

Tooling for Cavity Processing, String Assembly And Cryomodule

C. Pai
3-8-2011

Processes For Cavity, String Assembly and Cryomodule

1. Cavity and Helium Vessel

Ultra Sonic Cleaning

BCP, Buffer Chemical Polishing

HPR, High Pressure Rinse

UHV 600°C Heat Treatment: (One Time after bulk BCP)

VTF, Vertical test Facility

Repeat all processes if needed

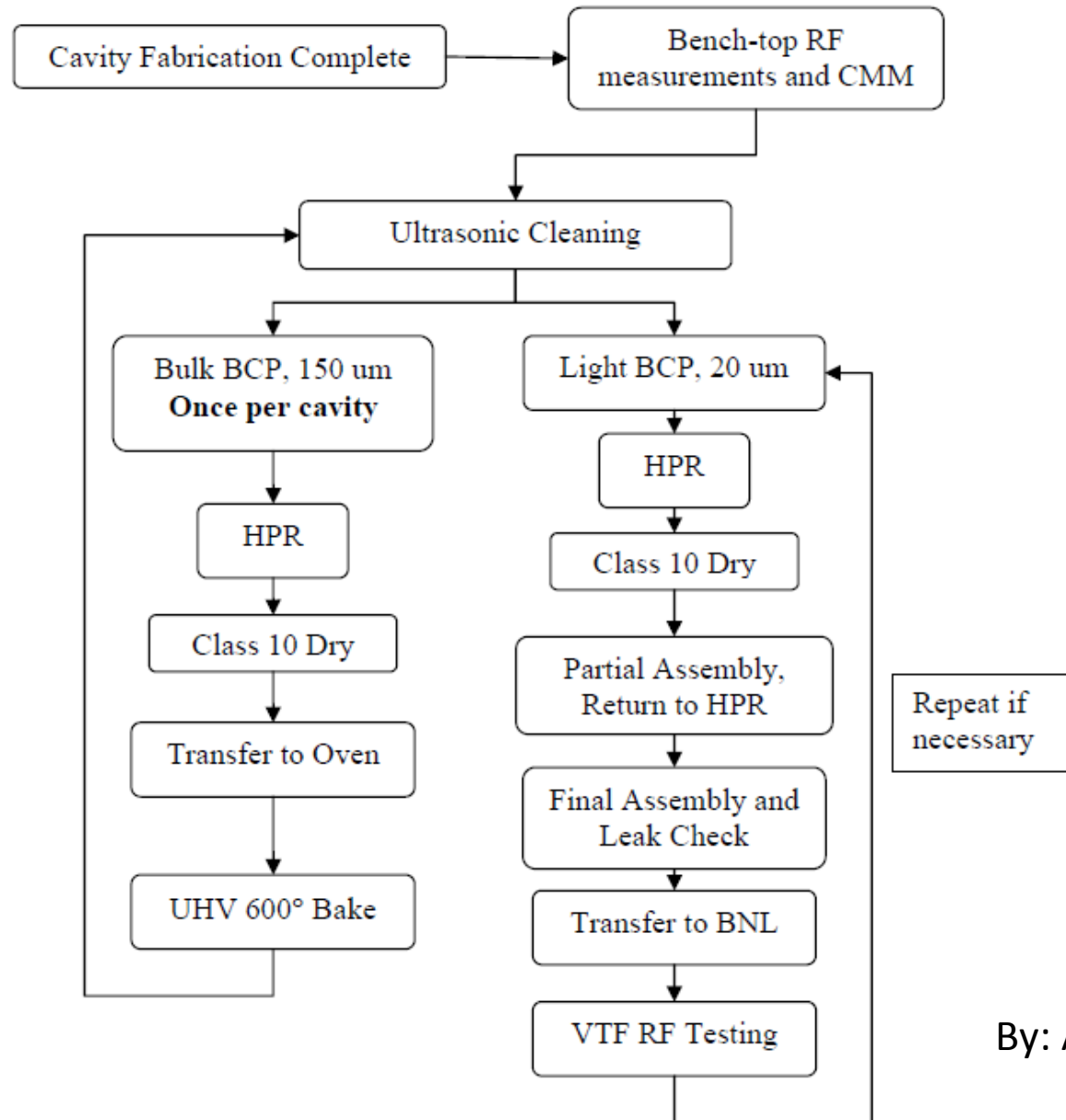
2. String Components Assembled in Clean room

