R9 Progress
(inc. Rack and Compressors)

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Summary

- R9 Model
- Rack Model
- Compressor Model
- Next Steps

R9 Coordinate System

Z -ive through AFC toward door, x +ive to North (inner) wall

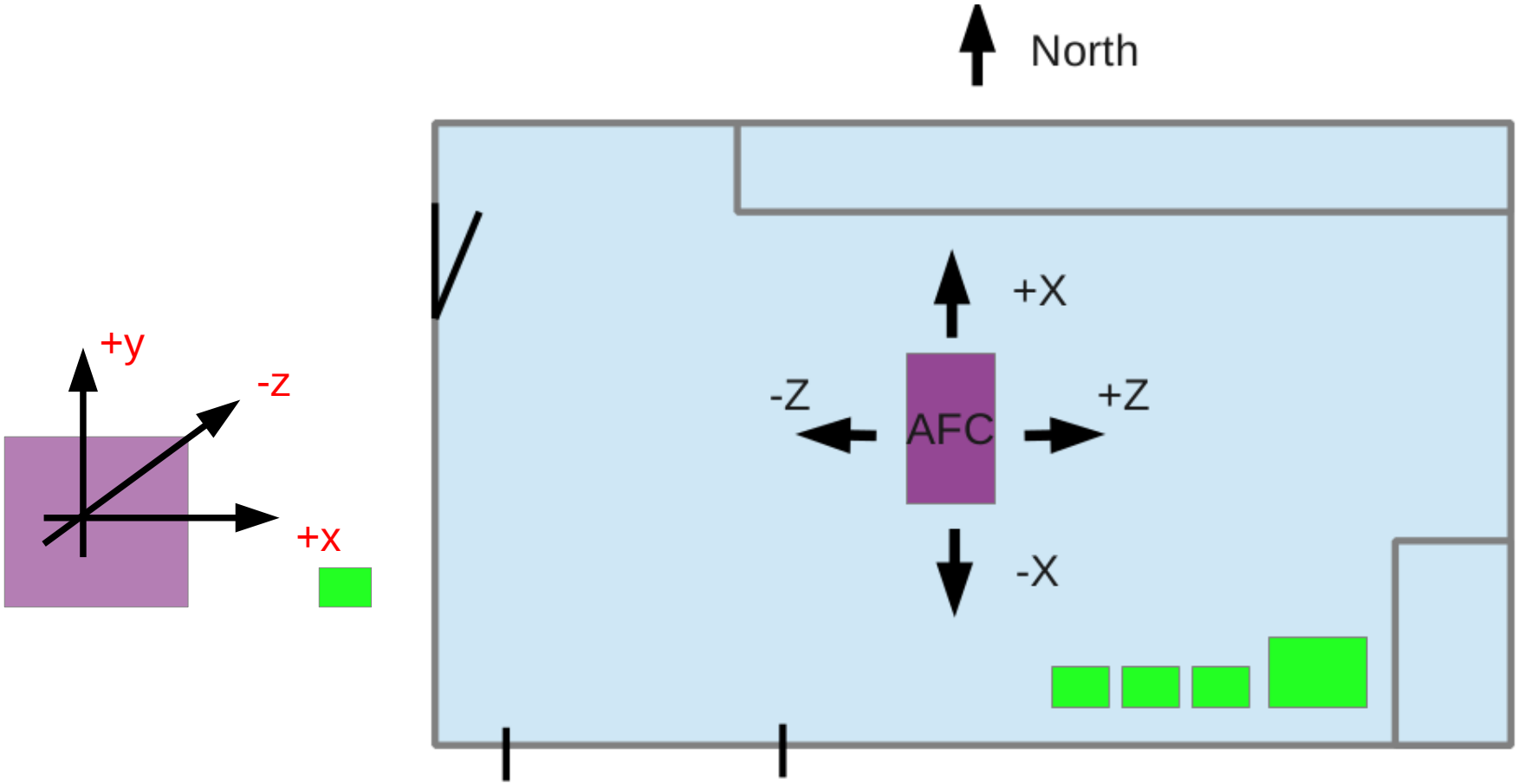
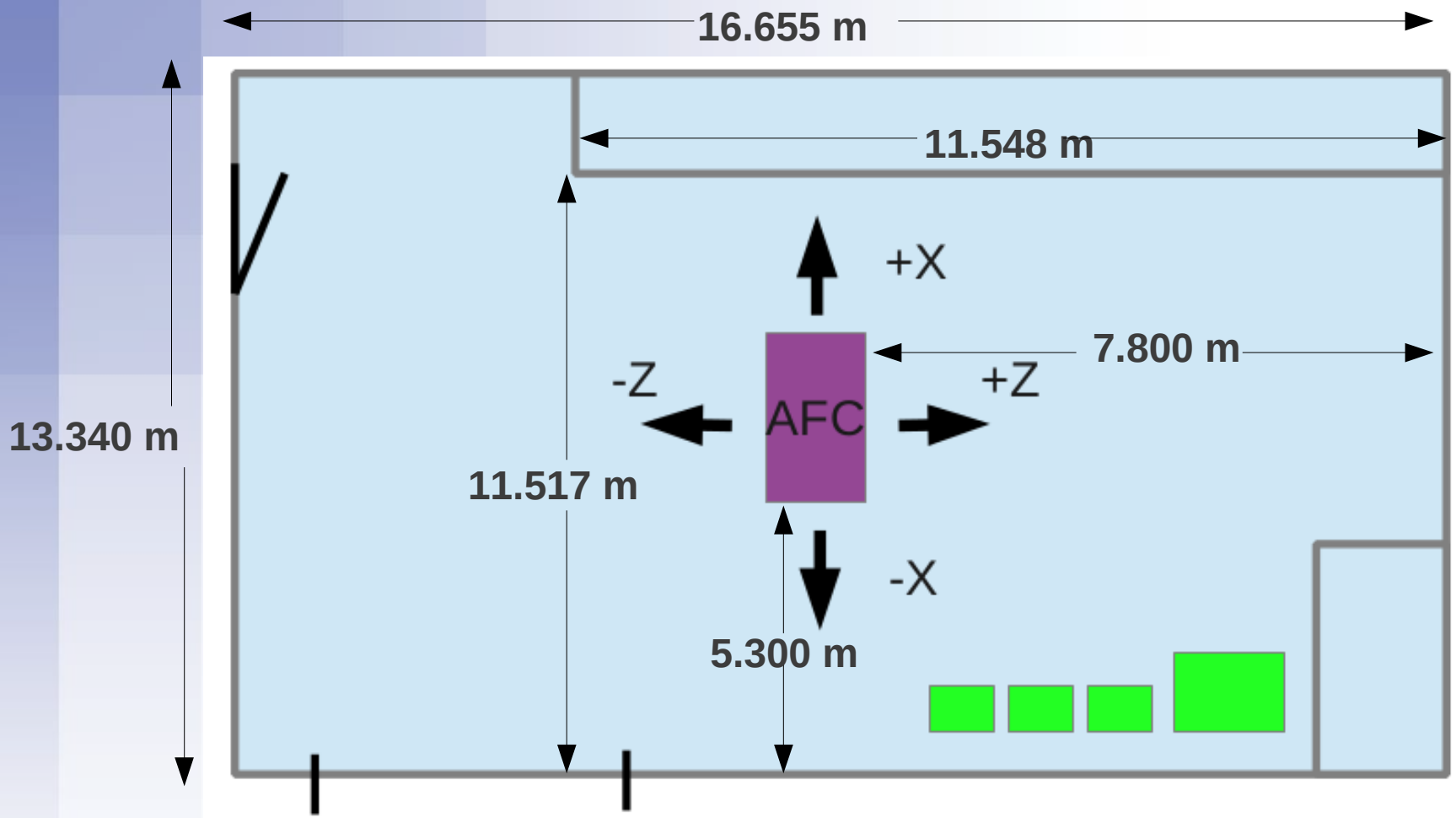


