OAK RIDGE National Laboratory | SECOND TARGET STATION

# Vessel Systems Manufacturing and Fabrication Strategy

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U.S. DEPARTMENT OF ENERGY

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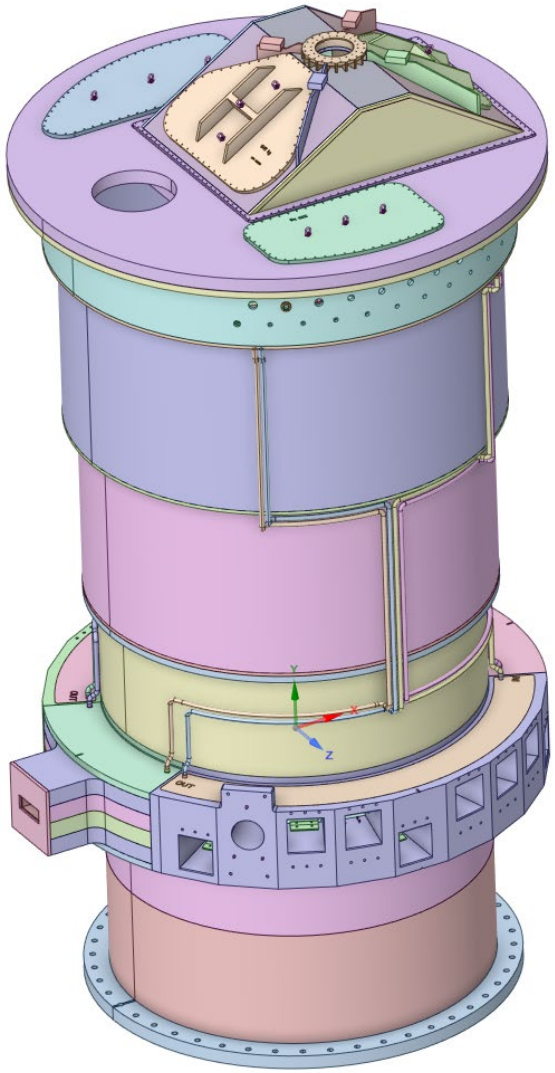
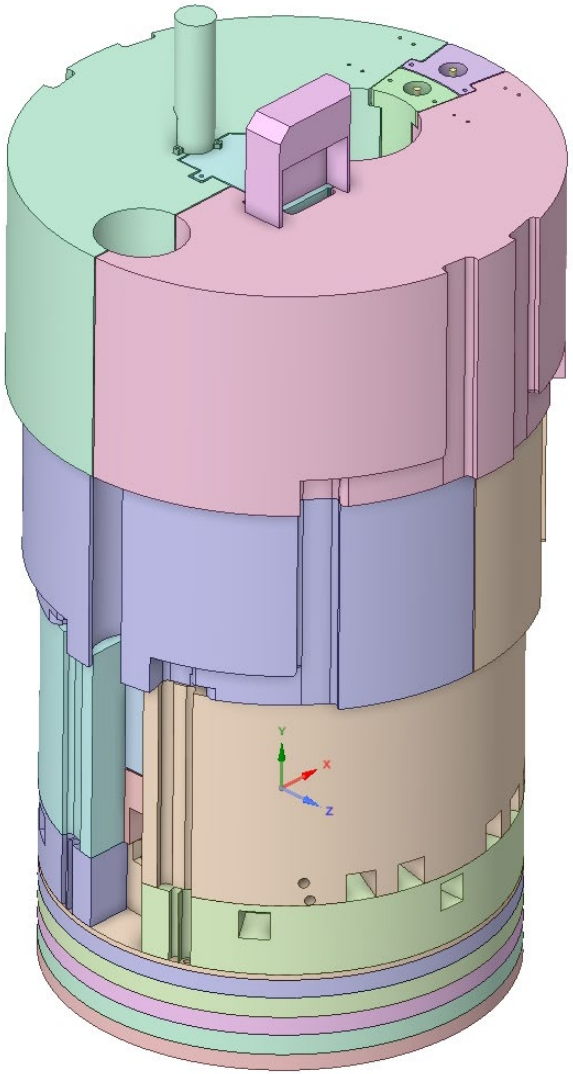
# Presentation Outline

