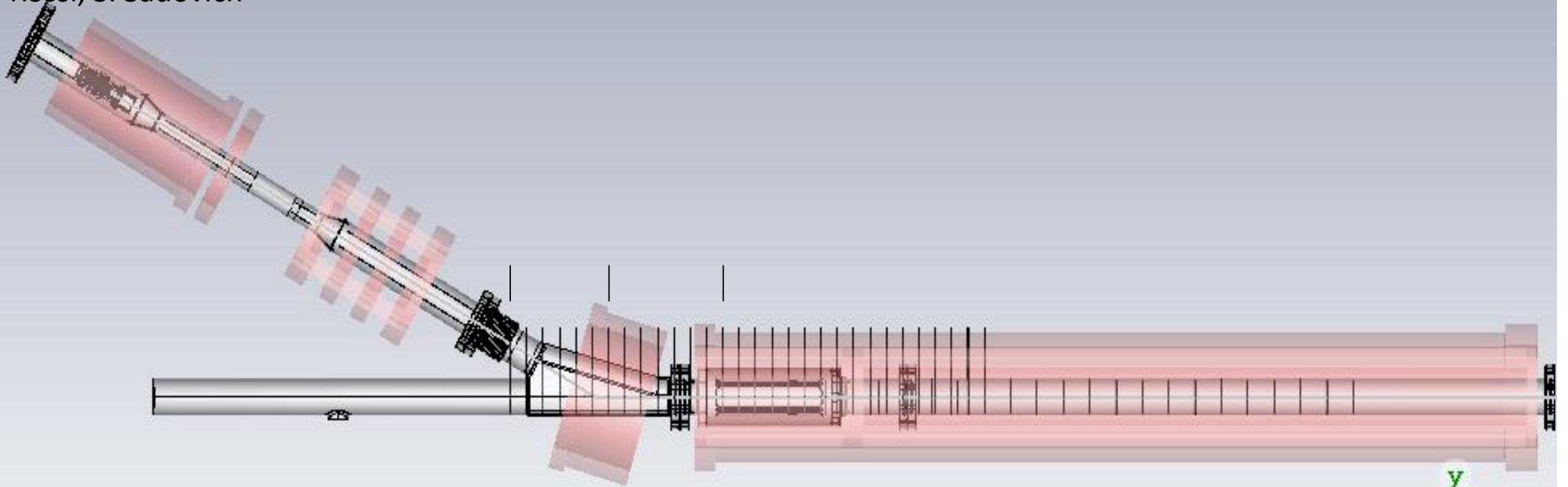
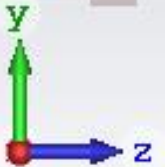


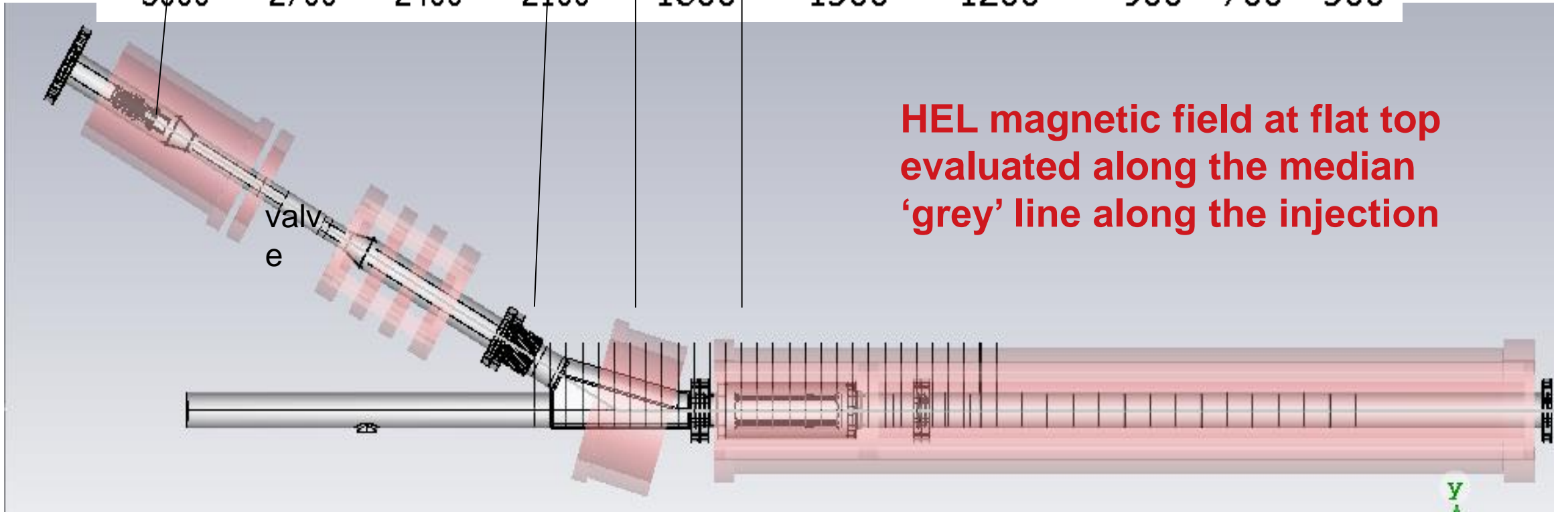
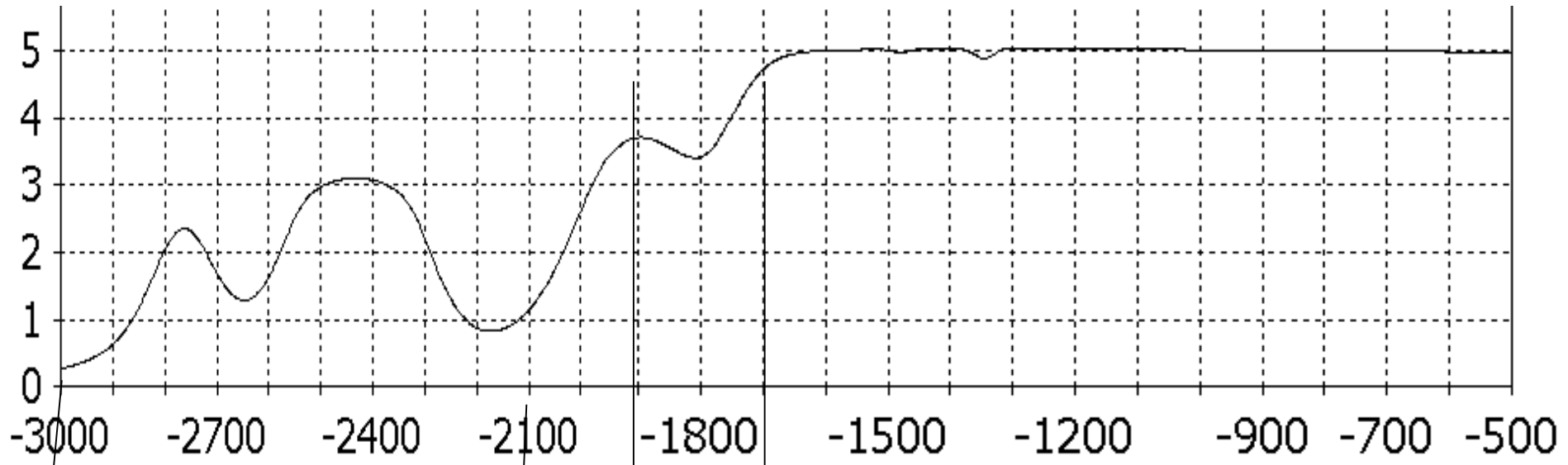
CST simulations of electron beam trajectory in the Hollow Electron Lens to find configuration without 'bump' at the inlet of the main solenoid

