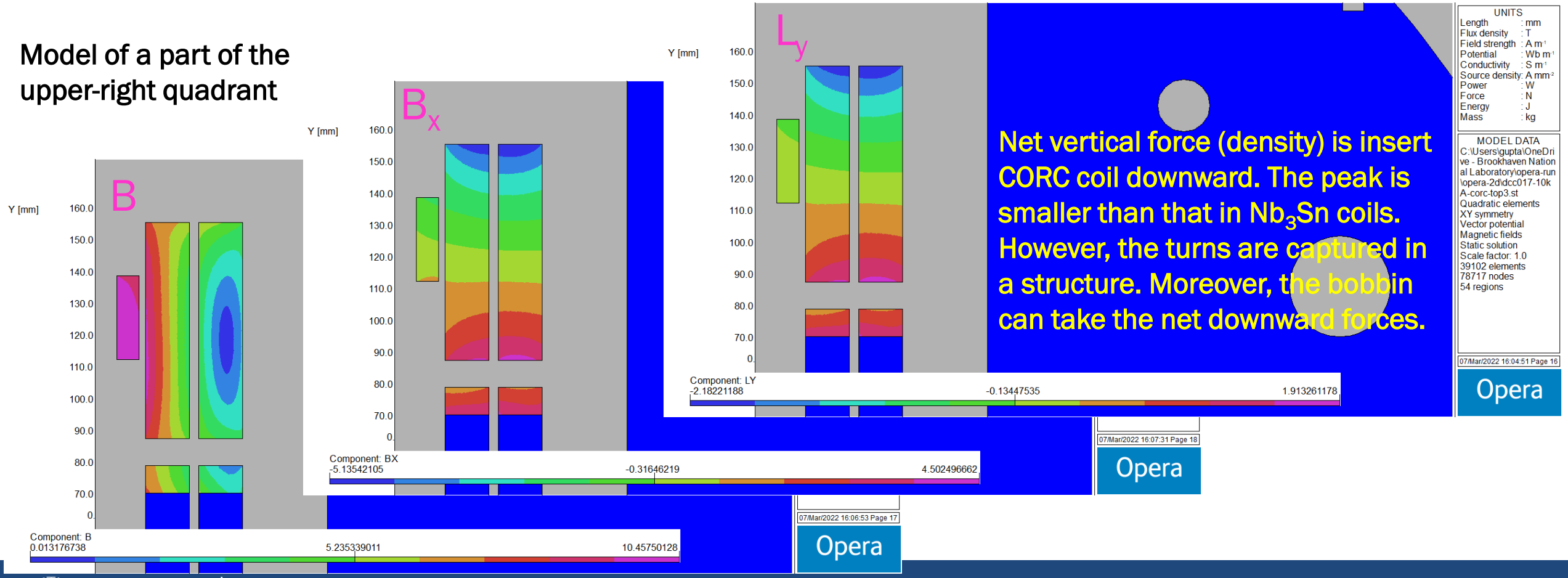
Question

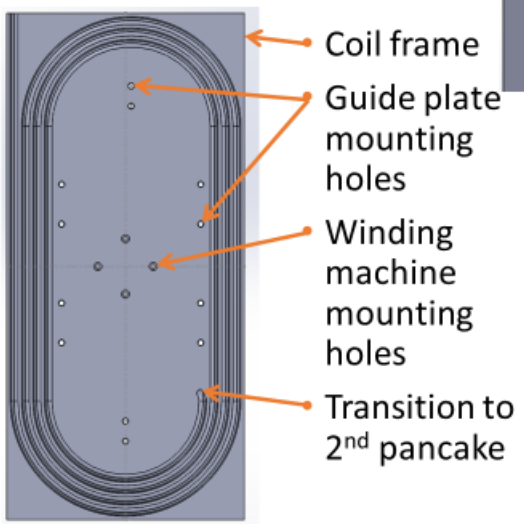
The desired location of the insert coils in DCC017 is that the vertical magnetic center of the coils align with the magnetic center of DCC017. This makes the net vertical force on the insert coil zero. The question is what happens when if not, specially for the MDP CORC insert coil, as designed? Is it still acceptable, even if not desirable?

