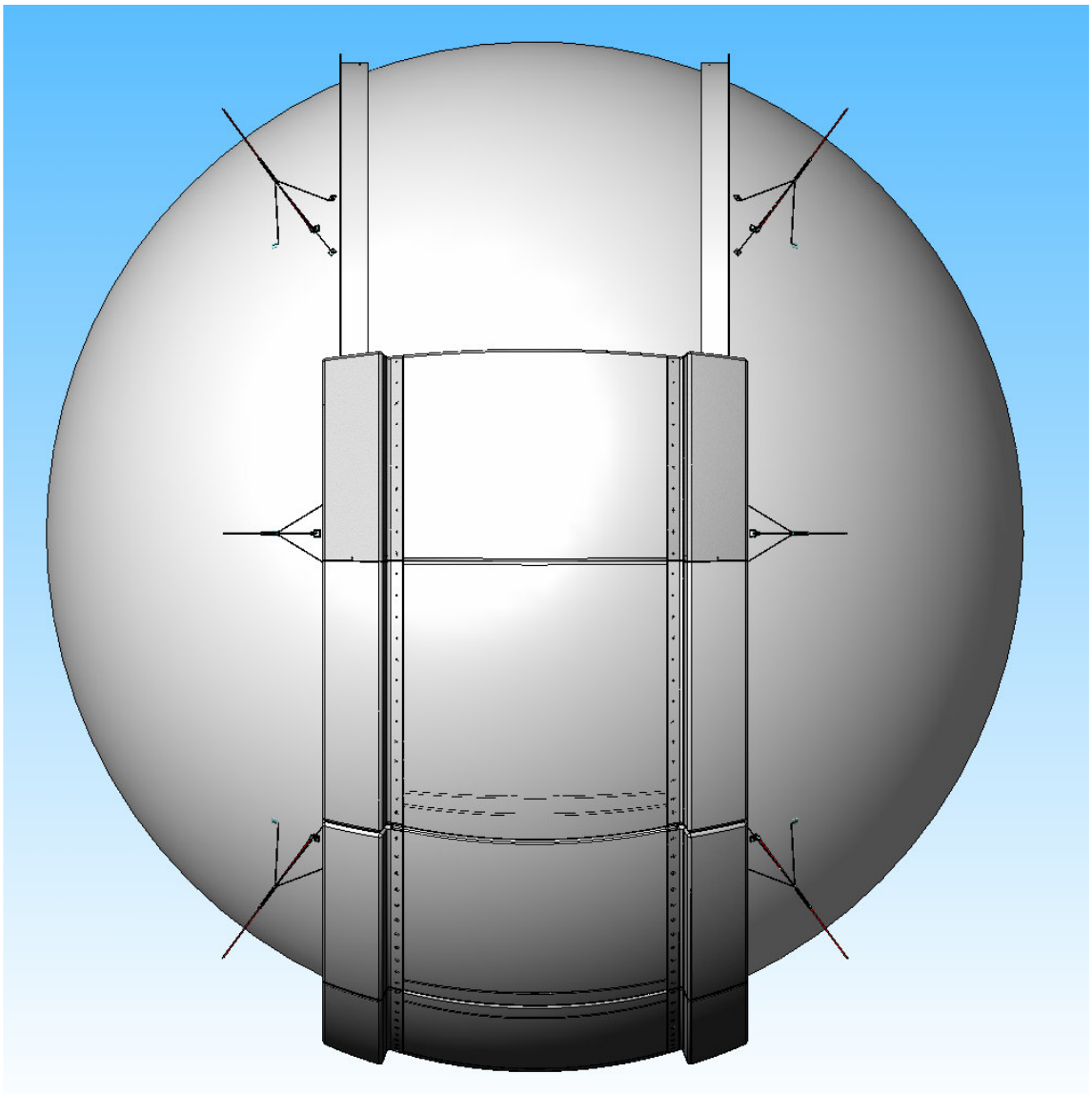
IceStorm II Lightning Protection - 09 January 2006