A. Rossi, S. Sadovich



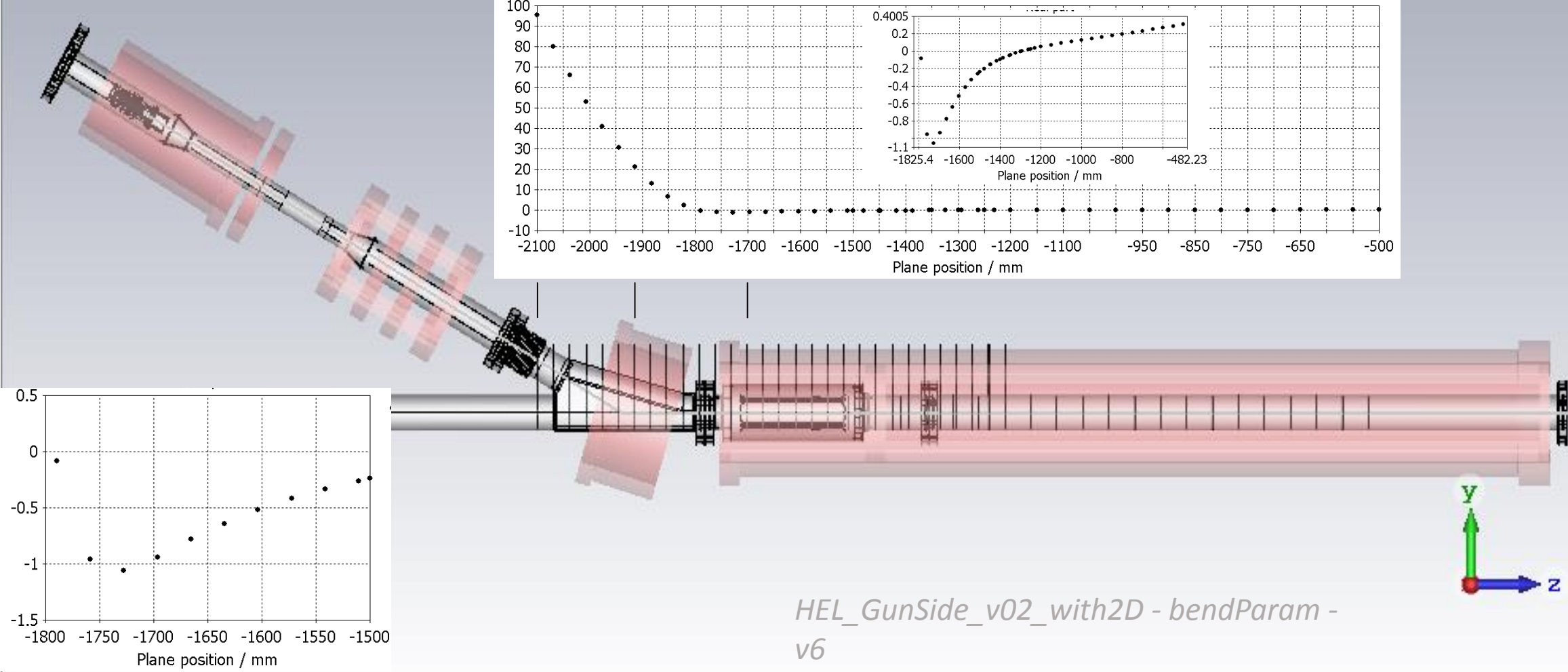
- Tracking with magnetostatic evaluation only
- 3mm mesh (will be refined after narrowing down spectrum of study)





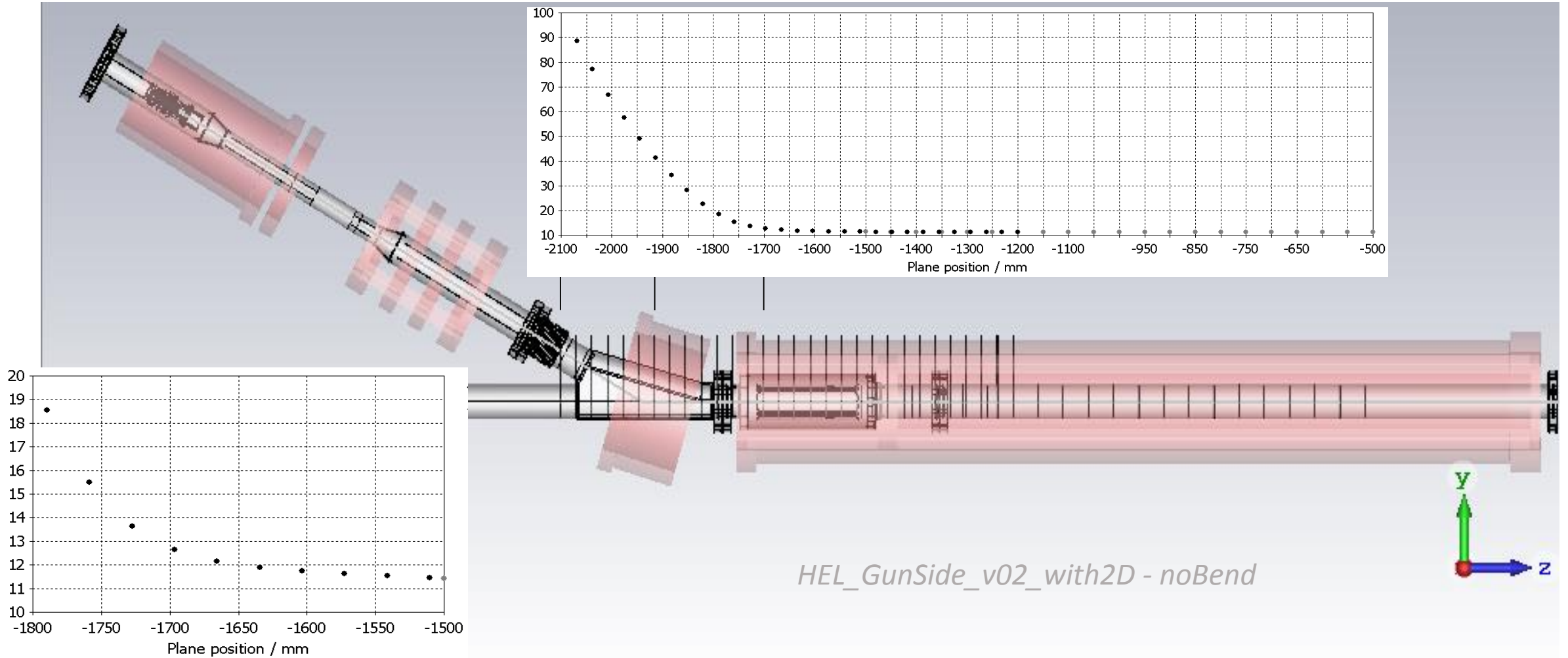
**HEL magnetic field at flat top
evaluated along the median
'grey' line along the injection**