Model of a part of the upper-right quadrant



CORC Coil Package

Details

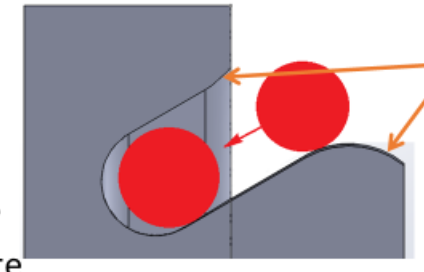


Coil frame

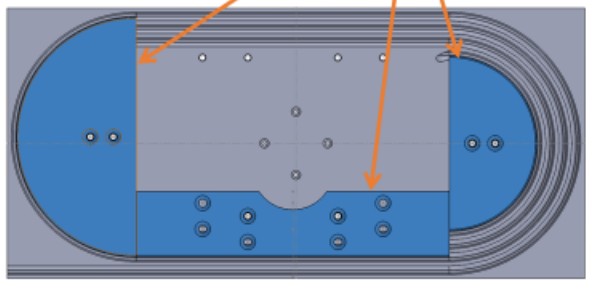
Guide plate mounting holes

Winding machine mounting holes

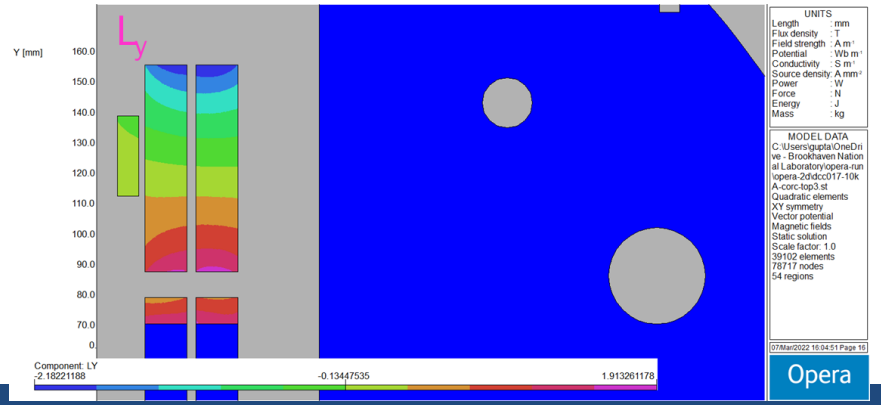
Transition to 2nd pancake



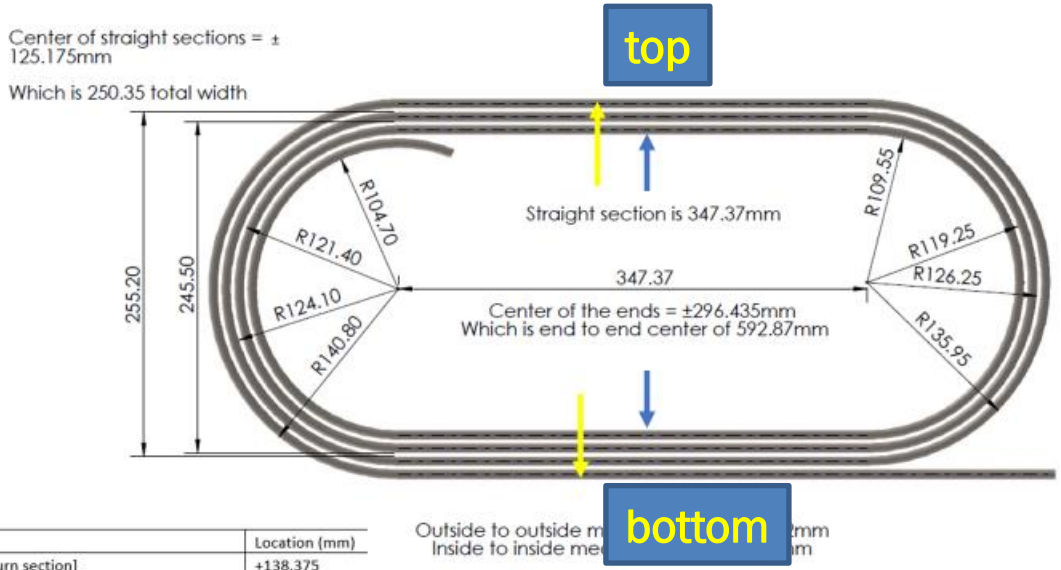
Plates radiused to eliminate damage due to contact with sharp edges