3. Cryomodule Construction

4. Lifting and Transportation

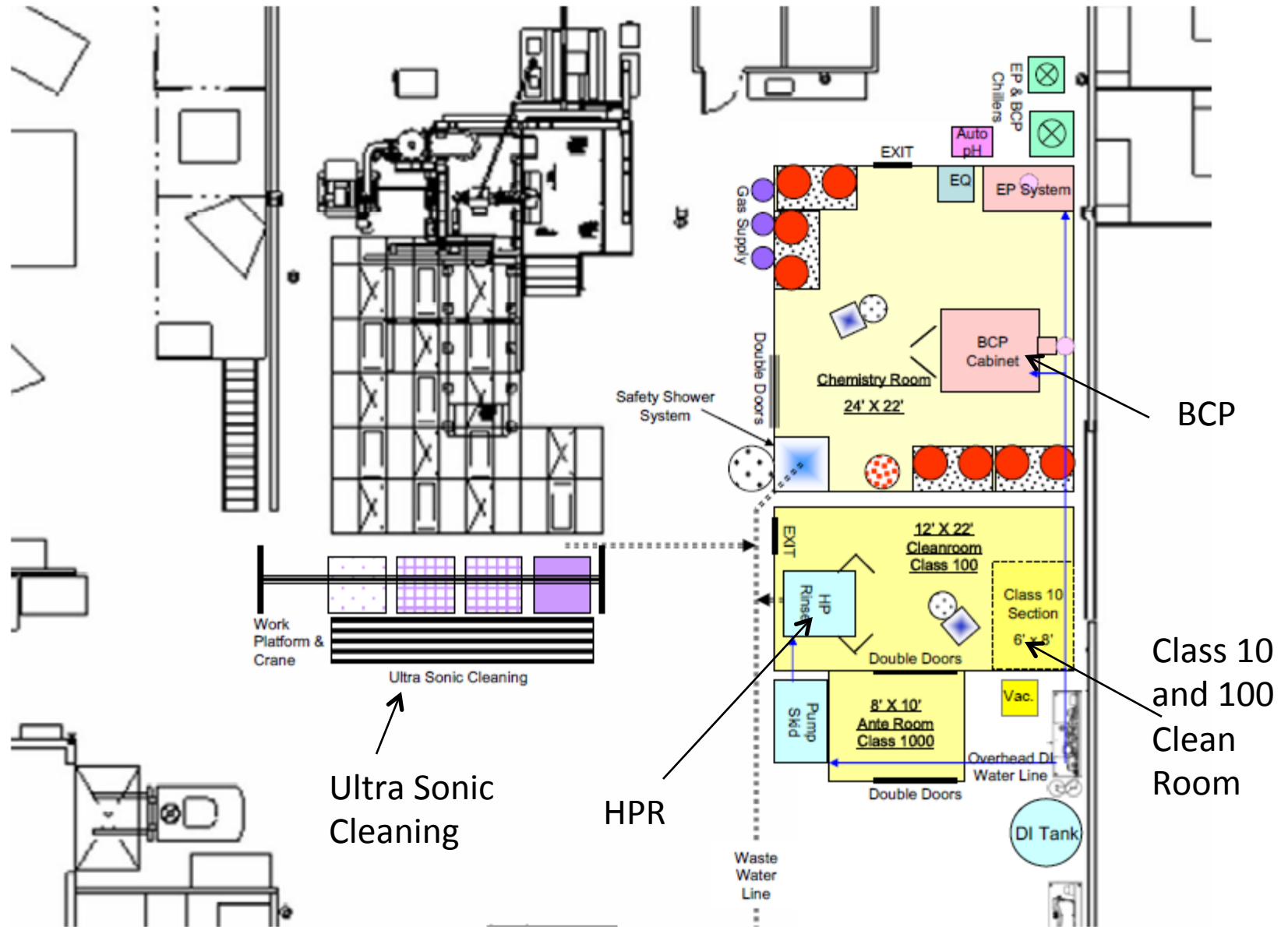
Between each process

Flow Chart of Cavity Process

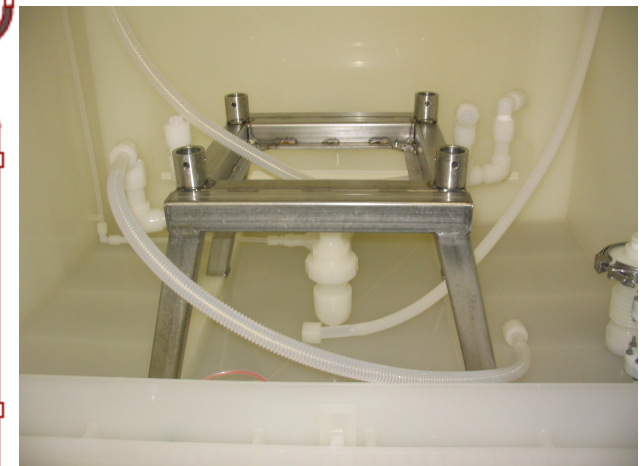
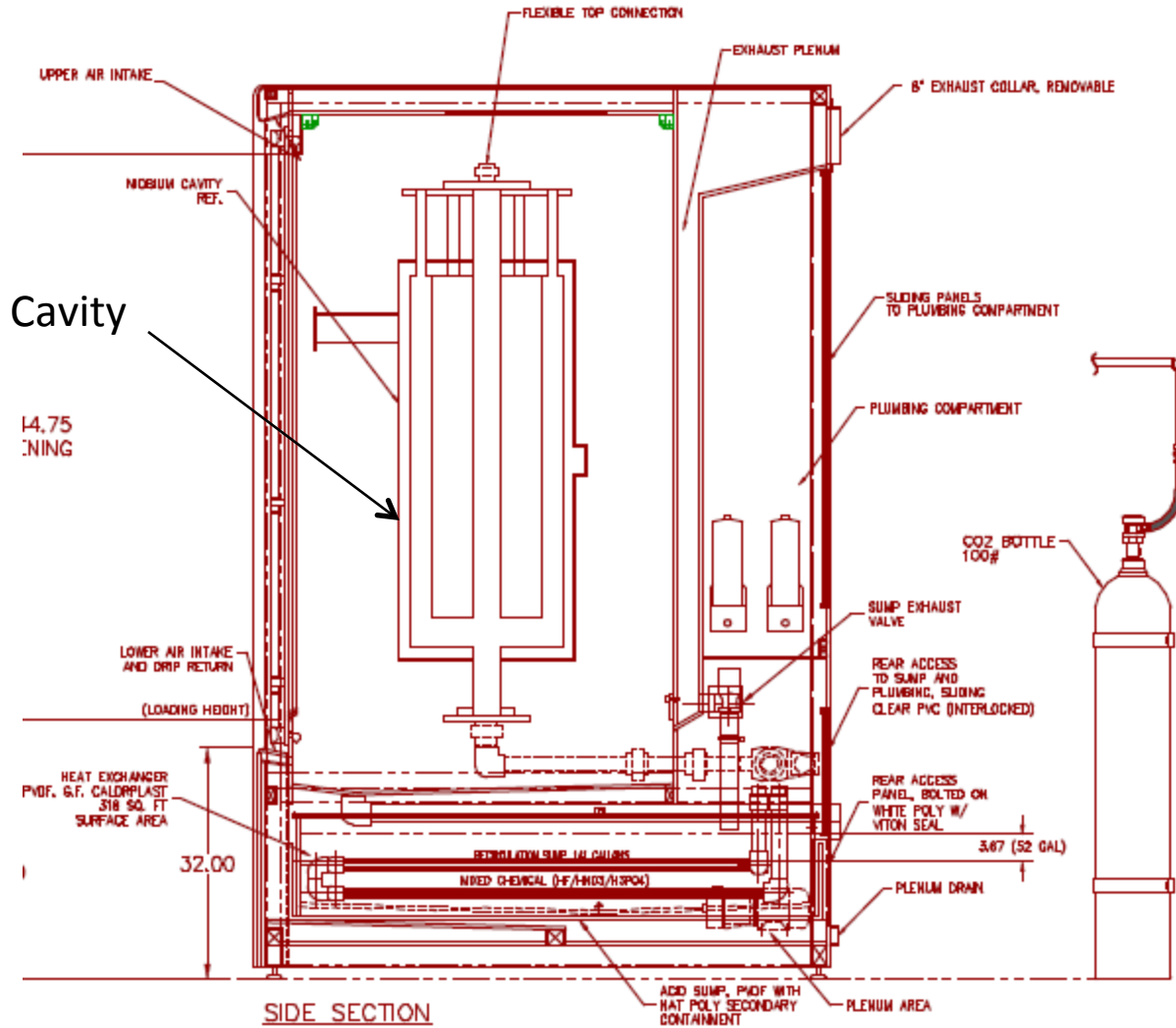


By: A. Burrill

Cavity Vessel Processing Facility in AES

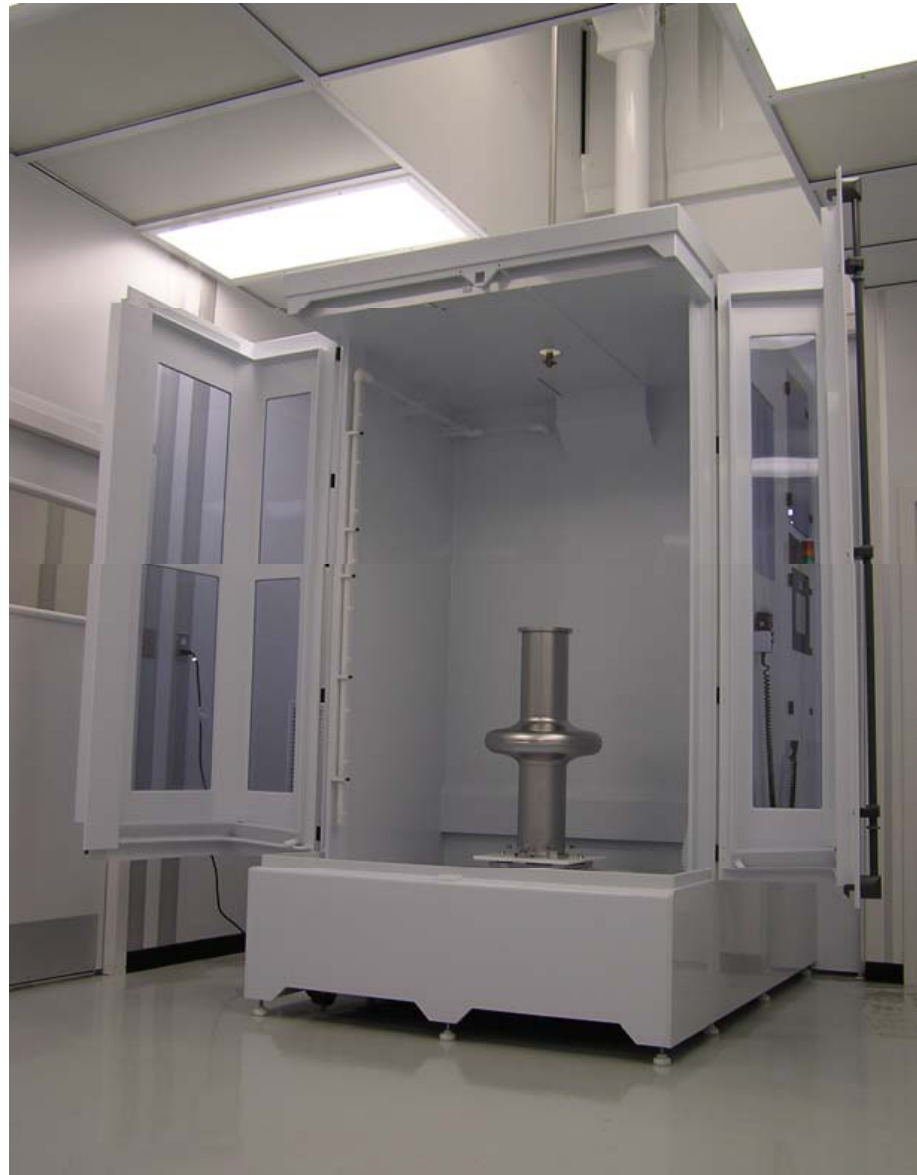


BCP Cabinet (AES)



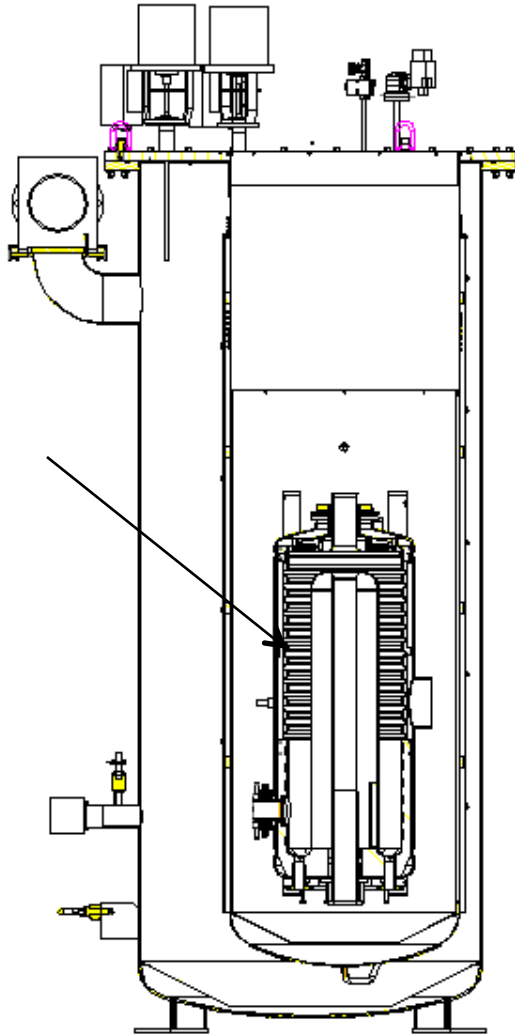
Support Stand

HPR Cabinet (High Pressure Rise)