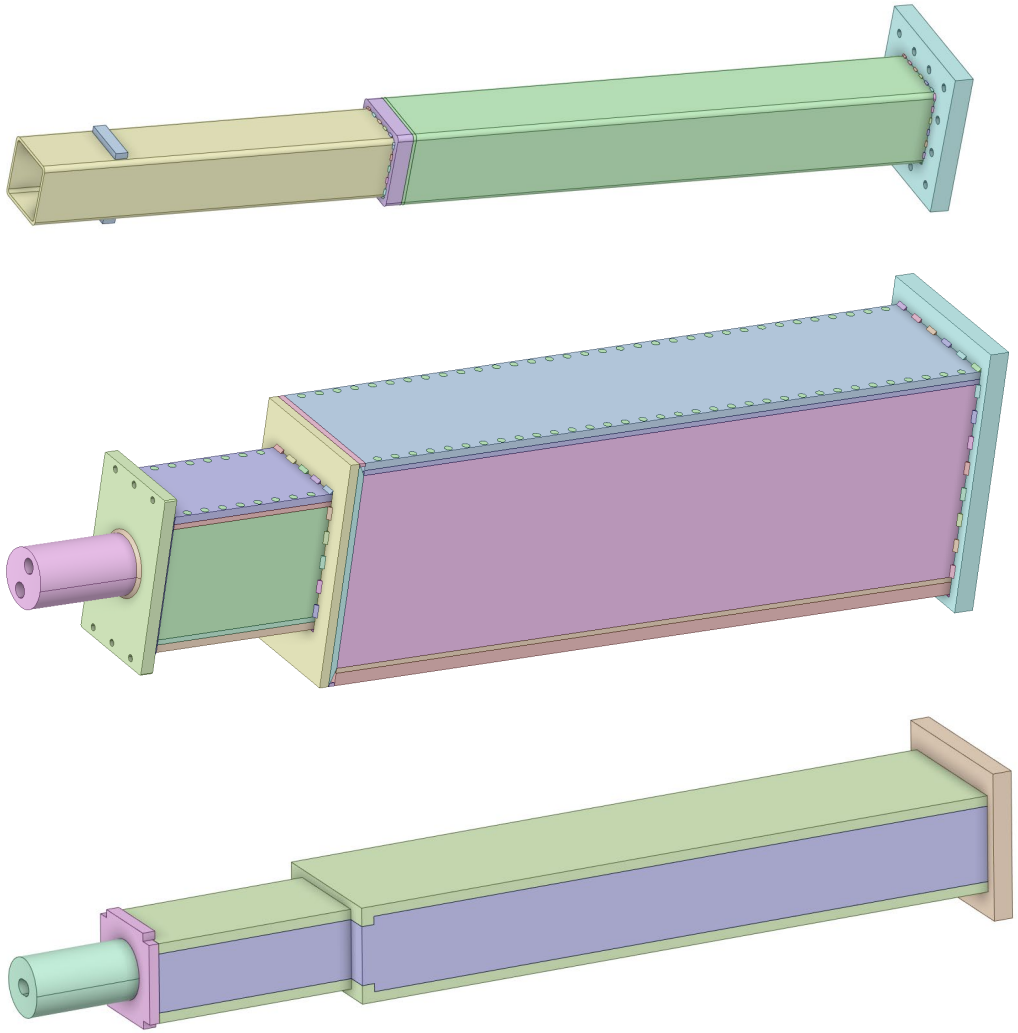
1. Core Vessel Assembly



2. Core Vessel Shielding

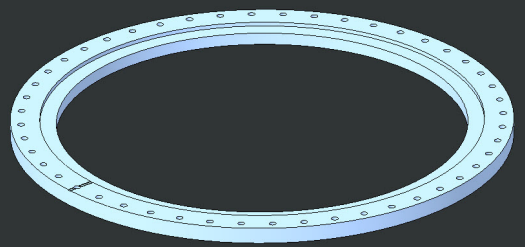


3. Nozzle Extensions

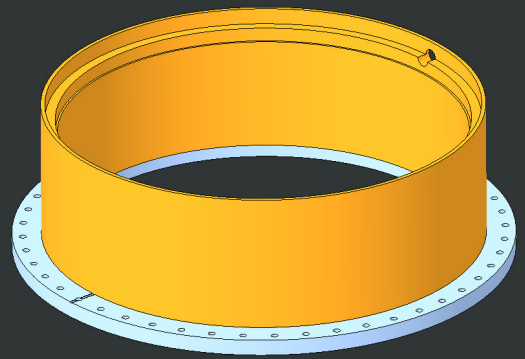


# The CV lower weldment will be built layer by layer with a flange at its base and vertex

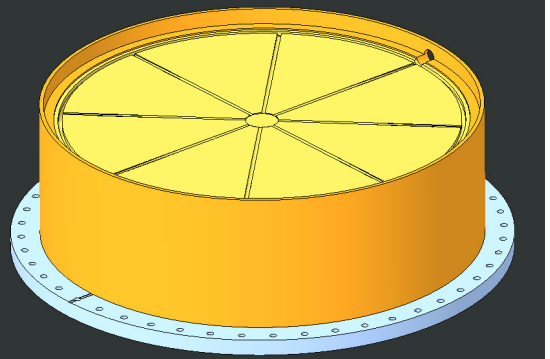
Pre-weld machine



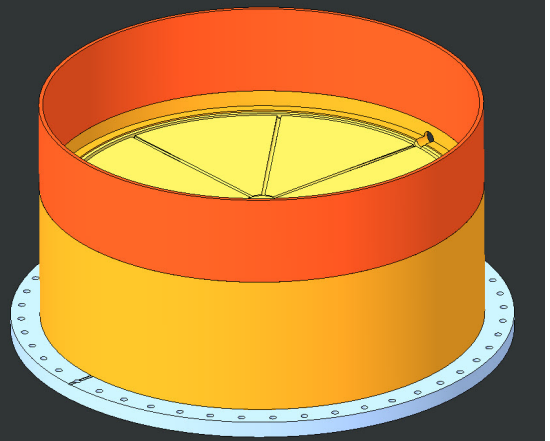
Roll, weld, pre-weld machine



Pre-weld machine, weld

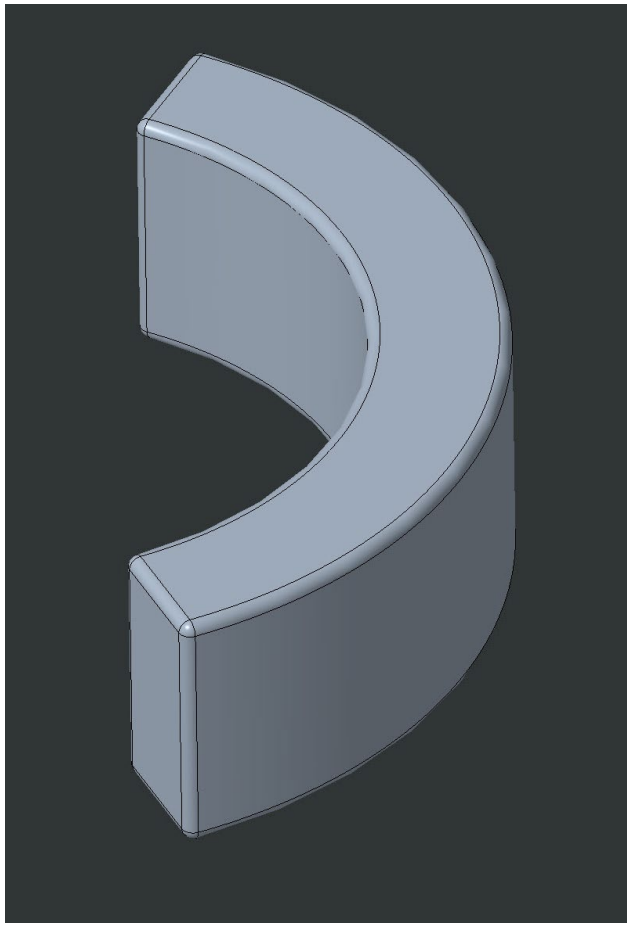


Roll and weld

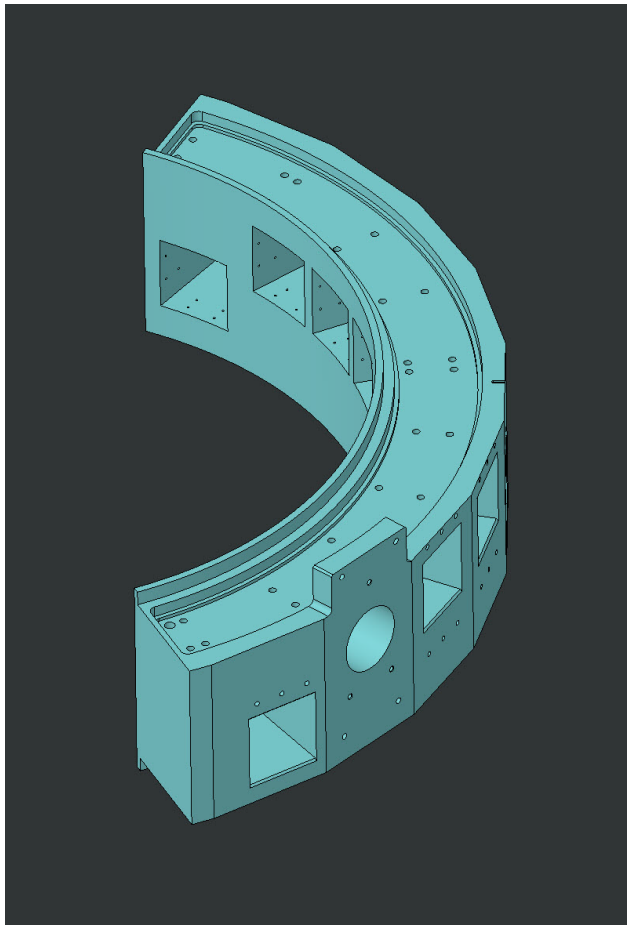


# Forged quadrant machined and welded with plenums

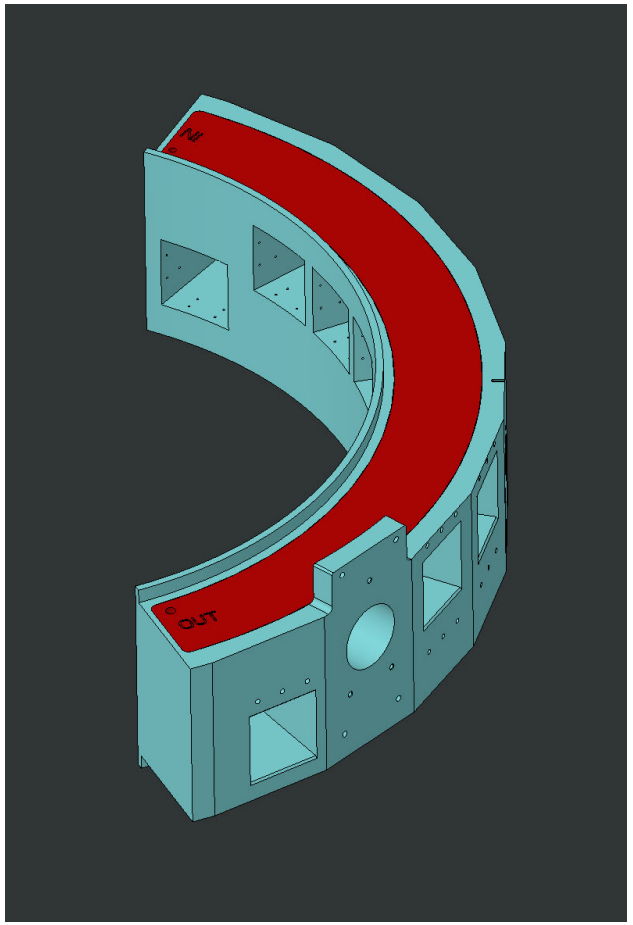
Rough machine forging outer profile



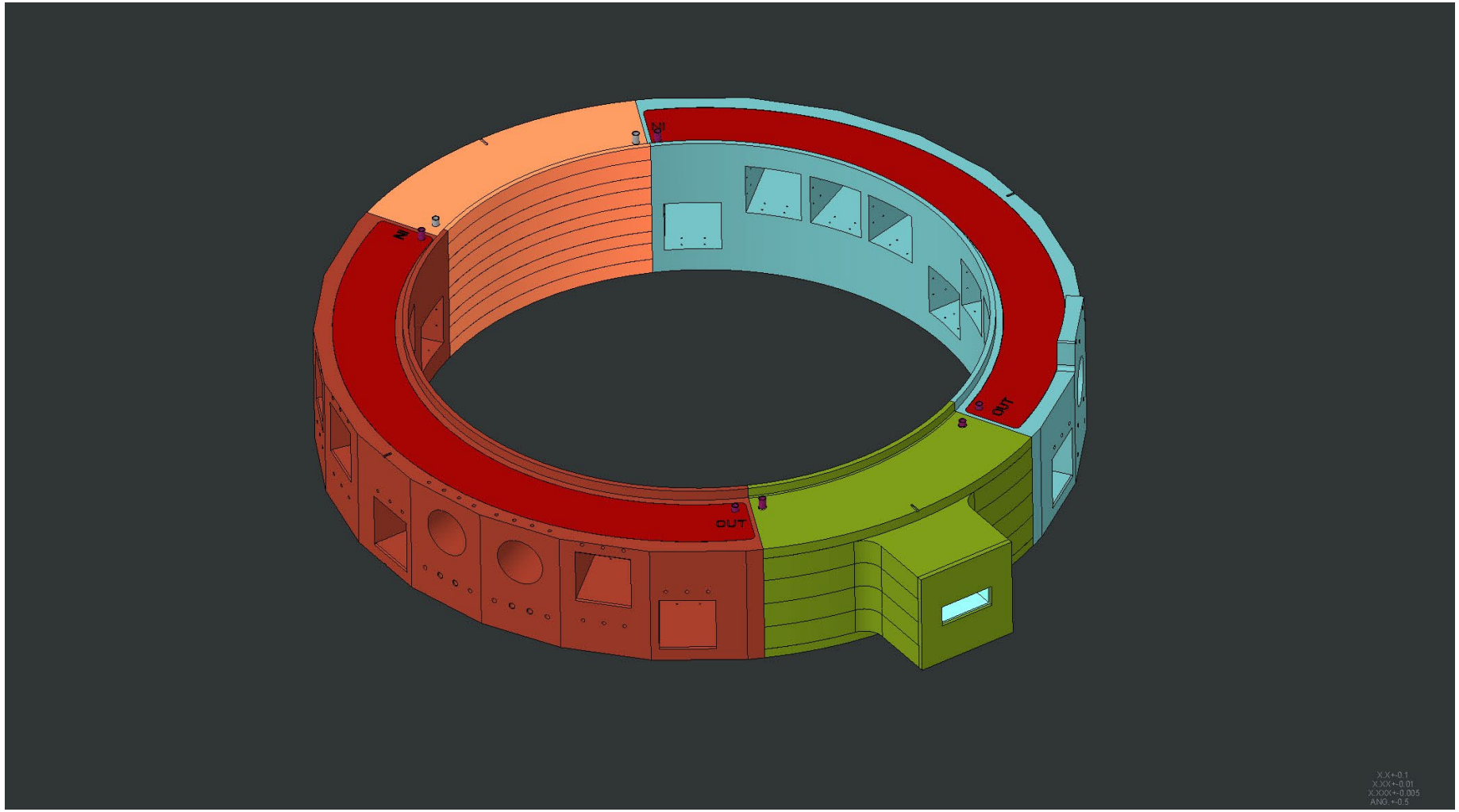
Mill water circuit, rough machine profile



