

# EPIC - Forward HCal 8M Tower Design Update

**Elliott Fountain**

October 25, 2022

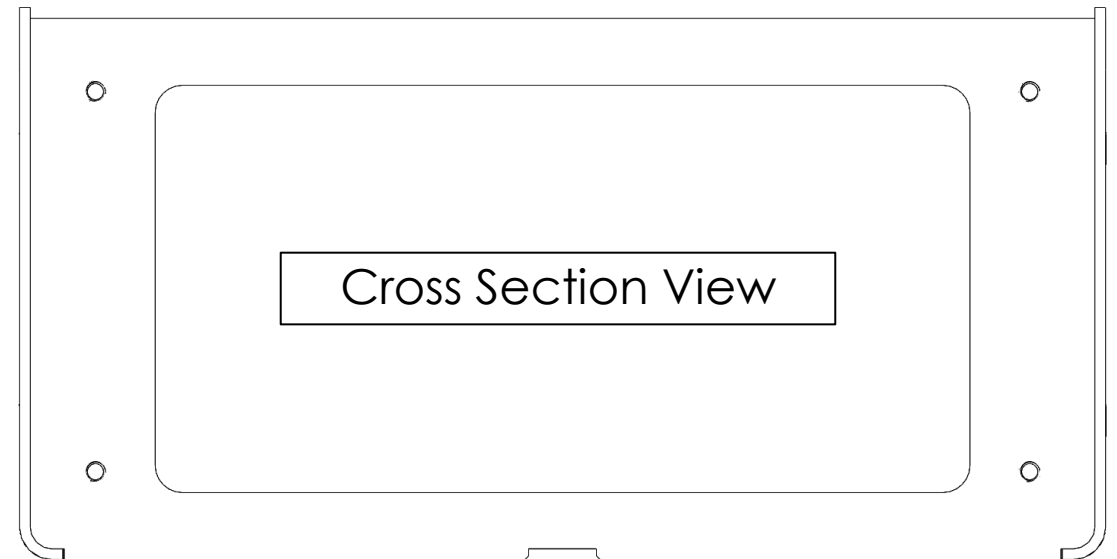
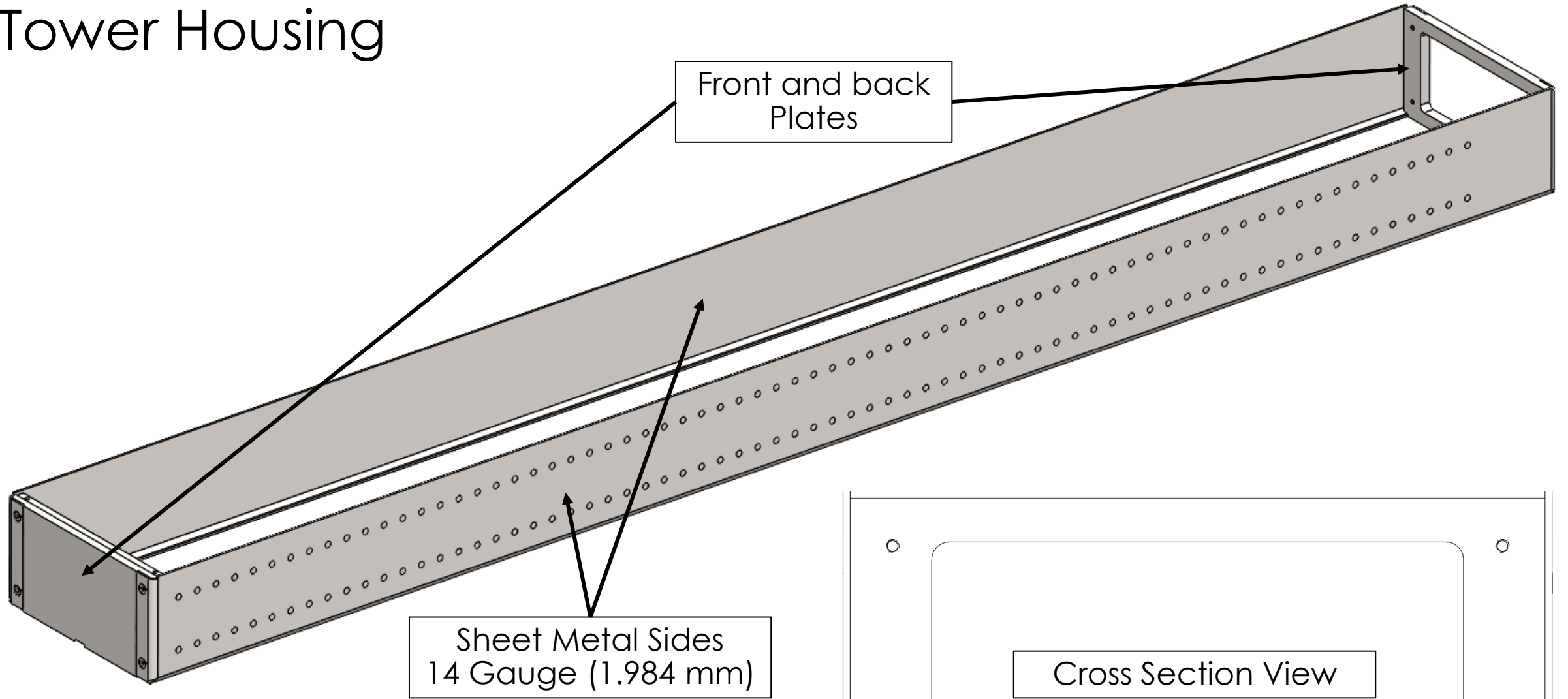