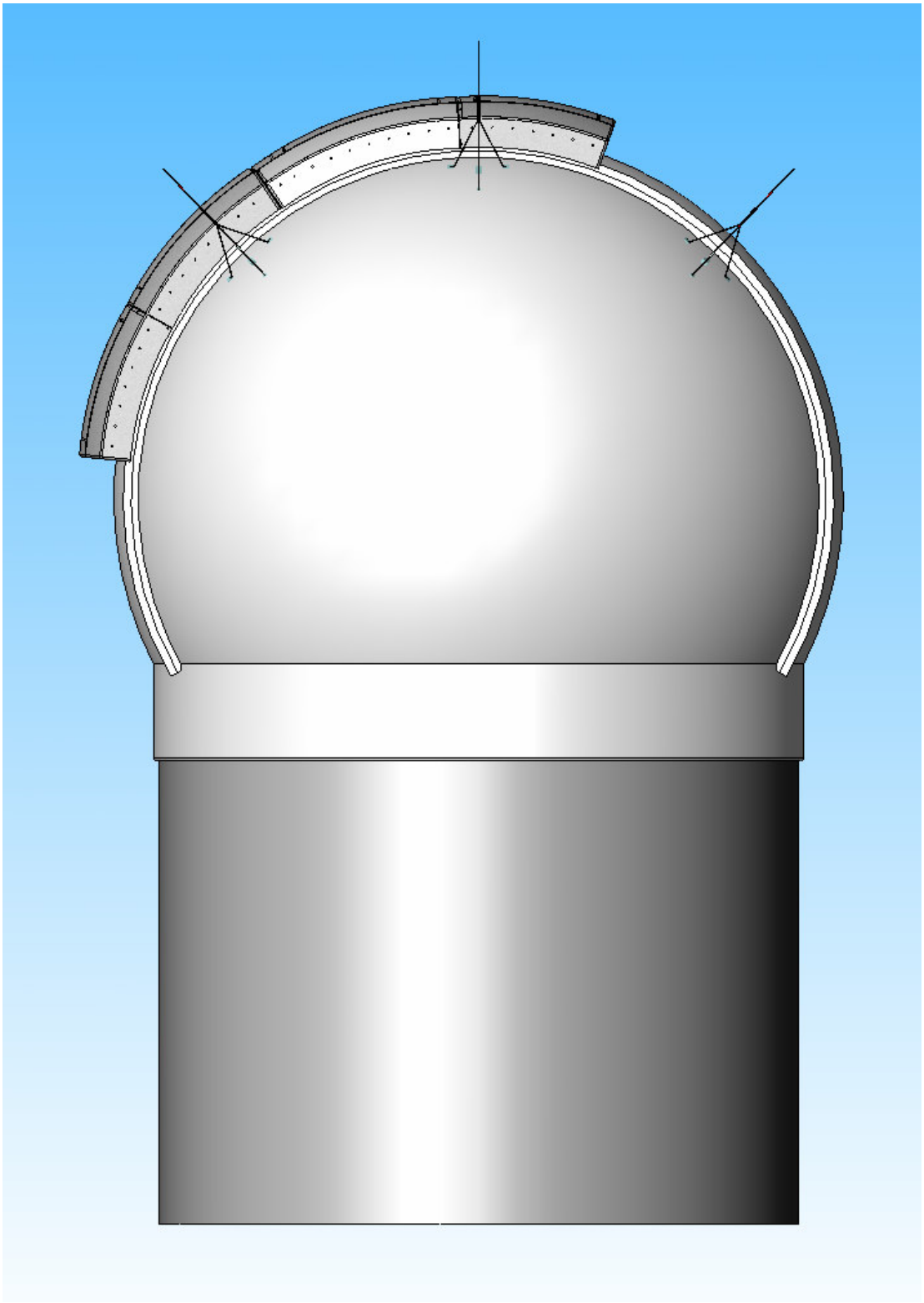
A 3D computer model was used to determine the lengths, positions & number of air terminals that are required to provide lightning protection for the IceStorm II enclosure. A R20m rolling sphere (as specified by Jak in accordance to AS/NZS 1768(Int):2003) was used in the modeling. Standard Harger air terminals & bracing were selected using the catalogue as supplied by M3 Engineering & Technology.

For the model, an extended ringwall (PanSTARRS) was used which put the dome springline at 9528mm above the ground level.

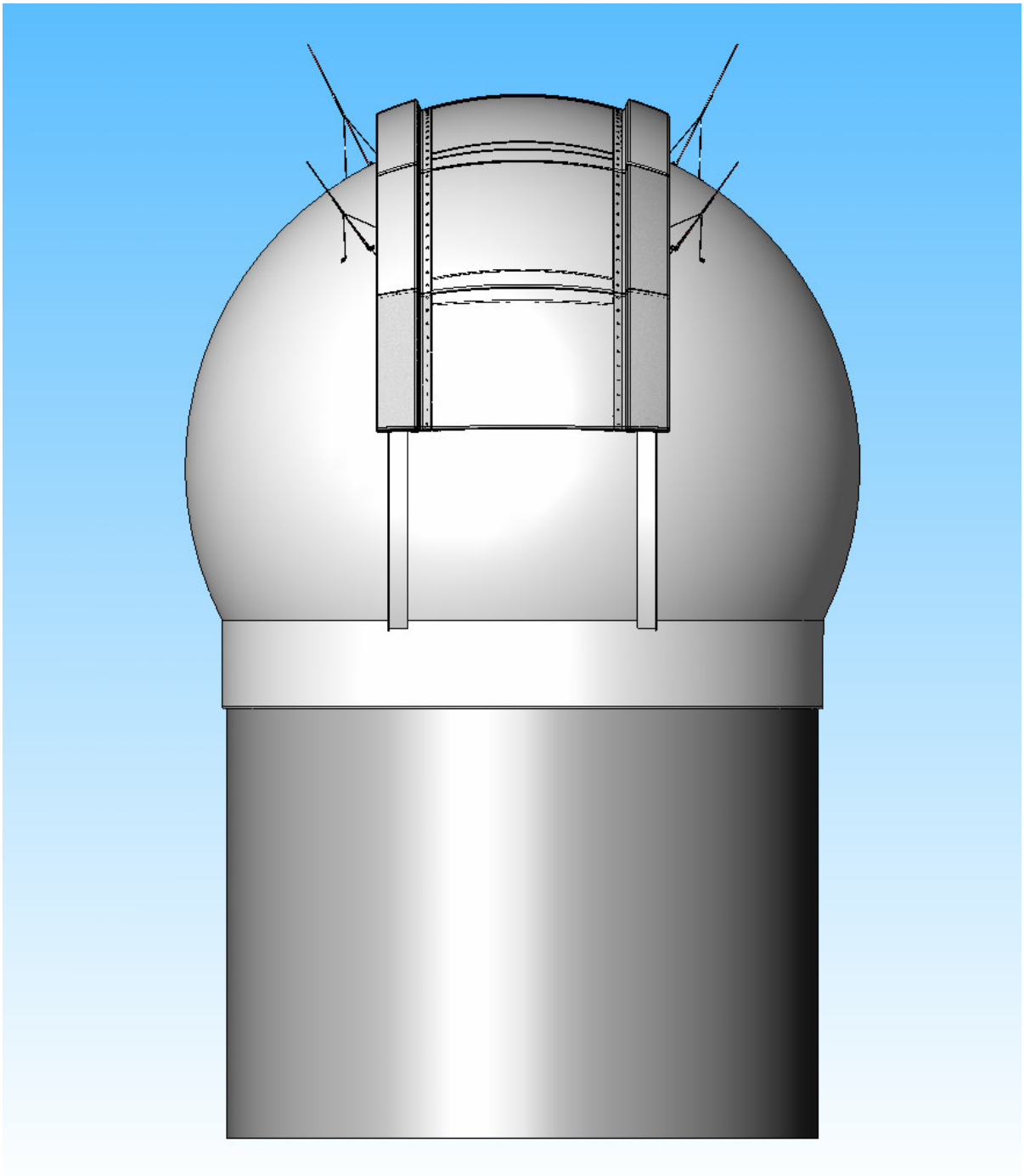
The 3D computer model was used to identify the critical positions that correspond to the selected air terminals. A total of six 72" air terminals & 48" braces will be used, 3 placed radially either side of the slit. The Solidworks files are stored on the EOS server at space_mechanical (eosfp1) M:\IceStorm Series II\lightning protection.