Fit and weld top and bottom plenums

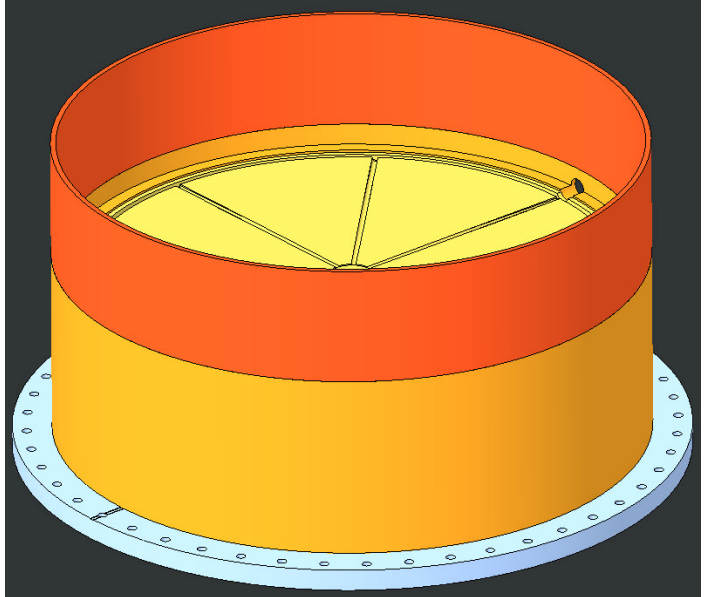


# Fit and weld 4x beltline quadrants to form full beltline

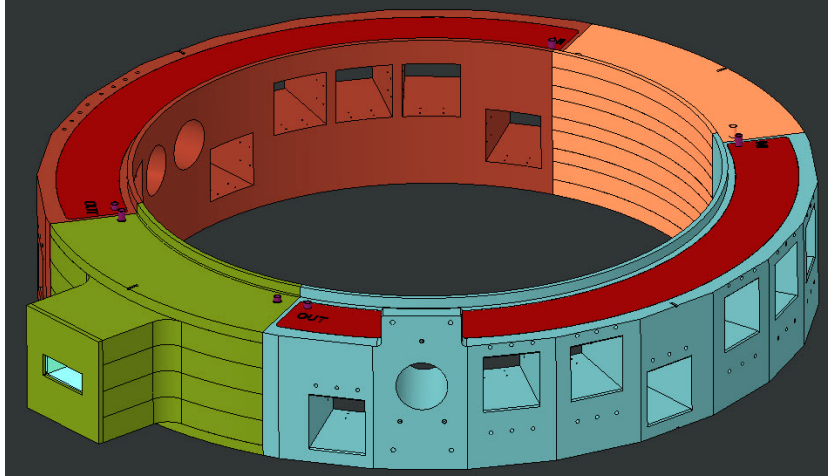


# Welding beltline to lower shell weldment

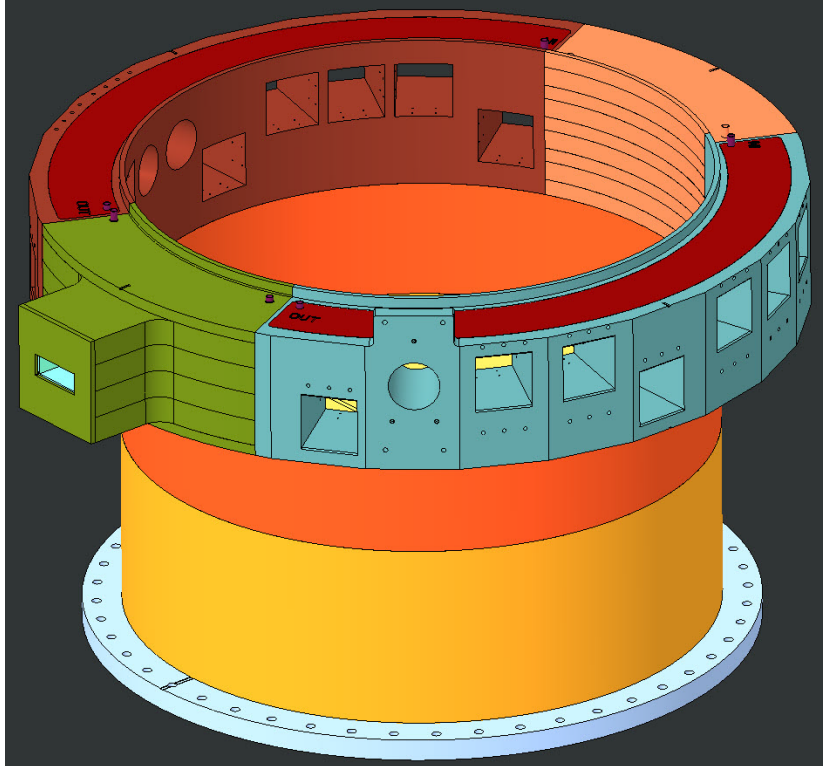
Lower shell weldment



Beltline weldment

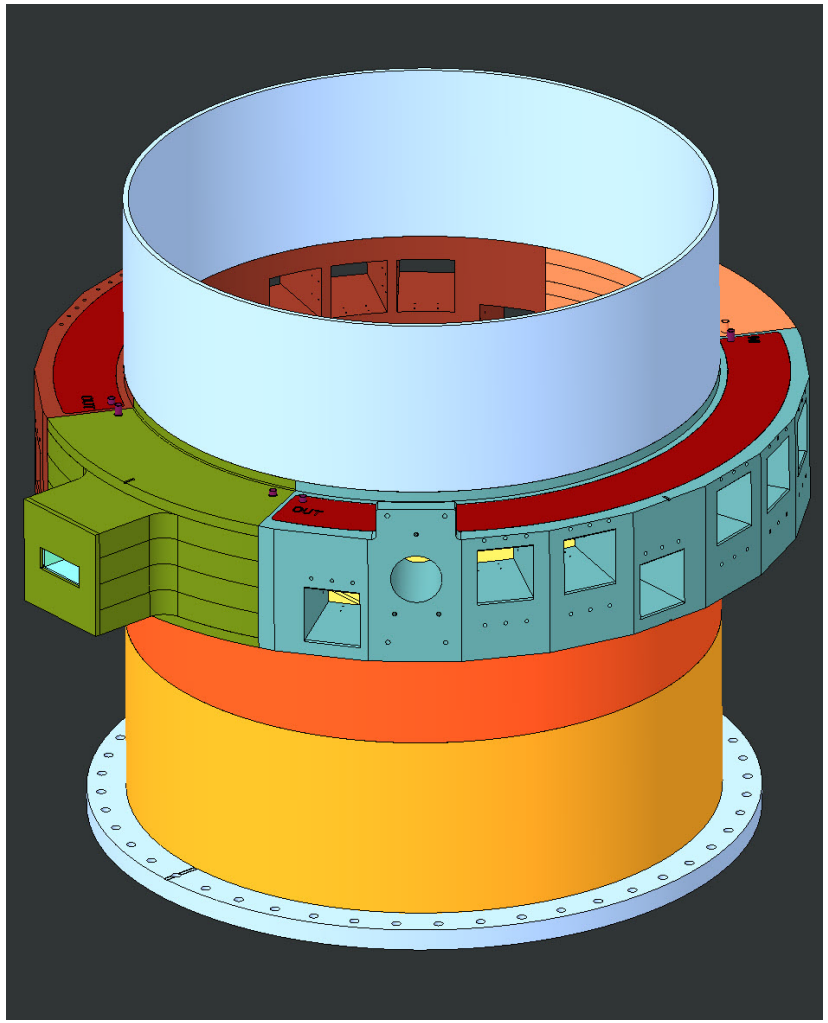



Fit and weld lower shell to beltline

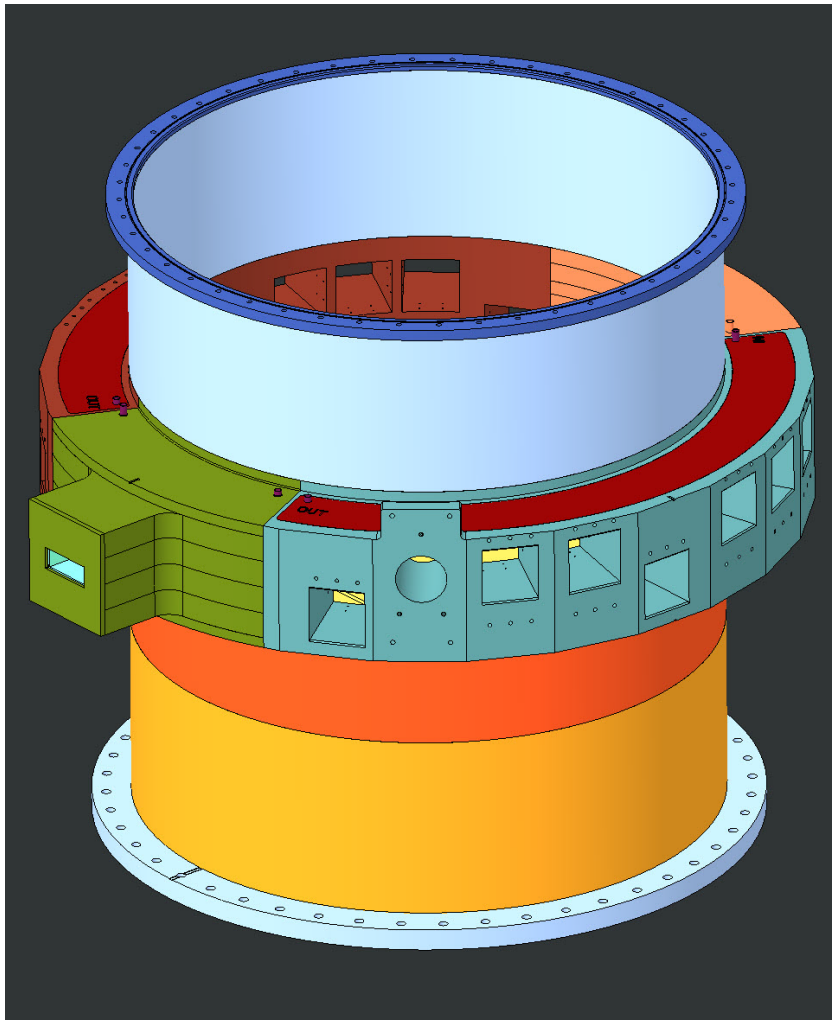


# Once all parts and assemblies are welded together, the flanges and beltline will be machine to ensure precise and accurate features

