Vacuum vessel calculations v3

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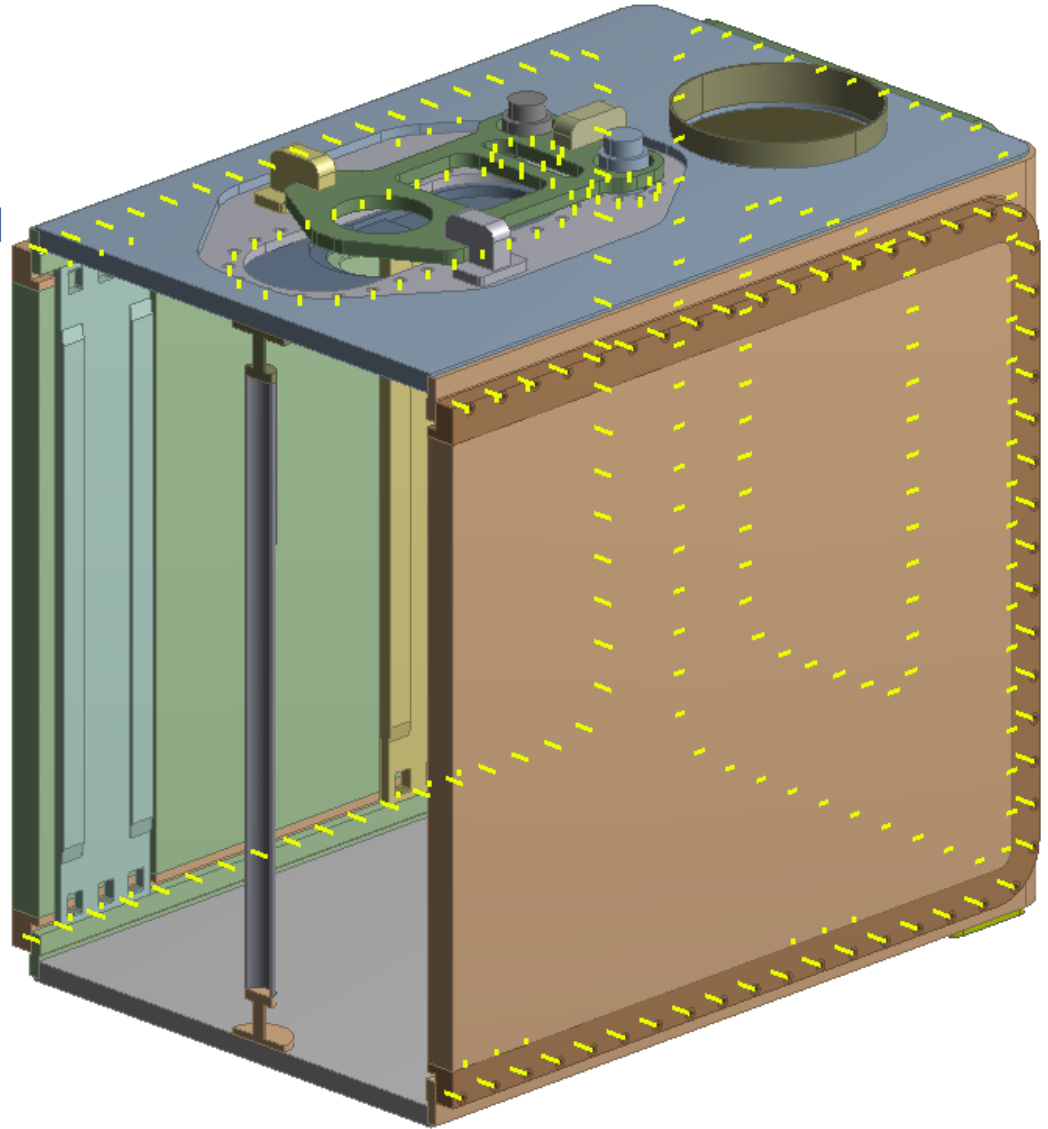
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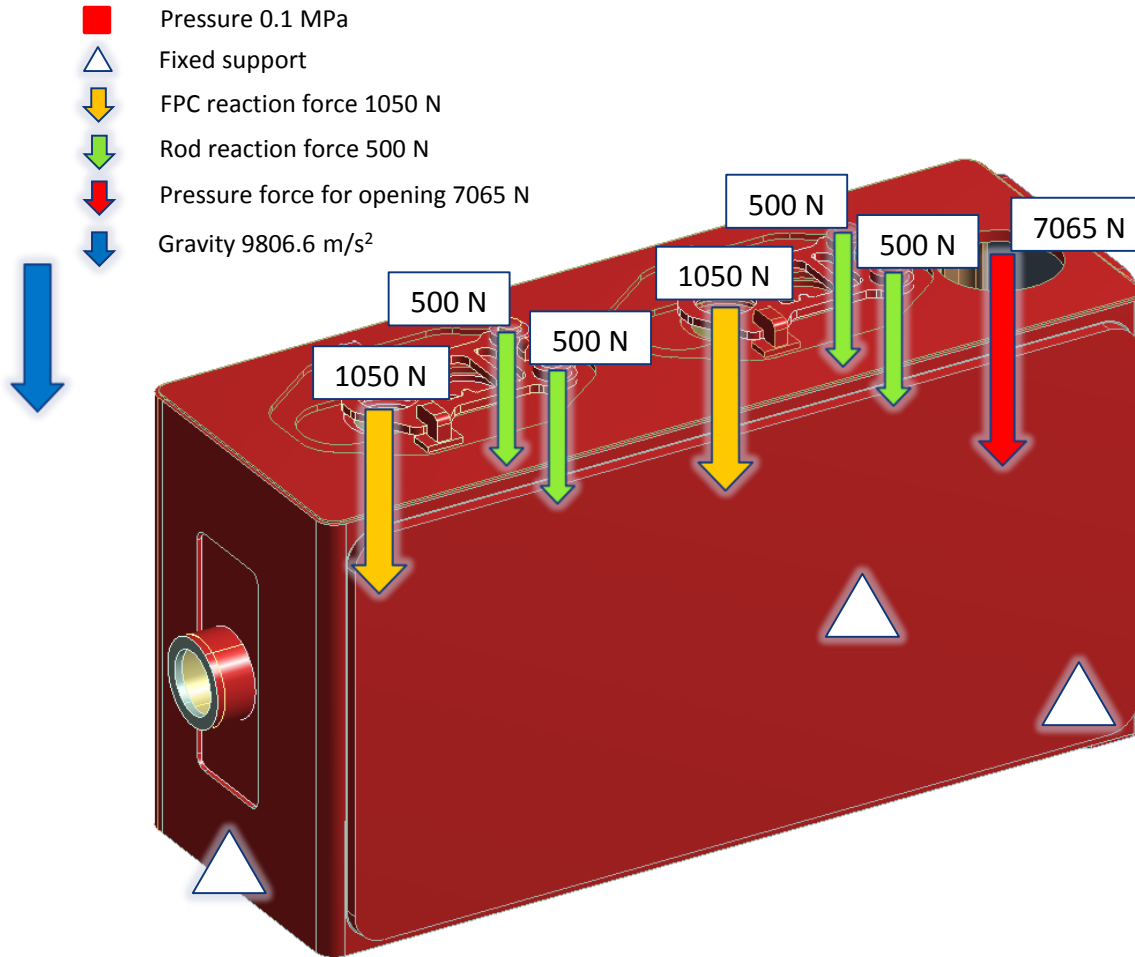
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FE model