Plan View

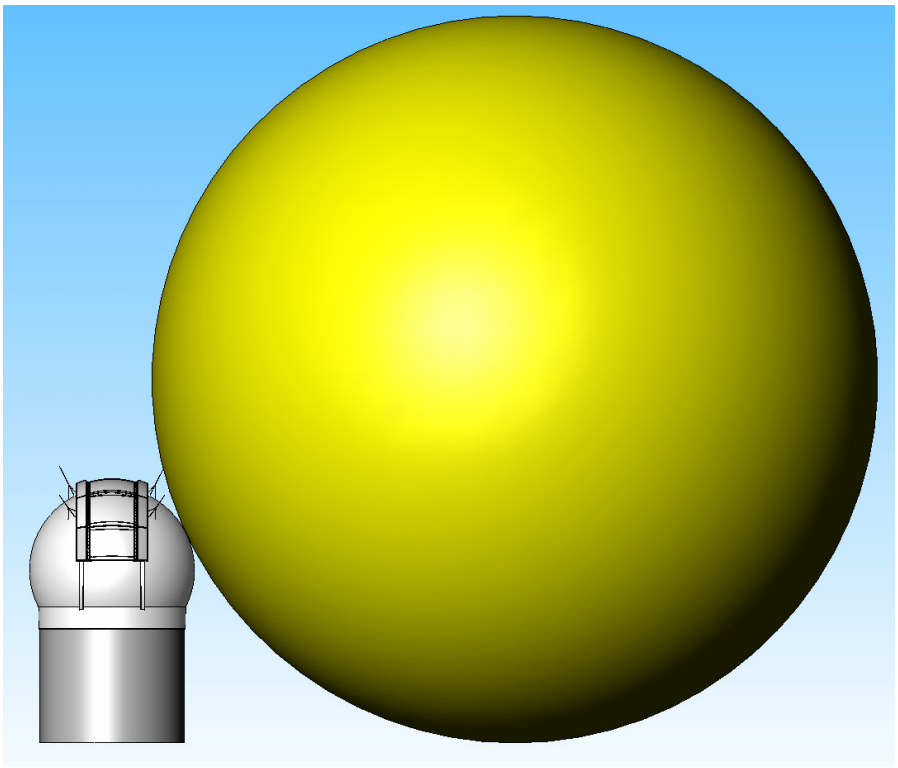


Side Elevation

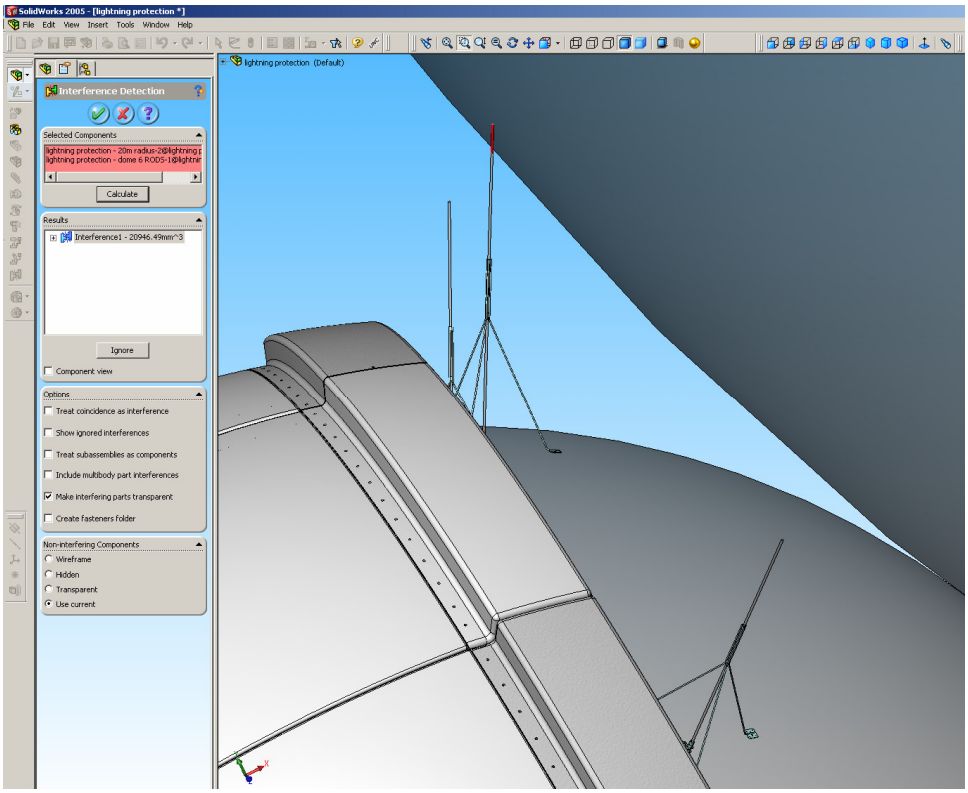


Front Elevation

Position 1.