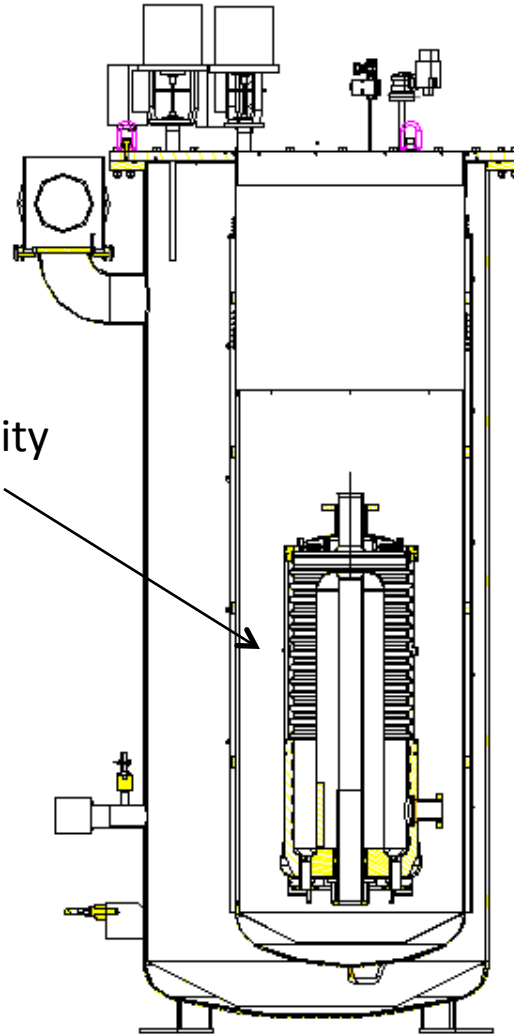


Cavity Niobium vessel in Vertical Test Dewar

Nb Cavity
Without
Helium
vessel



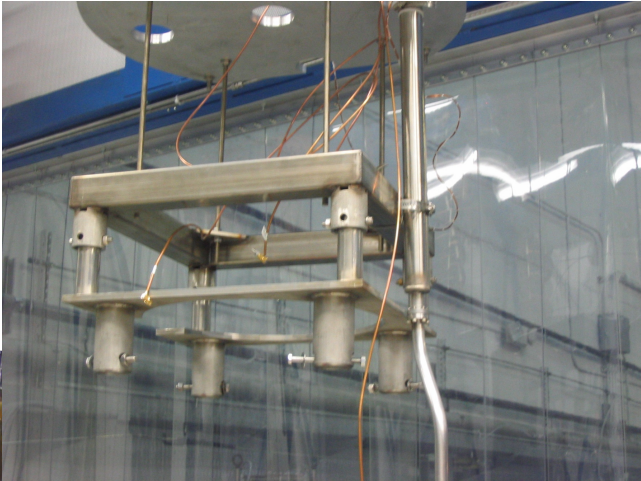
Nb Cavity
with
Helium
vessel



Tool used in Previous Cavity process



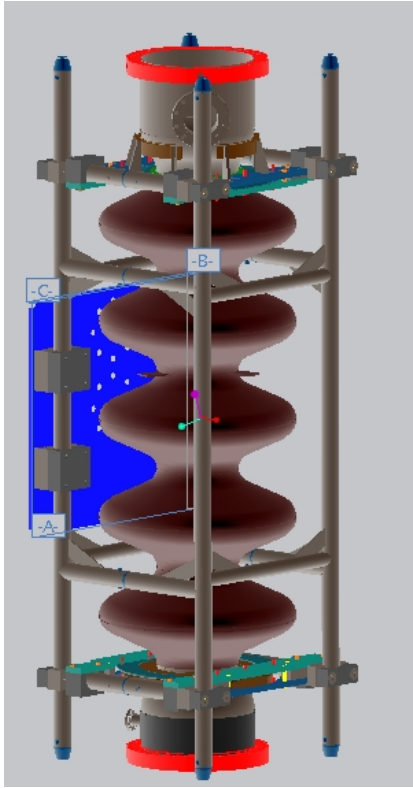
Flip Cart



VTF Adaptor



Roll Cart

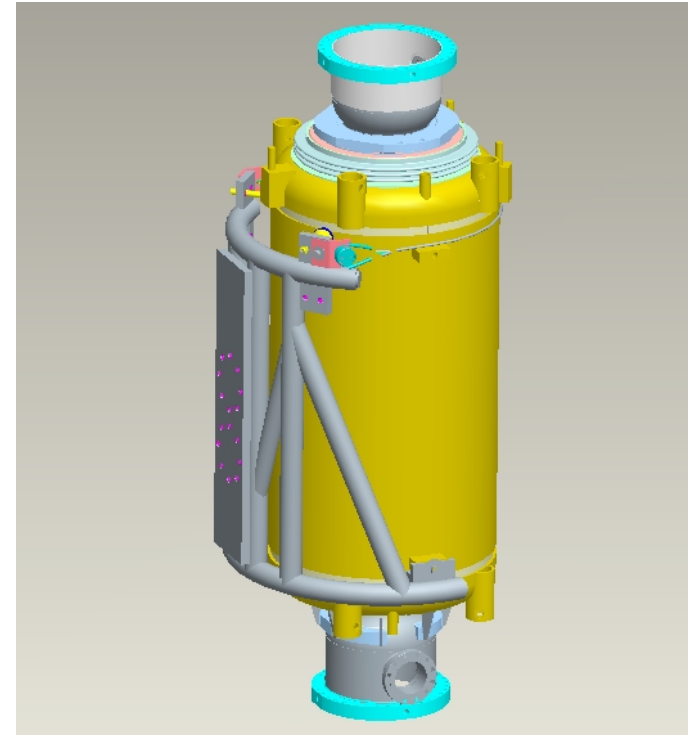


Cavity Cage

Tool used for Helium Vessel

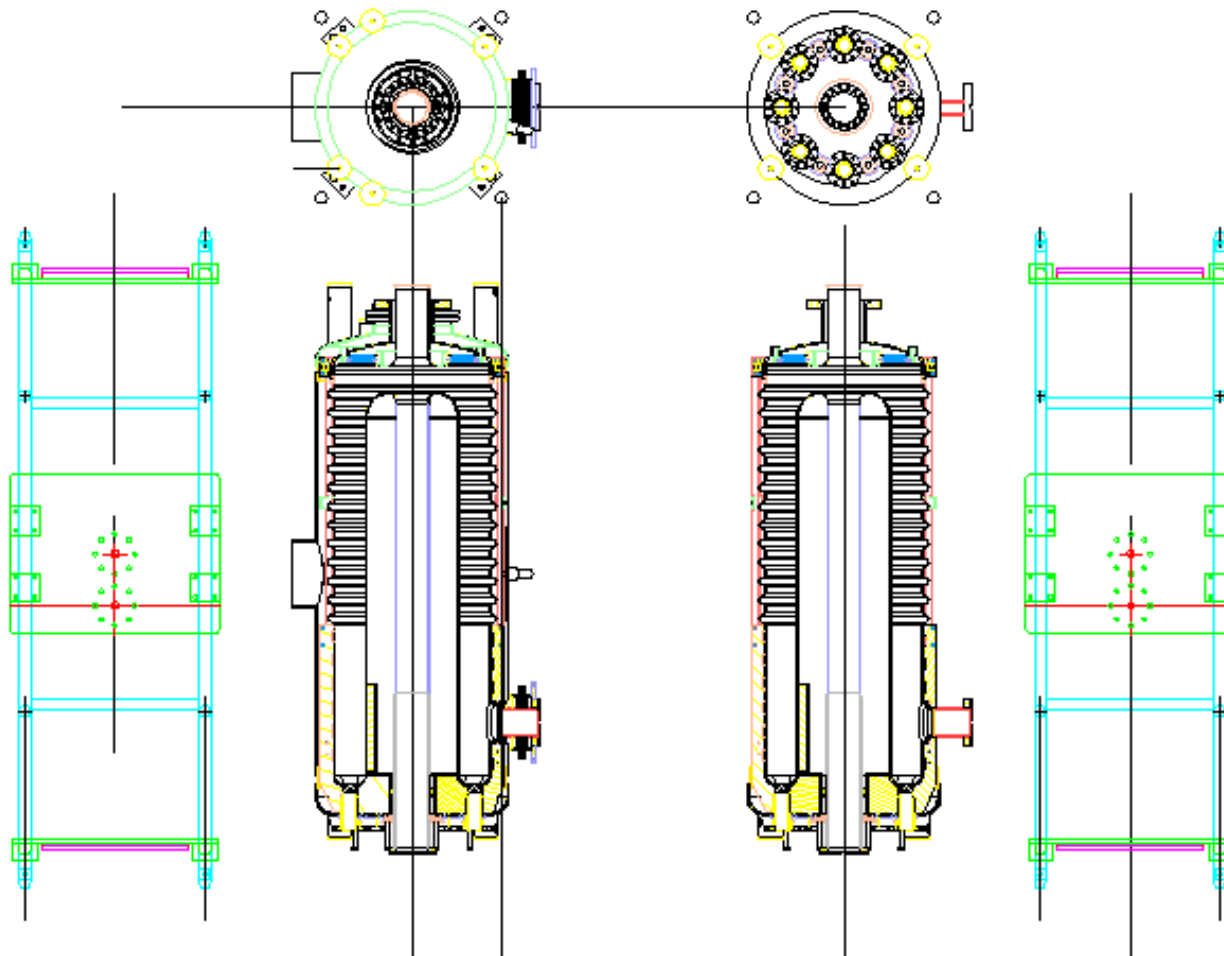


Back –Tech with Holding
fixture (Adaptor)



Helium Vessel with
Holding Fixture
(adaptor)

Cavity Cage for 56 MHz cavity



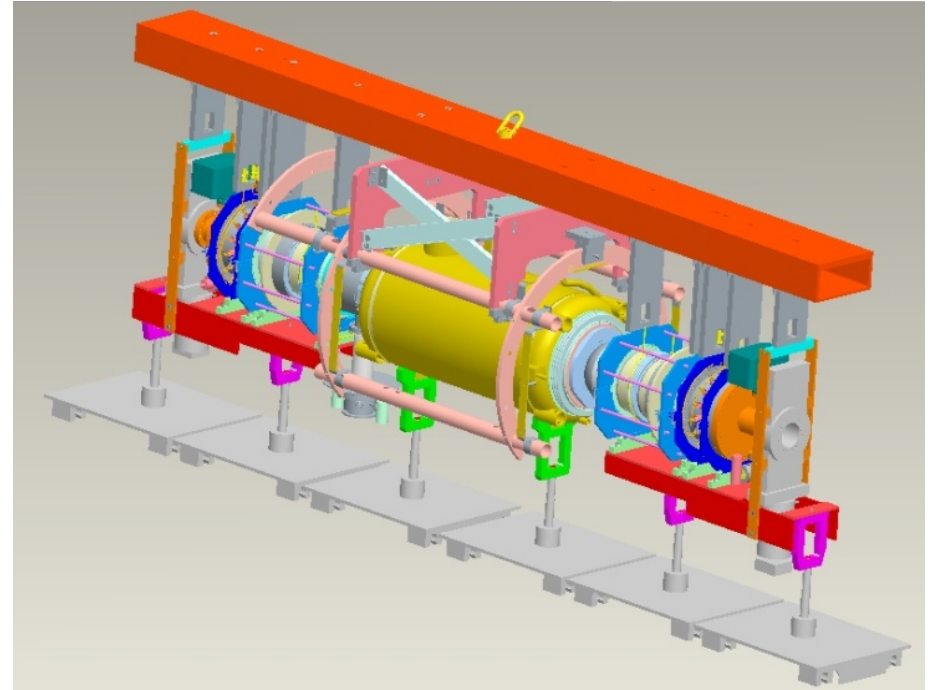
Nb cavity
With Helium
vessel

Nb cavity
Without Helium
vessel

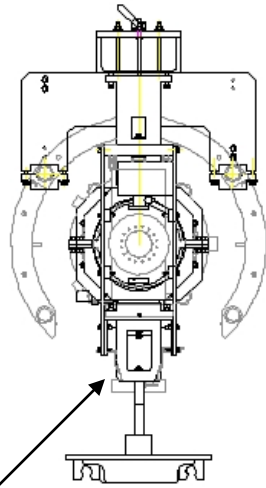
Helium vessel Handling (Alum-A-Lift Handling Equipment)