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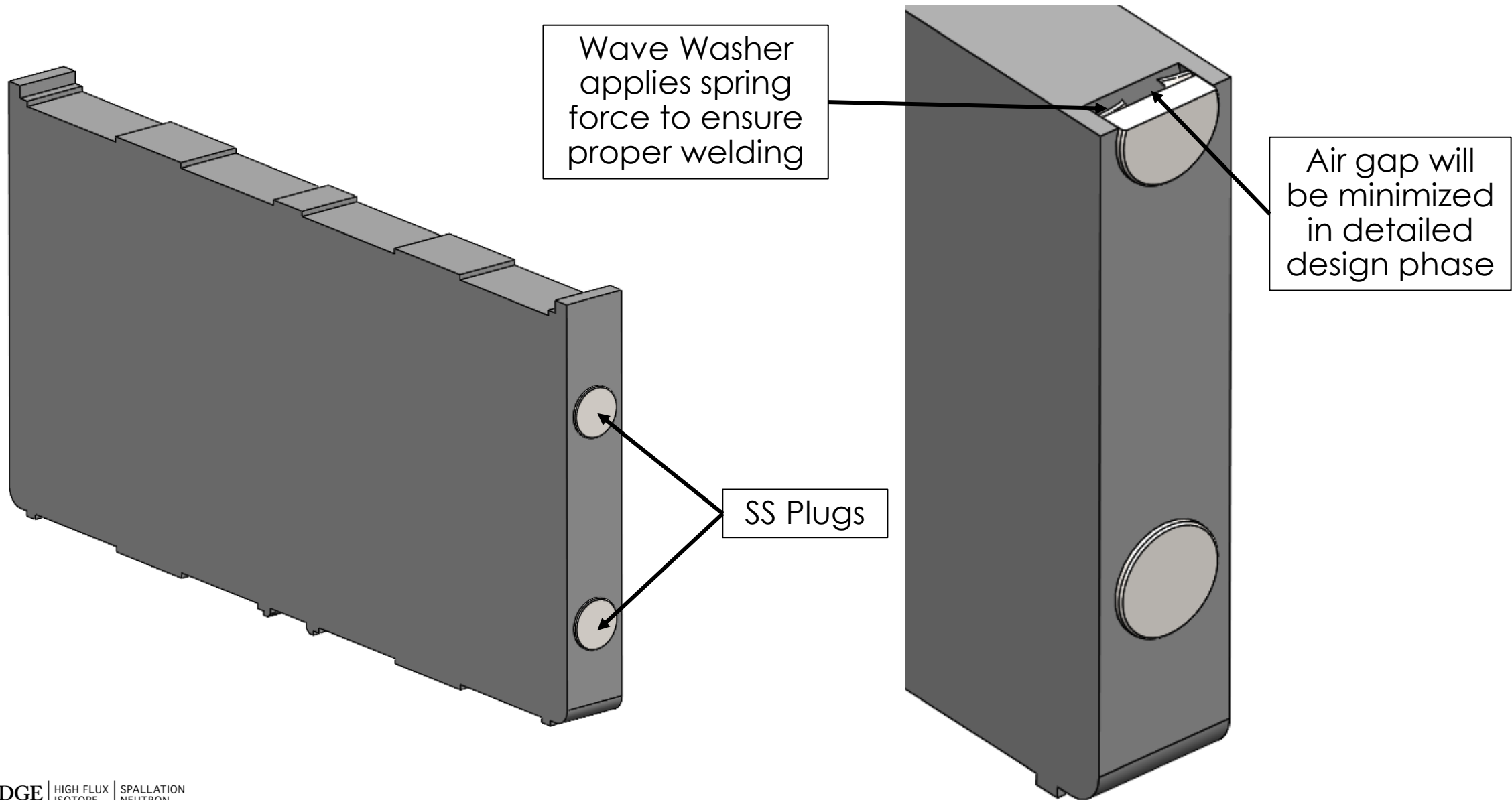
# Update Summary

- Location Pins / Holes **replaced** with Grooves / Slots.
- Tower housing design updated for ease of manufacturing and assembly. Uses 14-gauge sheet metal sides and machined front & back plates.
- Absorber plates to be Electron Beam welded to the sheet metal sides (automated process at manufacturer). Tungsten plates to have stainless steel plugs to facilitate welding.
- Electron Beam (EBM) Welding will leave no weld bead and will be superior to fastening for manufacturing and assembly, as well as structural integrity.
- 8M Tower Weldments can be tolerance checked post-weld to verify size and shape prior to delivery.
- Scintillator / fiber assembly to take place in a custom stand / fixture which allows full rotation of Tower.