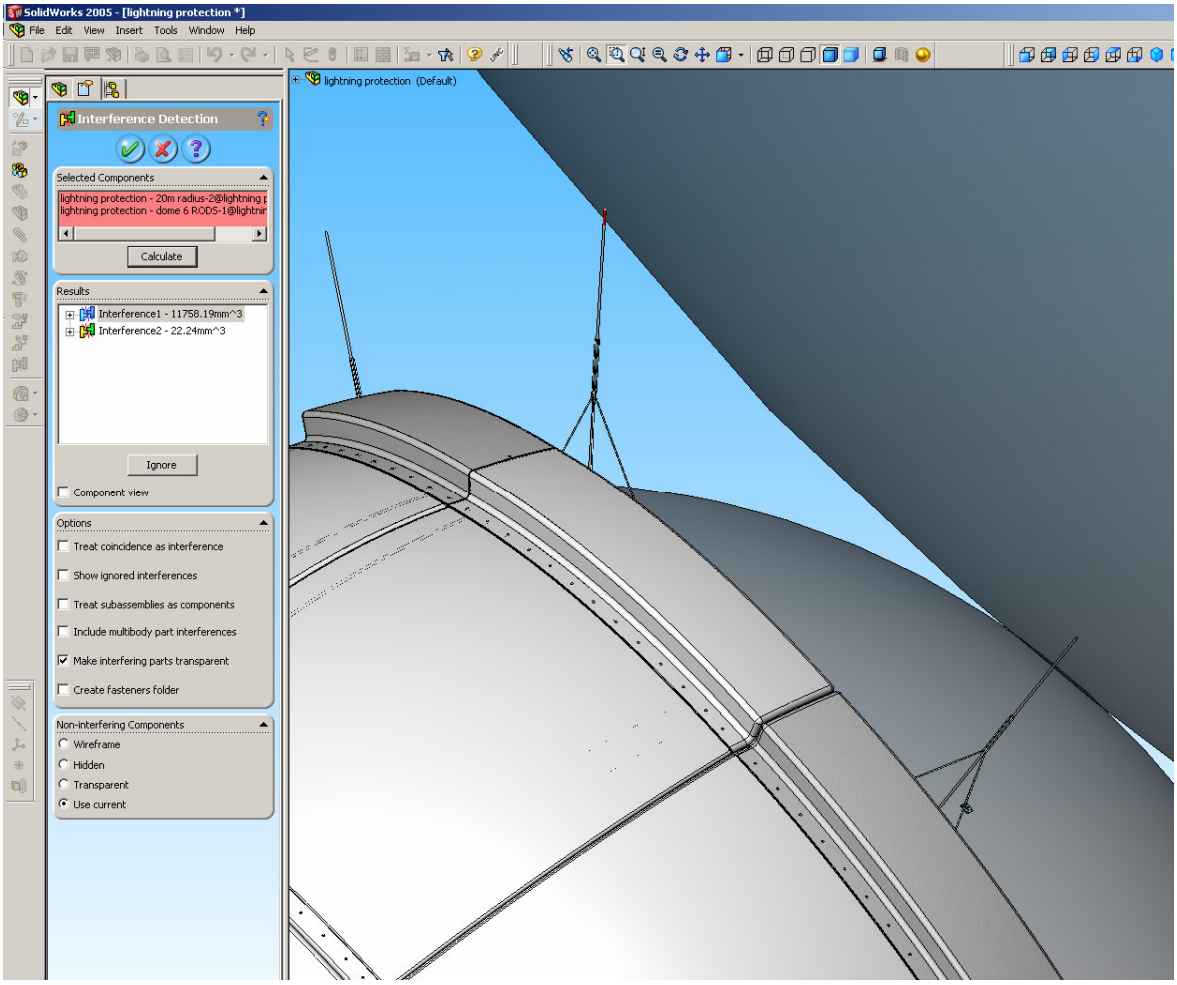
The rolling sphere is in contact with the ground & is tangent with the fixed cladding panel surface. Its orientation is perpendicular to the slit.



At Position 1, there is interference between the sphere & the centre terminal.