Figure: Rough schematic of the R9 hall. Green boxes are rack (large) compressors.

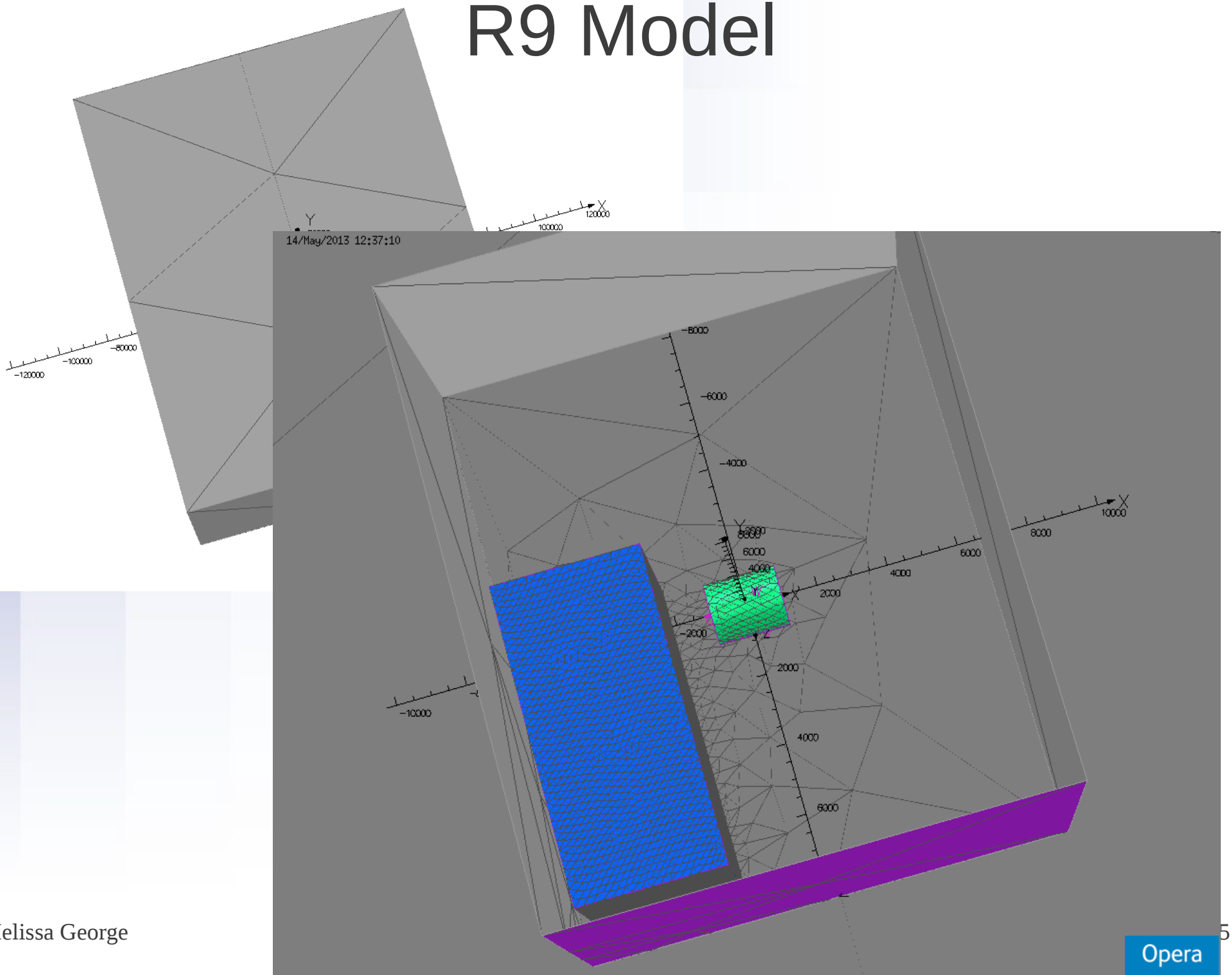
R9 Dimensions

~ +/- 5cm error



R9 Height = 9.000 m

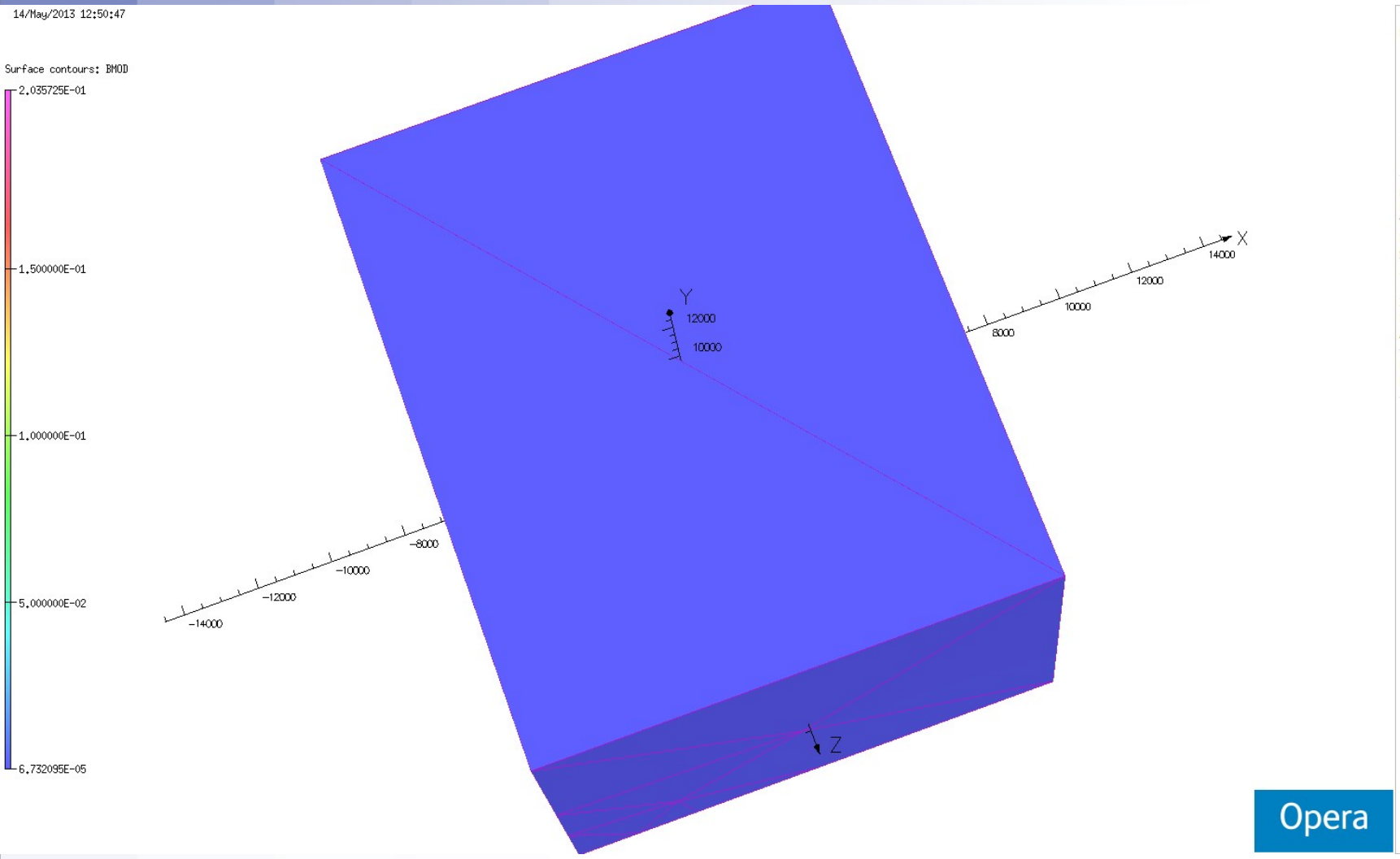
R9 Model



R9 Model

- V2 Model of room complete
  - No Walls
  - AFC is chosen by the user to be in flip or normal mode
  - Metal in floor and storeroom not included
- Meshing now works well and quickly.
- Solved using non-linear Newton-Raphson with adaptive conductor line integrals. Not sure if this is necessary for a model that is really just air regions and a conductor?