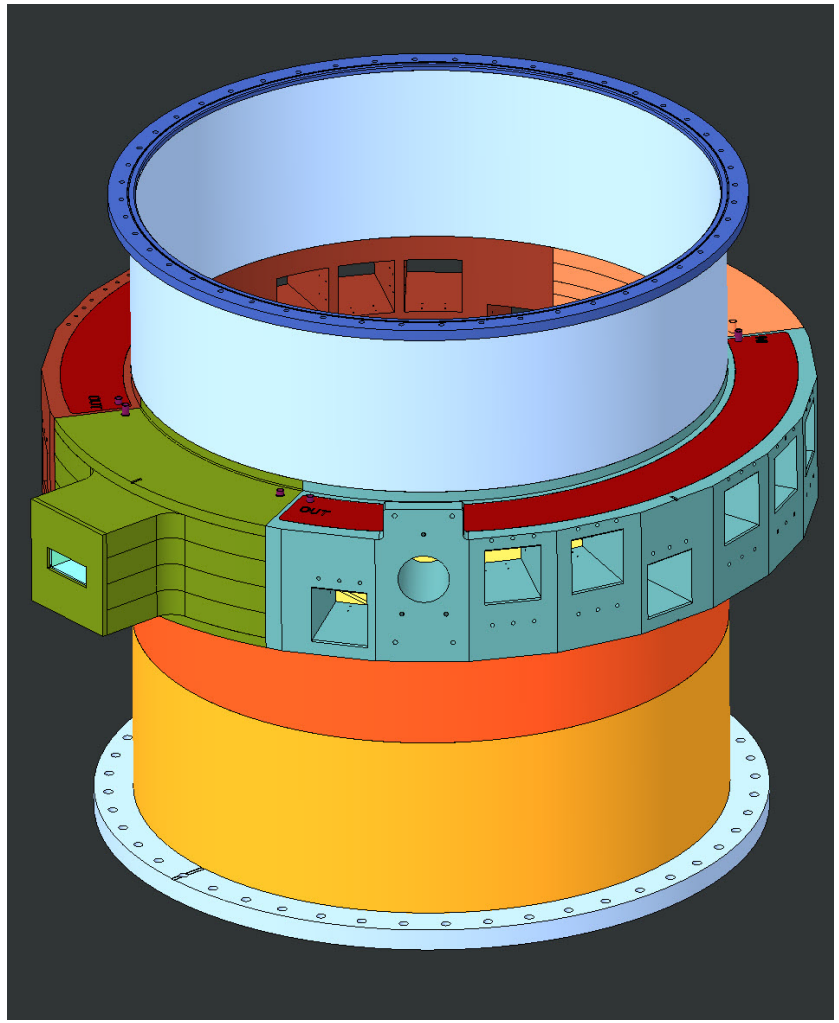
Roll, machine, fit and weld top shell



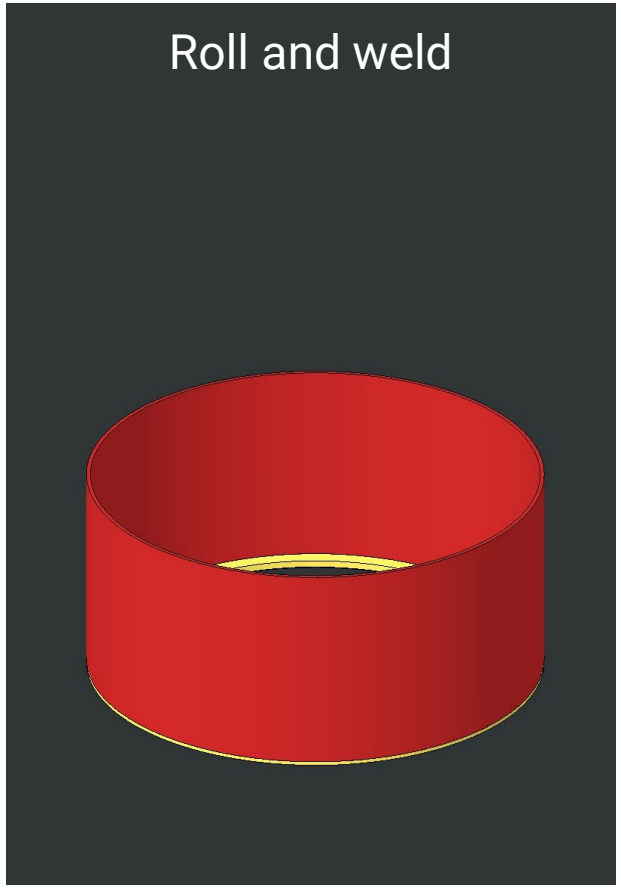
Fit and weld top flange



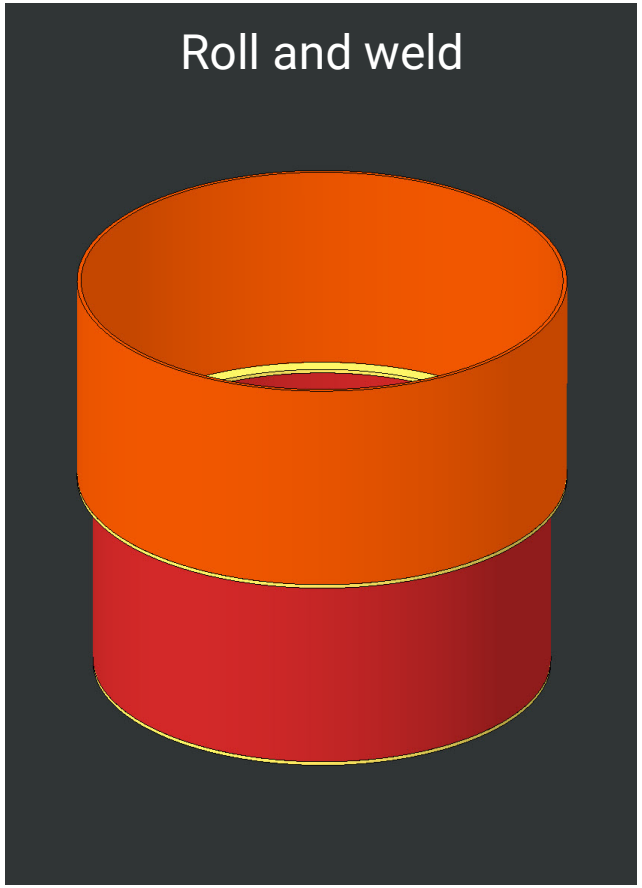
Final machine flanges and beltline



# The Upper CV Shell is similar in construction to the Lower CV Shell. Construction starts with a flange at its base

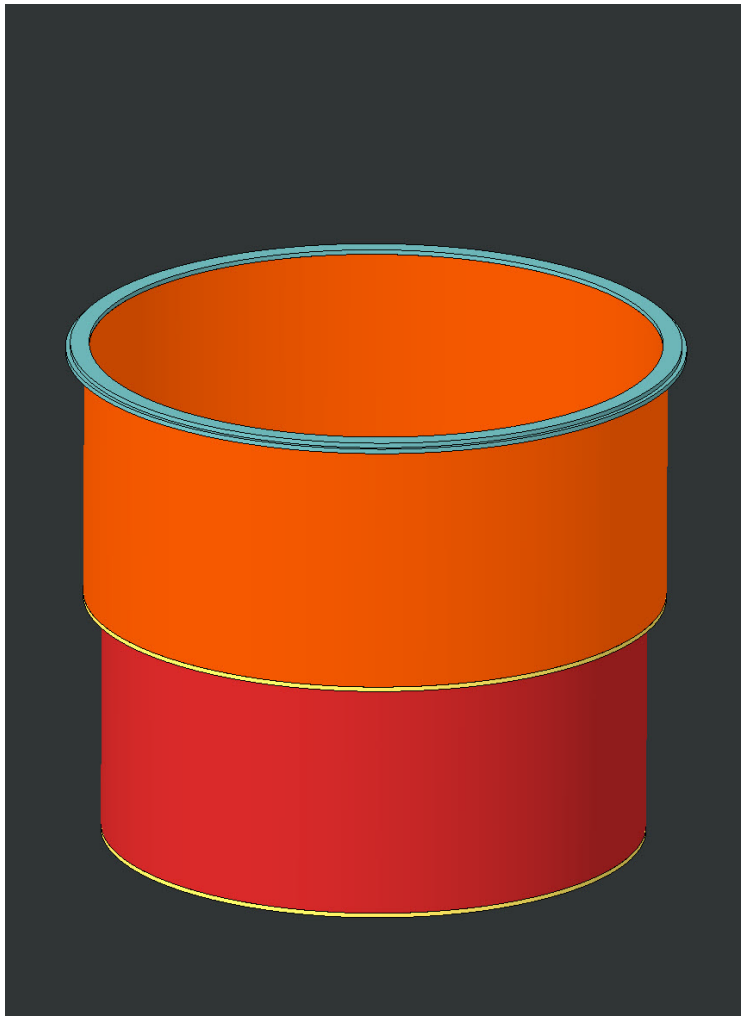





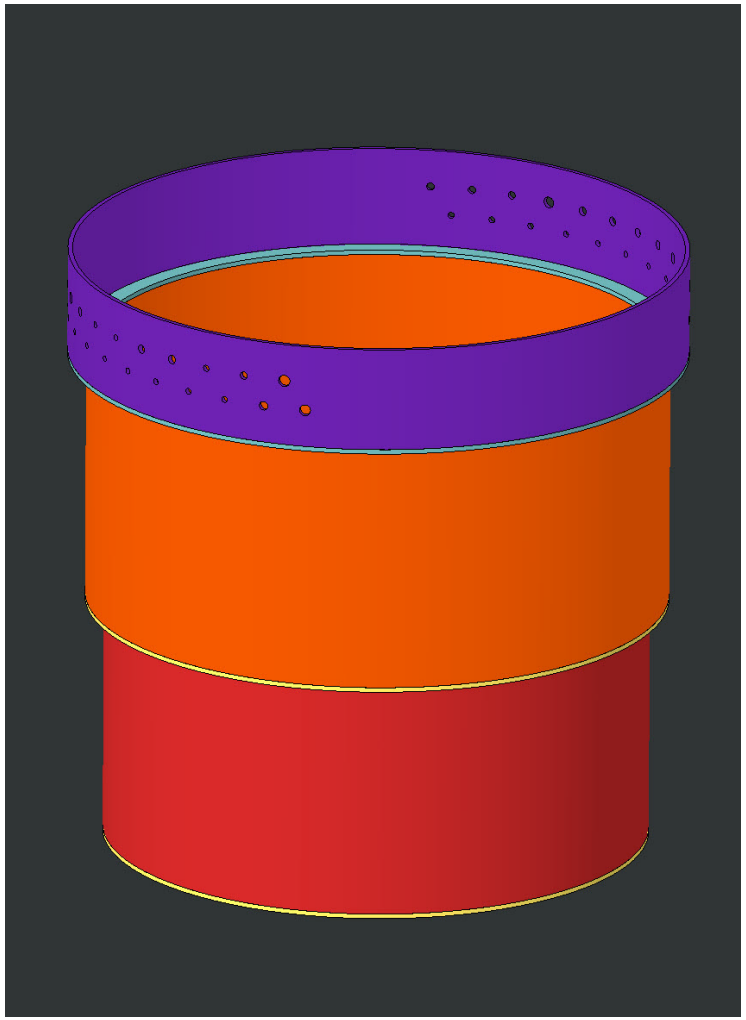


# Rolled sheets and additional flanges are then welded on layer by layer, up to the flange at the top of the weldment

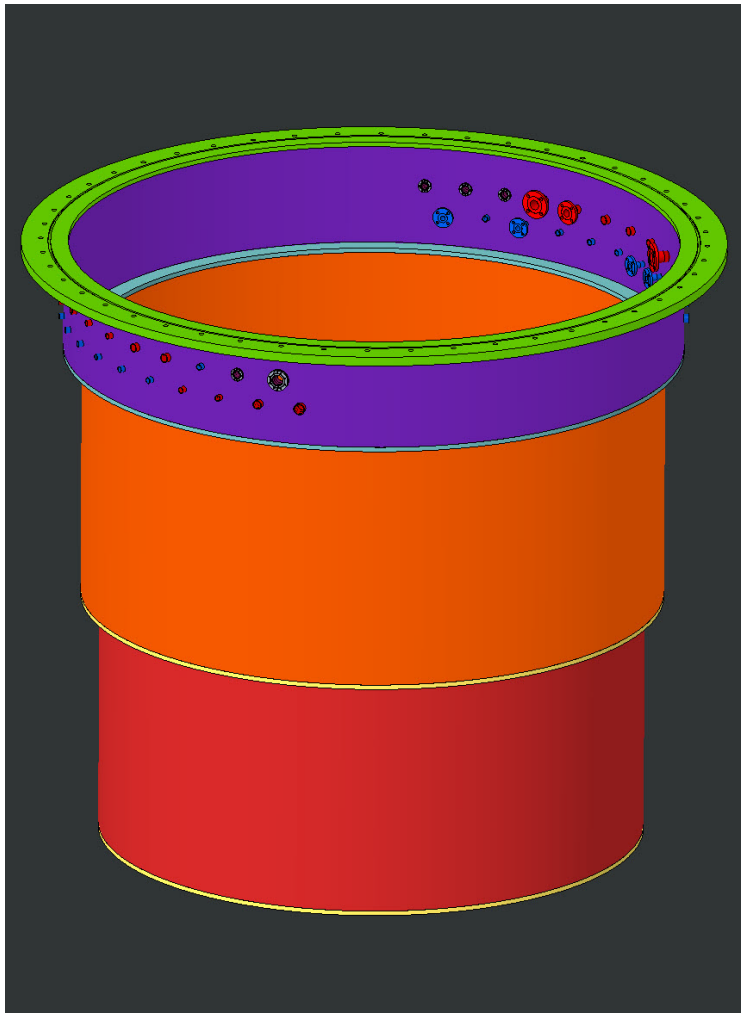
Pre-weld machine, fit and weld



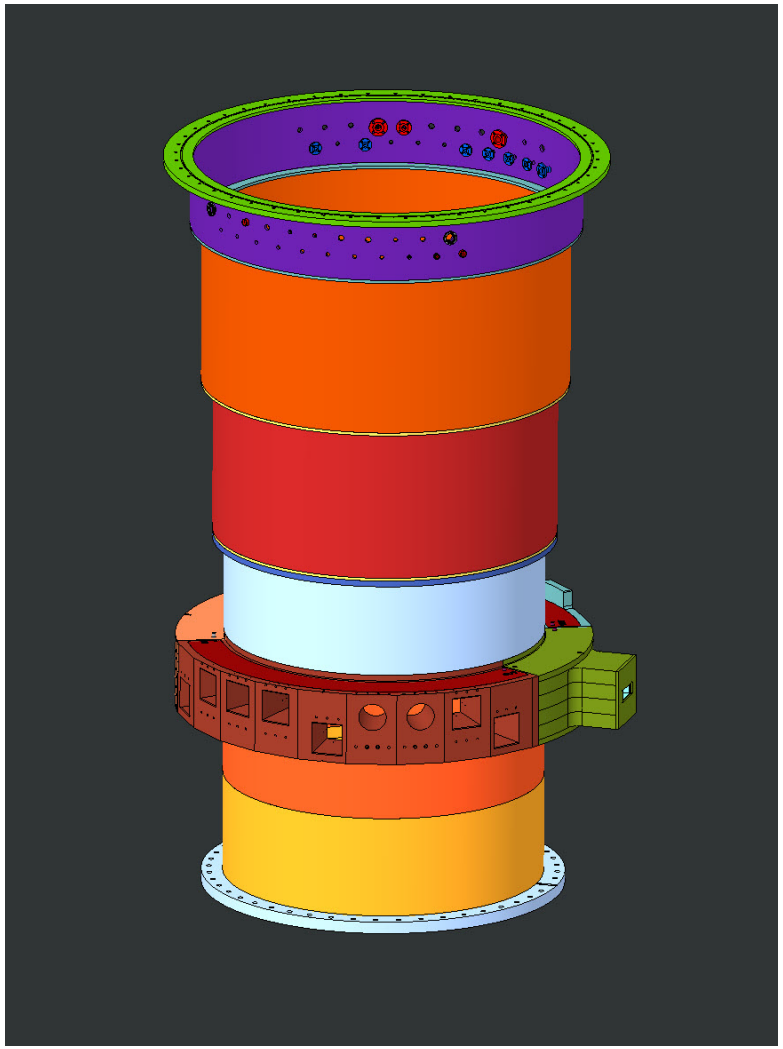
Laser cut, roll and weld

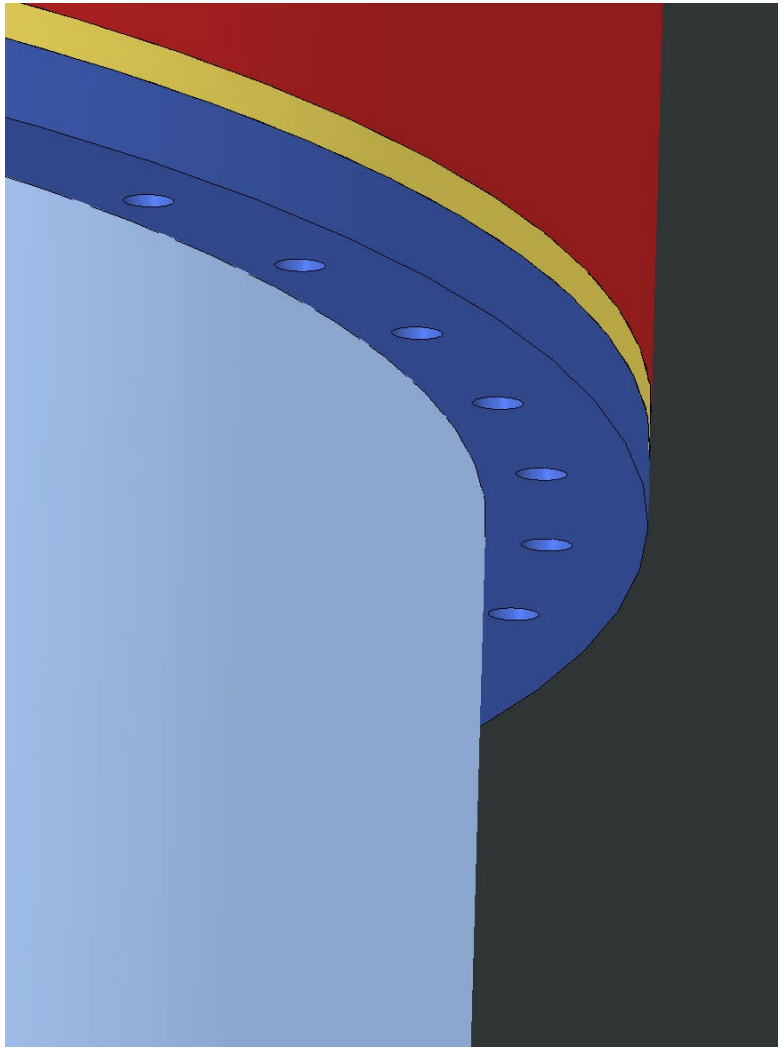