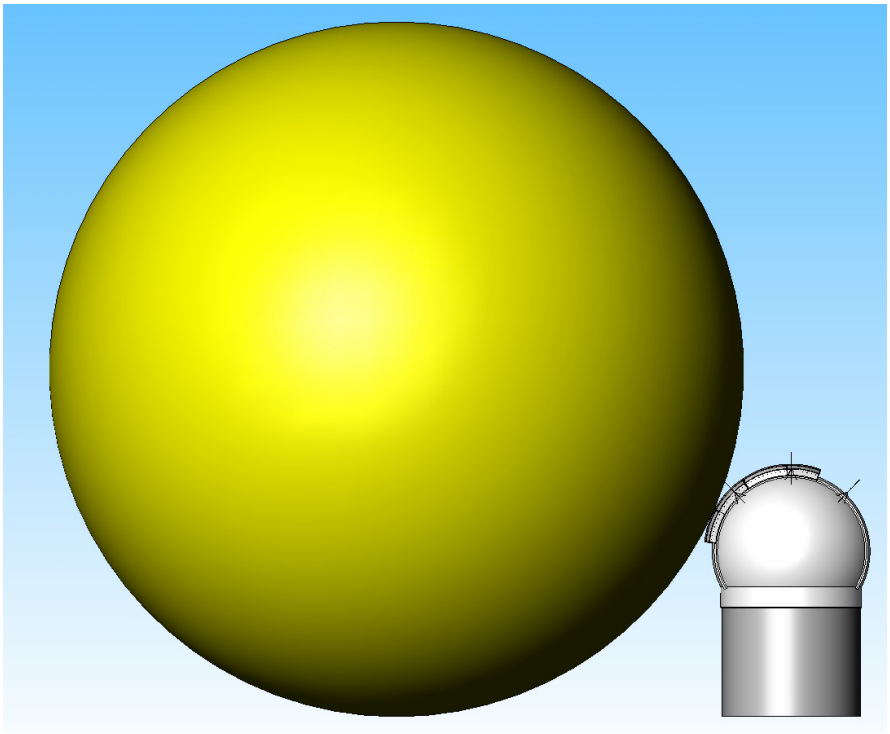
Position 2

The sphere remains in contact with the ground & is rolled around (keeping the tangency with the fixed cladding panel) until it just comes into contact with the front terminal.

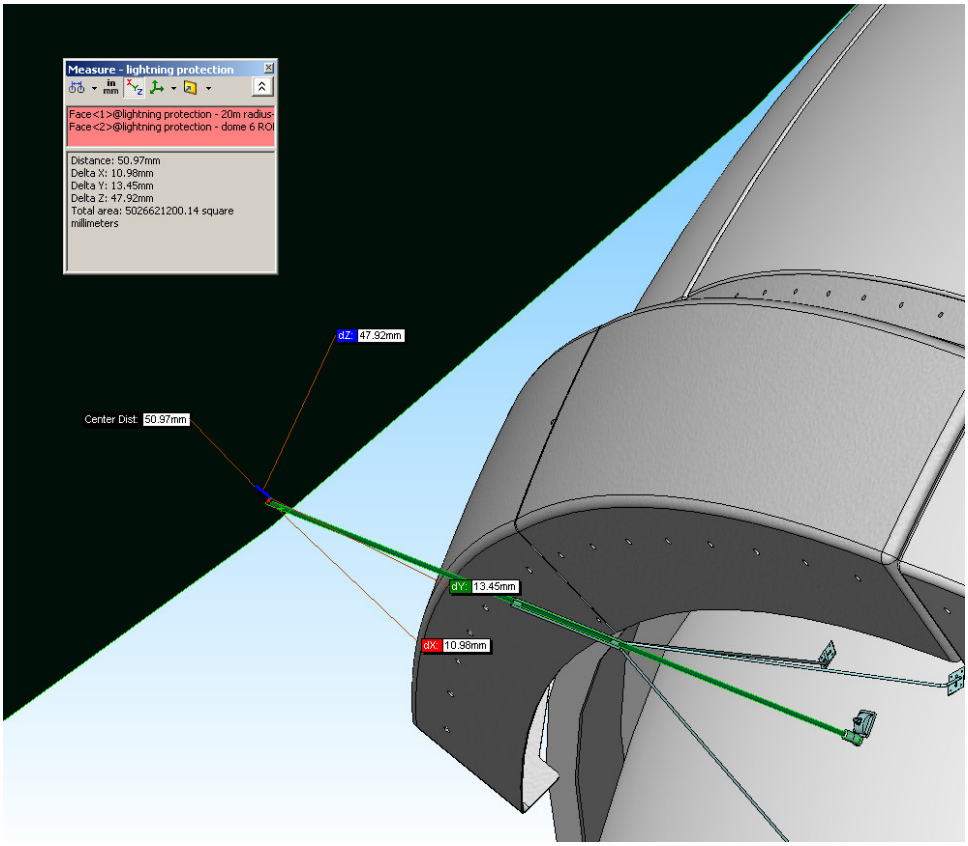


At Position 2, interference between the sphere & the centre terminal is maintained.

Position 3

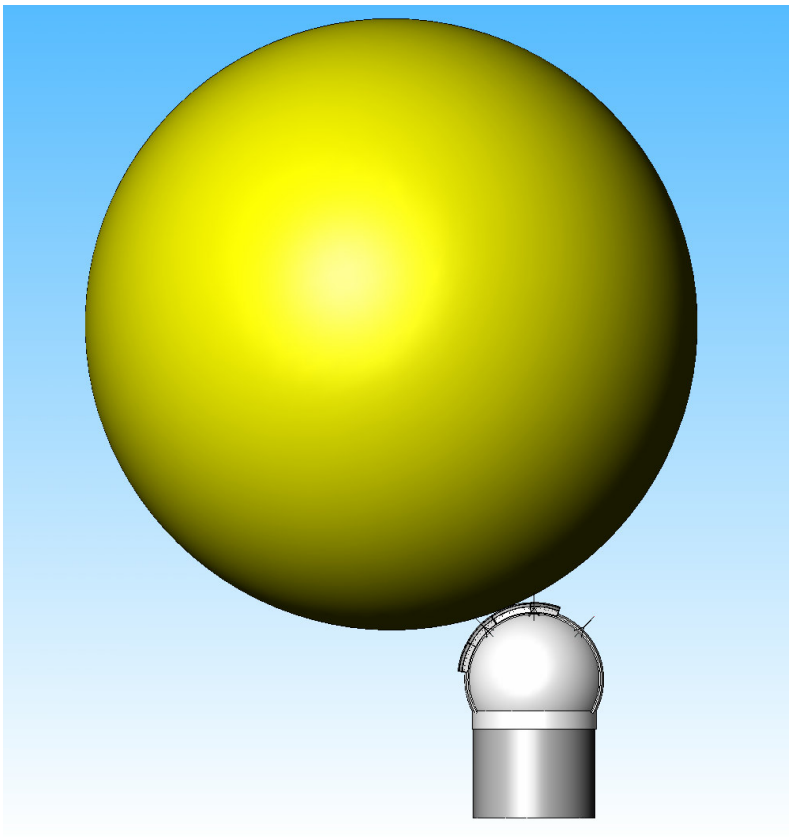


Keeping the sphere in contact with the ground, it is rolled around to be centred & tangent with the front shutter FRP surface.

