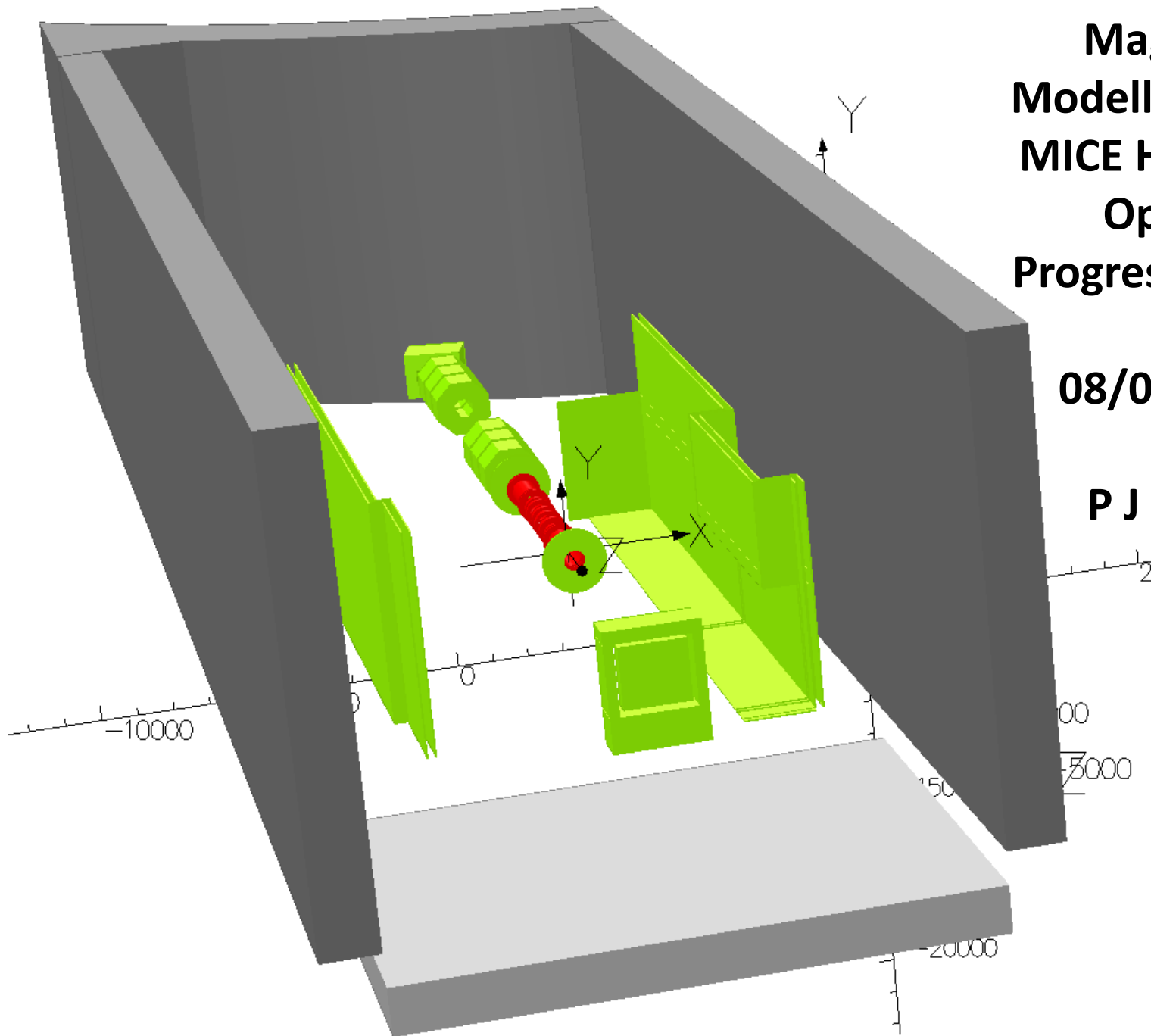


# Magnetic Modelling of the MICE Hall Using Opera - Progress Update

08/08/2012

P J Smith



## Overview

I took Vicky's code and rewrote much of what she had in a new framework – it's in a more modular style – this makes it easier for me to debug and change things. The time consuming part was to ensure hexahedral meshing in the plate structures (very fiddly!)