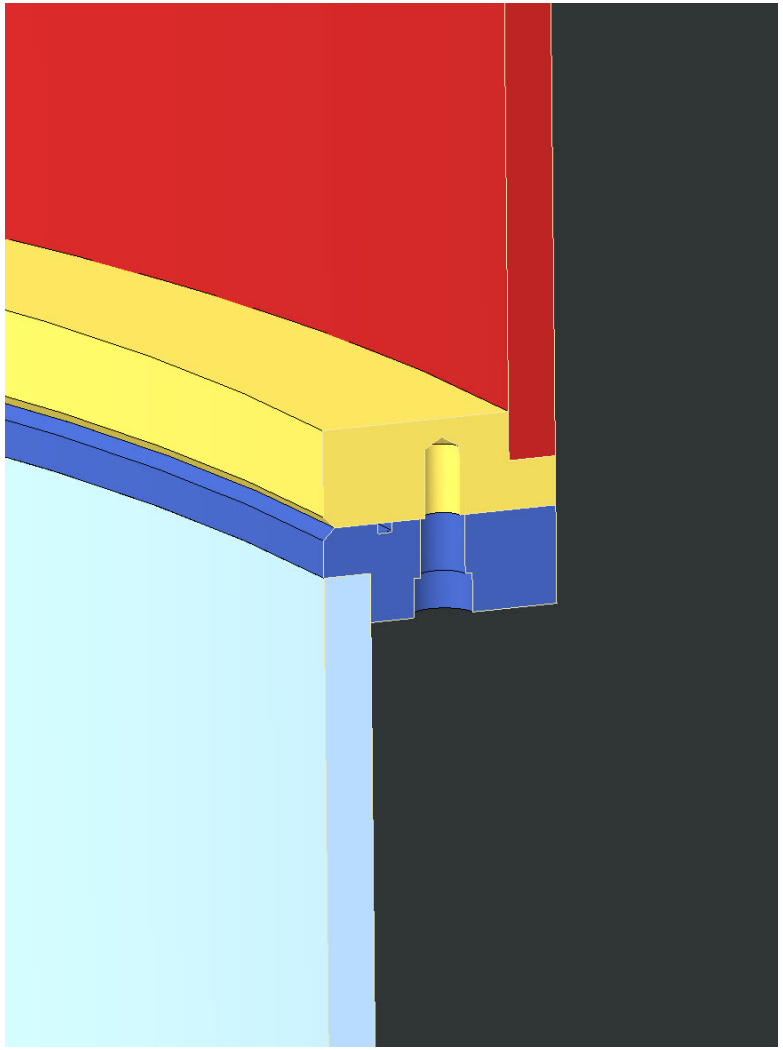
Fit and weld, final machining



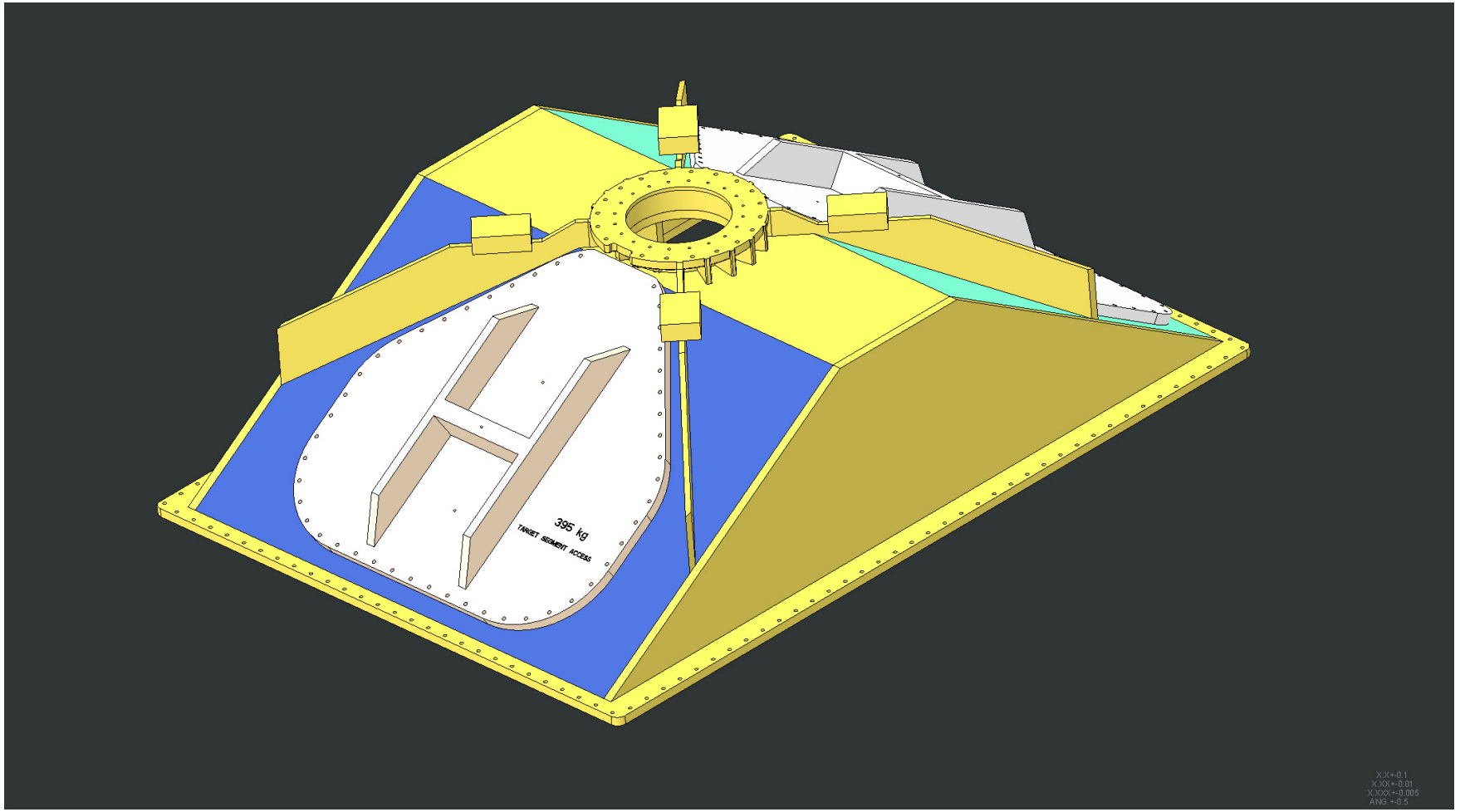
# Upper and lower weldments are bolted together for factory leak testing, and welded together once joined in the monolith



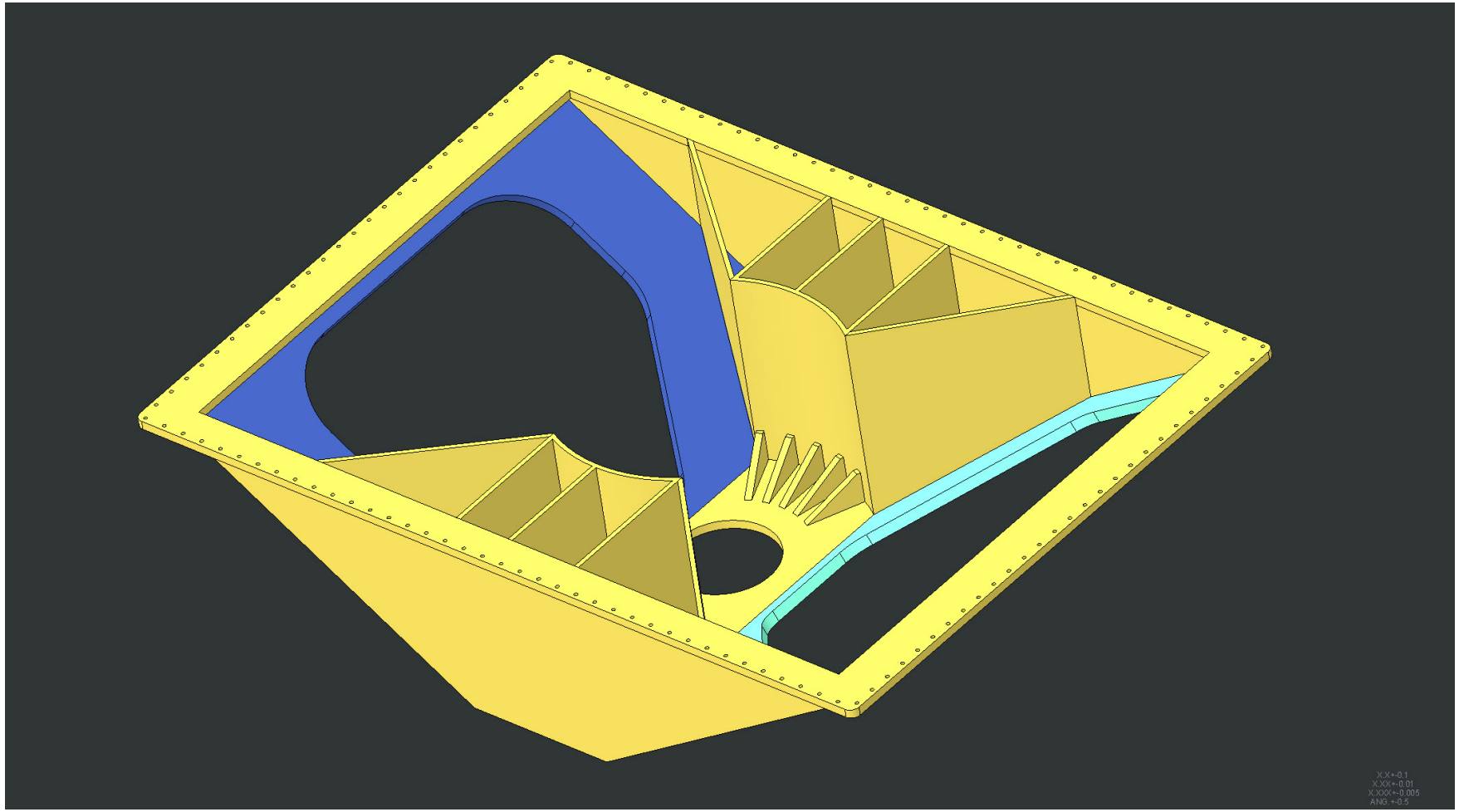




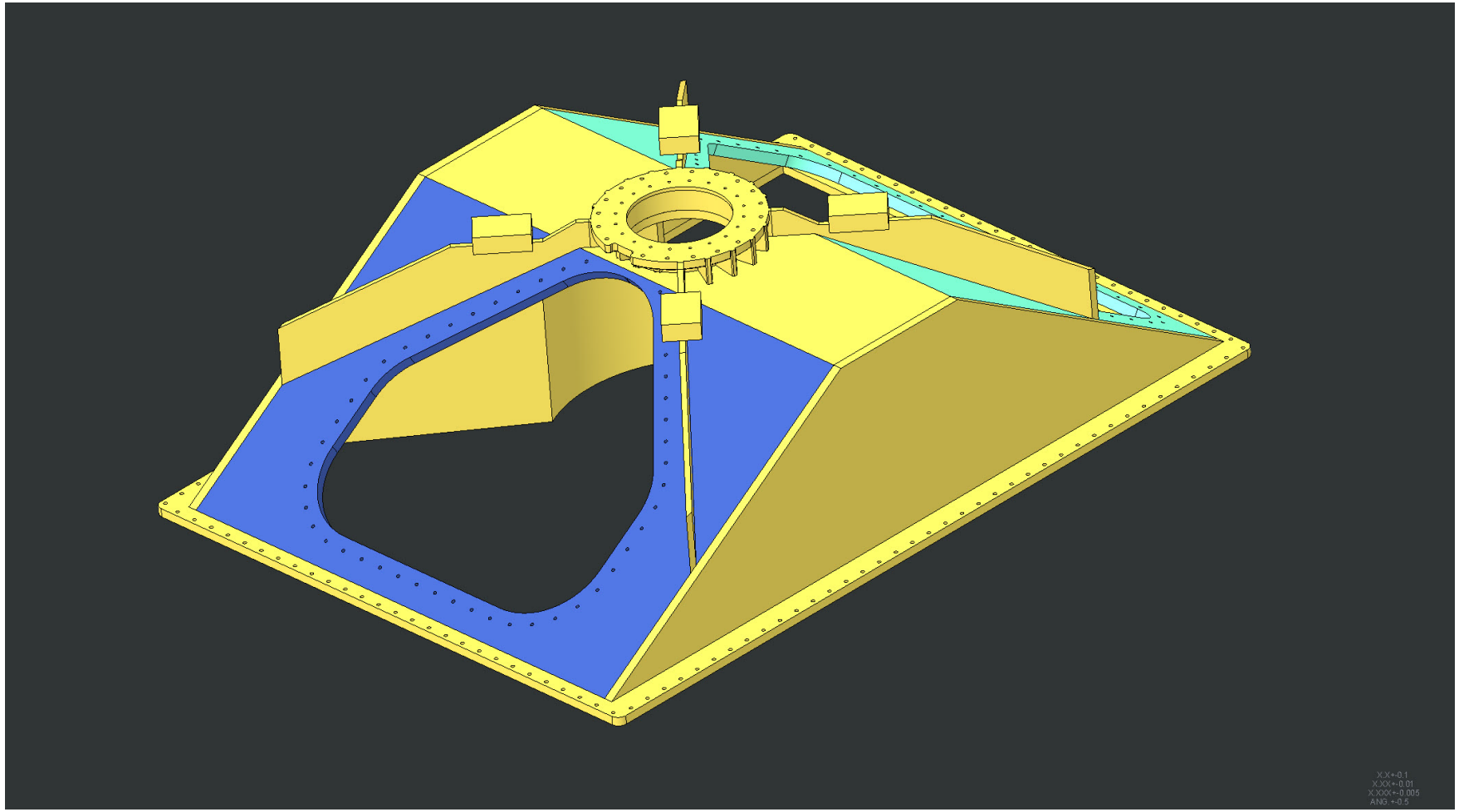
# The tent at the top of the CV is another weldment that requires some relatively simple fabrication followed by finish machining



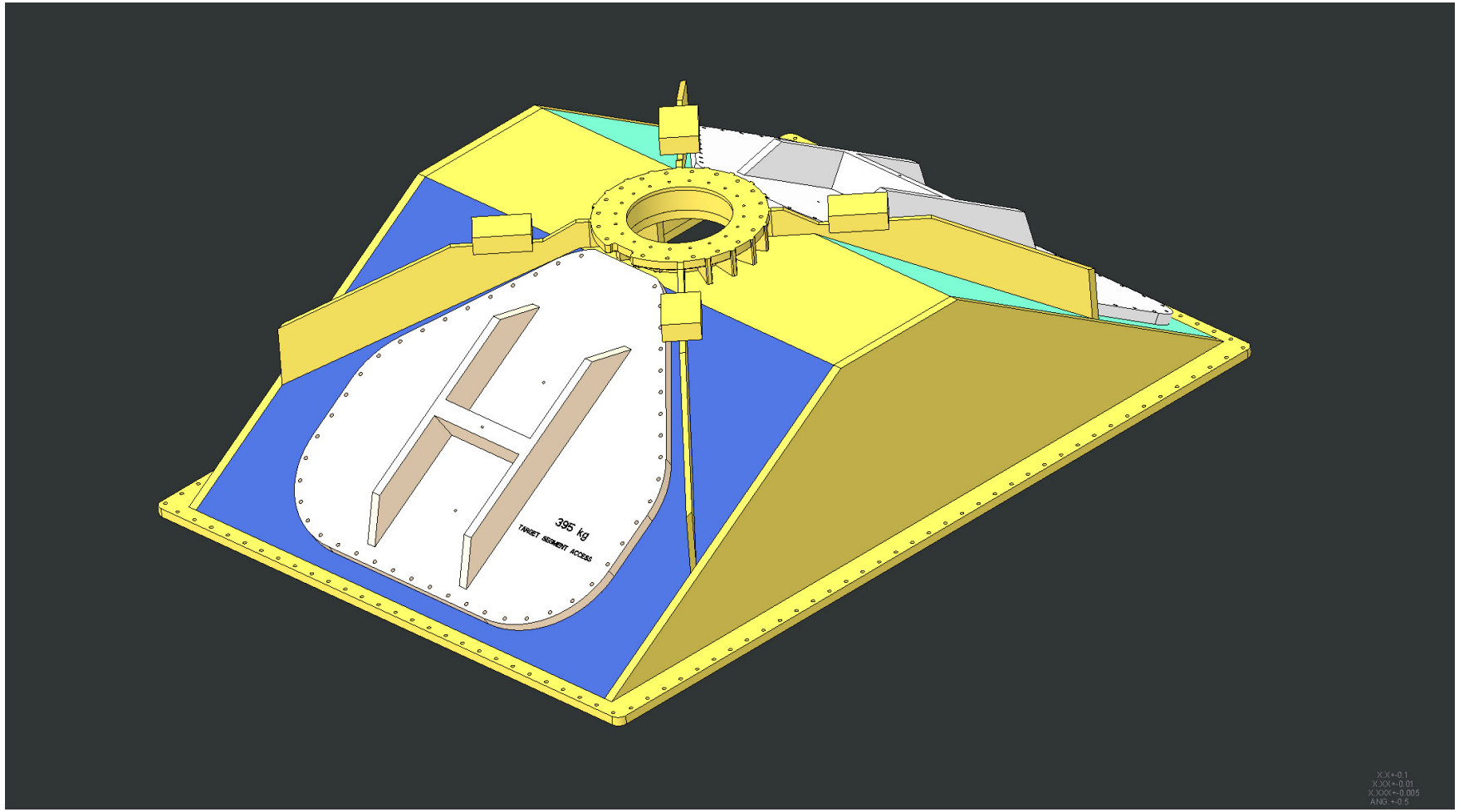
# Construction consists mostly of plates being welded to the base flange with a generous amount of bracing to support the weight of the Target Assembly and prevent deformation under a vacuum load