# Tower Housing



# Component Updates (Tungsten Plate)

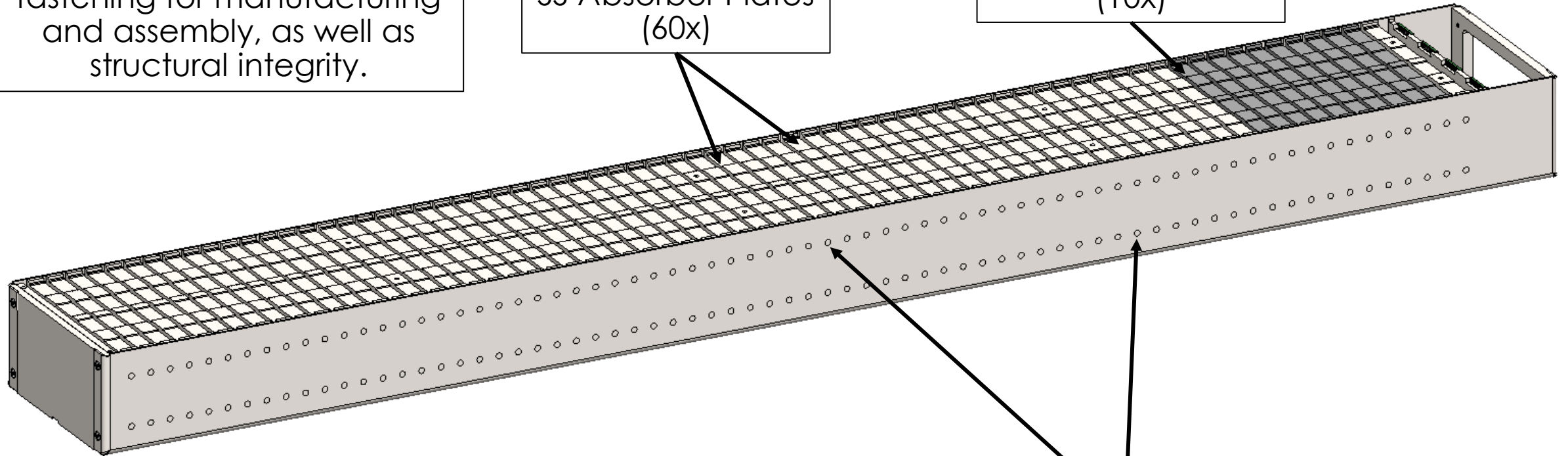


# Tower Housing Weldment

Electron Beam (EBM) Welding will leave no weld bead and will be superior to fastening for manufacturing and assembly, as well as structural integrity.

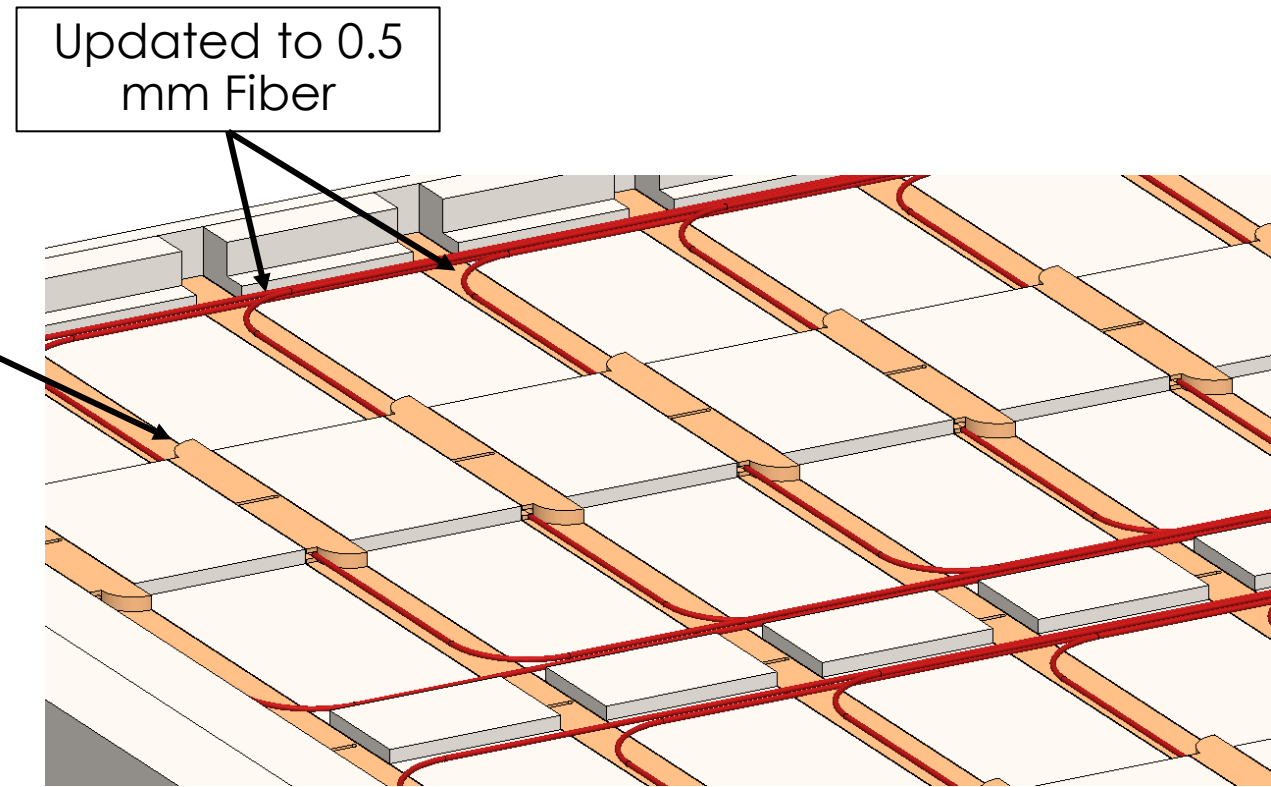
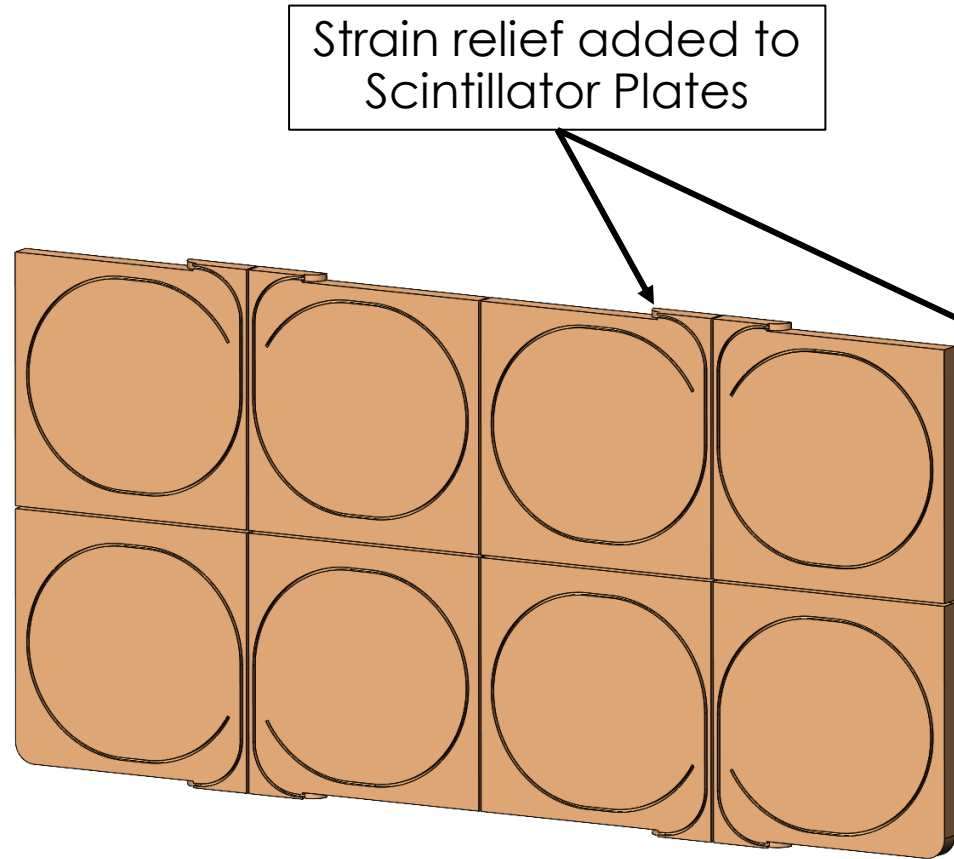
SS Absorber Plates  
(60x)