Guide Plates

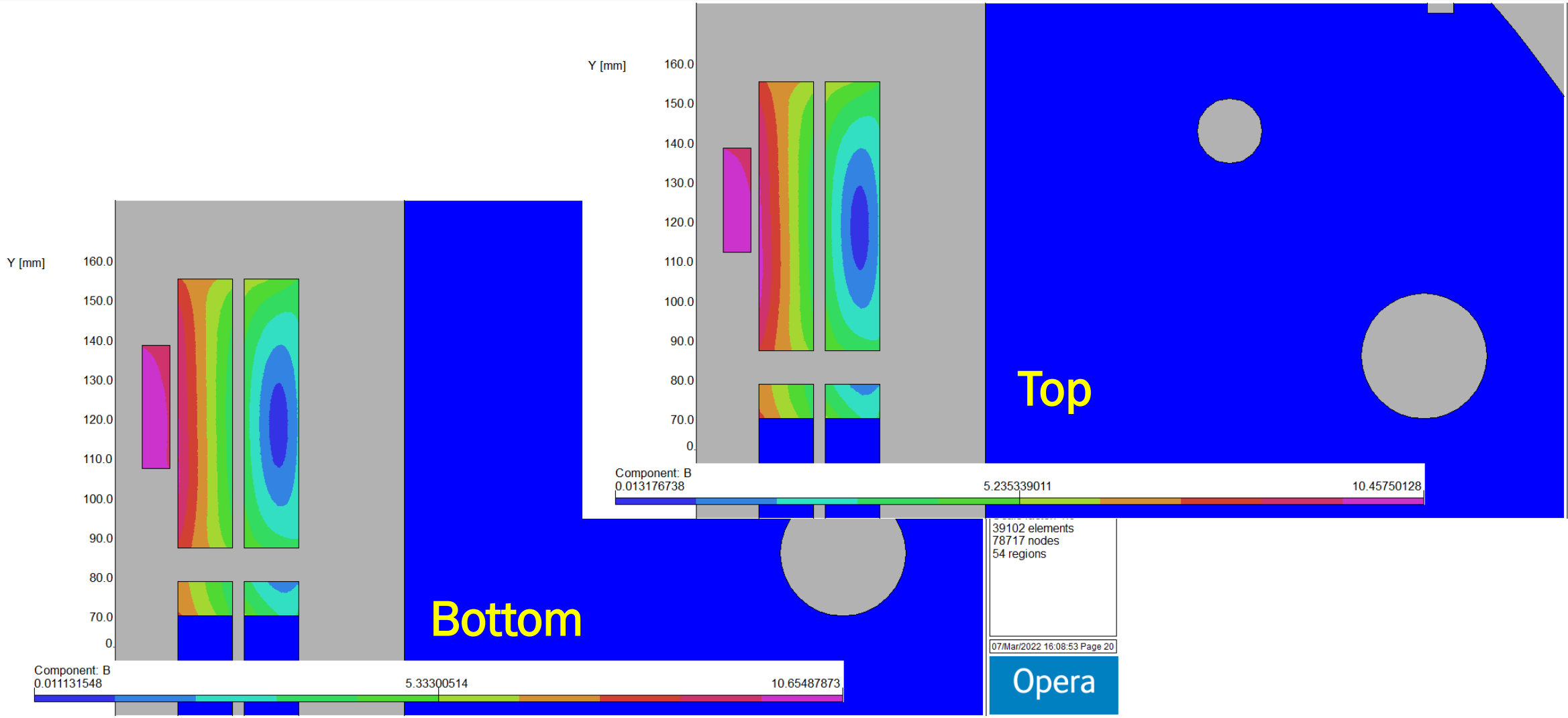


Net vertical force (density) is insert CORC coil downward.
The peak is smaller than that in Nb_3Sn coils.
However, the turns are captured in a structure.
Moreover, the bobbin can take the net downward forces.