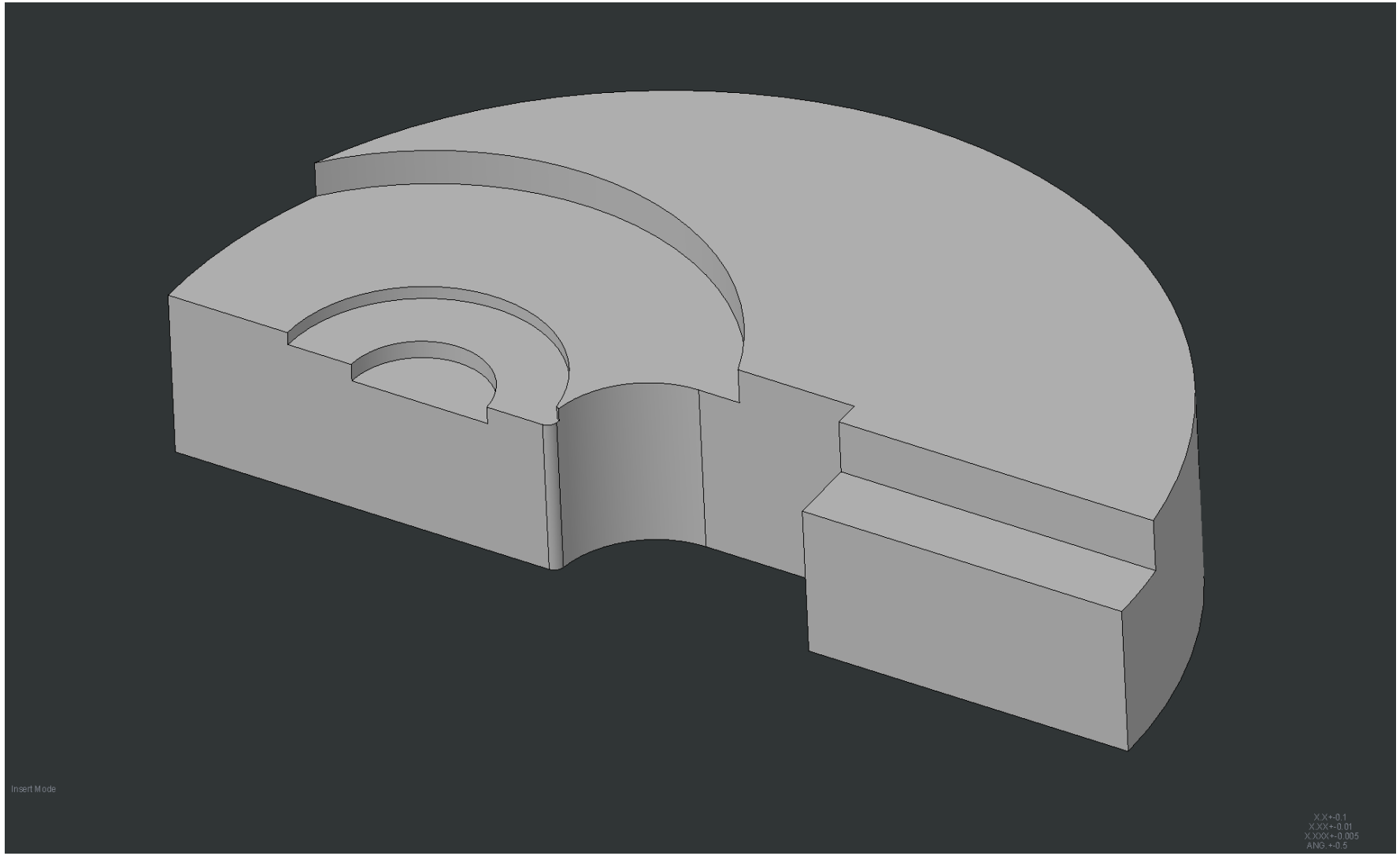
# The flange weldment for the Target Assembly is welded to the top of the Tent as well as additional bracing



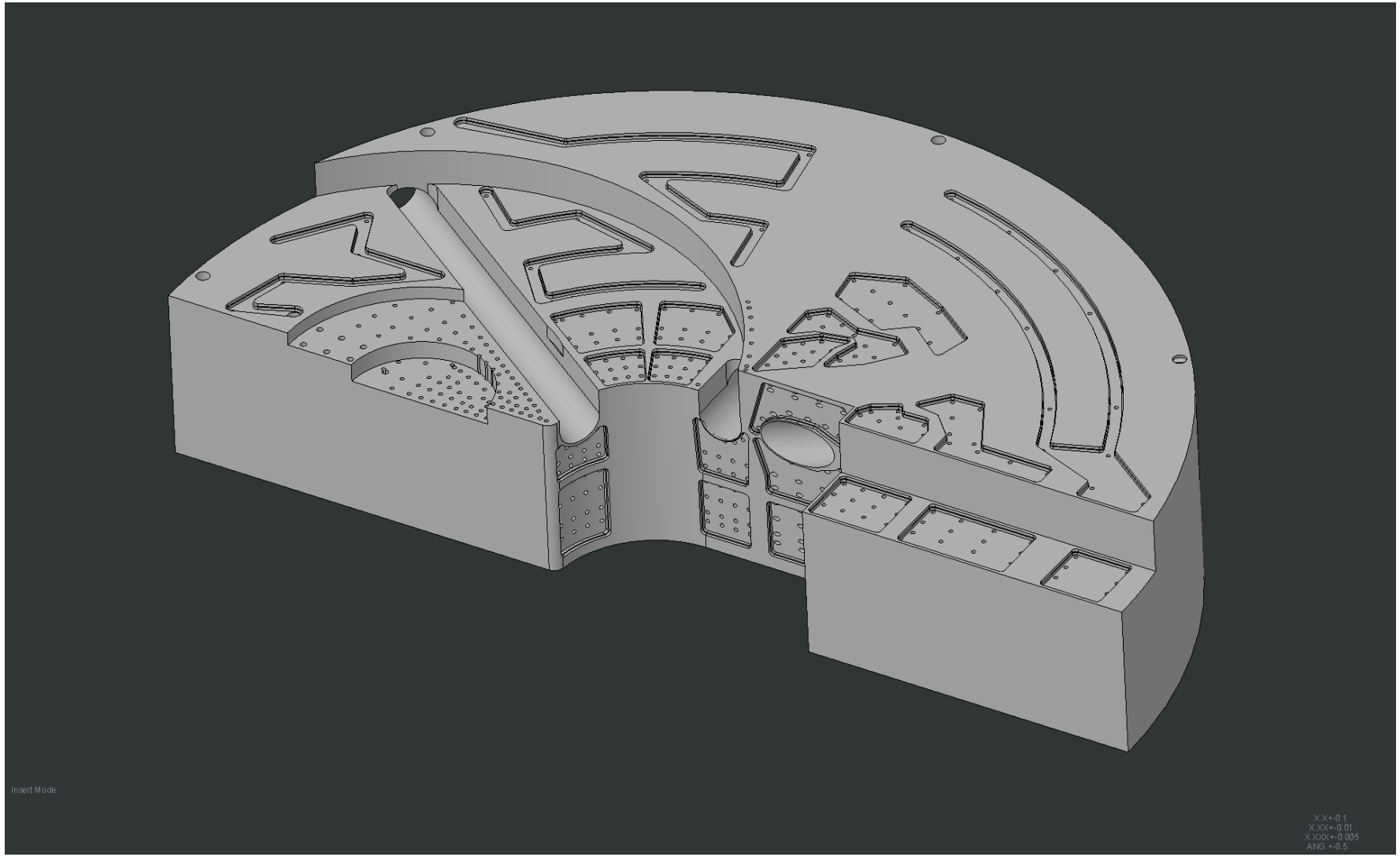
# Post-weld machining of the top and bottom flanges, hatch mating surfaces and target support pads to complete the weldment



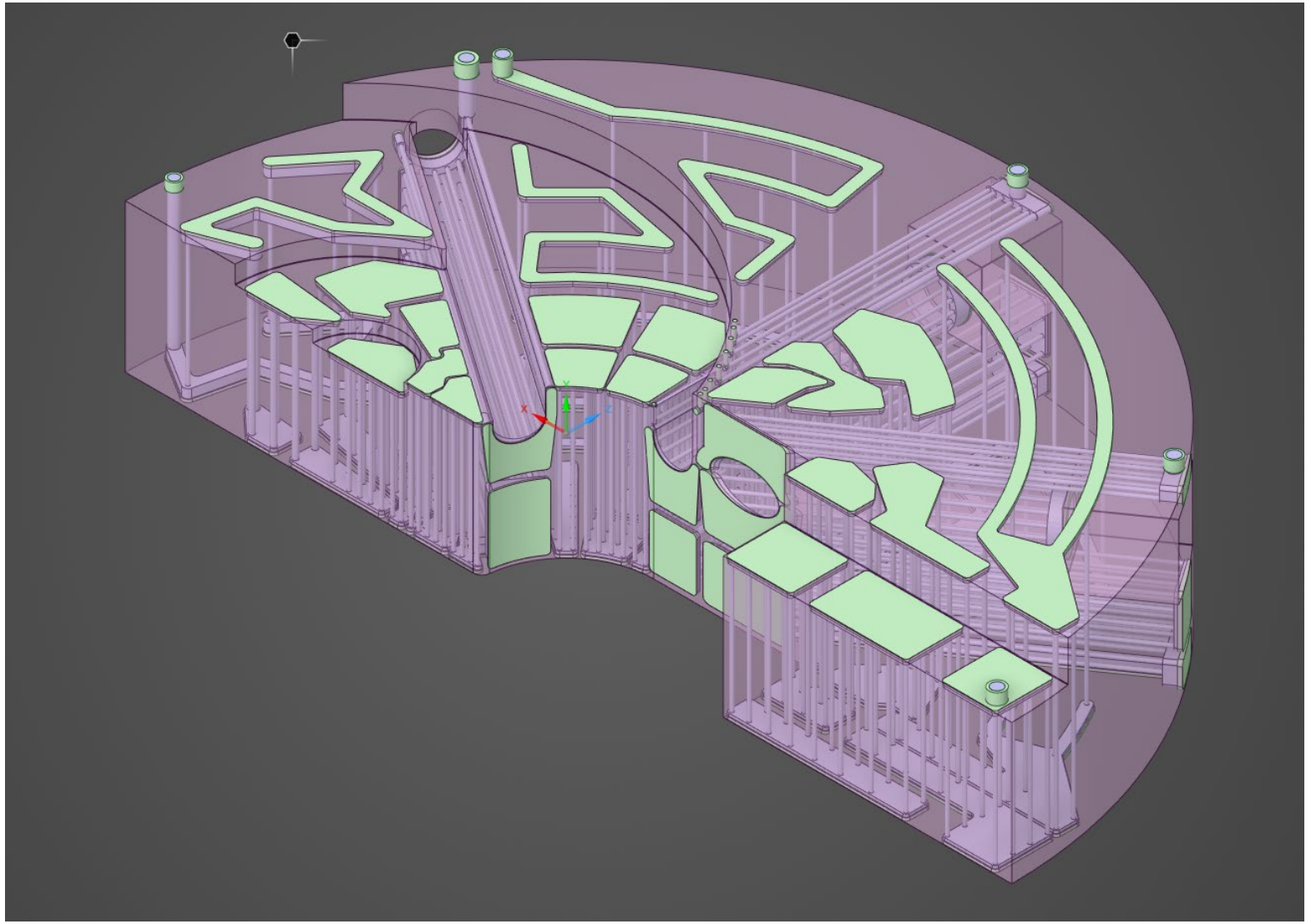
# The cooled shield blocks will start as a large, stainless-steel forgings and will be machined to size



