Modelling Update – 12/9/12

Goals for (last) week…

Primary…

- To get the quads and D2 meshed and into the model (well ¾!)

The quads are in and meshed but I need to ensure that they mesh correctly with other components. D2 needs meshing but it's so far away from everything else that I'm not expecting this to take too long to do.

- To tidy up the existing model and take another look at the meshing resolutions and then to try to formalise what I already have.

I have a bit to say about this on the next slide or two.

Secondary

- To continue getting other iron into the model from Luke's list.

Other

- Beam bump design needed to be updated….

Meshing Issues…

I spoke to VF again last week about the relationship between meshing resolution and geometry resolution. Most of what I've been told is probably self evident but it seemed appropriate to take advice…

A lot of meshing problems were occurring do to misalignments in the model between various components in the hall. By misalignment this means that they don't fit nicely onto a regular grid in my model and you get small irregular shaped volumes that struggle to mesh.

There are two ways of fixing this.

1) Increase the meshing resolution to the point where it is of the same size as the misalignment.
2) Move the geometry about a bit to make it fit nicely.

We want to avoid 1) as much as possible because it comes with a BIG cost in terms of computational time.

But 2) sounds like we need to be careful…

Meshing Issues…

- Providing that the geometry is moved by an amount that is much smaller than the meshing resolution the region of interest then it should in principle be fine to move the geometry.

- I have therefore spent a good few days both moving nudging items around a little bit, typically 10mm or less, and redefining the meshing reference planes to get the components/mesh to align nicely. This appears to have solved a number of intermittent meshing problems that I was getting.

  To put this in perspective, the meshing resolution is typically on the order of 100mm+ except in areas of particular interest.

  The meshing reference planes have also been fixed to a specific location, i.e. they don't move around depending upon various other variables. Locking them down has enabled me to remove other areas of potential problems.

  In some areas I have also had to increase the meshing resolution slightly to get around a few problems.

Meshing Issues…Conclusion

The idea is to build an accurate model of the MICE hall but clearly we need to take a considered view of this.

Very high accuracy will cost enormously in terms of computing time and therefore some compromises are having to be made.

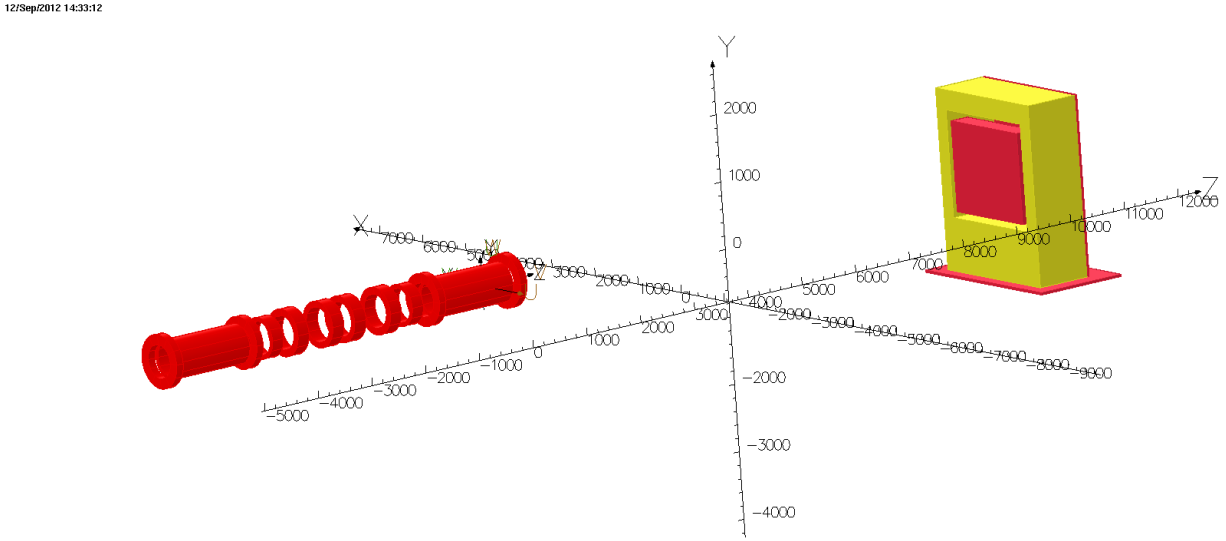
I do feel that for each week that passes the meshing of the model is improving significantly; although an ‘unseen’ part of the process it is critical to obtaining a model that will run reliably.