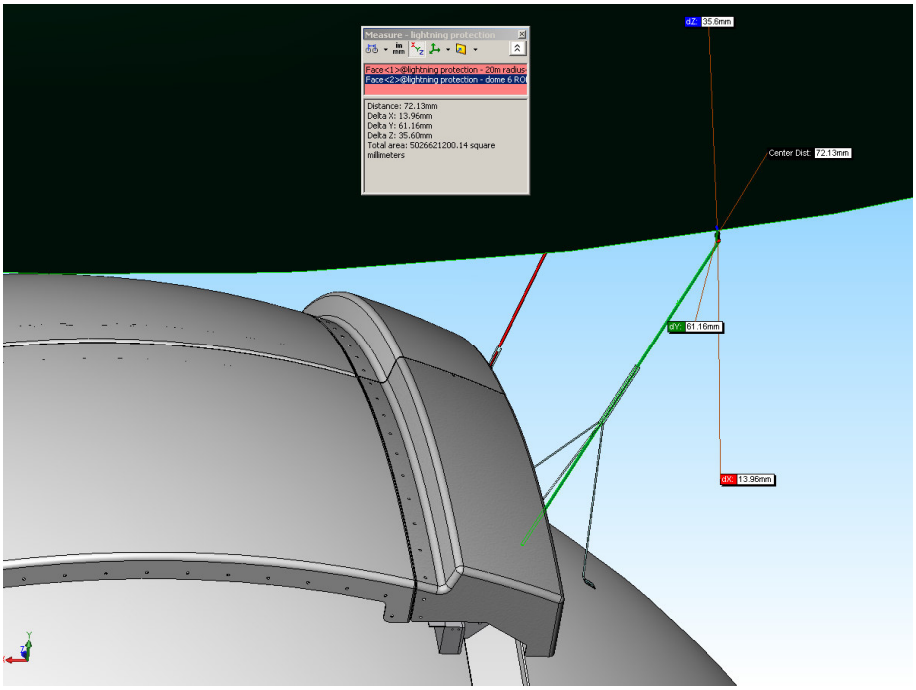


At Position 3, there is a clearance of 50mm to the lower terminals on both sides.

Position 4

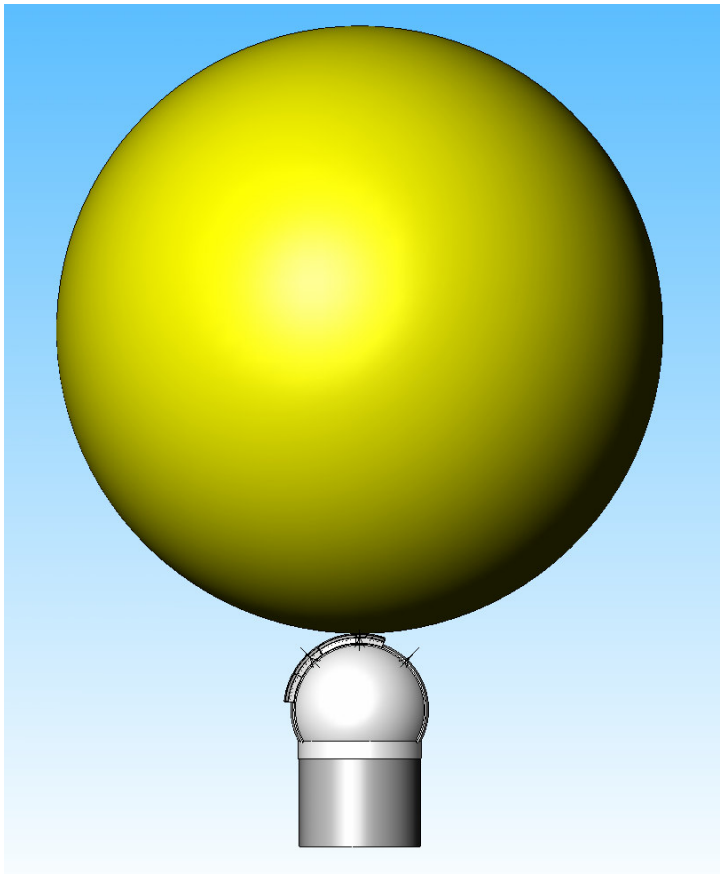


Keeping the sphere centred & tangent with the front shutter FRP surface, it is rolled up along the shutter until it is half way between the lower & centre terminals.