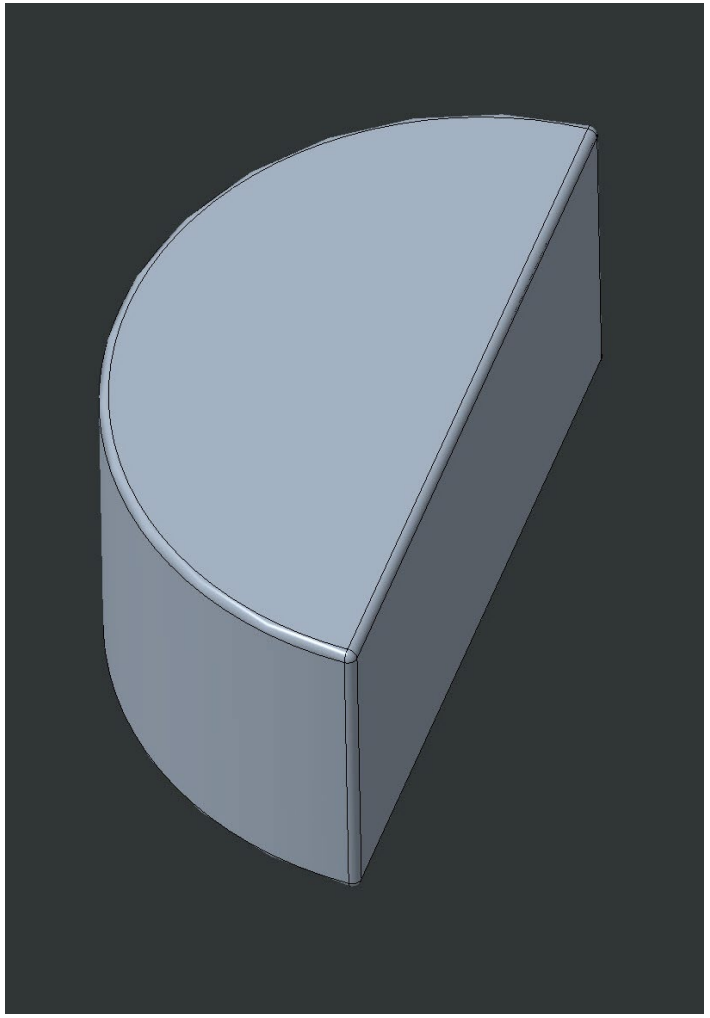
# After machining to size, more milling and drilling operations will follow to create all the necessary cooling channels

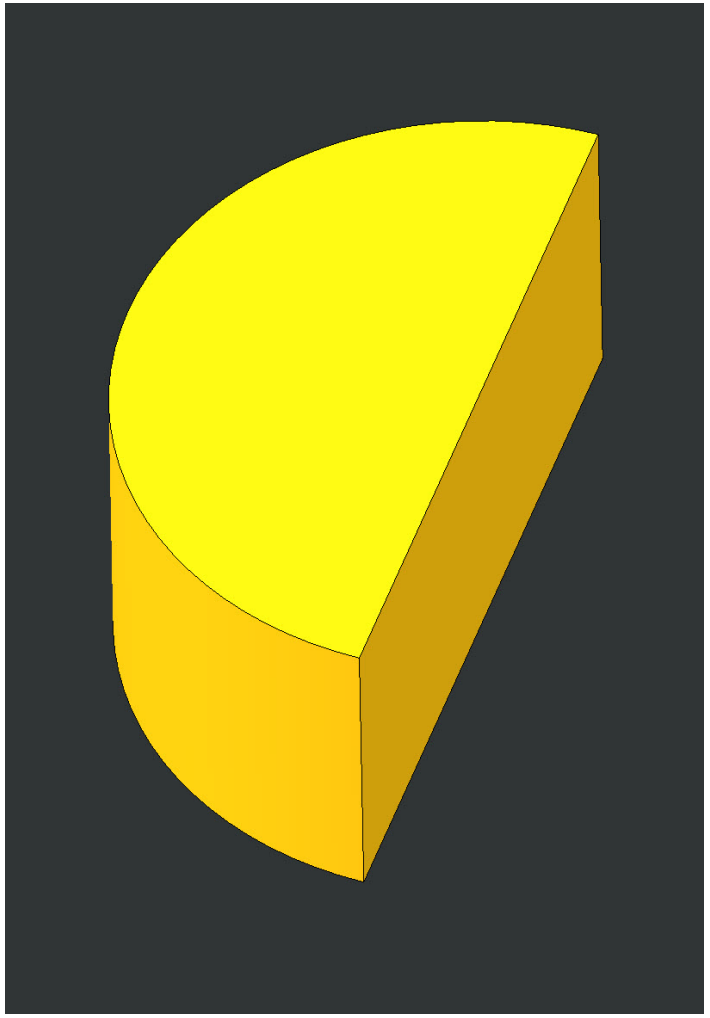


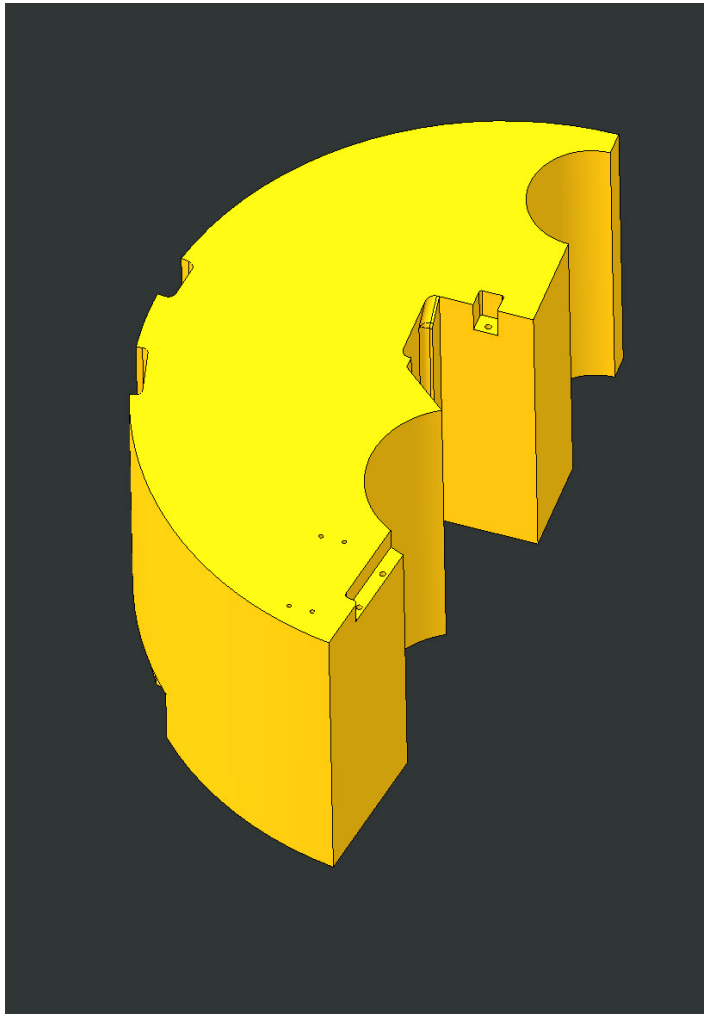
# When machining is completed, plenums will be installed to properly direct coolant flow



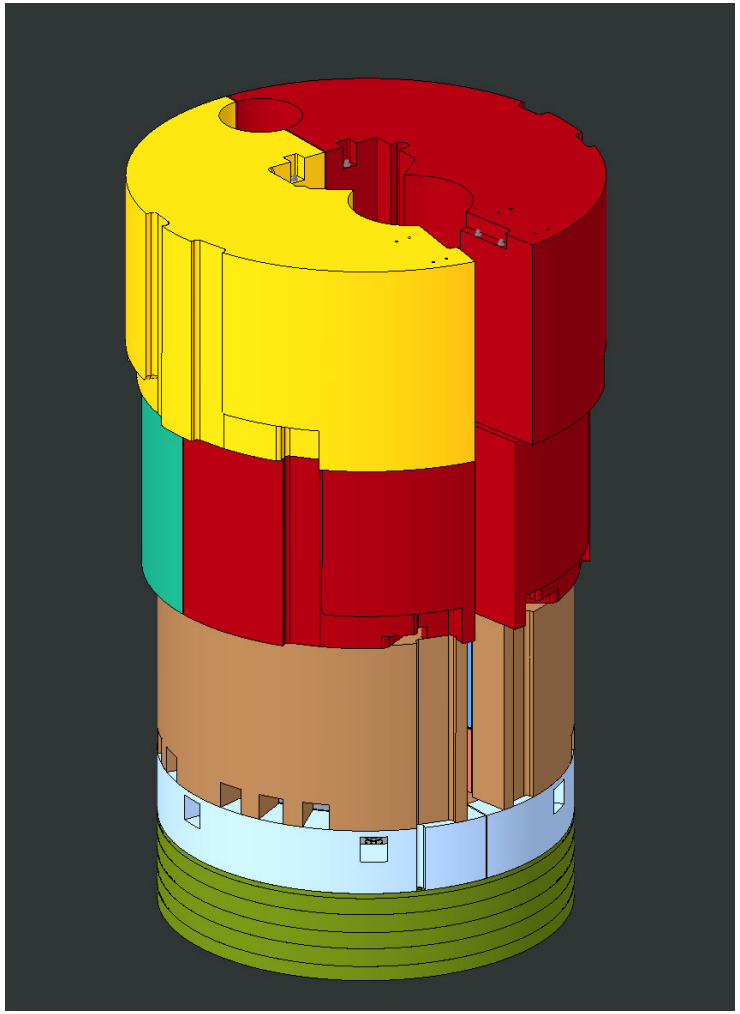
# Uncooled shield block typical manufacturing