**Current mechanical design: 30 deg angle of injection,
bend solenoid tilt 16.7 deg**

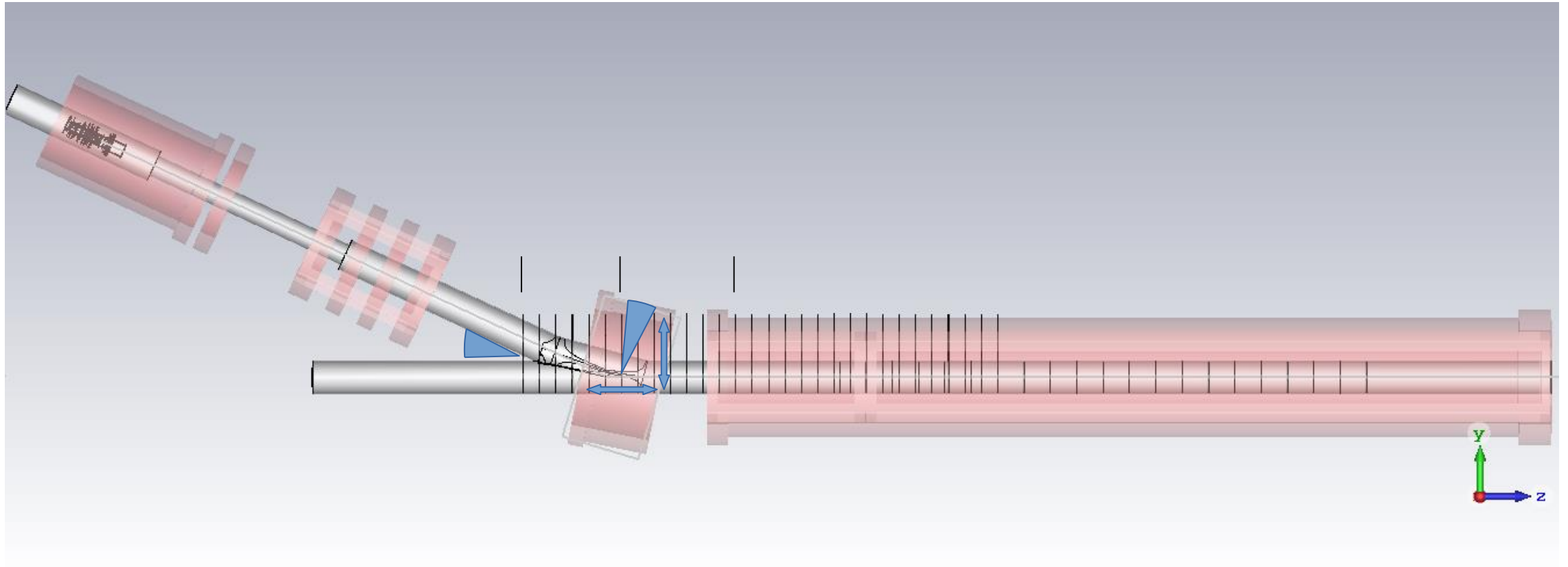


HEL_GunSide_v02_with2D - bendParam - v6

Trajectory without bending magnet

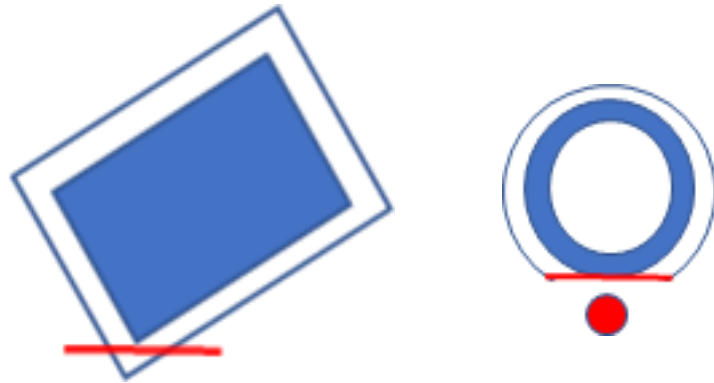


Vary angle and position of bending magnet, go to 25 deg injection

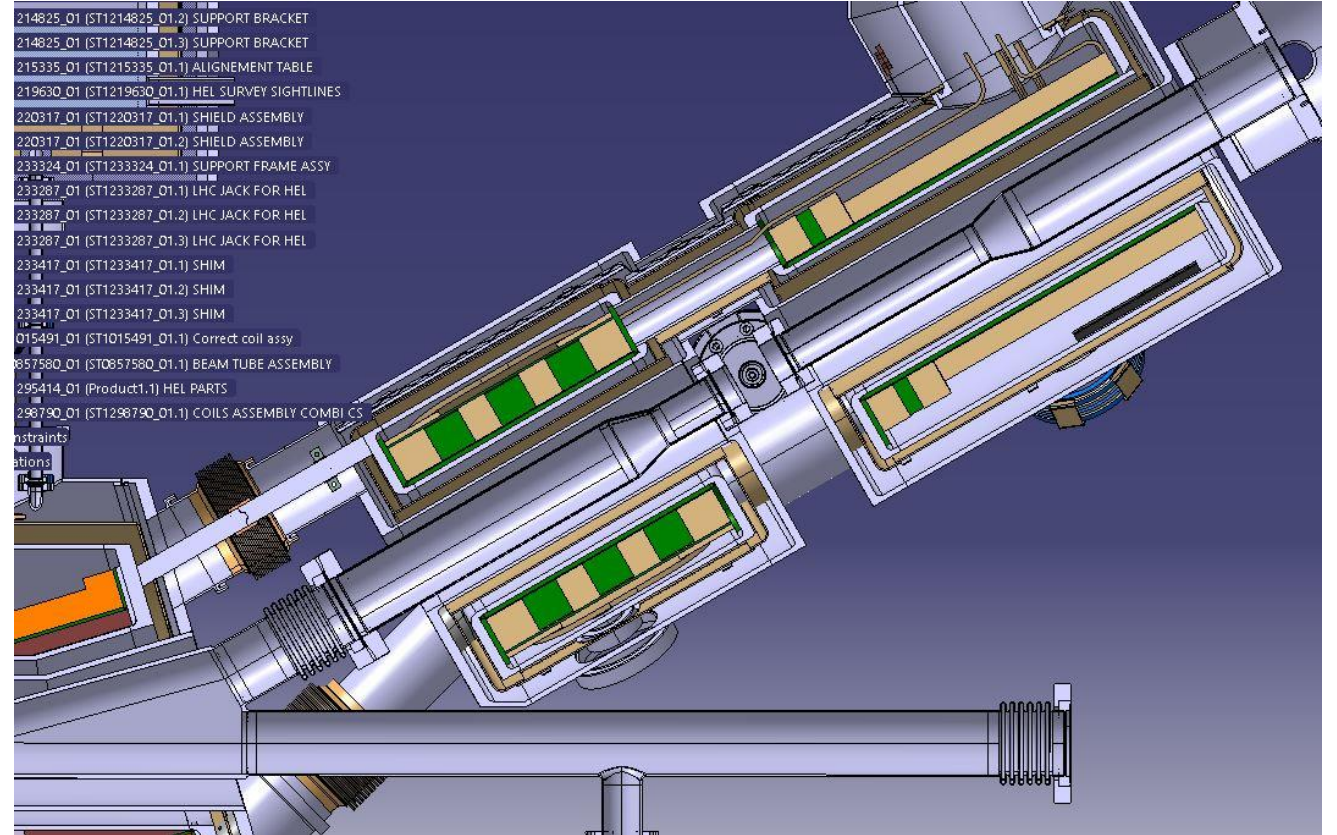


- Tracking with magneto-static evaluation only
- 3mm mesh (will be refined after narrowing down spectrum of study)

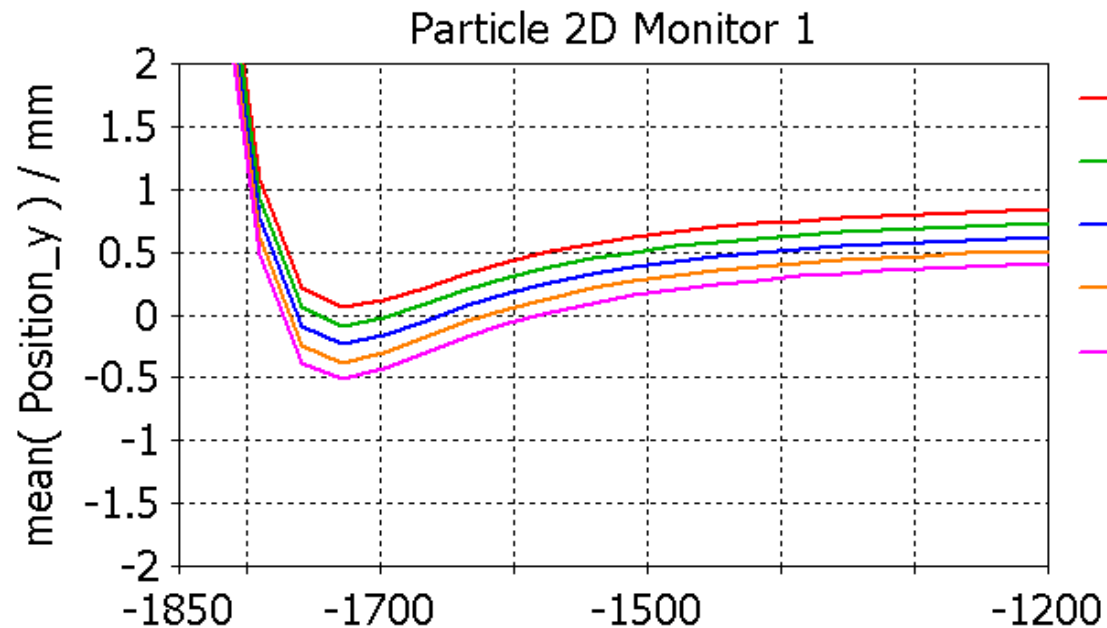
Mechanical design



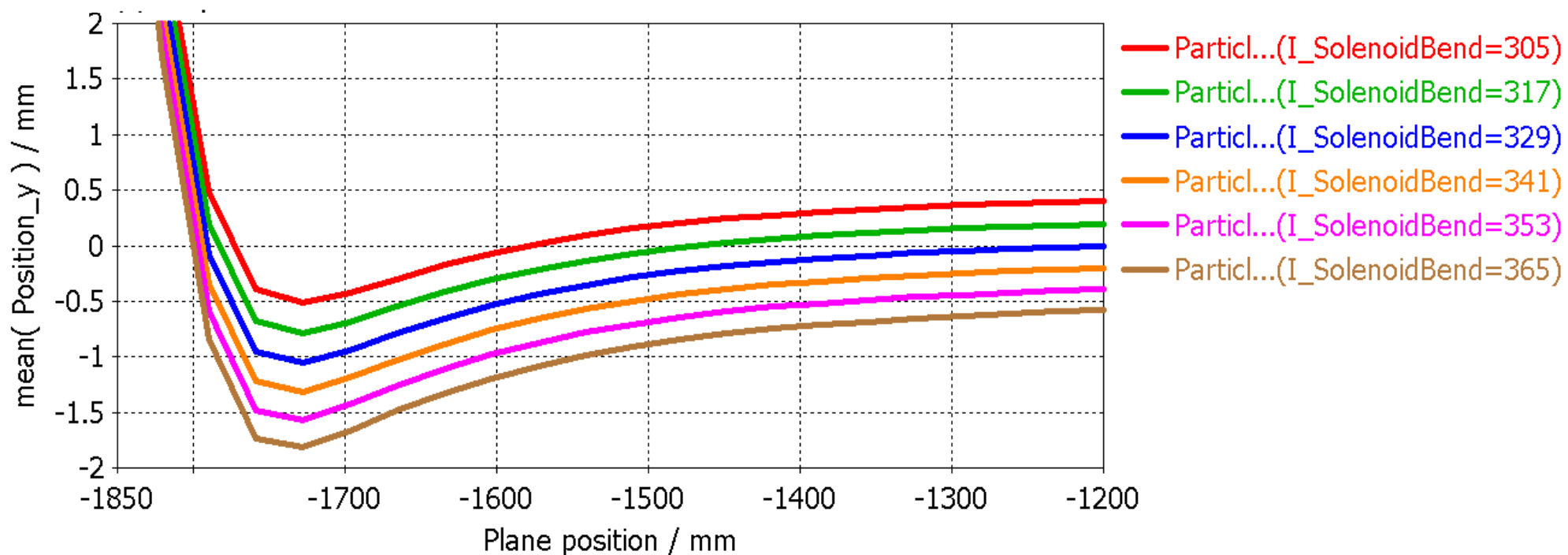
In blue the coil. Around the He tank. In red the local cut to create space for the vacuum pipe (in red)