- only half of the vacuum vessel considered due to the model size and computational time,
- 263 bolts (M10 and M8),
- bolt preload:
  - 35 kN (M10),
  - 25 kN (M8).
- friction coefficient:
  - steel – steel (0.7),
  - aluminium – steel (0.6)
- bolt properties calculated according to VDI2230-2

BCs and loads

Legend:
- ■ Pressure 0.1 MPa
- △ Fixed support
- ↓ FPC reaction force 1050 N
- ↓ Rod reaction force 500 N
- ↓ Pressure force for opening 7065 N
- ↓ Gravity 9806.6 m/s²

Load on top plate	
Weight [kN]	Pressure force [kN]
7.7	161.25

Vertical deformation

Contact	Model	Material for the sides	Central support	Stiffener for the top plate	Vertical deformation [mm]	Vertical deformation (bonded) [mm]
Bolted	1	SS316LN	+	-	0.45	0.43
	2	Al AW6082	+	-	0.43	0.4
	3	SS316LN	+	+	0.24	0.2
	4	SS316LN	-	+	0.27	0.23
	5	Al AW6082	-	+	0.22	0.19

- The difference in the vertical deformation for the bolted vacuum vessel and bonded vacuum vessel is small and probably is due to the symmetry. The high preload and friction coefficient allow modelling the vessel with the bonded contact to facilitate the model and save time.