Beam Dump

I followed up Ken's concern about the Beam Dump and he was correct, the geometry I had in my model was completely wrong.

It has been redesigned to be (nearly) correct…

Due to meshing resolution it is not possible to model features below a certain size. Typically the minimum I can get to is about ~25mm. Consequently the beam dump frame has not been modelled and the plate on the back of the beam dump is 25mm thick (as opposed to the ~15mm it looks to be on the TD drawing)



Running Models…

So I have a solved model containing:

- South Shield Wall
- North Shield Wall
- Virostek Plates
- Solenoids in Step IV solenoid mode
- Floor Web
- Beam Dump
- Hall Walls

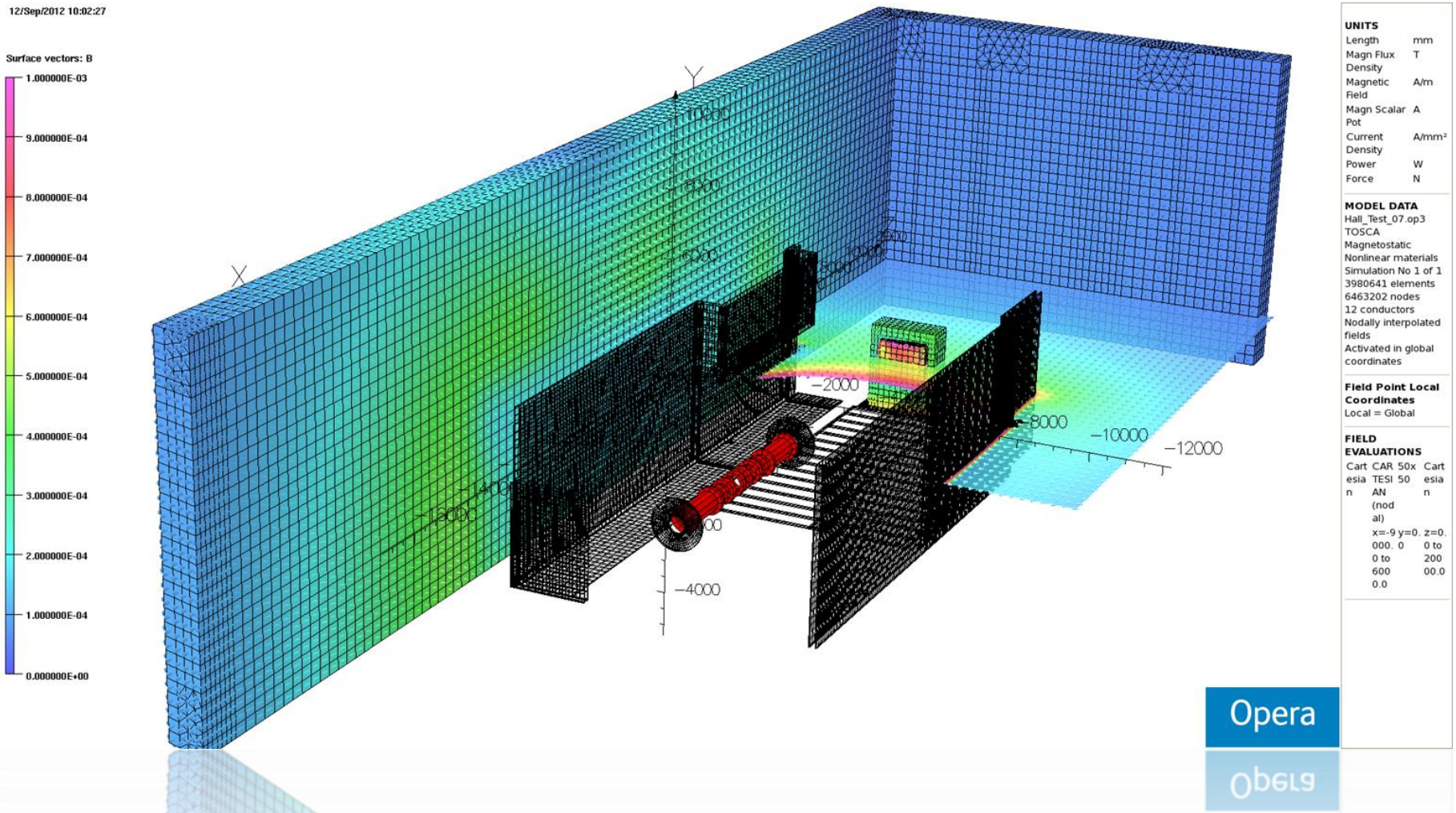
Is this a model that could be useful for looking at fields at the West Wall?