Diego Perini and Antti Kolehmainen



Bend solenoid current scan:
Simple shift of the trajectory

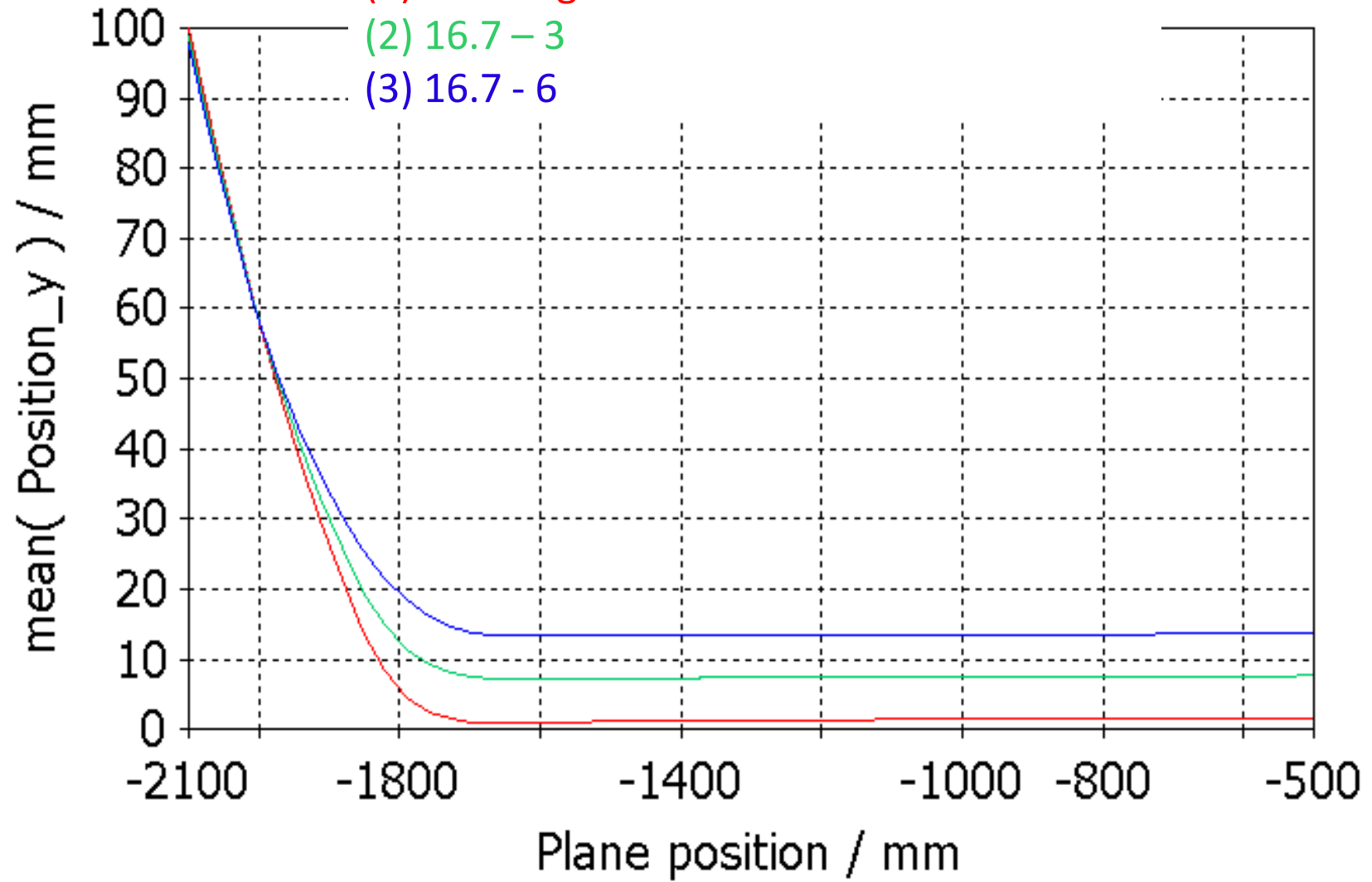


Bend solenoid tilt scan:

(1) 16.7 deg

(2) 16.7 - 3

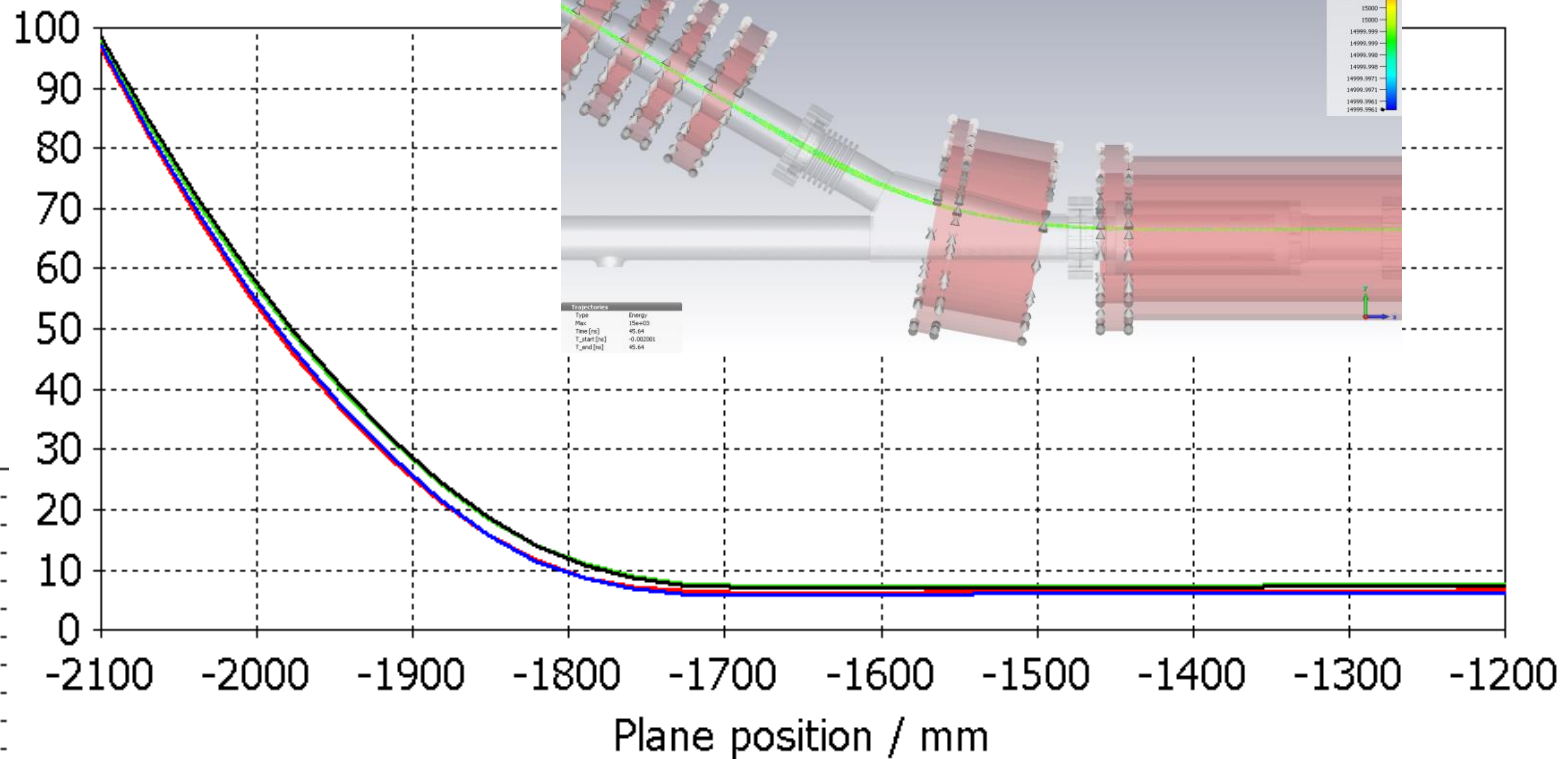
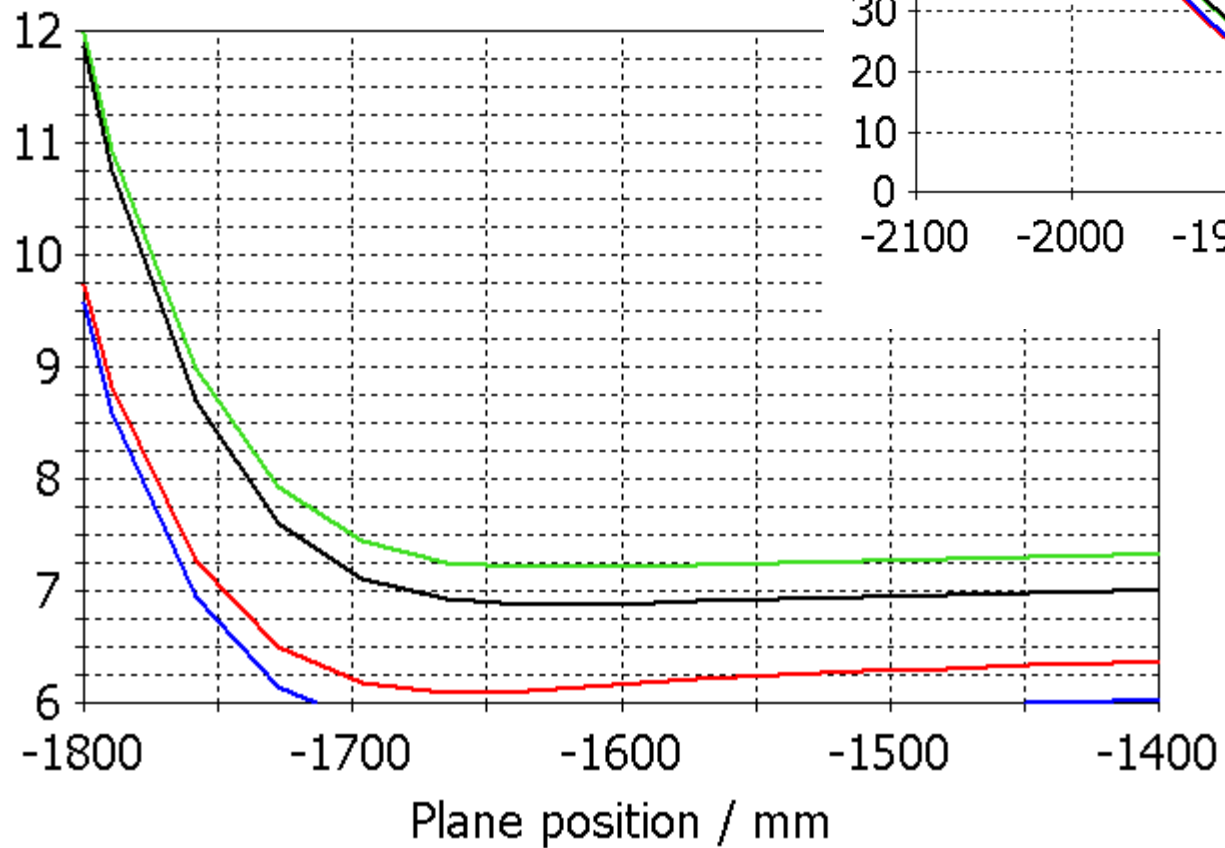
(3) 16.7 - 6