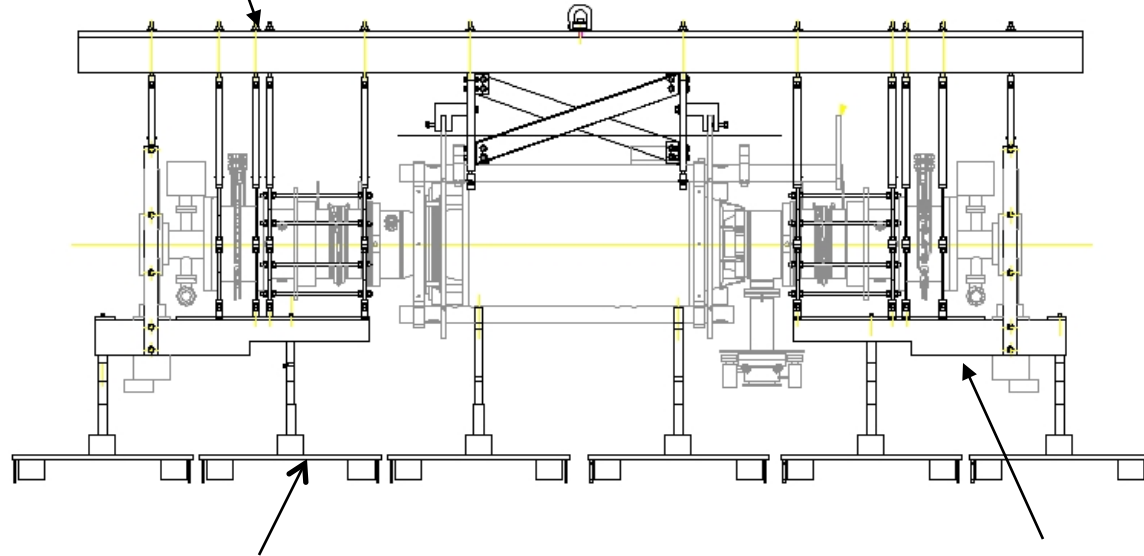
Cavity string assembly Tooling Used in Previous String assembly



Upper strong
box beam for
lifting



Slide
carriage
adaptor

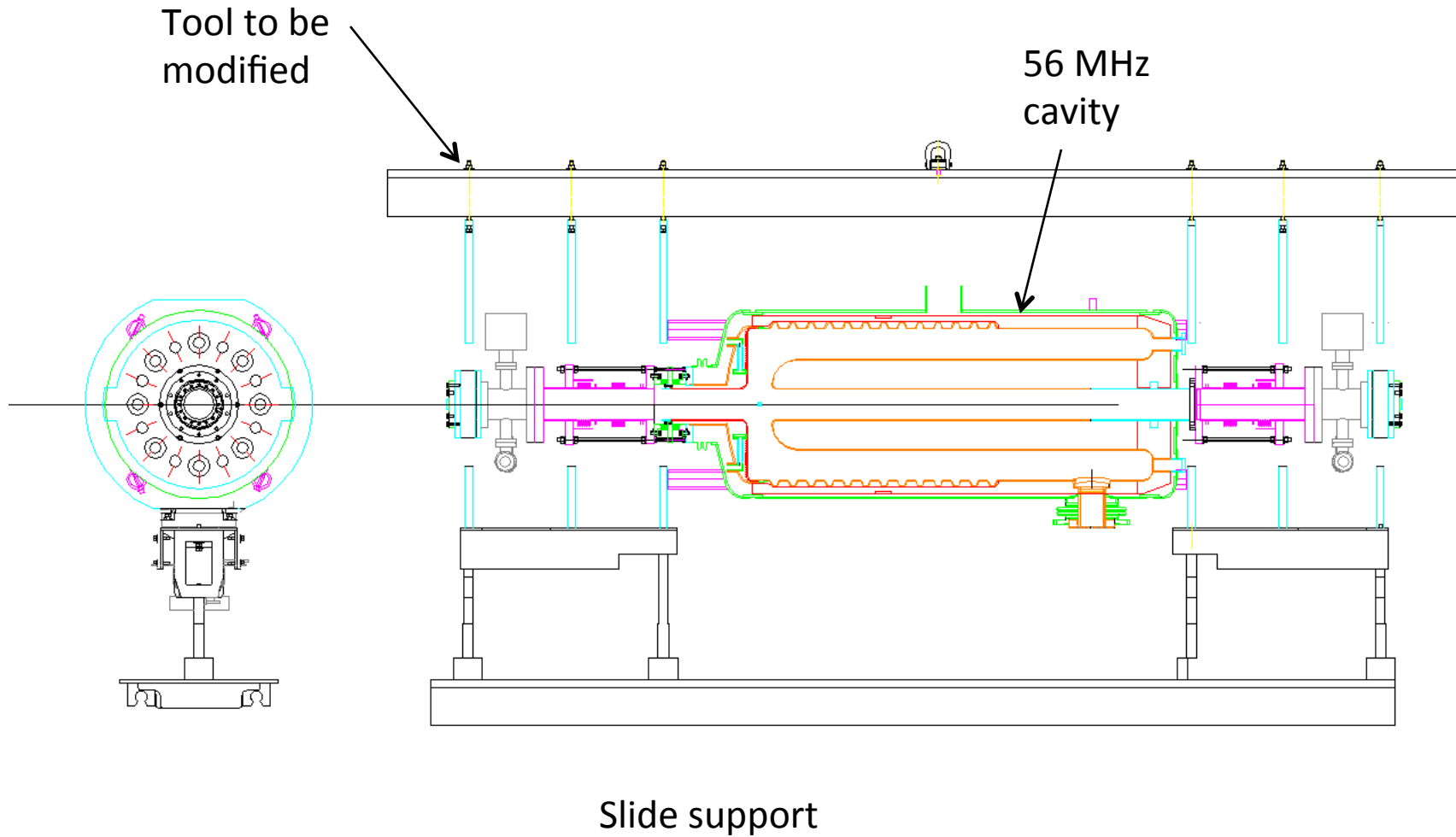


Each Component can move in a Linear slide
support

Lower strong
back

56 MHz SRF string assembly tooling

Will be modified from existing old tool

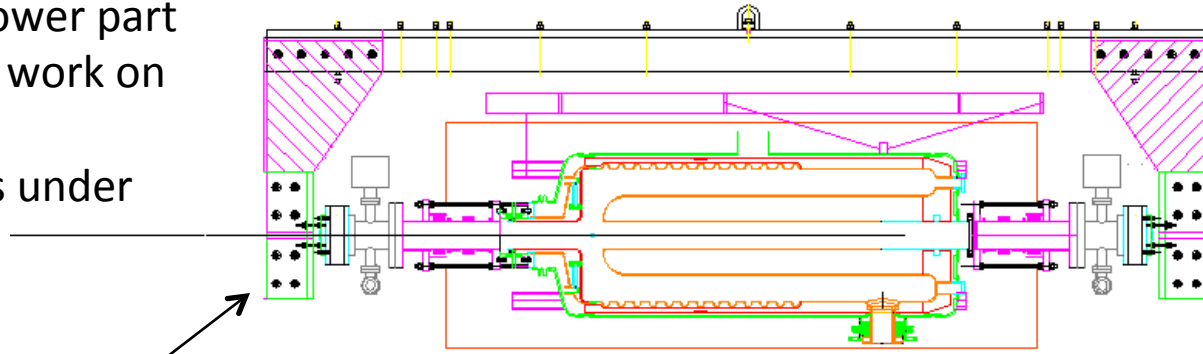


Two ways of Support needed for Cryomodule construction

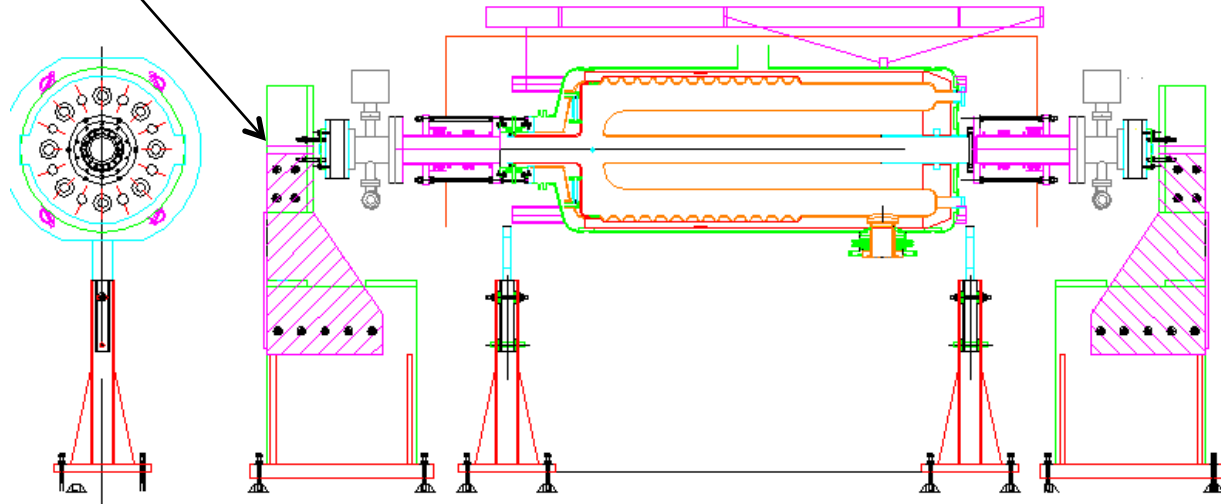
1. Lifting to work on lower part
2. Ground support to work on upper part