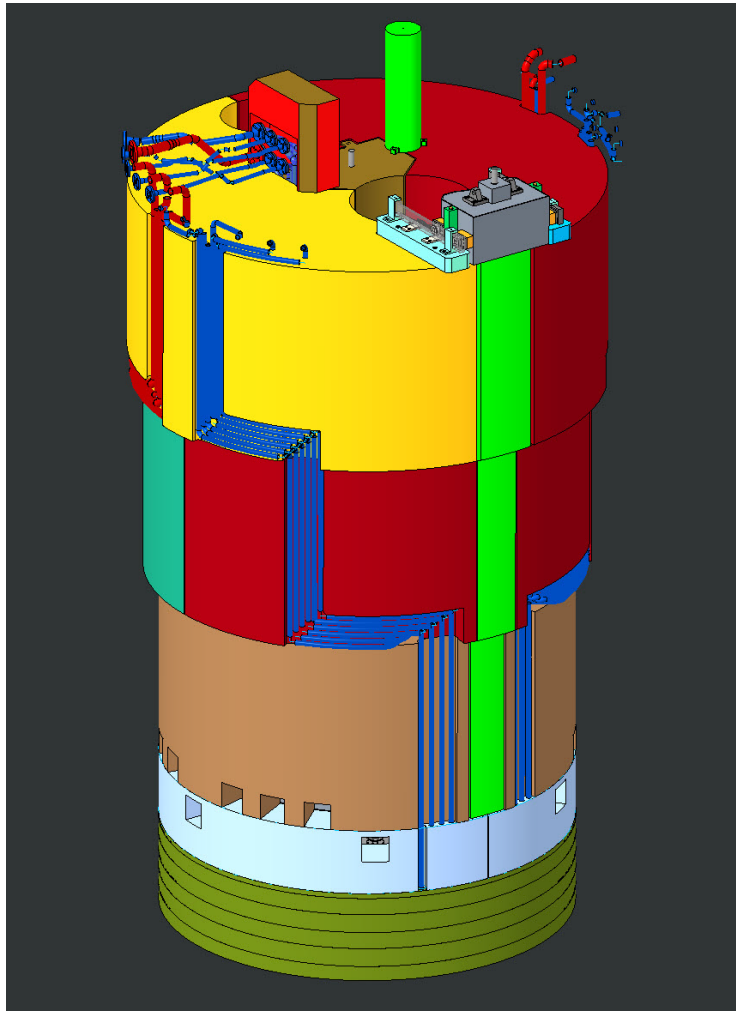




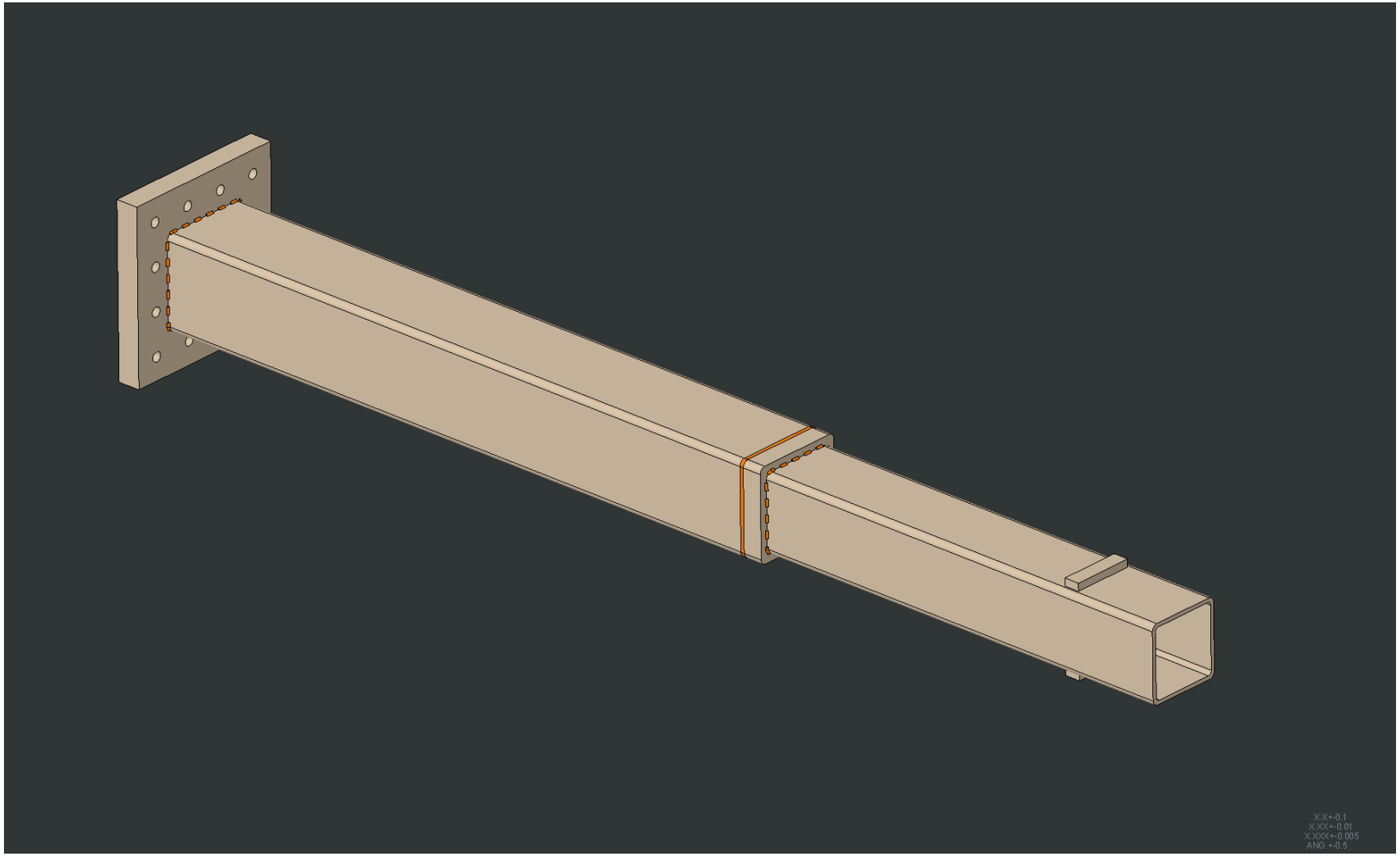


# Fully assembled shield stack without and with piping and removable shielding

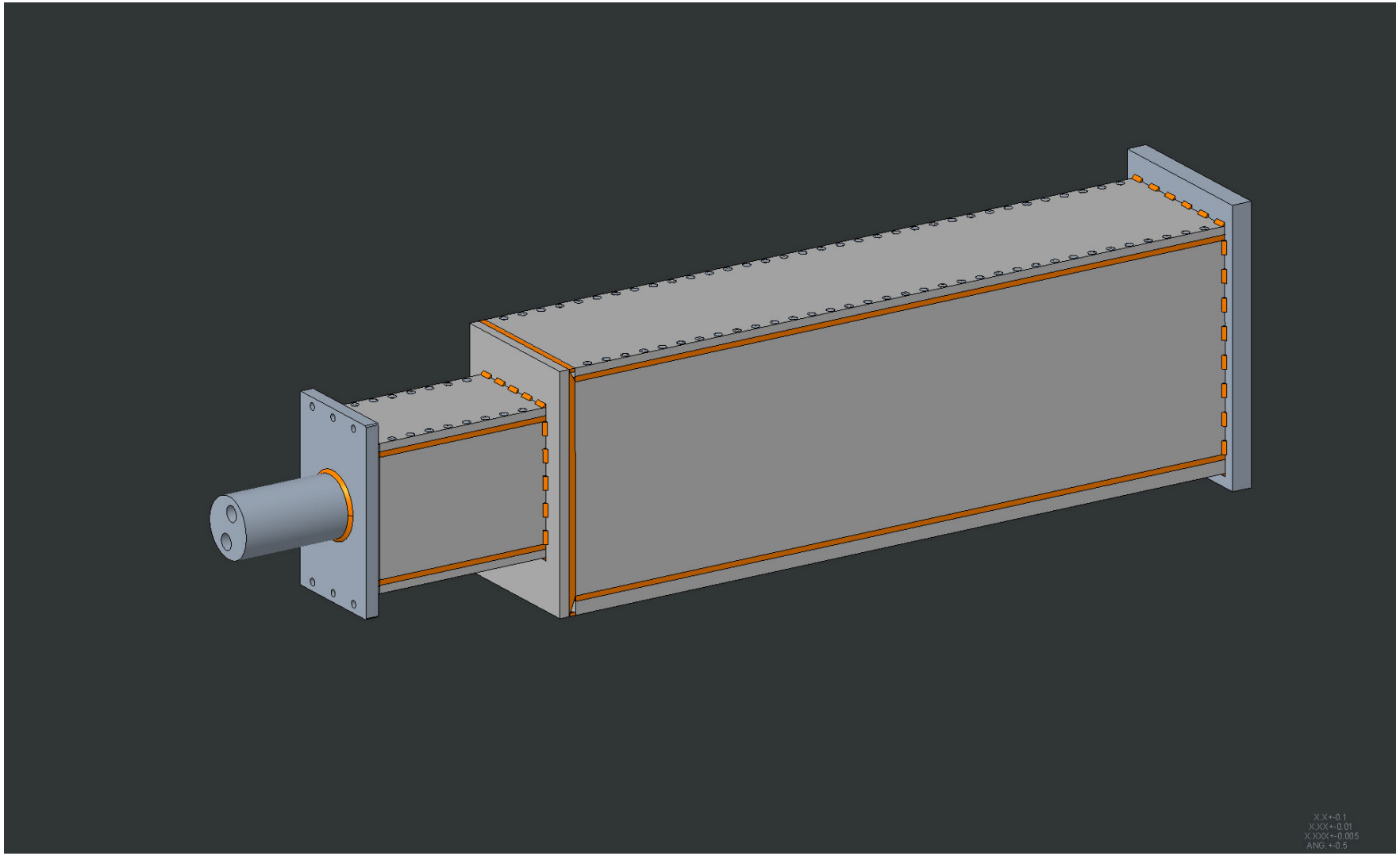




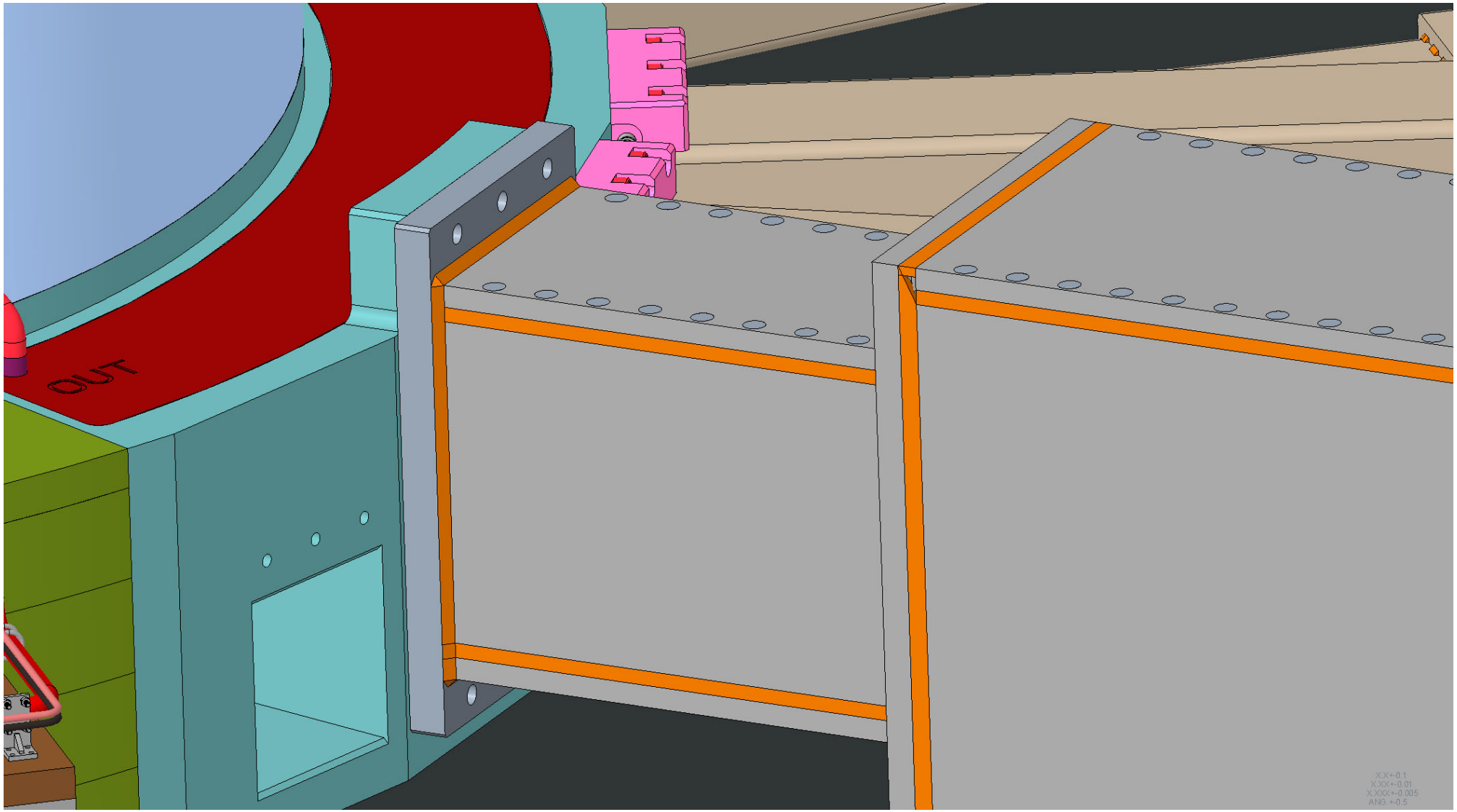
# The standard beam nozzles will be constructed of square steel tubing that is welded together with a transition flange



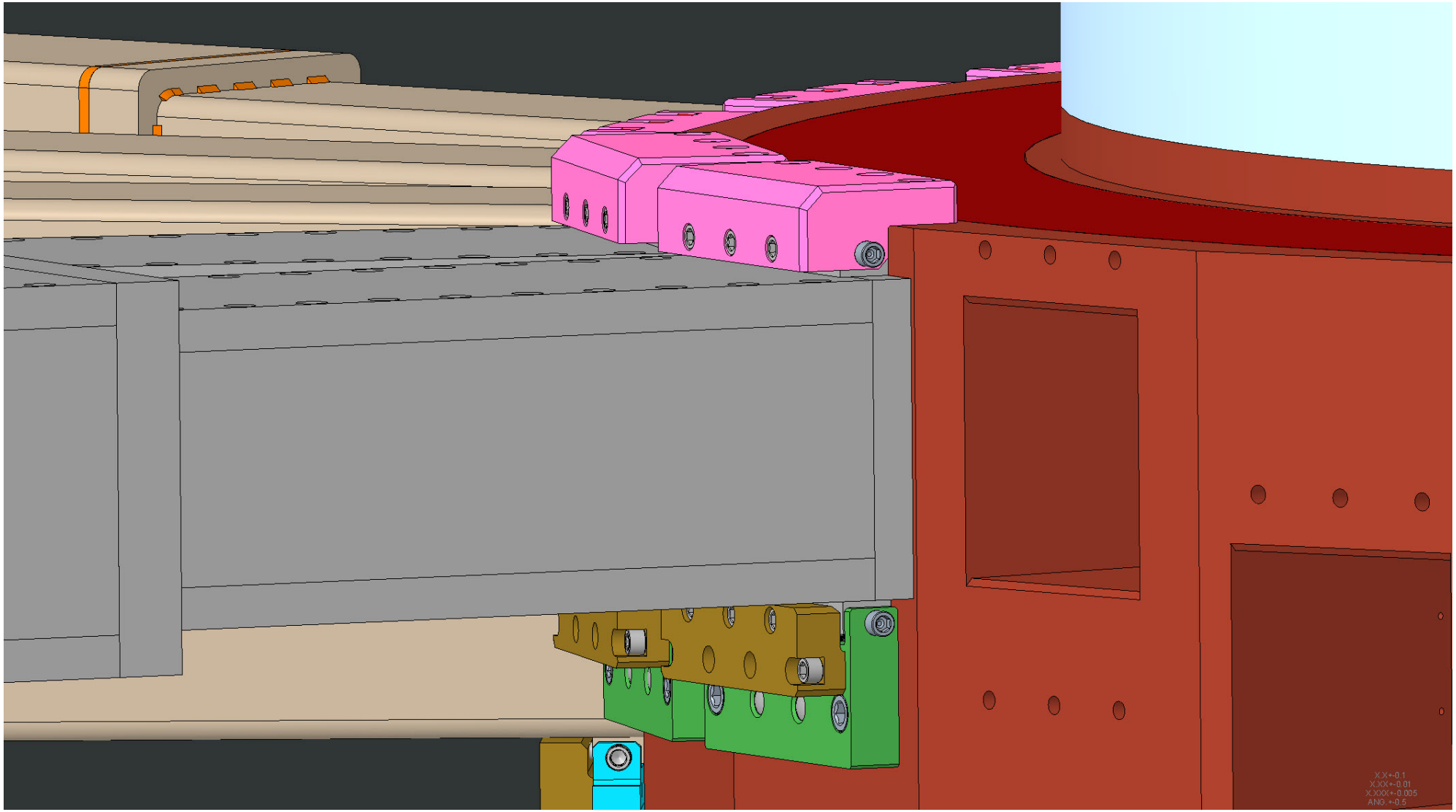
# QIKR and the Dual Beam Nozzle shields will be construct of machined plate that is bolted and welded together.



# QIKR Installation



# Dual Nozzle and Standard Nozzle Installation



# Interior view of the landing pads