Bend solenoid Y-Z position scan:

Tilt= 16.7-3 degrees

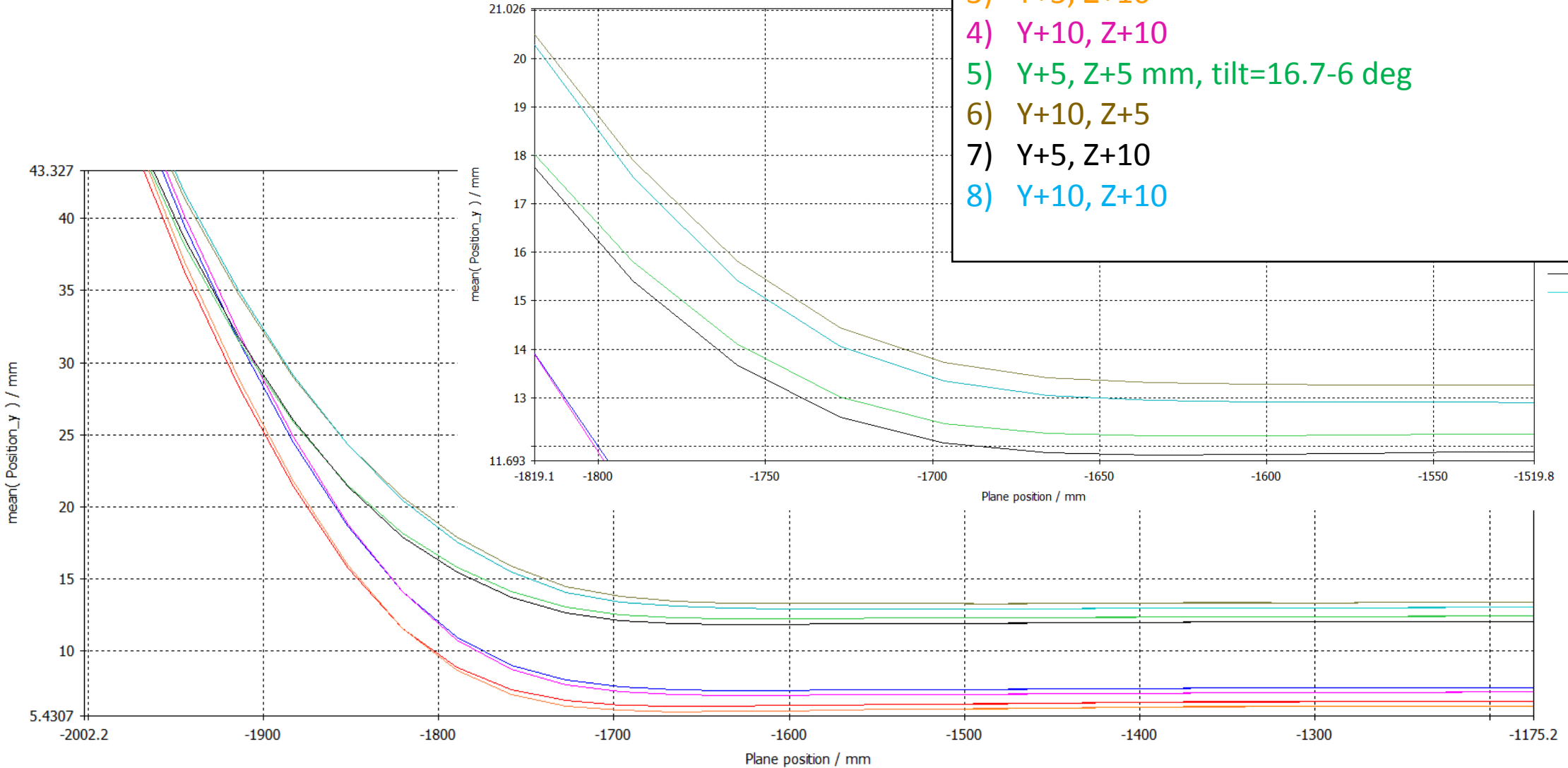
- 1) Y+5, Z+5 mm
- 2) Y+10, Z+5
- 3) Y+5, Z+10
- 4) Y+10, Z+10



HEL_GunSide_v02_with2D - bendParam - v3

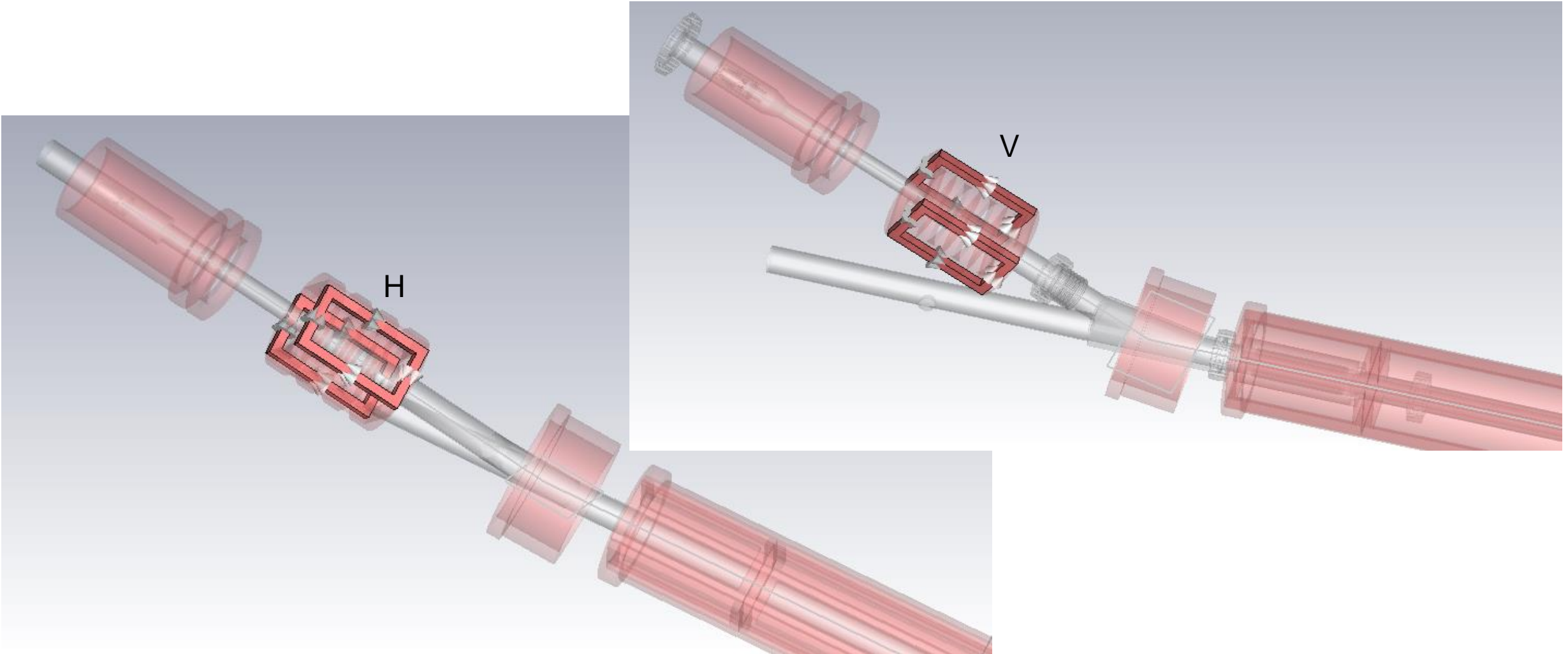
Bend solenoid Y-Z position scan:

- 1) Y+5, Z+5 mm, tilt= 16.7-3 deg
- 2) Y+10, Z+5
- 3) Y+5, Z+10
- 4) Y+10, Z+10
- 5) Y+5, Z+5 mm, tilt=16.7-6 deg
- 6) Y+10, Z+5
- 7) Y+5, Z+10
- 8) Y+10, Z+10



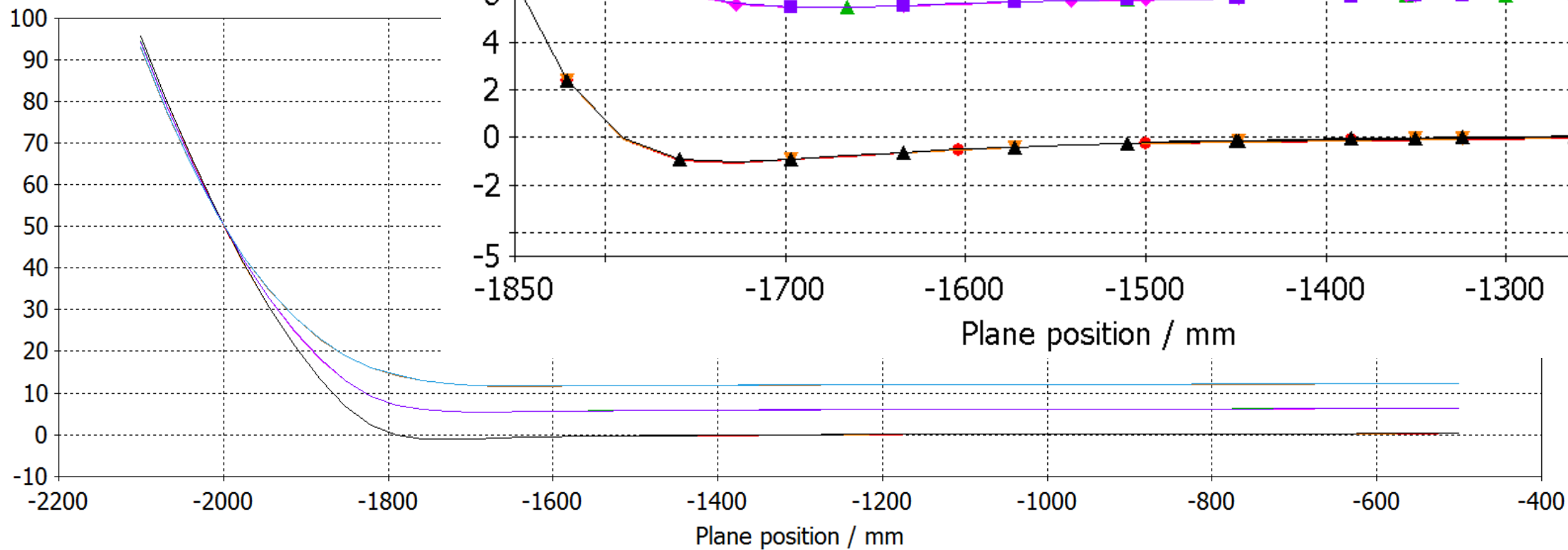
- mean(Position_y) (1)
- mean(Position_y) (2)
- mean(Position_y) (3)
- mean(Position_y) (4)
- mean(Position_y) (5)
- mean(Position_y) (6)
- mean(Position_y) (7)
- mean(Position_y) (8)
- mean(Position_y) (1)
- mean(Position_y) (2)
- mean(Position_y) (3)
- mean(Position_y) (4)
- mean(Position_y) (5)
- mean(Position_y) (6)
- P...2 - mean(Position_y) (7)
- P...2 - mean(Position_y) (8)

- Corrector dipole magnets, V and H installed on the second gun solenoid, and along the main solenoid
- Dipole approximated with 2 opposite windings, not yet realistic in shape or size

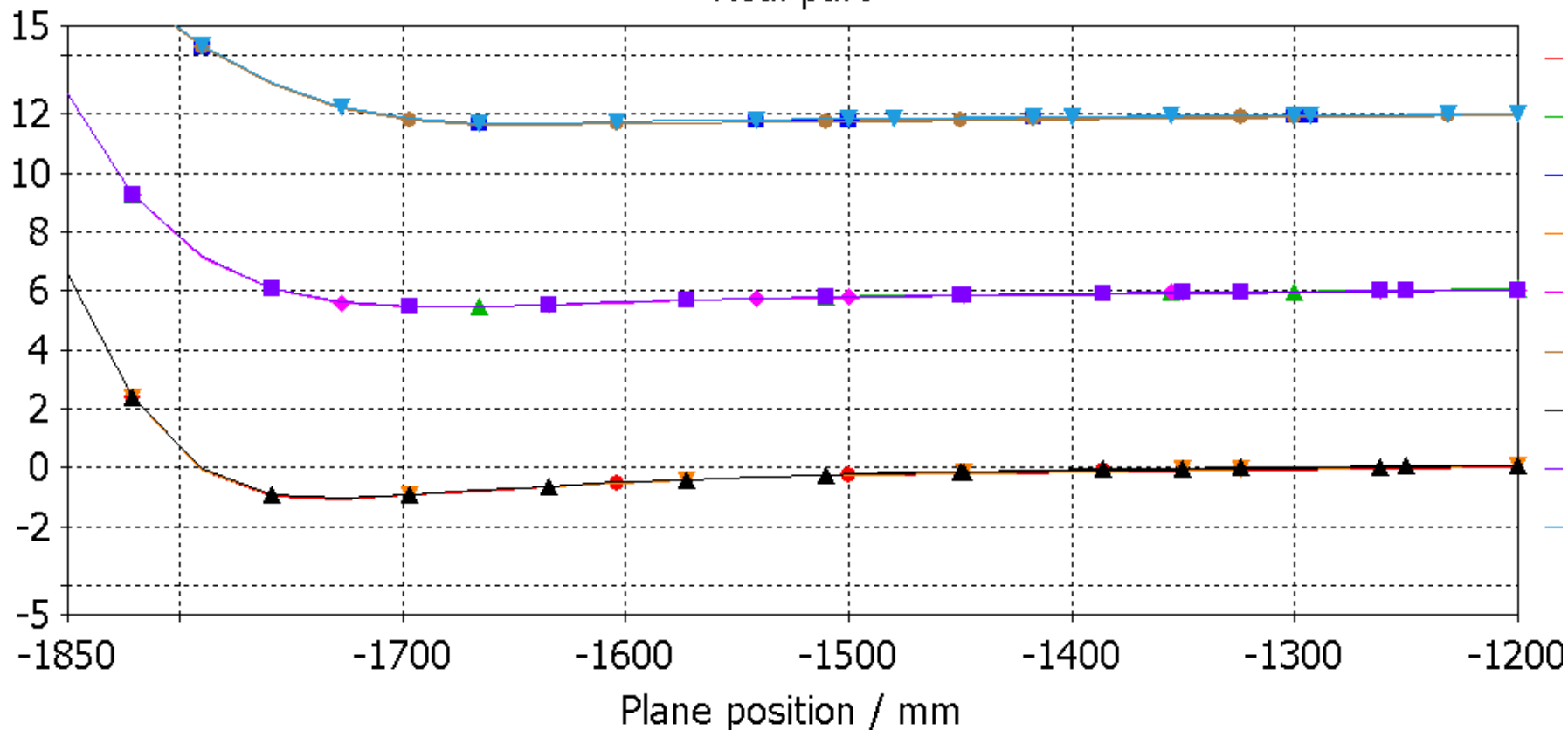


Bend solenoid tilt scan Gun corrector V current :

- 1) Tilt = 16.7 - 0 deg, Iv = 0 A
- 2) Tilt = 3, Iv = 0
- 3) Tilt = 6, Iv = 0
- 4) Tilt = 0, Iv = -50
- 5) Tilt = 3, Iv = -50
- 6) Tilt = 6, Iv = -50
- 7) Tilt = 0, Iv = -100
- 8) Tilt = 3, Iv = -100
- 9) Tilt = 6, Iv = -100