Note: The stream is under Vacuum

Strong Back
to resist
vacuum force

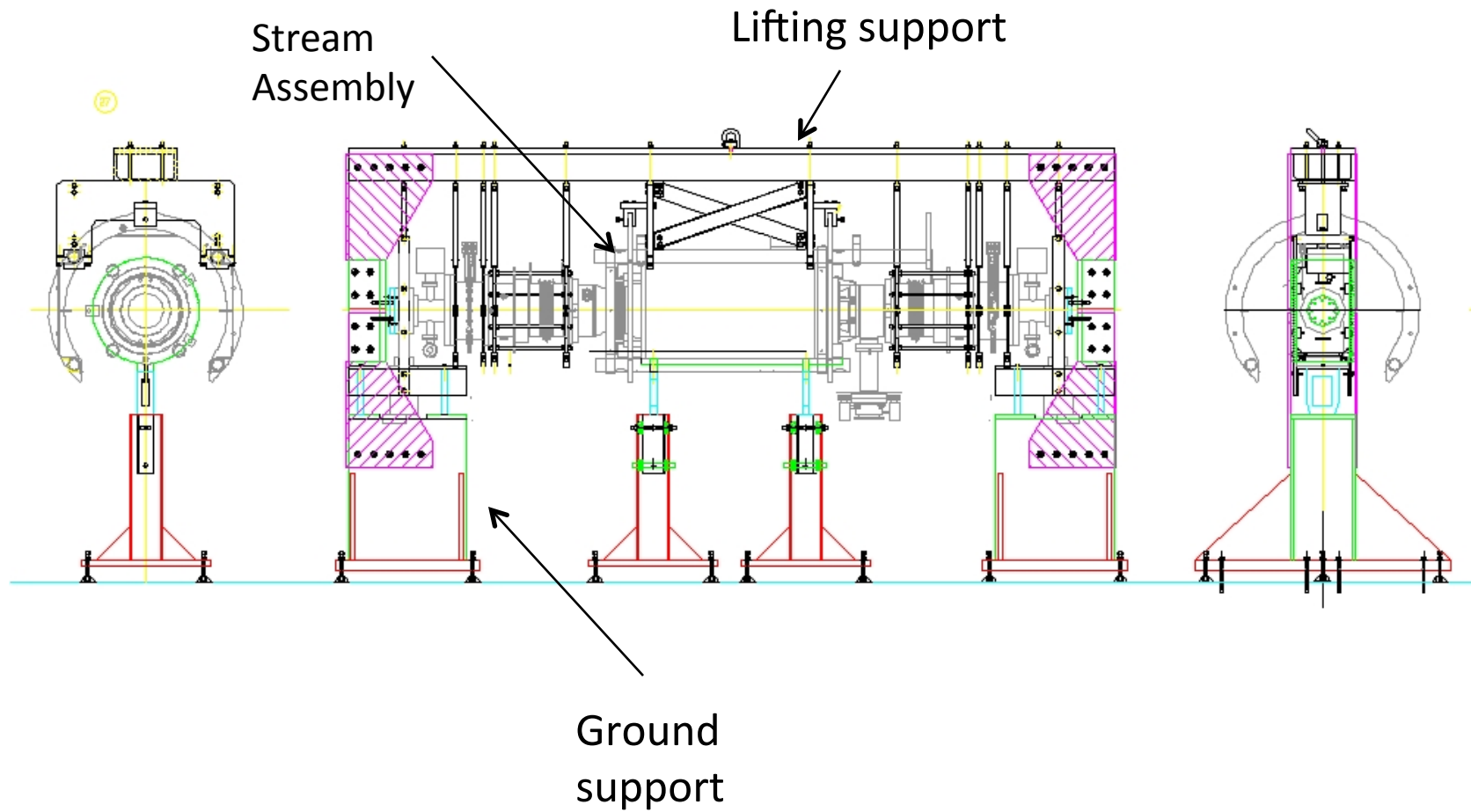


From top or Lifting



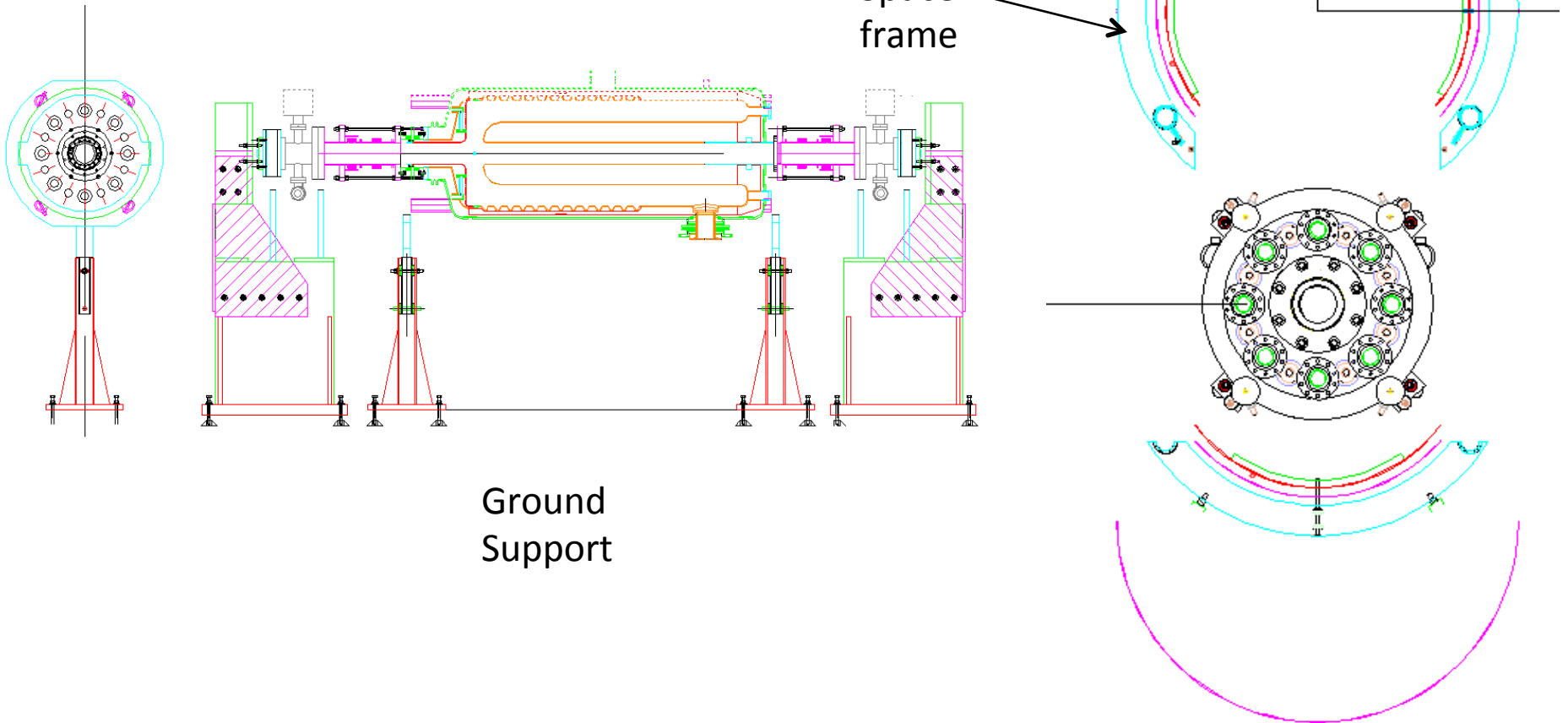
From bottom

Exchange between the two supports During Cryostat Construction (Note: Vacuum load is retained in all time)