Tungsten  
Absorber Plates  
(10x)

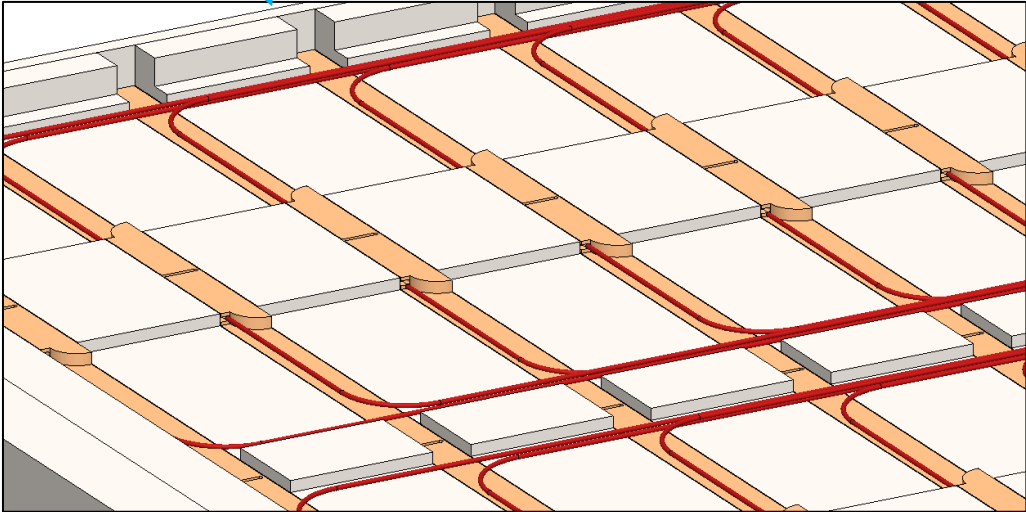
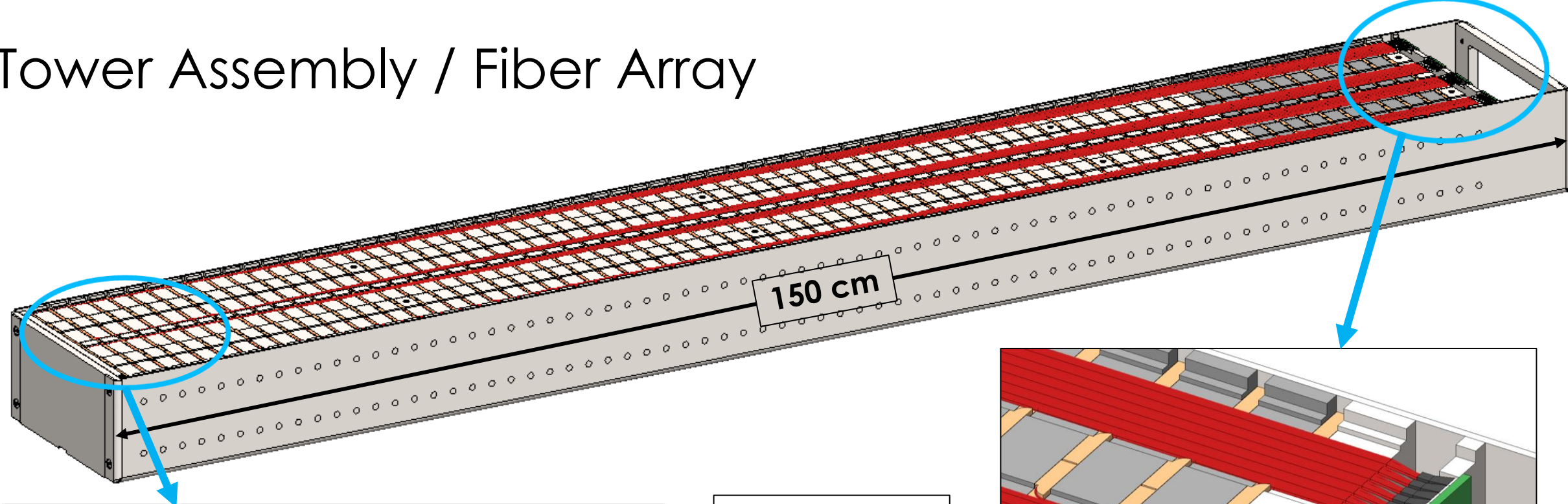