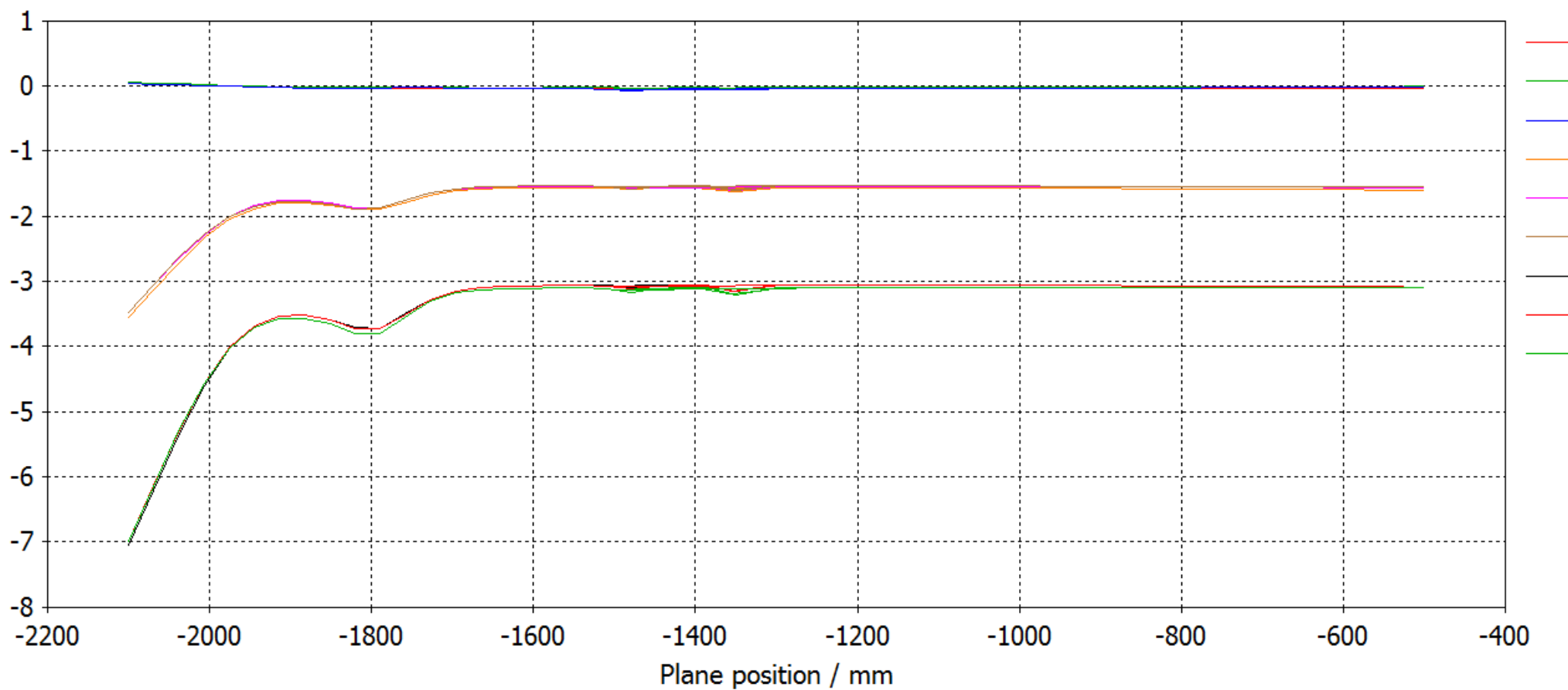


Real part



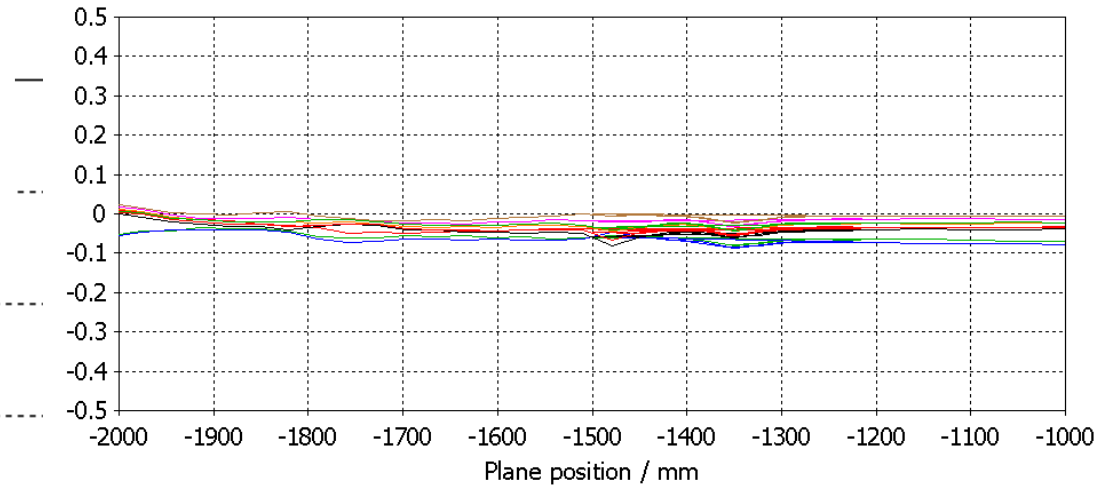
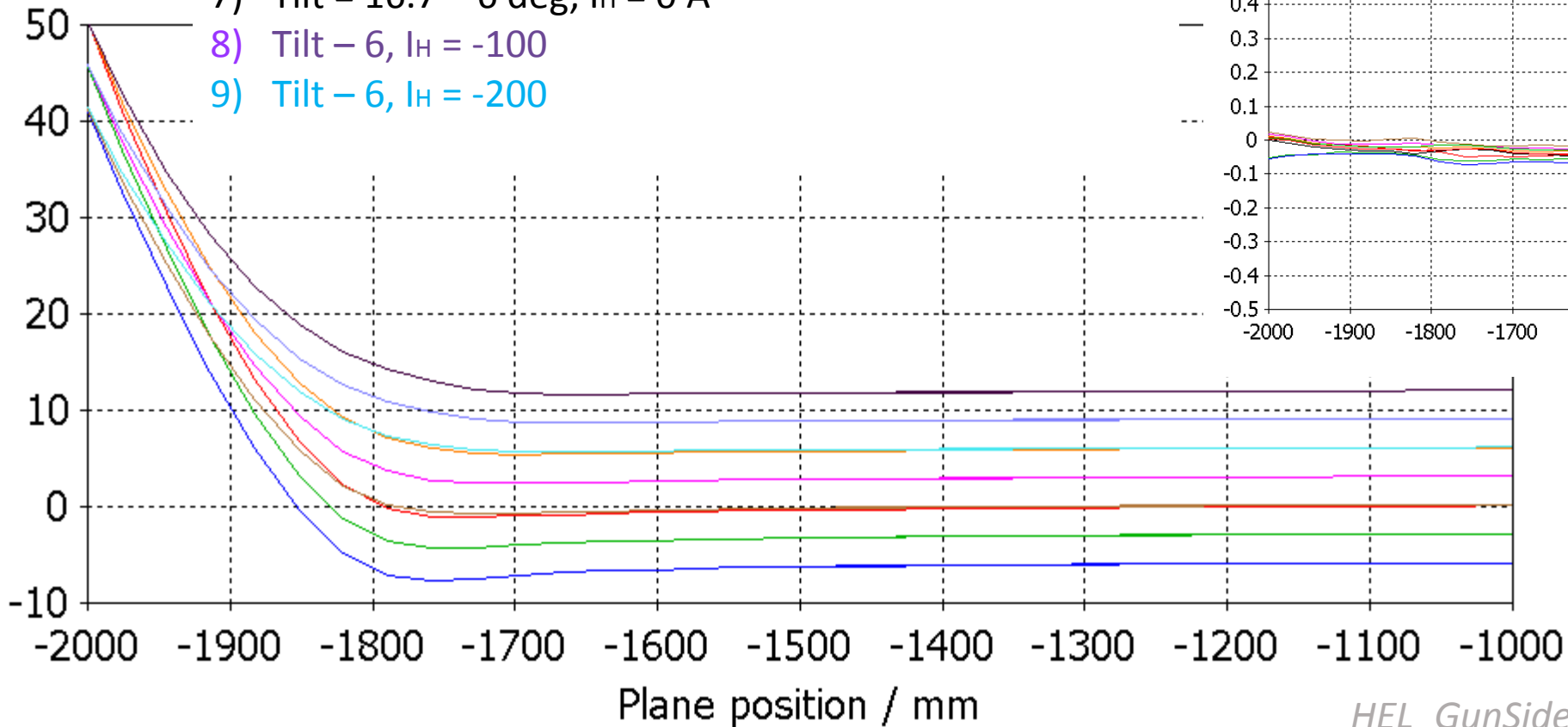
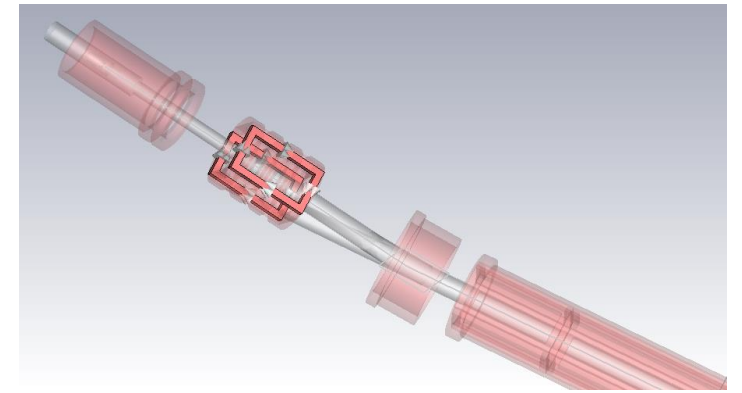
Bend solenoid tilt scan Gun corrector V current :