What's in the model so far?

- North Shield Wall (been converted to double skin)
- South Shield Wall, Floor Plates and Fridge Plates
- Virostek Plates
- Beam Dump
- Q4-9 (Best guess at geometry)
- D2 (Best guess at geometry)
- Hall Walls
- Hall Roof
- Lower West Floor
- Magnets STEP IV configuration

## Materials

So far there are only 3 materials used:

Concrete, Air and Iron

I'm presuming the concrete has the same BH characteristics as Air.

I'm also currently presuming that all iron can be modelled as 1010 steel. Is this a reasonable way to proceed? I would need appropriate BH curves for other flavours of iron..

## Checking of Dimensions

I've spent quite a bit of time with Jason/Luke trying to check dimensions of the objects that we have put in and their relative locations.

- I think the dimensions and locations of the shield walls and the MICE hall Walls is now almost correct- except for sloping floor.
- The geometry/location of the BeamDump and Virostek plates need checking
- Quads and Dipoles (iron only) are probably in the right location but their cross sectional dimensions are wrong – Very simple approximation to geometry at the moment.
- Not yet checked the SC magnets as these are imported from a separate magnet file.

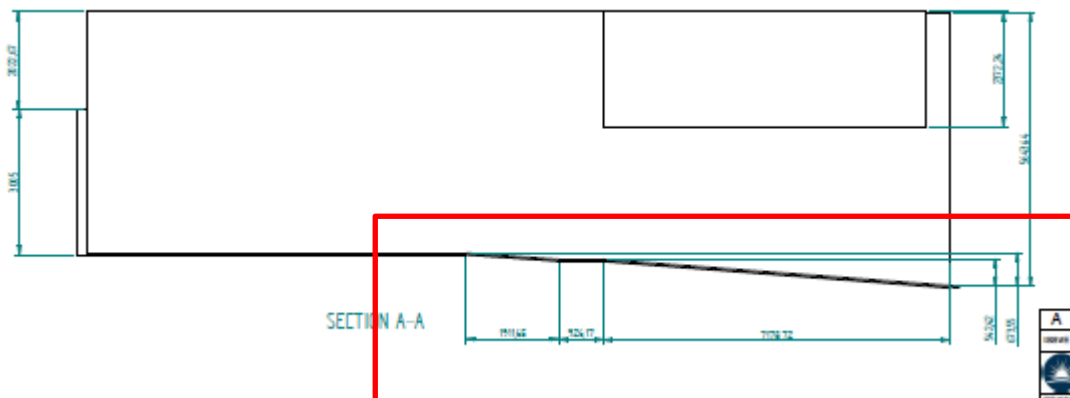
## South Shield Walls

The geometry of the south shield walls in the original model had level floor plates and as I originally only had plan drawings of these structures I never questioned this – although I've been in the MICE hall often enough that I should know better.

Luke gave me a section drawing of the south shield wall on Mon and it is clear that the floor plates slope quite a bit.

I can fix this in the model but it would take some time (it's not the modelling, it's building the model in a way that allows it to subsequently be meshed Hexahedrally that is labour intensive.)

It is something I want to fix but I don't think it is high priority – I think it is more important that I get more iron into the model first and then come back to it.



## Checking of Dimensions

Jason has found a way of importing the graphical files that OPERA produces (.sat) so that he can overlay my drawings onto his technical drawings – this should provide a good secondary check that both geometry and locations of various components are correct.

## Running of the Model

I've not yet tried to run the model...

It surface/volume meshes the objects fine but it won't volume mesh the whole volume of the MICE hall properly yet. **This is not surprising**, it will take a bit of work in cutting the hall up into smaller volumes before this will work properly.

I would like to get a partial model running soon though.

## Plan

- There is enough geometry in the model that I think it is important that I now get the model into a condition where I can fully volume mesh it and actually run a simulation. This is likely to take the rest of this week.
- To ensure that all the objects in the model are in their correct locations and are the correct size.

On annual leave next week so it will be 2 weeks before I can report again!