- When creating analysis database I got an error Unable to load library icui18n "Cannot load library icui18n: (libicui18n.so.36: cannot open shared object file: No such file or directory)" But the analysis still ran fine?!

Outer R9 Boundary = 67 μT



UNITS

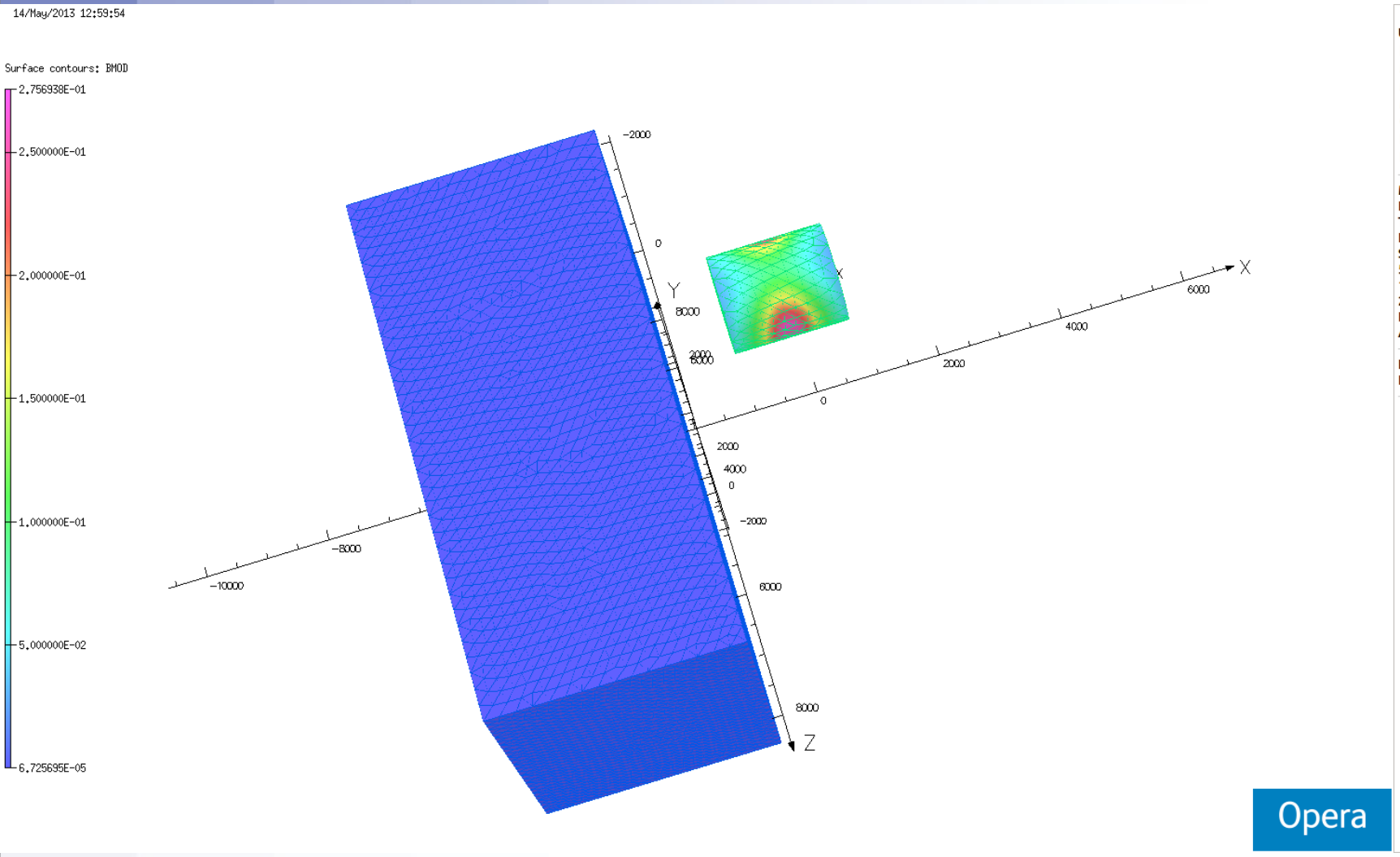
Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm²
Power	W
Force	N

MODEL DATA
R9NoWallsV2.op3
TOSCA Magnetostatic
Nonlinear materials
Simulation No 1 of 1
563541 elements
124068 nodes
2 conductors
Nodally interpolated fields
Activated in global coordinates

Field Point Local Coordinates
Local = Global

Boundary conditions okay as BMOD at boundary is several orders of magnitude lower than centre