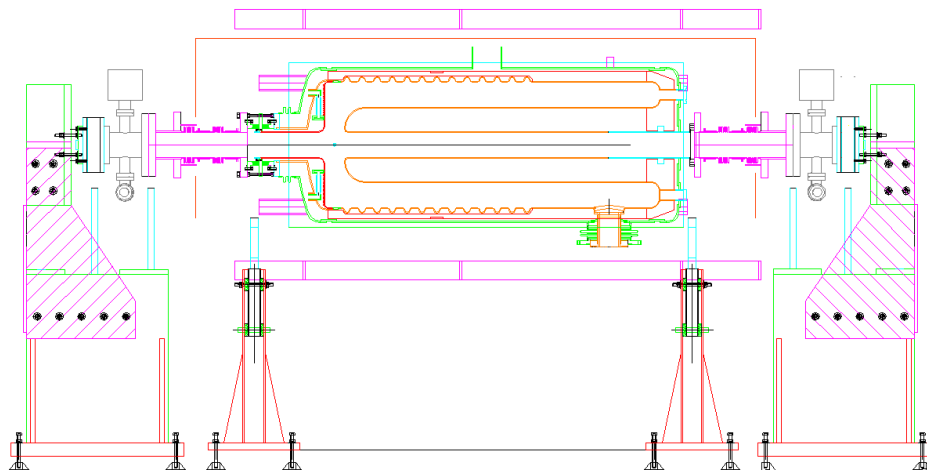


Steps of Cryomodule Construction

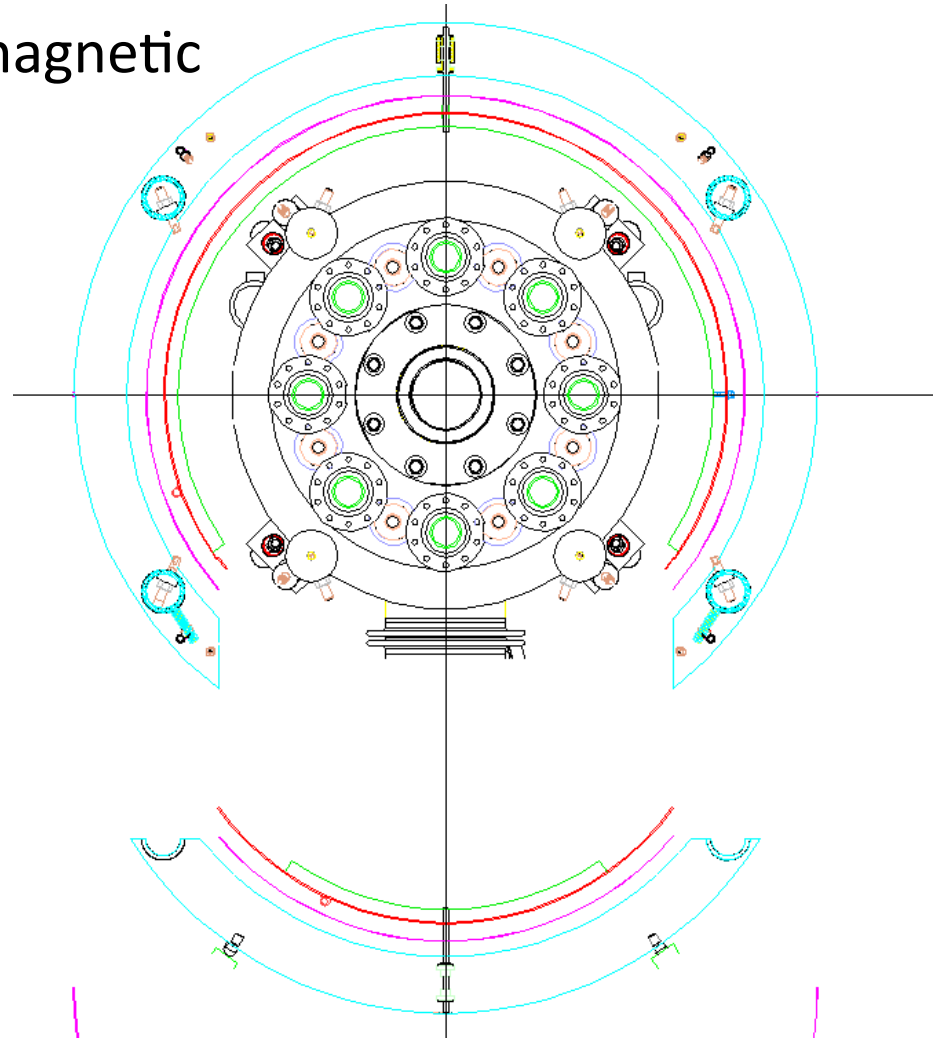
1. Upper part of heat shield and inner magnet Shield installed in the space frame



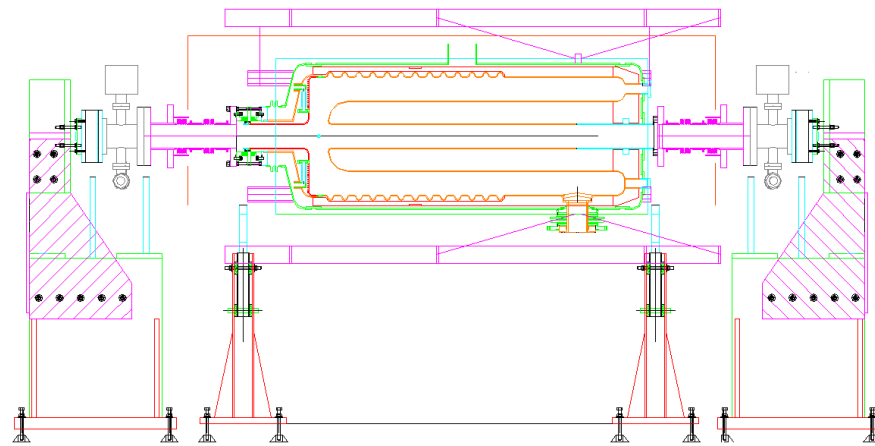
2. Install Space frame with pre-assembled upper part of thermal and inner magnetic shield



Ground
Support



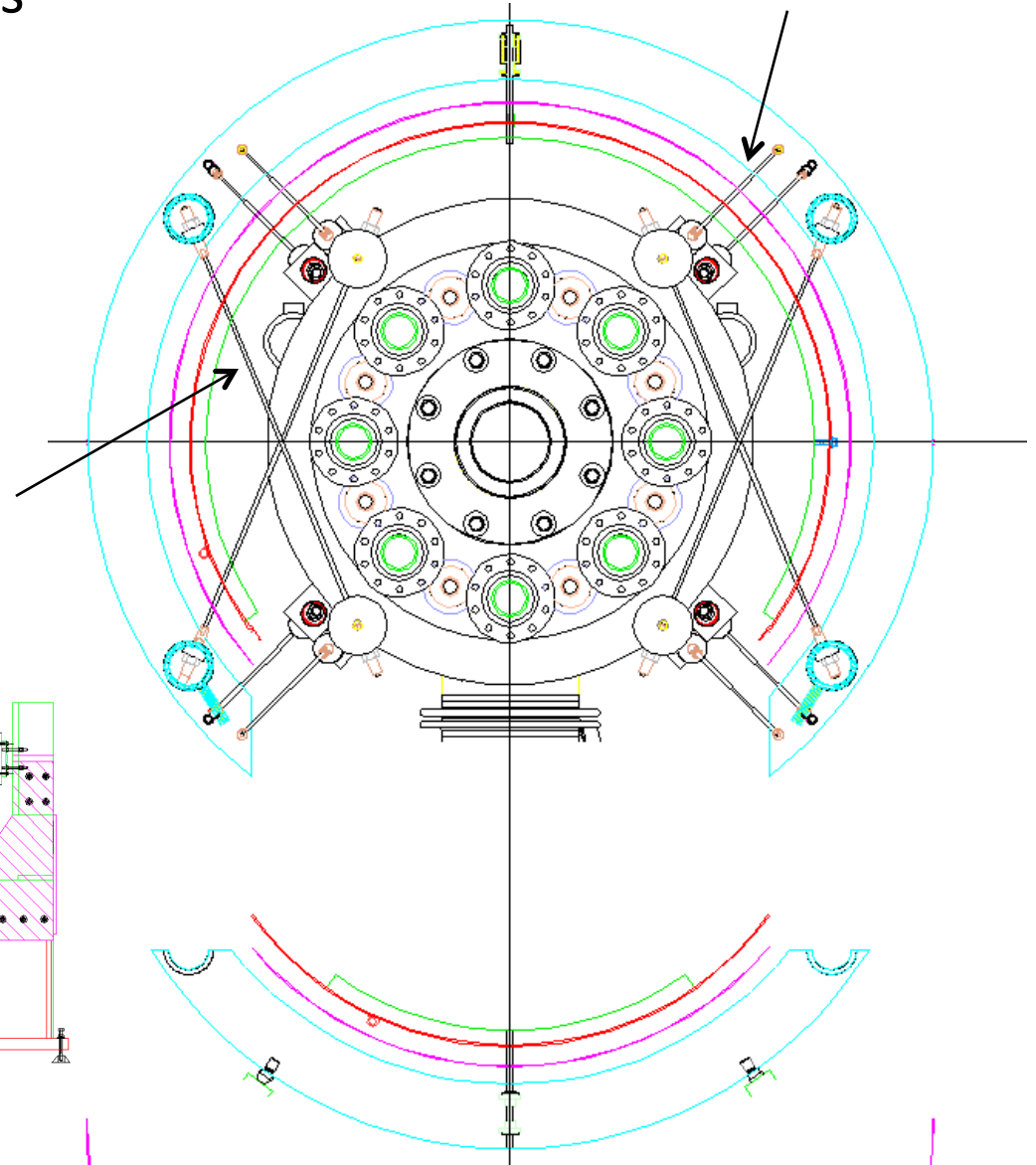
3. Install Nitronic rod supports both axial and radial