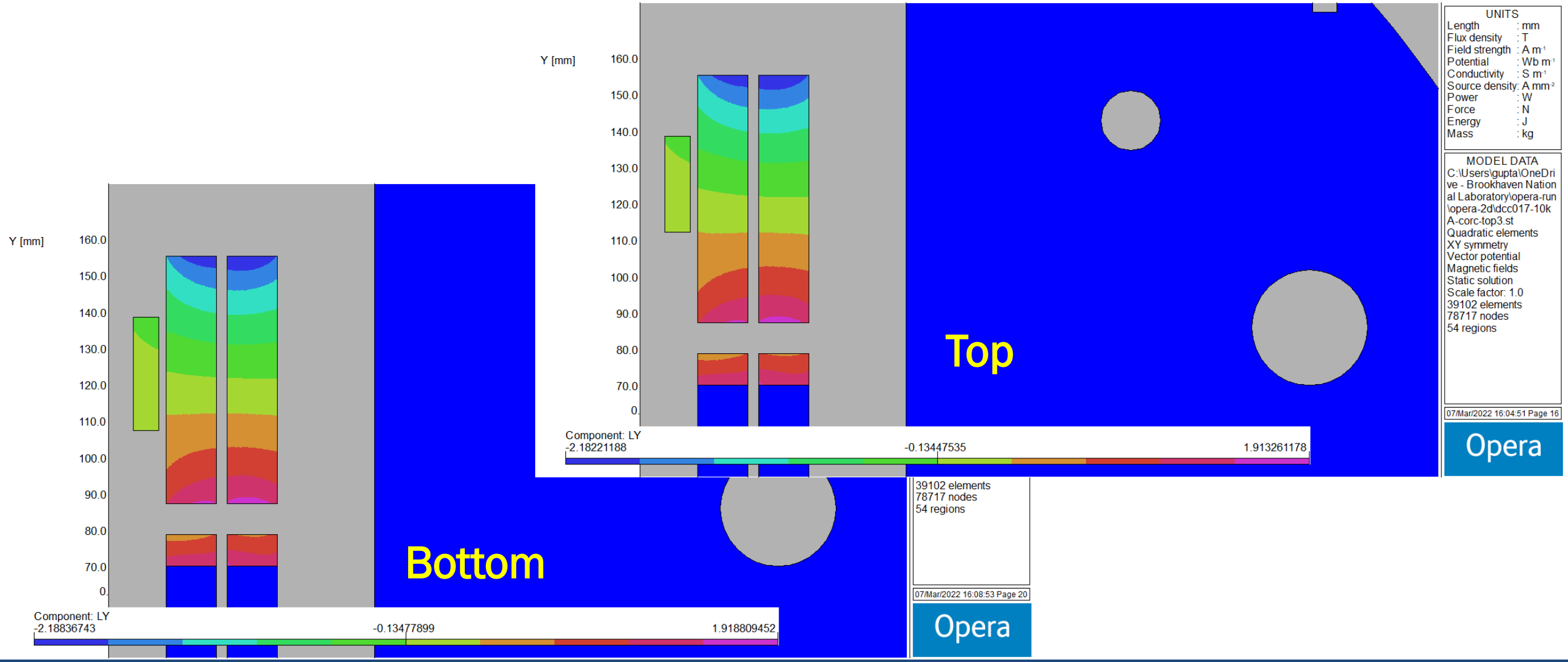


Position	Location (mm)
Top of Top [3 turn section]	+138.375
Bottom of Top [3 turn section]	+111.975
Top of Bottom [4 turn section]	-107.125
Bottom of Bottom [4 turn section]	-143.225

Magnetic Field Contours



Contours of the Vertical Component of the Lorentz force density (Nb_3Sn and CORC Coils)