Inside R9



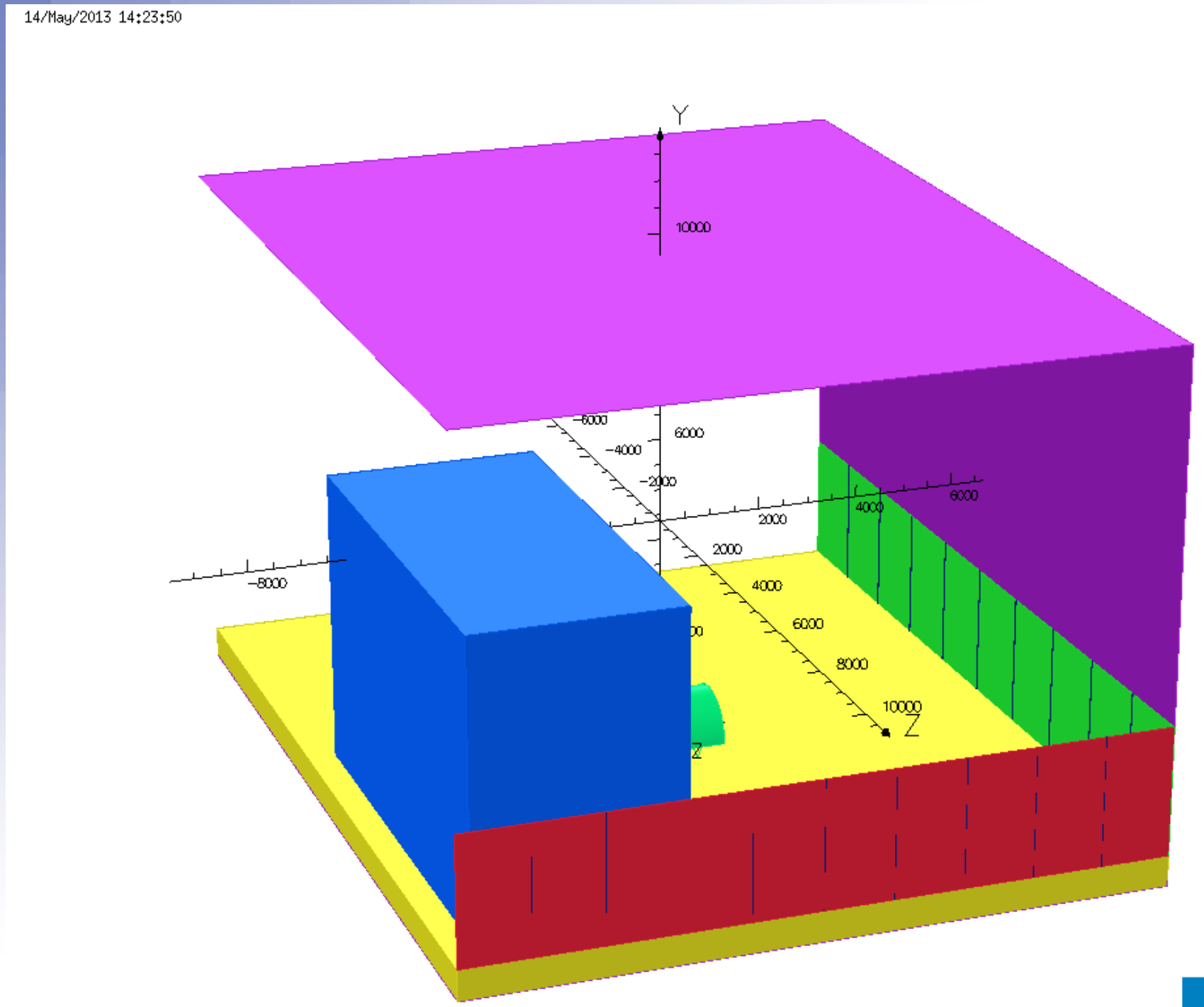
Field is currently low as the region of the compressors and rack is just an air box.

R9 Model without walls ready for 'Alpha test' comparisons

R9 Model With Walls

- V3 of Model of room almost complete
  - Walls
  - AFC is chosen by the user to be in flip or normal mode
  - Metal in floor and storeroom not included
- Meshing now works and quickly, but has lots of warnings.
- Solved using non-linear Newton-Raphson with adaptive conductor line integrals.