Electron Beam  
Weld Locations  
(proposed)

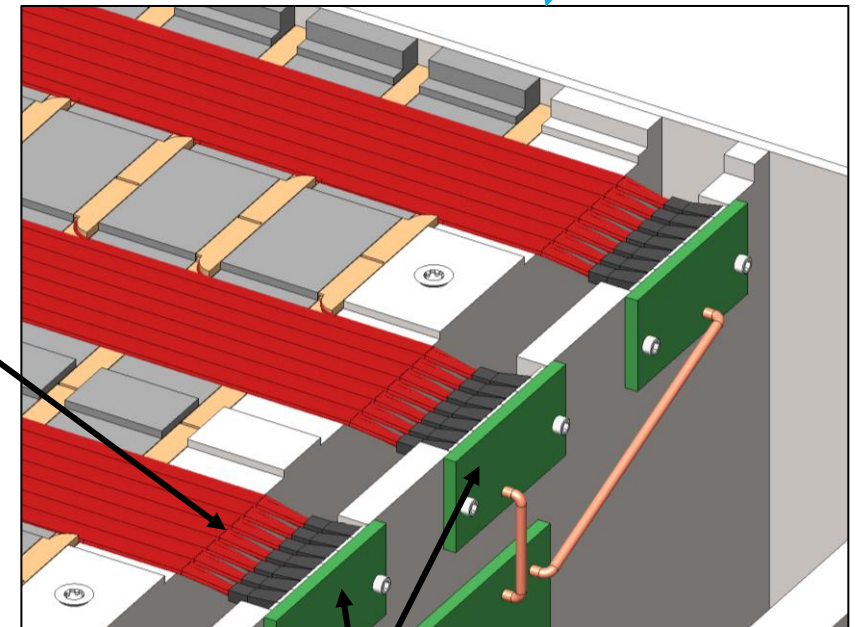
# Component Updates (Scintillator Plates)