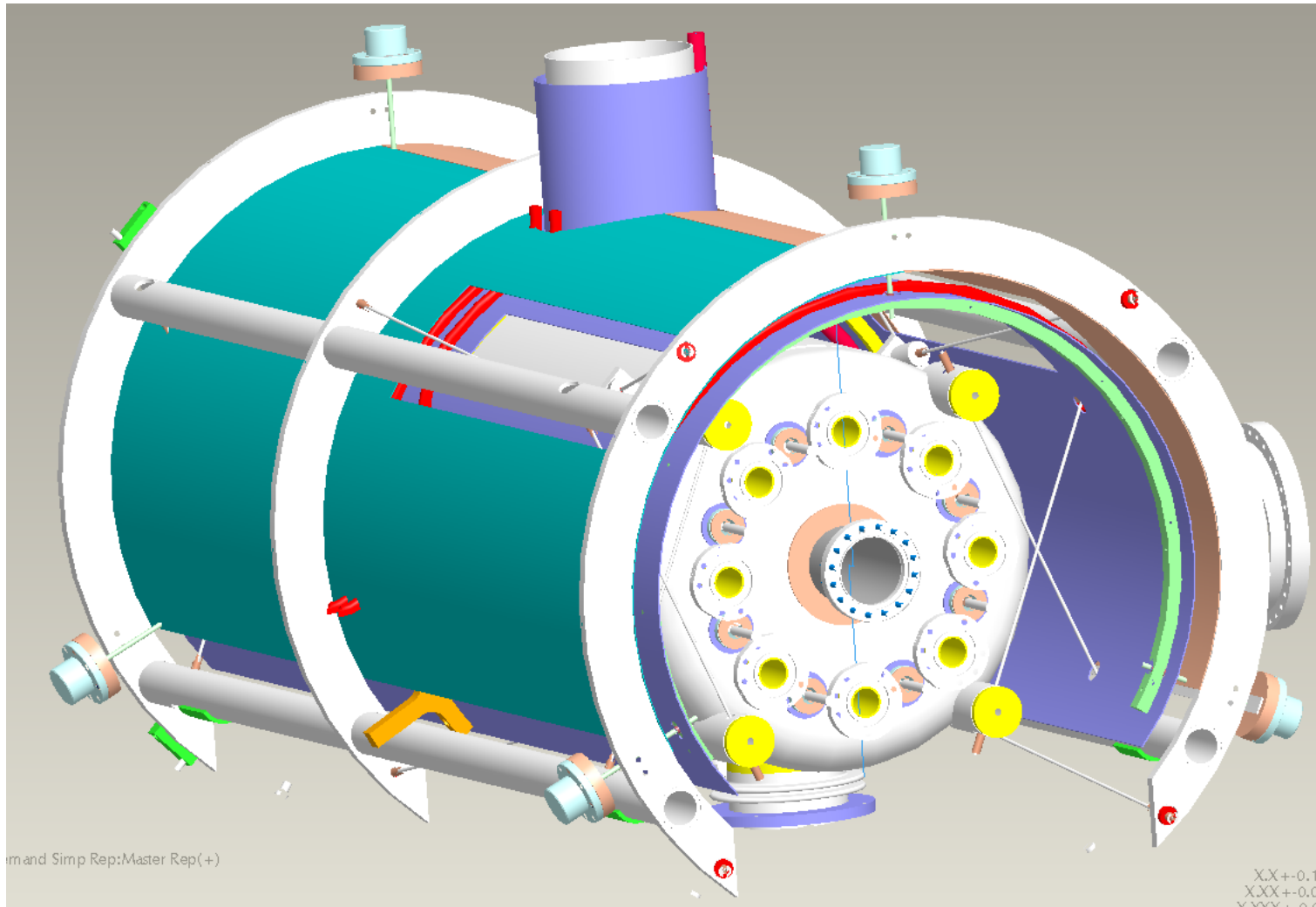
Ground Support

Radial support

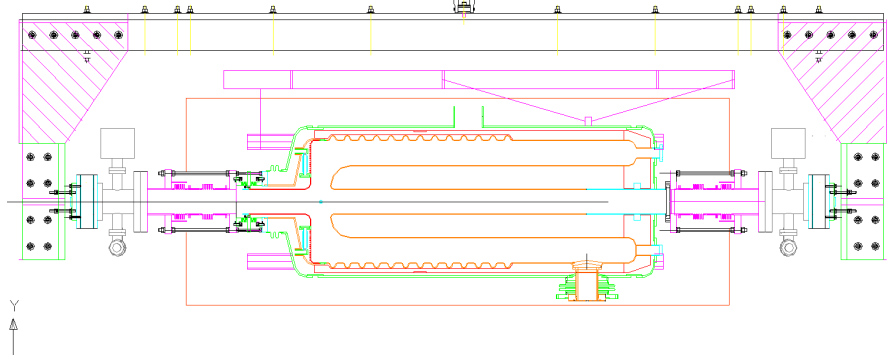
Axial support



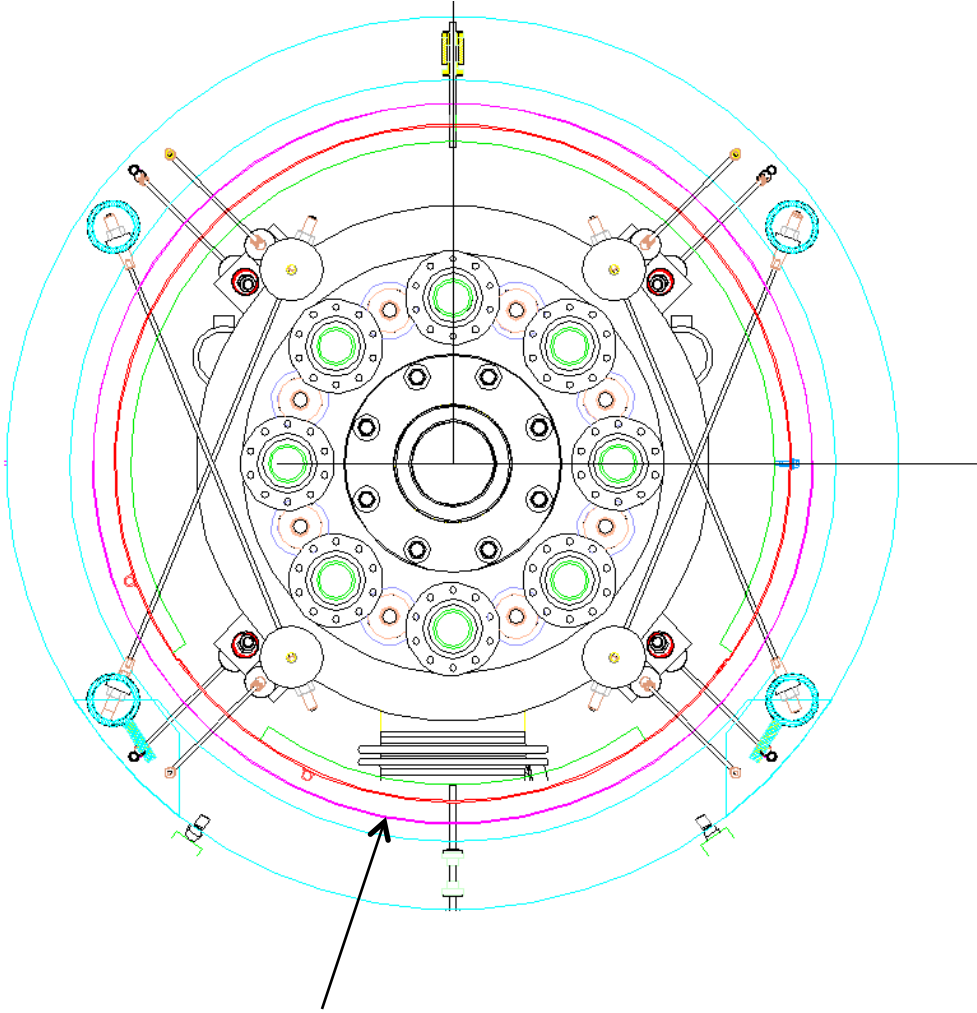
Complete upper part of Inner Magnetic shield and Heat shield