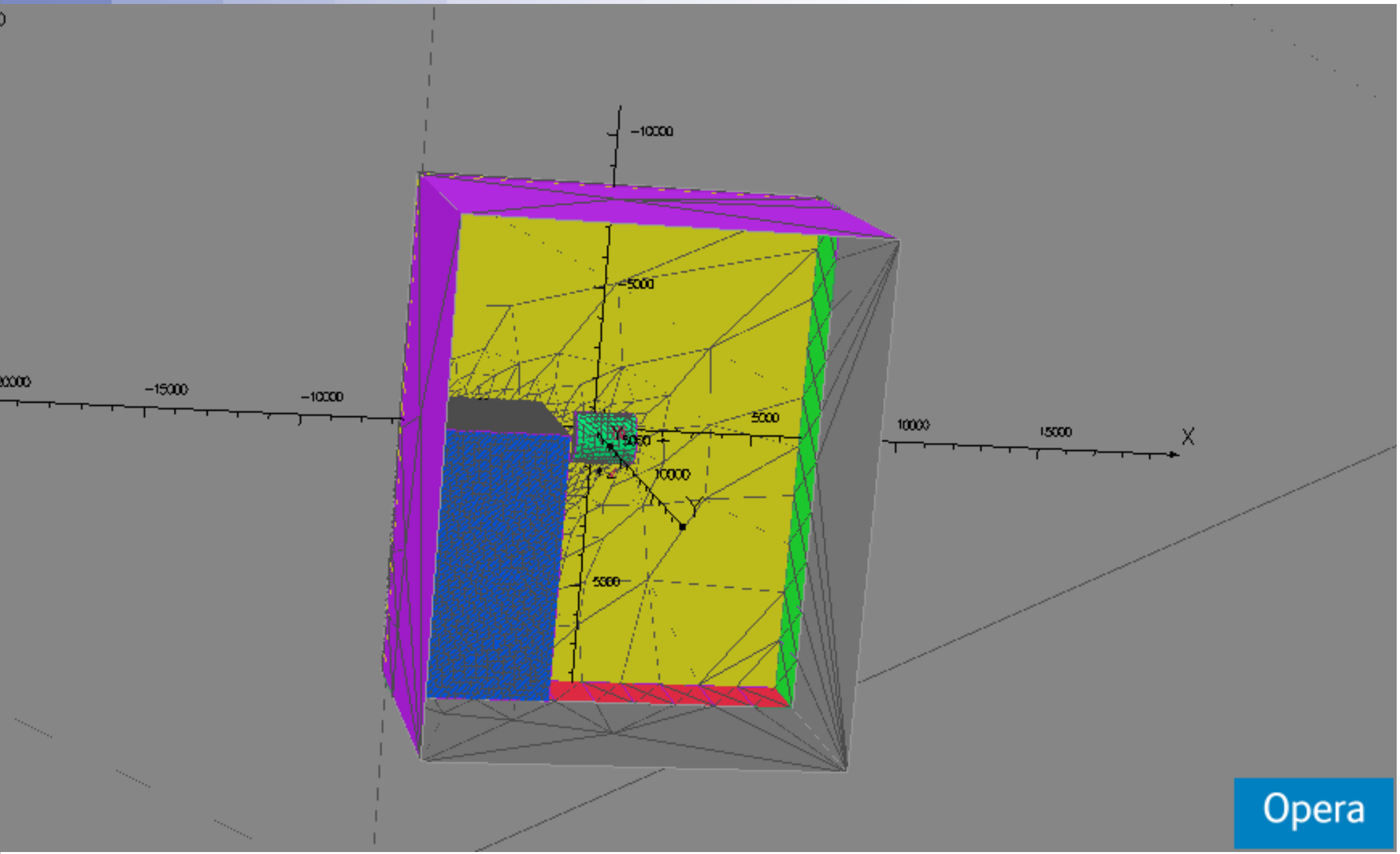
R9 Model With Walls



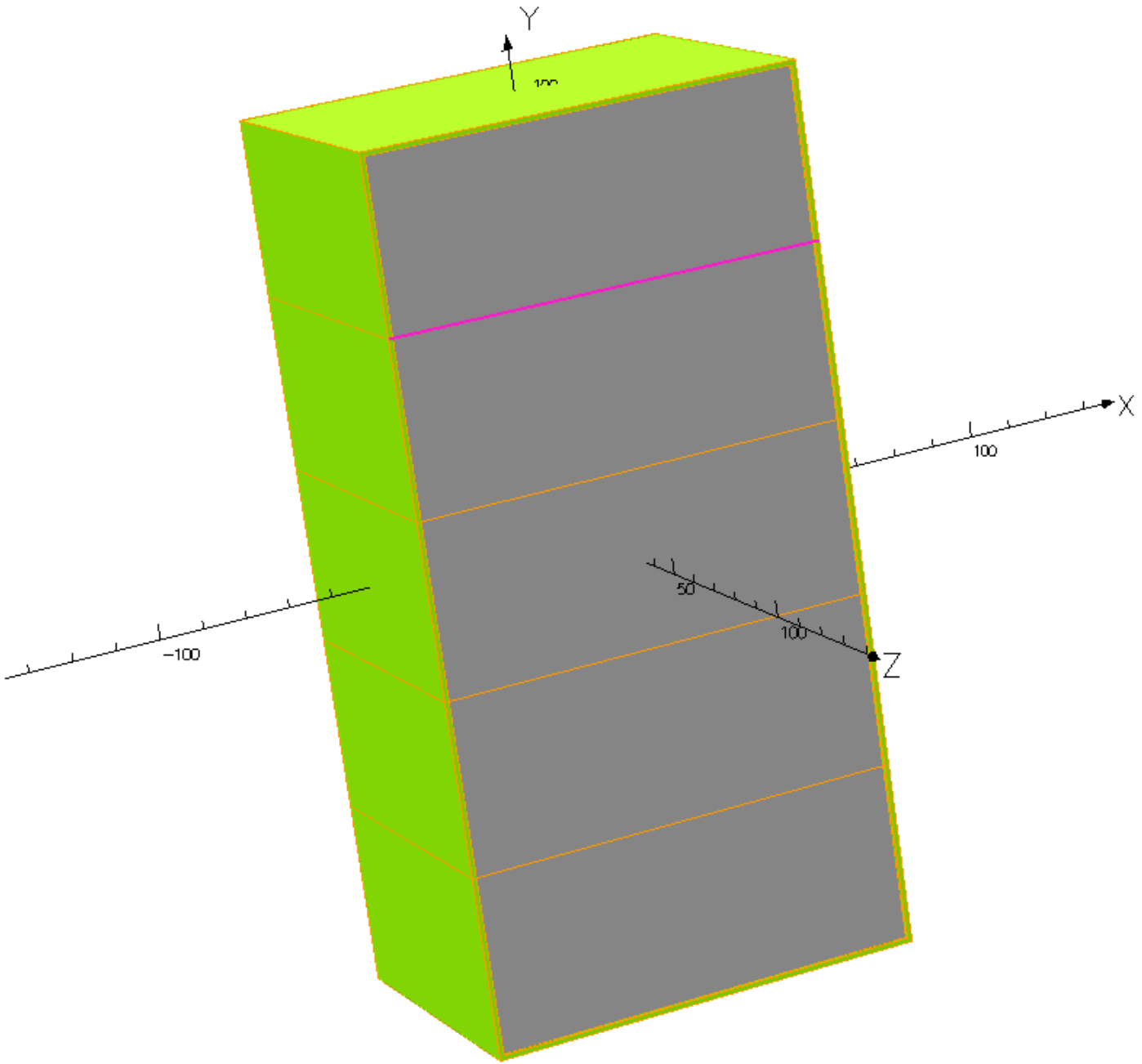
Opera