# Tower Assembly / Fiber Array

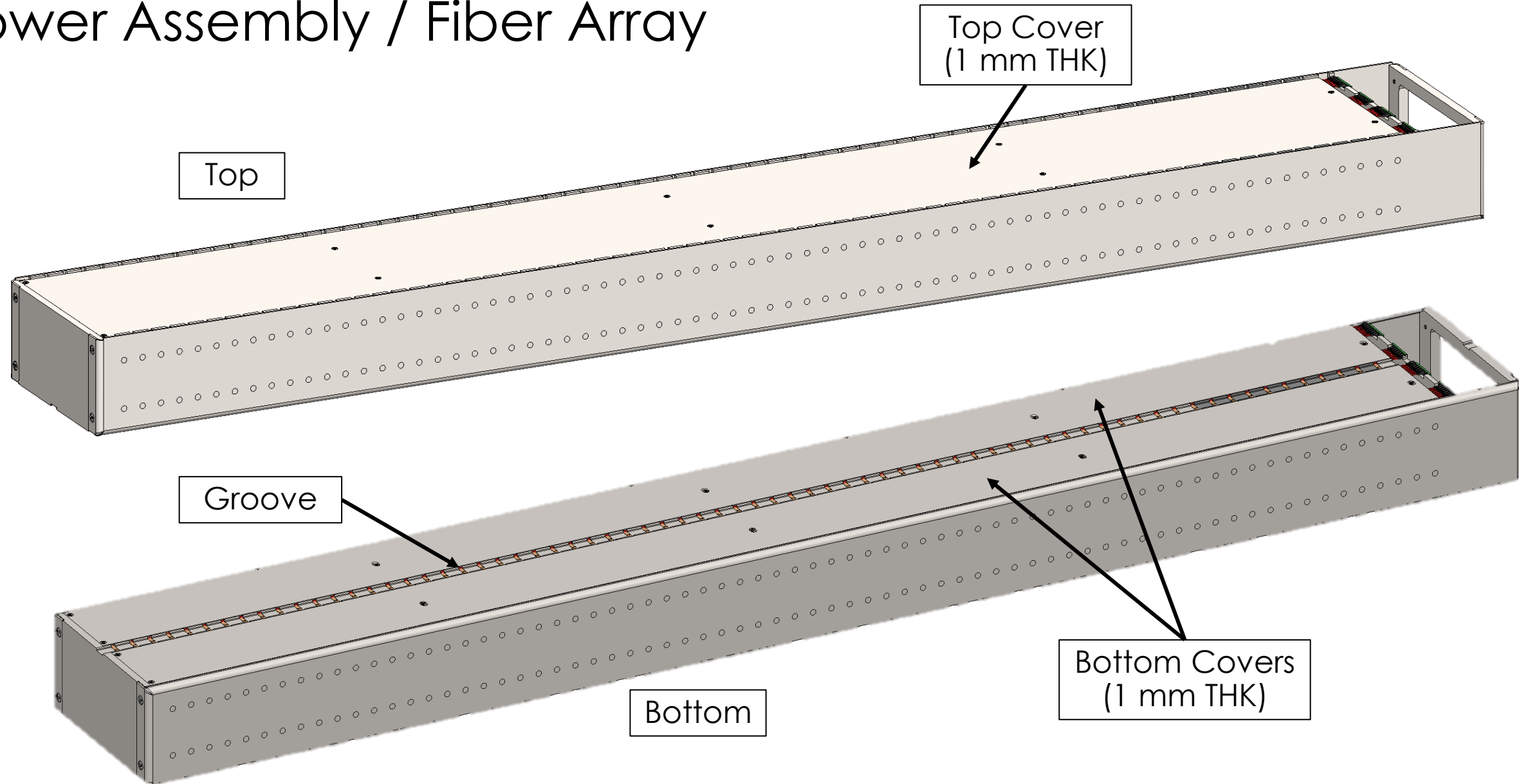


Fiber Consolidation Region



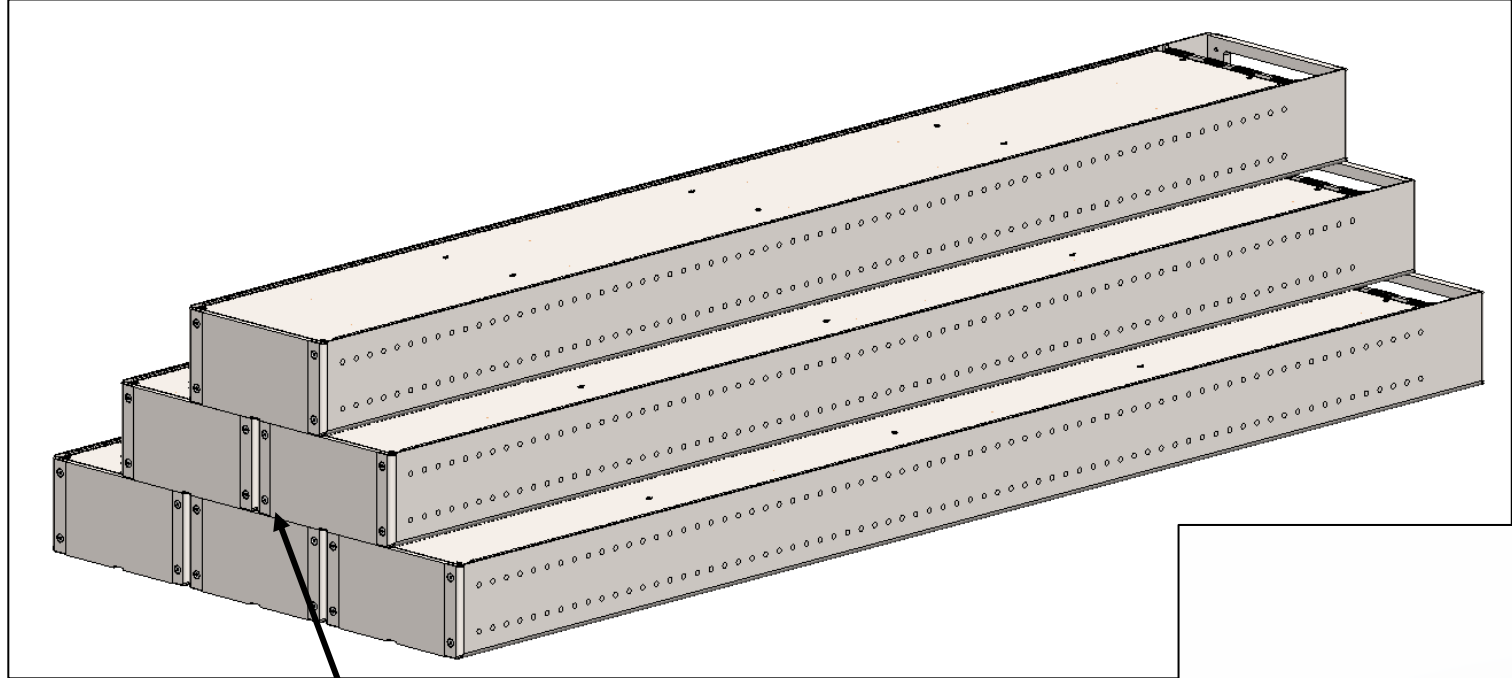
Read-Out Boards (8x)