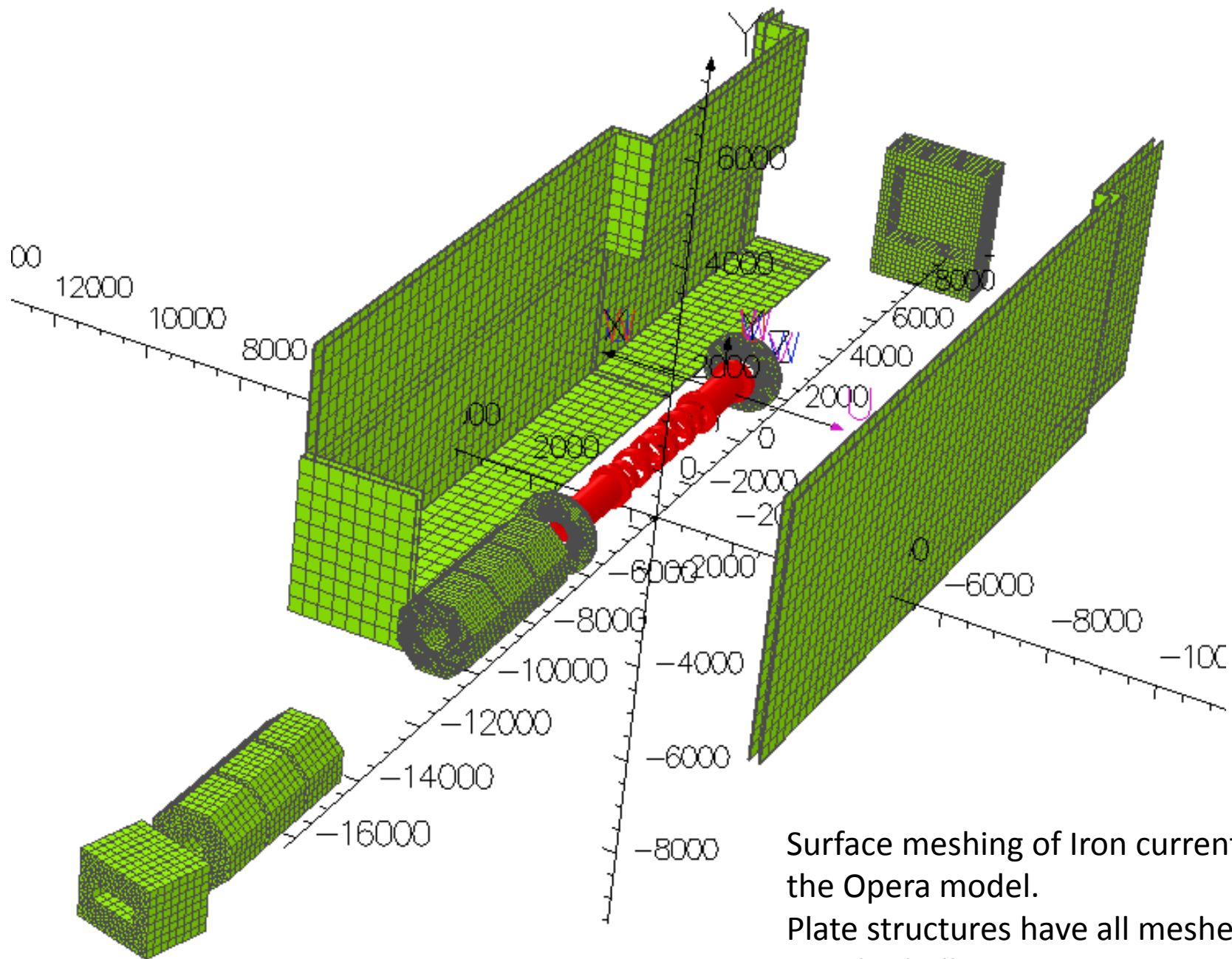
## Questions

What iron do we want to get into the model next?

I'm under the impression that there is a lot of iron hidden in the MICE hall walls and in the DSA – Any in the floor?

Do we have a list of iron that 'must' go into the model?

Clearly there's a few weeks work to do before we have a useful model that we can try putting objects of interest into.



Surface meshing of Iron currently in the Opera model.  
 Plate structures have all meshed Hexahedrally.