R9 Model With Walls

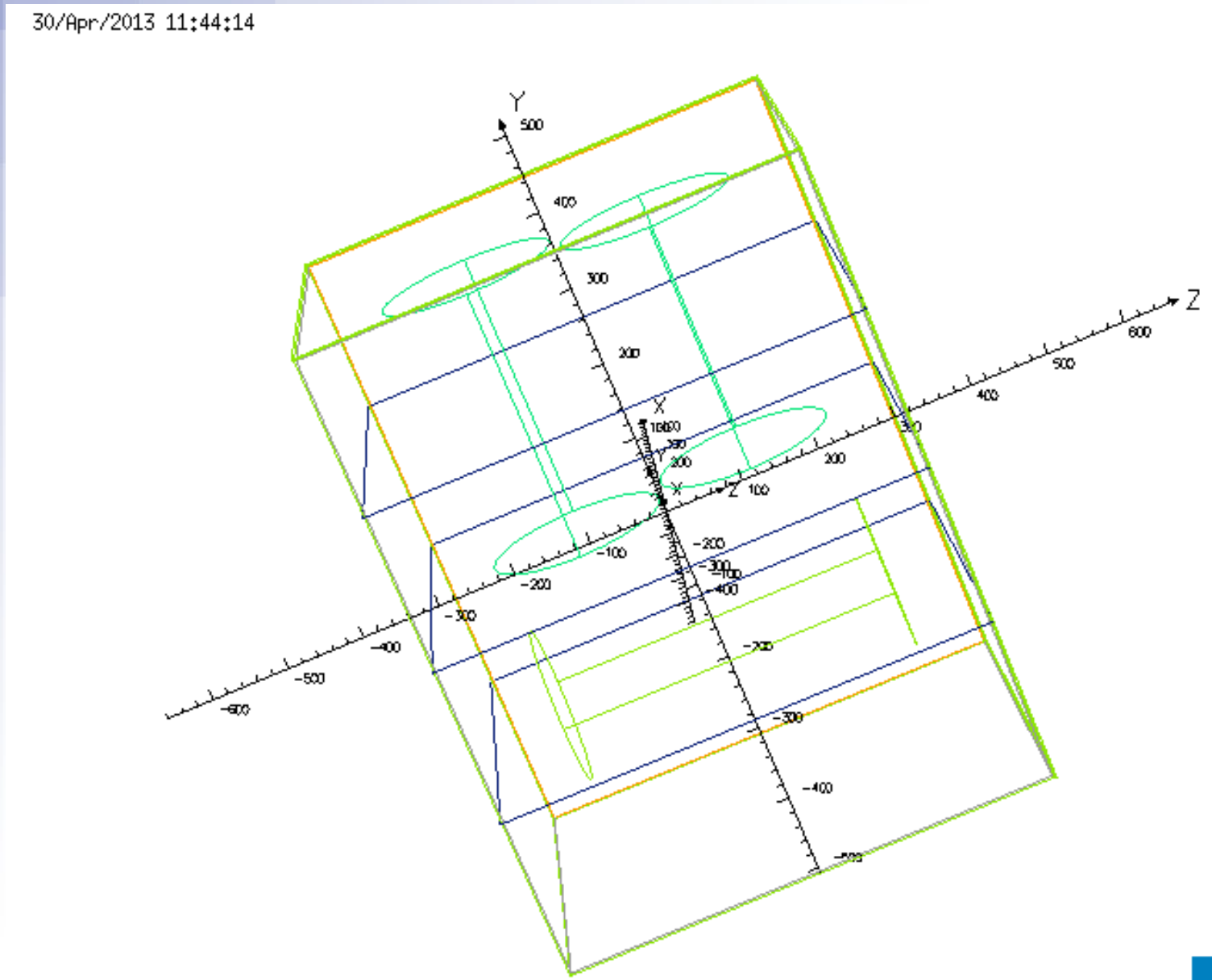
Meshing Works but there are possible errors to fix