Is there anything that *needs* to go in downstream of Beamdump before we start looking at the fields on the west wall?

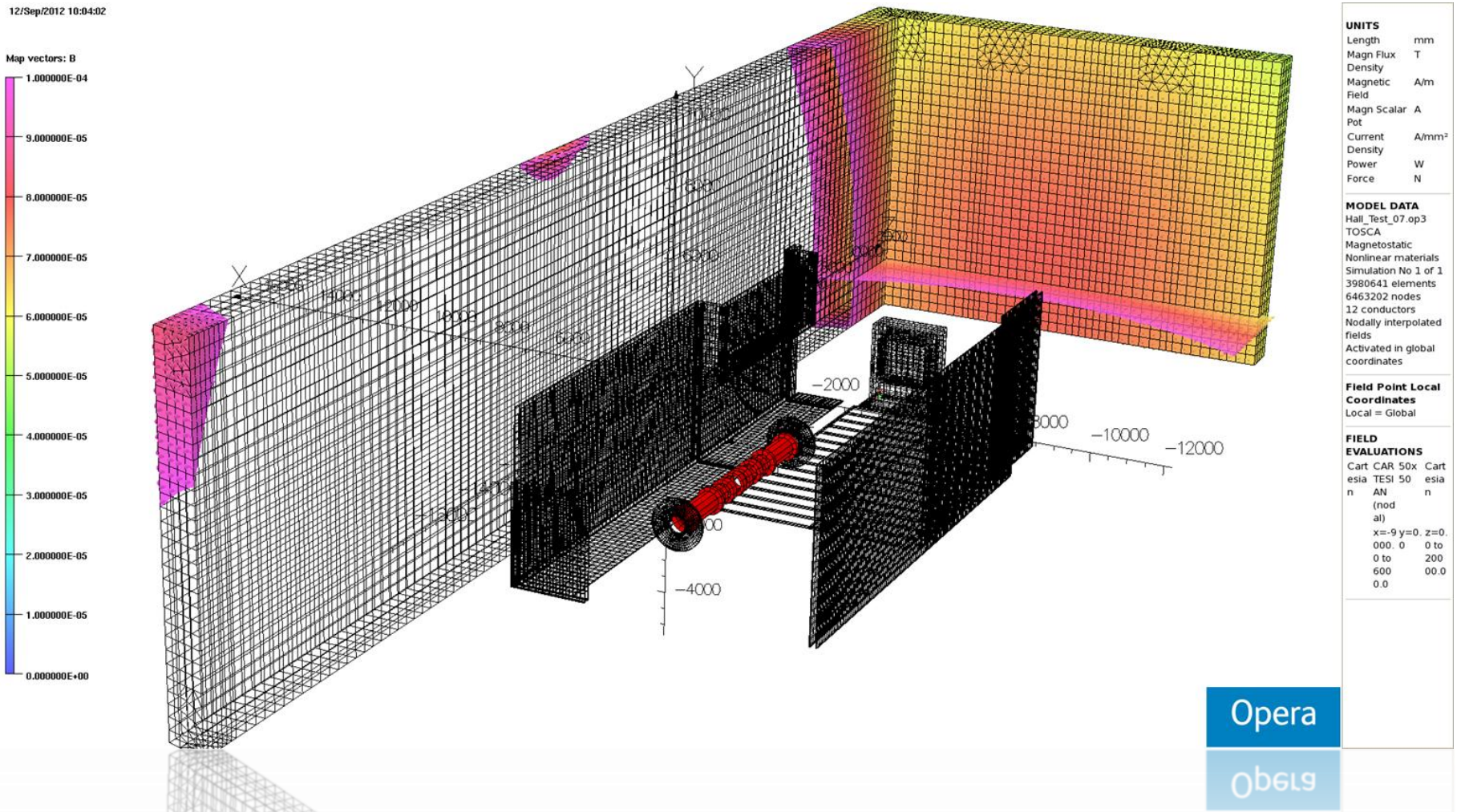
Geometry checks….

Buried Magnets?
Cages? (Could be a problem due to minimum feature resolution)

Iron in compressors/Racks/Supports?



Test Model 6 – B Range: 0 to 1E-3 Tesla.
Step IV 240MeV/c Solenoid Mode



Test Model 6 – B Range: 0 to 1E-4 Tesla.
Step IV 240MeV/c Solenoid Mode