# Tower Assembly / Fiber Array

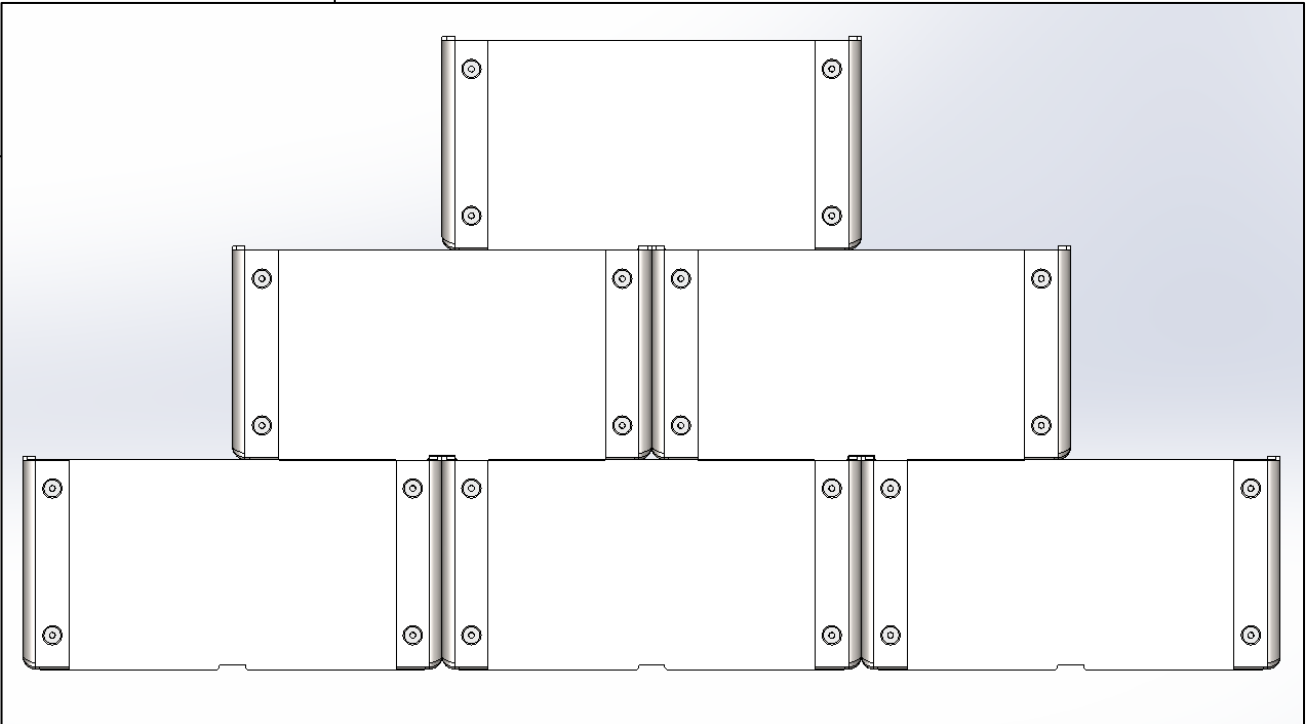




# Tower Stack

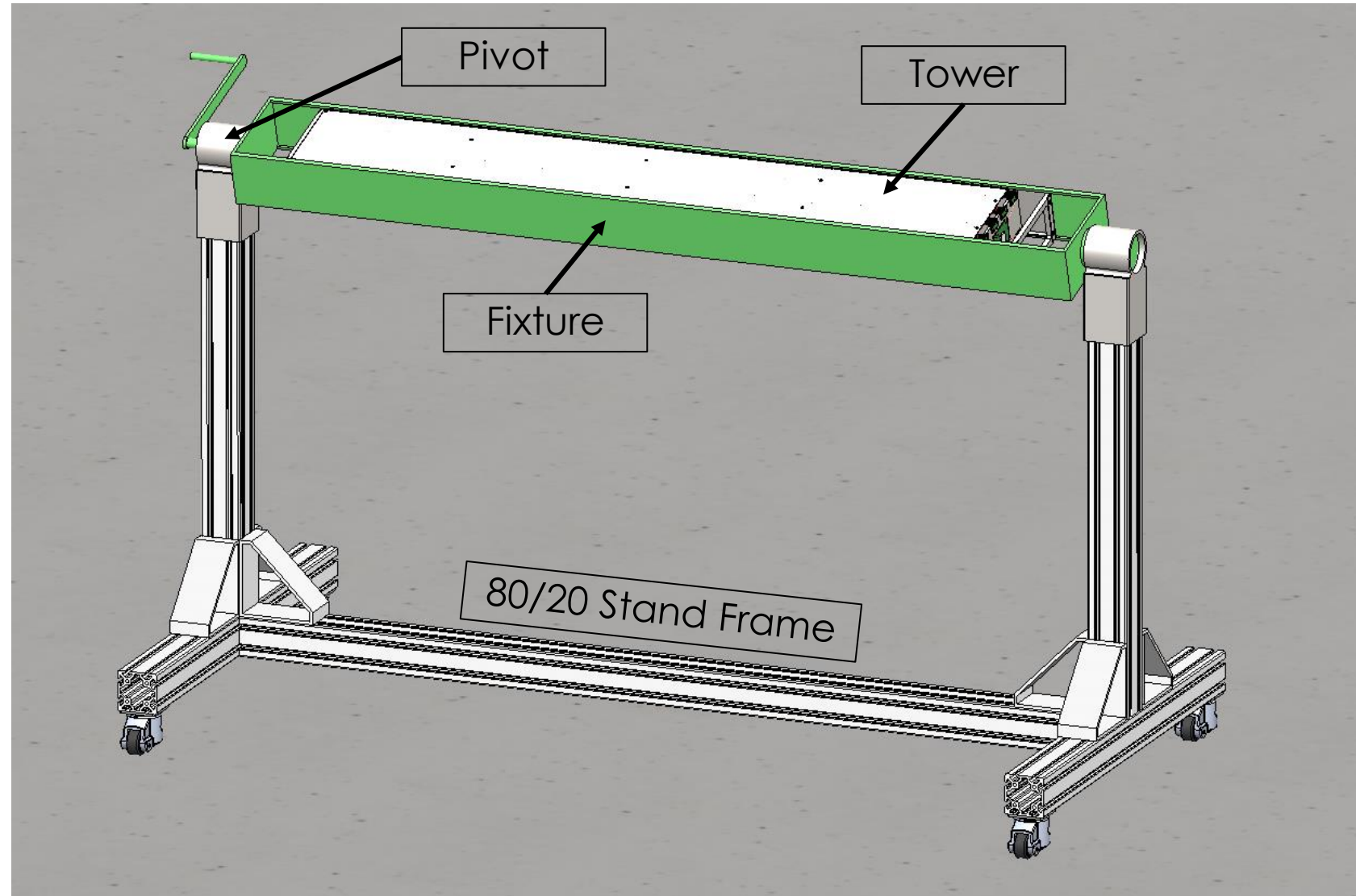


Will add Locking tabs / mechanism to front and rear tower plates.