Rack Model – As Before



Compressor Model

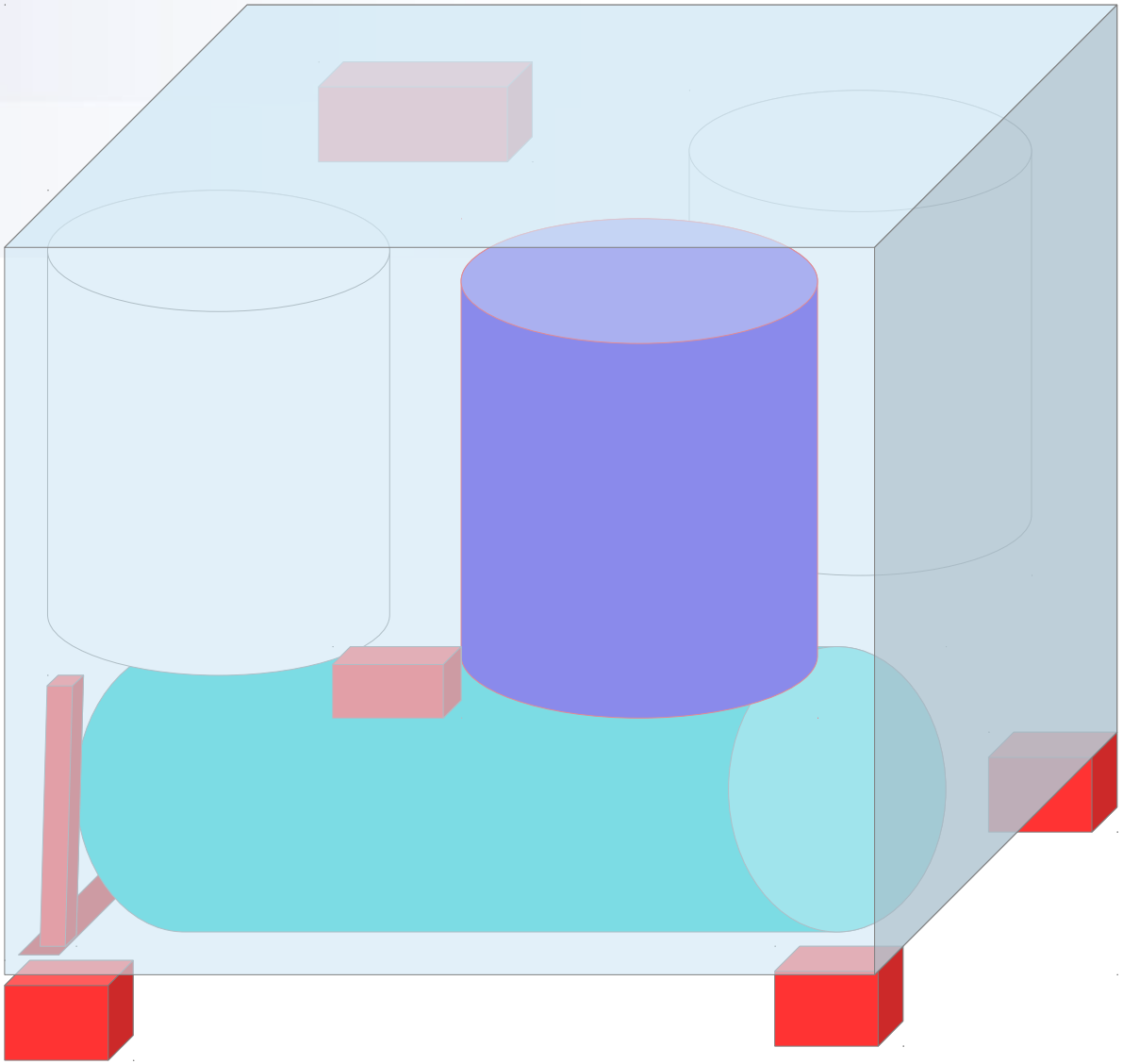


Compressor Model - Next

- There are some extra areas of mild steel that may or may not be modelled in a second round depending upon physics case.

  These areas are shown in red.

- Once meshing has been improved the model will be run with and without additional iron to judge the benefit of including it.



Next Steps

- Improve model meshing.
- Test model with analysis in OPERA.
- Include walls in R9 model.
- Cileste can begin comparisons with data.
- Improve R9 with wall model ready for data comparisons.
- Rack and Compressor model input.
- Further comparisons with data.
  - Inc Walls
  - Rack
  - Compressors
- Implement joists (and workshop) in model.
- More comparisons.
- Develop Rack and Compressor models as sub-models to hall model.