- 1) Tilt = 16.7 - 0 deg, Iv = 0 A
- 2) Tilt - 3, Iv = 0
- 3) Tilt - 6, Iv = 0
- 4) Tilt - 0, Iv = - 50
- 5) Tilt - 3, Iv = - 50
- 6) Tilt - 6, Iv = - 50
- 7) Tilt - 0, Iv = - 100
- 8) Tilt - 3, Iv = - 100
- 9) Tilt - 6, Iv = - 100



Bend solenoid tilt scan Gun corrector H current :

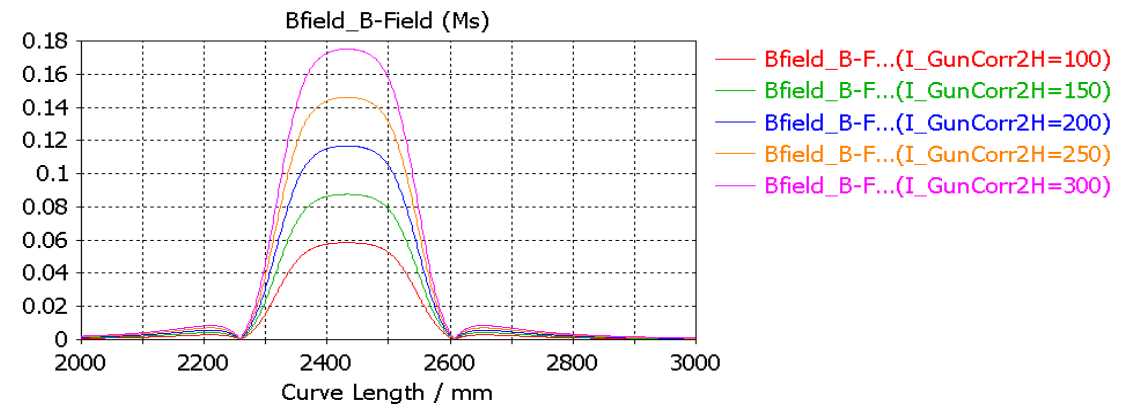
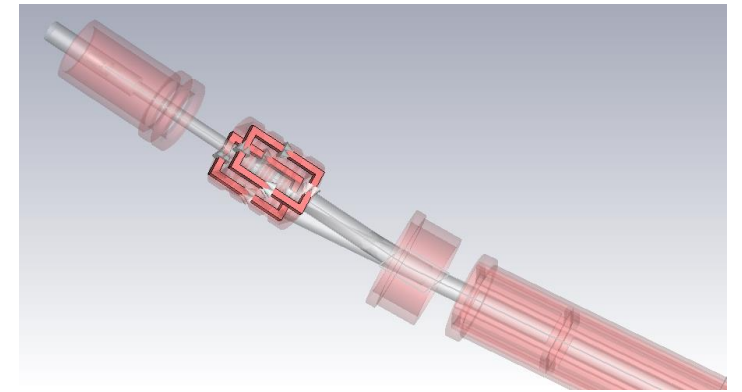
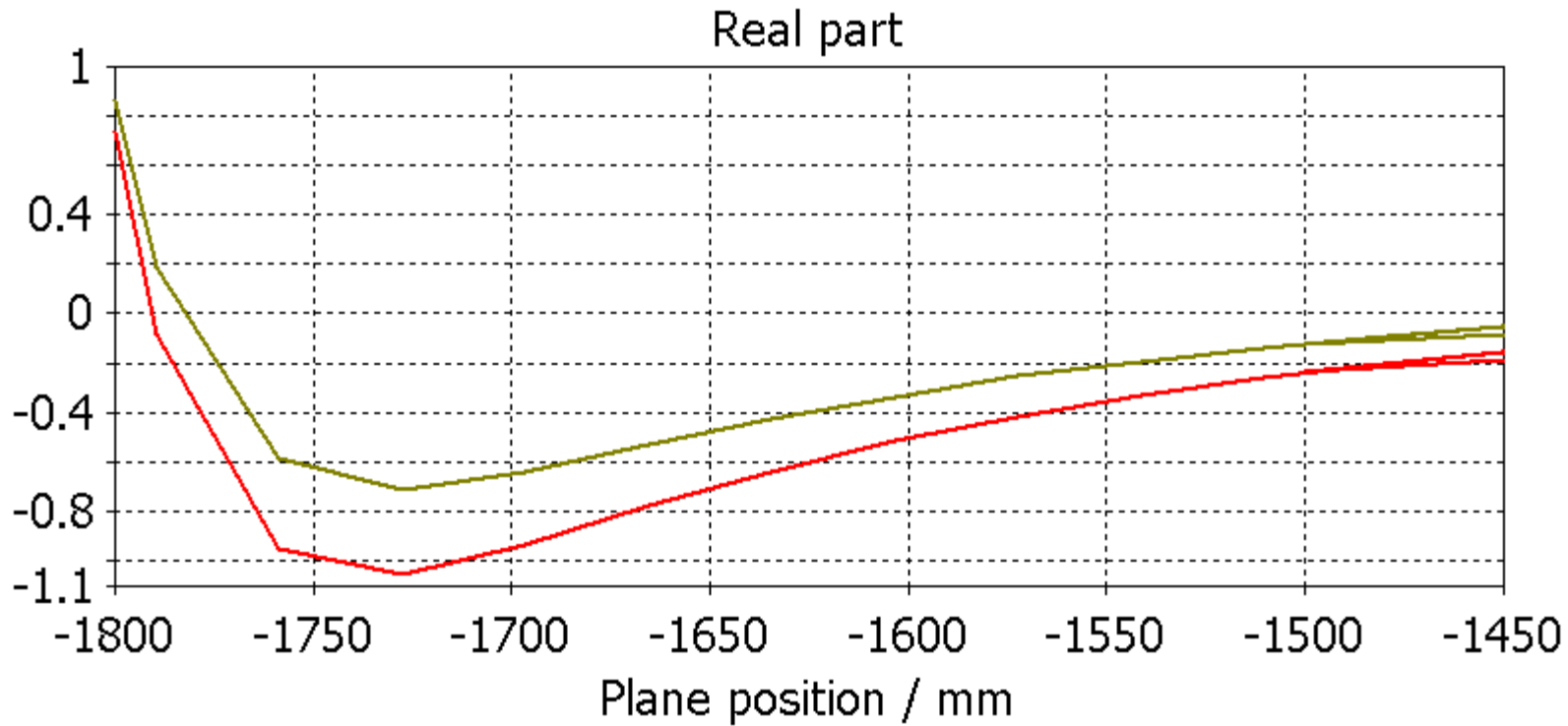
- 1) Tilt = 16.7 – 0 deg, $I_H = 0$ A
- 2) Tilt 0, $I_H = -100$
- 3) Tilt 0, $I_H = -200$
- 4) Tilt = 16.7 – 3 deg, $I_H = 0$ A
- 5) Tilt – 3, $I_H = -100$
- 6) Tilt – 3, $I_H = -200$
- 7) Tilt = 16.7 – 6 deg, $I_H = 0$ A
- 8) Tilt – 6, $I_H = -100$
- 9) Tilt – 6, $I_H = -200$

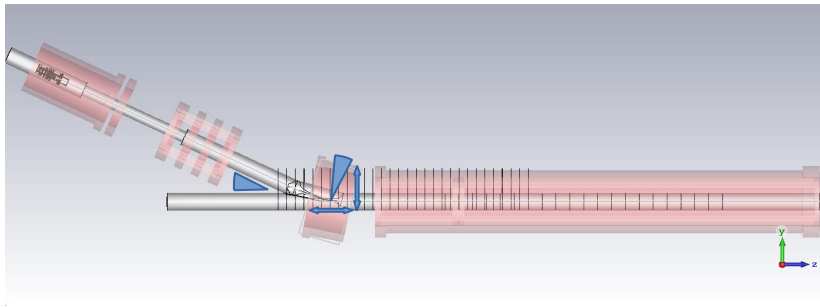


Bend solenoid tilt scan Gun corrector V current :

----- Tilt = 16.7 – 0 deg, $I_H = 0$ A

----- Tilt = 16.7 – 3 deg, $I_H = -200$





Injection angle reduced to 25 deg

----- No other variation from ref design

----- Bending magnet straightened by 5 deg, shifted 5mm up and H gun corrector at -150A