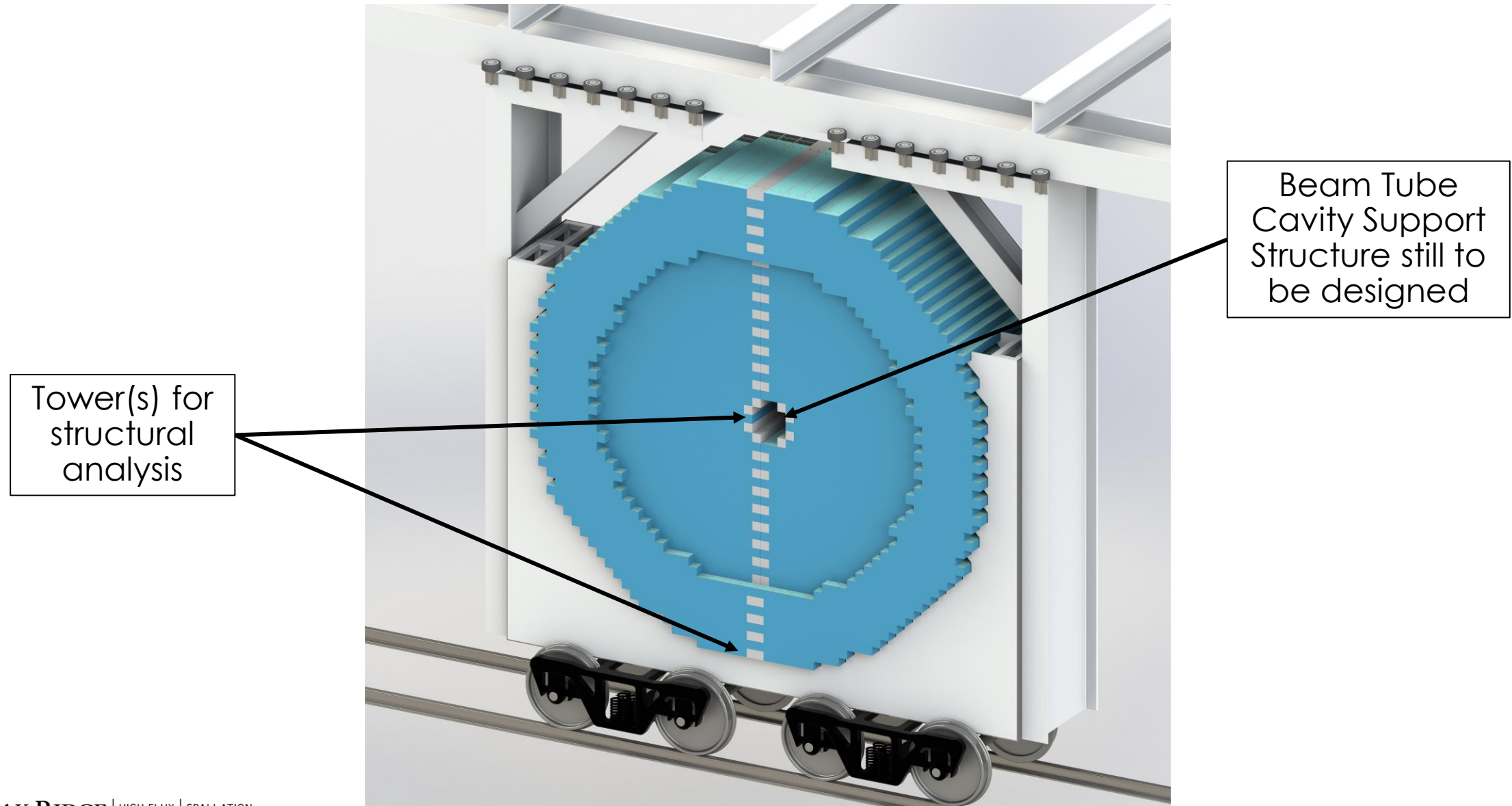


# Tower Assembly Stand

- 80/20 Stand frame can be built at ORNL.
- Pivot with crank handle allows for 360° rotation for ease of assembly.
- Final design of fixture and trays to organize fibers to be completed prior to fabrication.
- Should be ~\$5k for total fabrication, so could build multiple stands to allow for more efficient assembly.



# Forward HCal Assembly Structure (preliminary)



Tower(s) for structural analysis

Beam Tube Cavity Support Structure still to be designed

# Next Steps

- Preliminary Assembly Procedure (document)
- Structural Analysis / Iteration / Update Tower Design.
- Finalize fiber read-out board design. **Shorten Tower?**
- Add Locking Mechanism to front / back of Tower to lock Z-direction. **(Need maximum magnetic force applied to towers in X, Y, & Z)**
- Finalize Preliminary 8M Tower Design, Produce Fabrication Drawings, Manufacture 8M Tower.
- Manufacture Assembly Stand (80/20 frame, in-house fabrication)
- Advance design of HCal array support structure and beam tube support design.
- **Seismic response spectrum (X, Y, & Z) for analysis, and which code to follow? ORNL?**

# Questions / Comments / Discussion