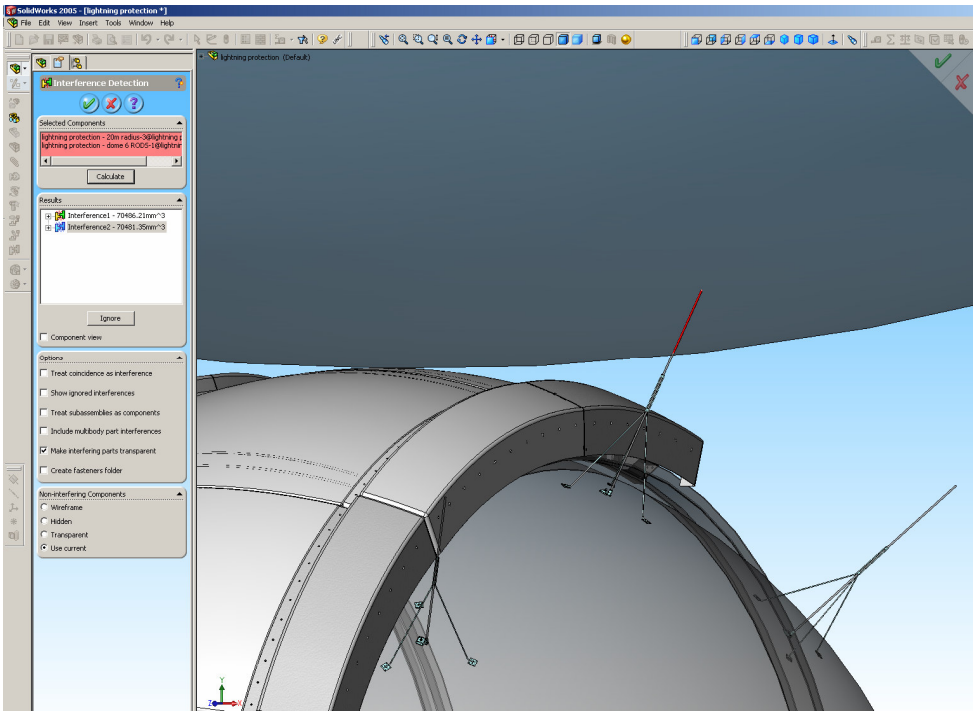


At Position 4, when the sphere is dead centre between the 4 terminals there is a clearance of approximately 75mm to the terminals.

Position 5

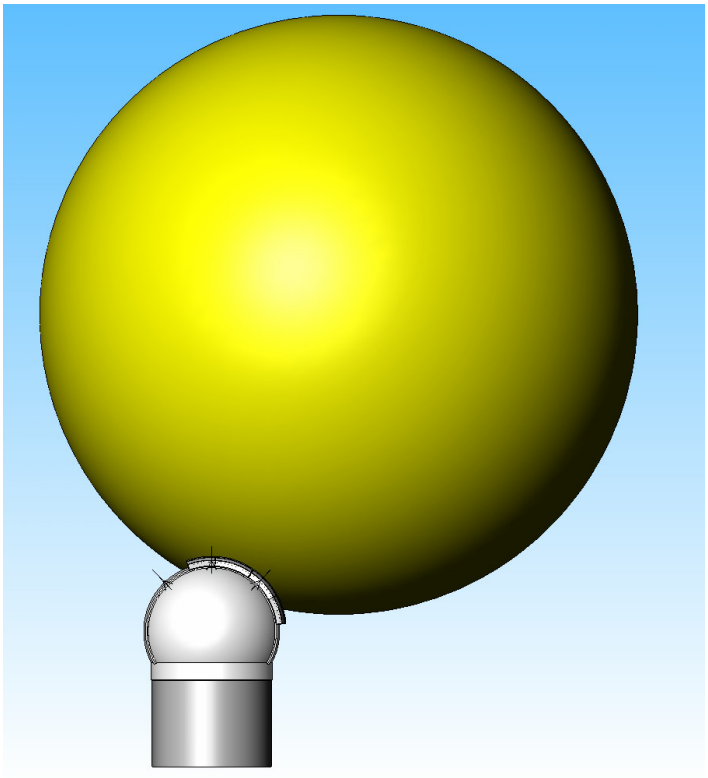


Keeping the sphere centred & tangent with the front shutter FRP surface, it is now rolled up along the shutter to zenith.

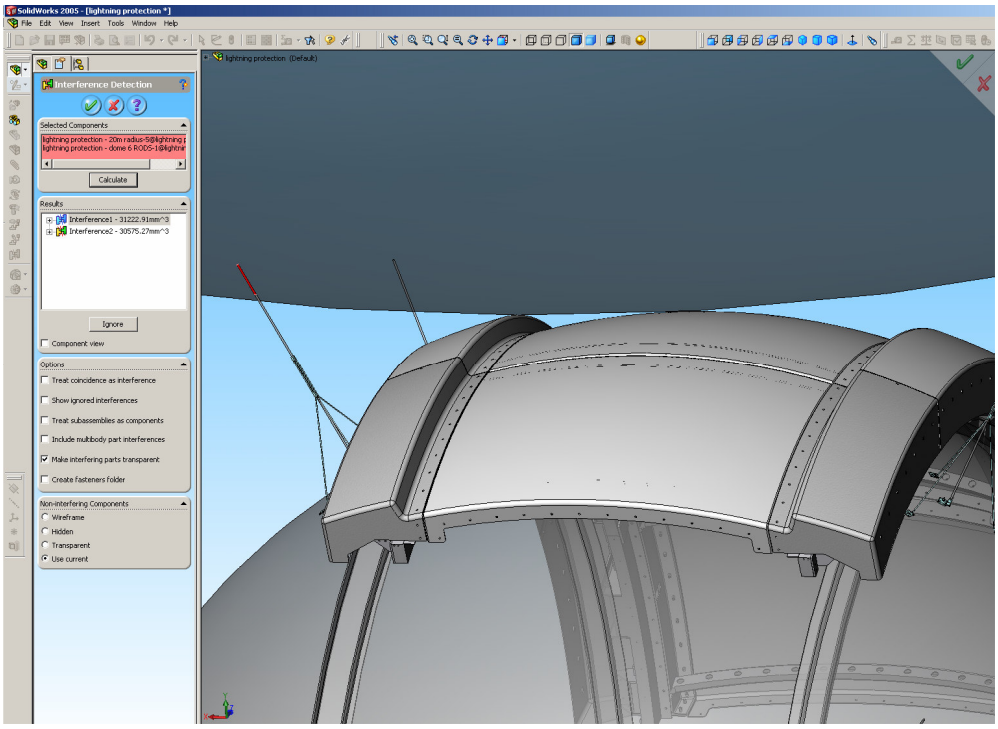


At Position 5, the sphere is interfering with the centre terminals on both sides.