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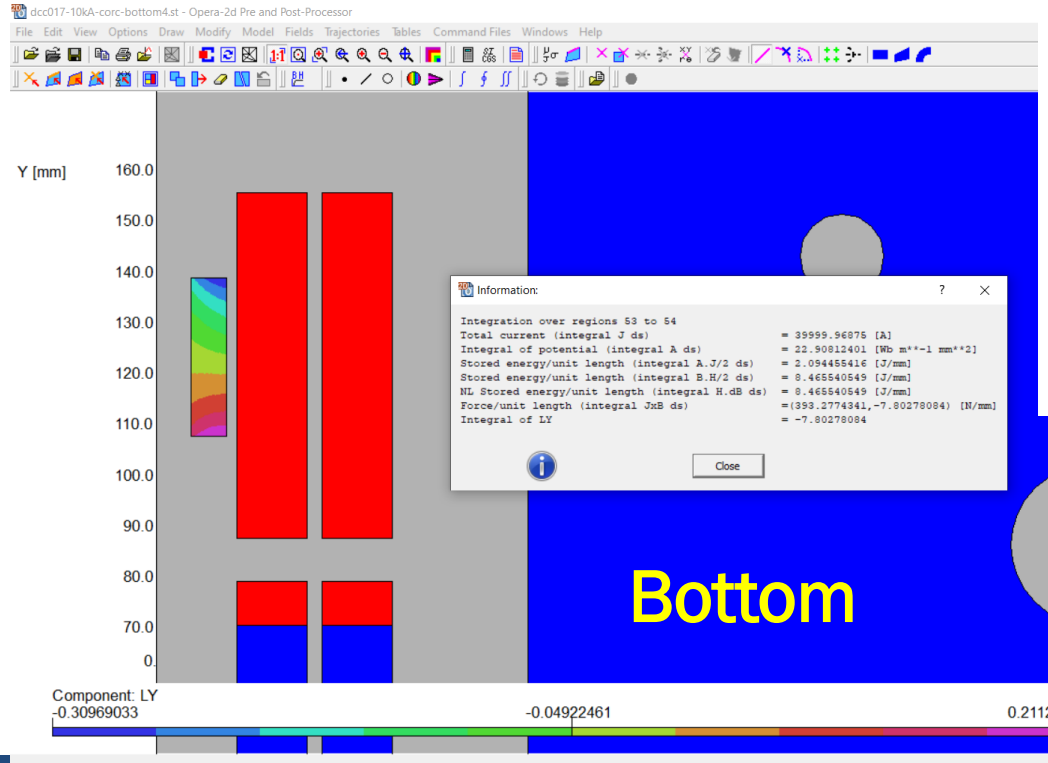
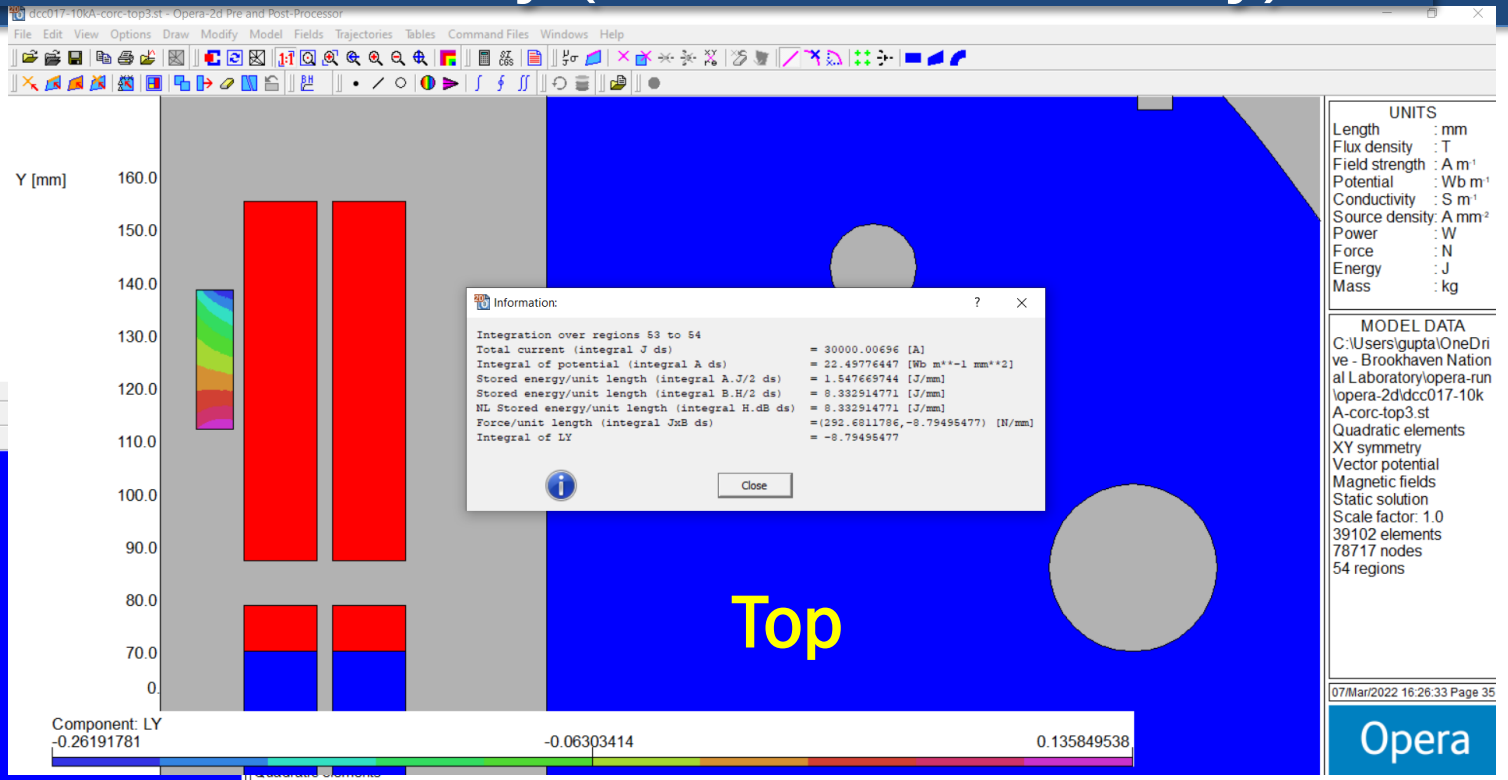
Contours of the Vertical Component of the Lorentz force density (in CORC Coils only)





Conclusion:

Even though the location of turns in the CORC insert coil for MDP is not ideal. however, since the turns are captured in a structure that, and the bobbin should be able to handle the net forces.