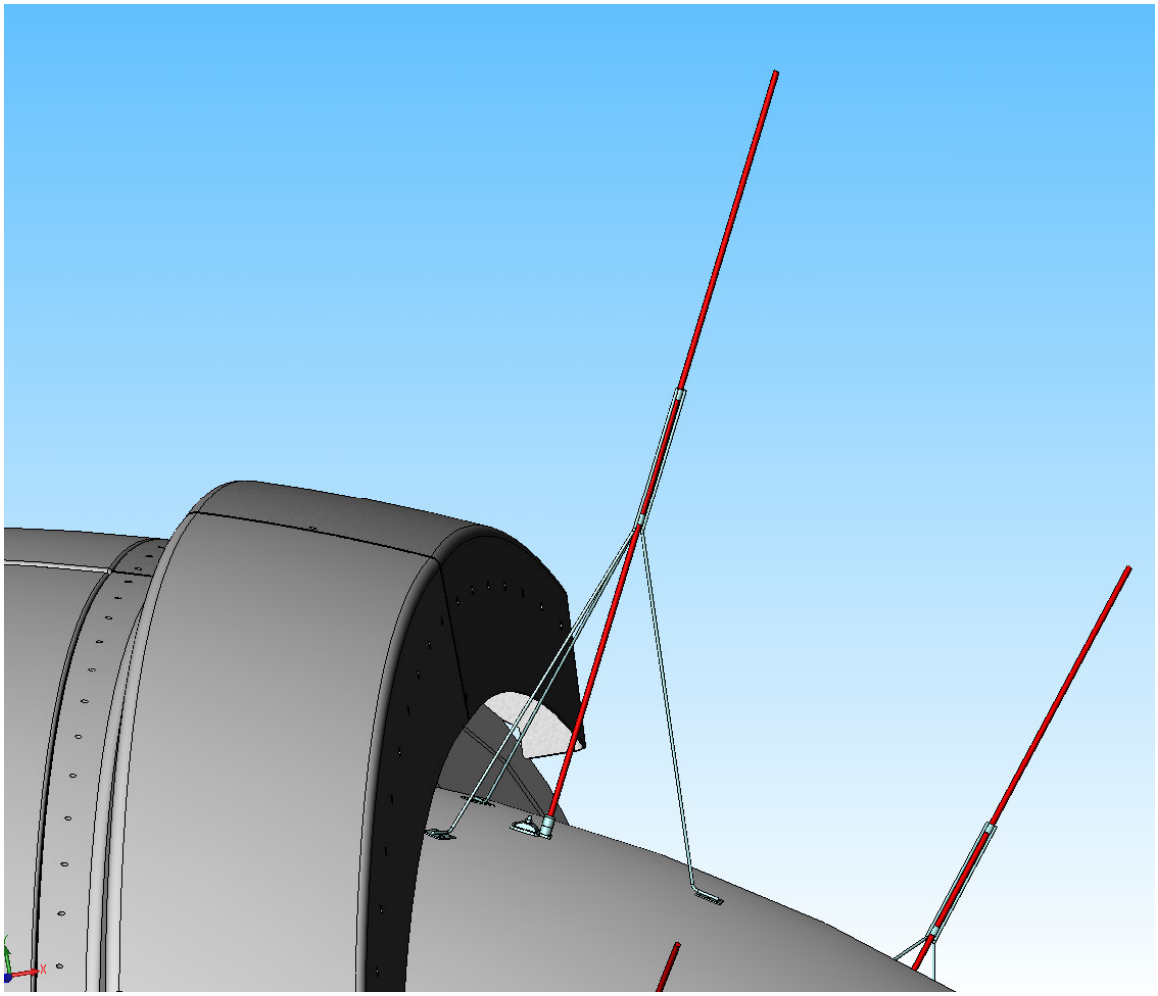
Position 6



As the flares are the further most outboard part of the dome, this condition was checked also. The surface of the sphere was put in contact with the flare panel & then rolled towards the centre of the slit until it just made contact with the main shutter panel. The orientation of the sphere was half way between the lower & centre terminals.



At position 6 there is interference with both the centre & lower terminals.



Harger 72” air terminal with a 48” brace & swivel base mounted radially

The foot of the brace is mounted approximately 200mm from the arch beam. There is 100mm clearance from the shutter flare to the brace.

For any future enclosures that have a higher ringwall, repositioning of the air terminals may be required. For a standard ringwall (Lick APF), the lower terminals are closer to the ground so the clearance at Position 3 will not occur. Note that for the modeled configuration of air terminals, the springline to ground level distance required to eliminate the clearance at Position 3 is approximately 9100mm.

Other Combinations

A greater number of shorter air terminals in conjunction with repositioning was also investigated. The number per side of the slit was increases from 3 to 4. This did not offer any great advantage as a 72” terminal was still required due to the height & width of the shutter.

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