4. Install the lower part of Heat shield and inner magnetic shield

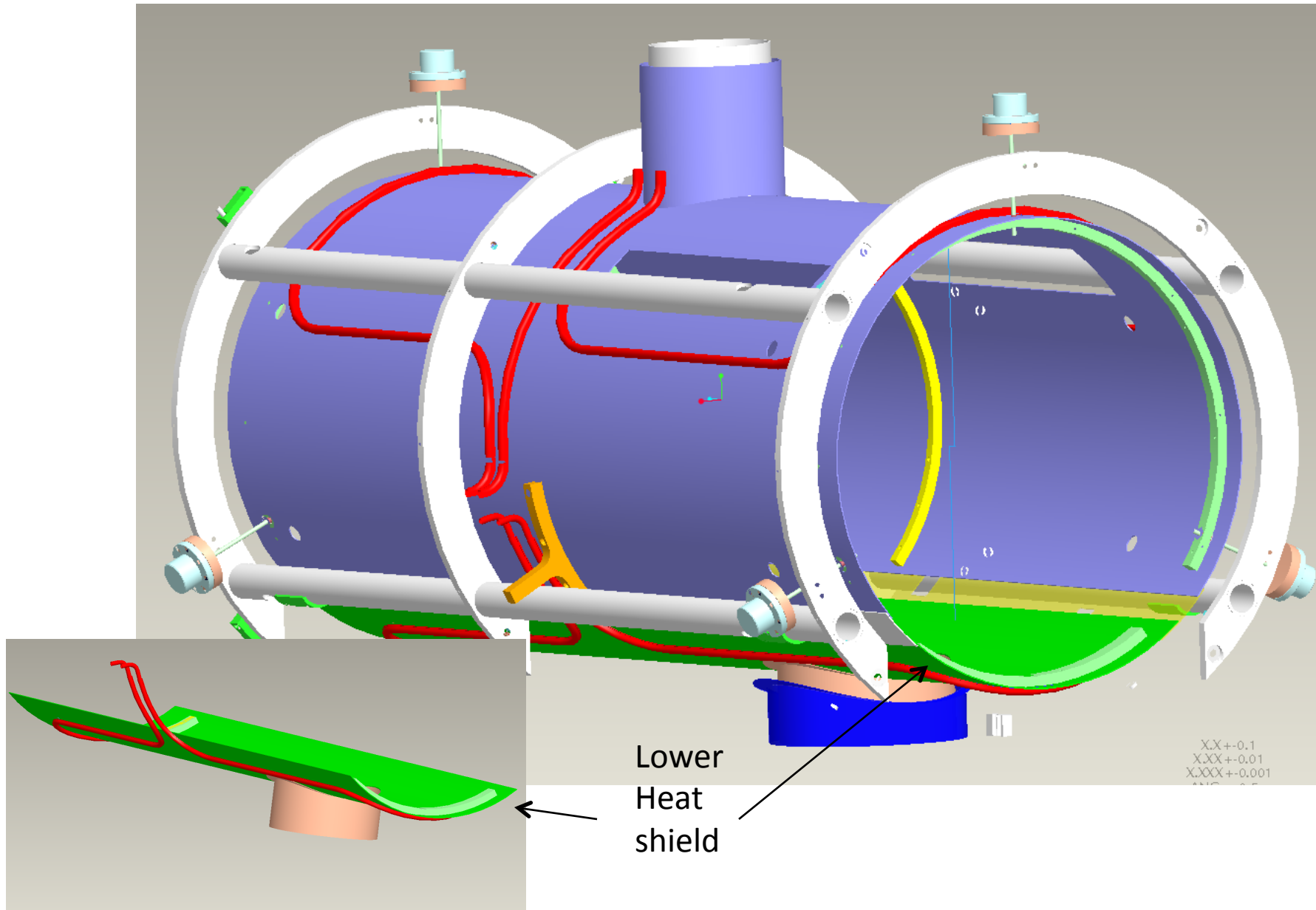


Exchanged to Lifting support

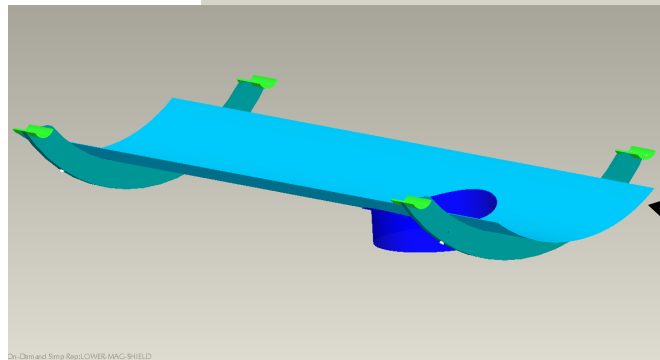
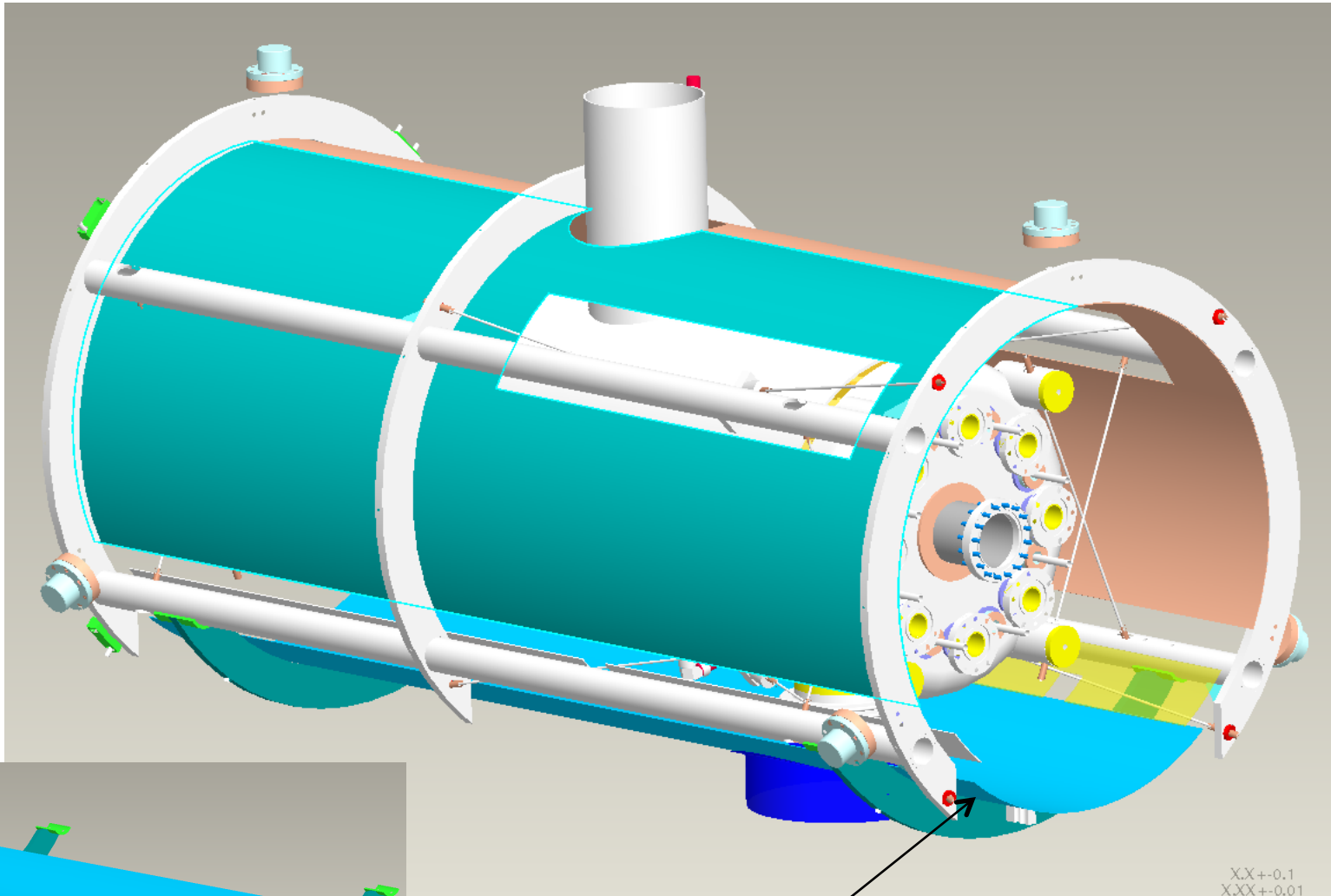


Lower part of 3 shields

Heat Shield installed inside the Space Frame

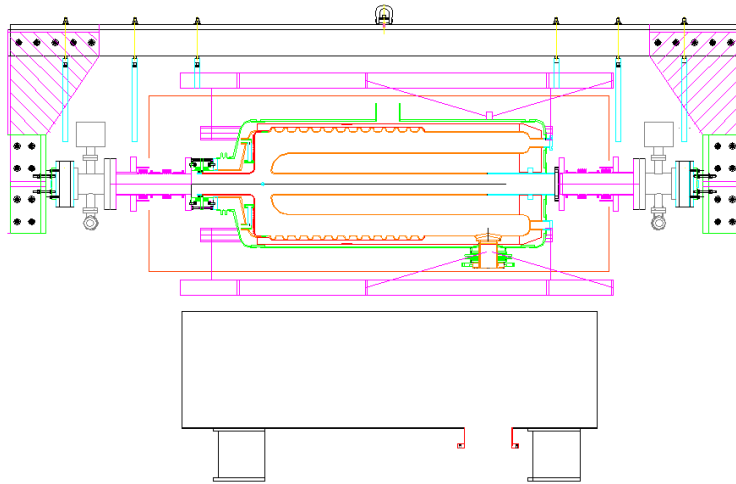


Complete Inner magnetic shield and heat shield

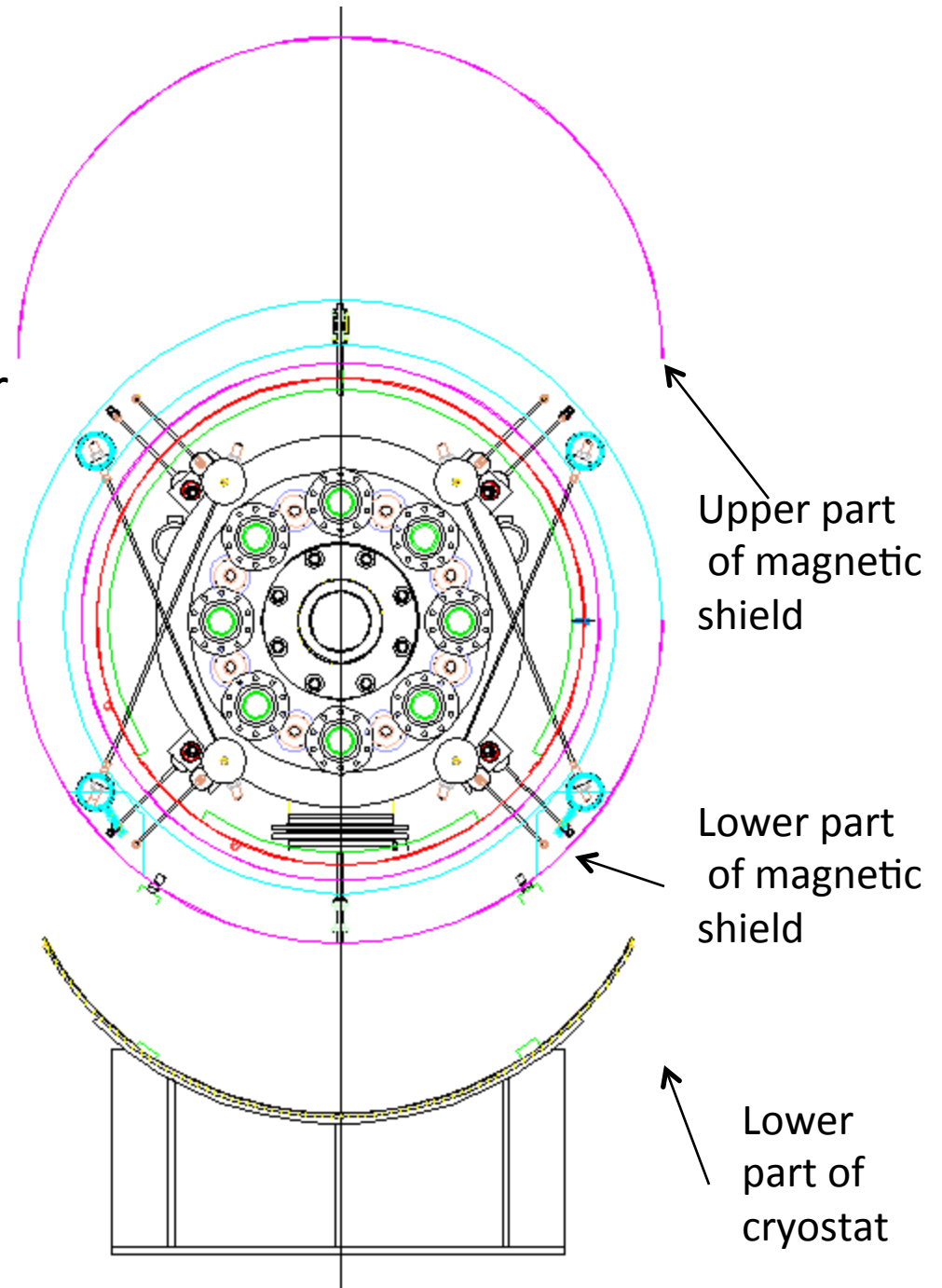


Lower inner
Magnetic shield

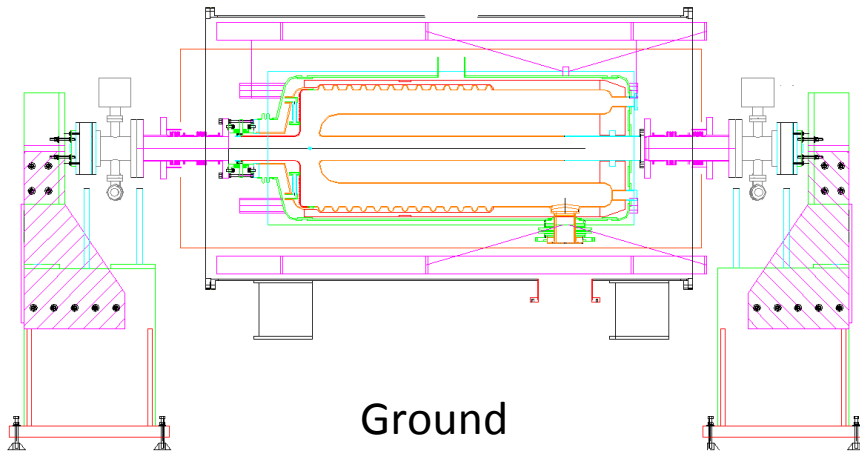
5. Install the lower part of outer magnetic shield.
6. Lower cavity into the vacuum chamber
7. Install the Upper part of outer magnetic shield.



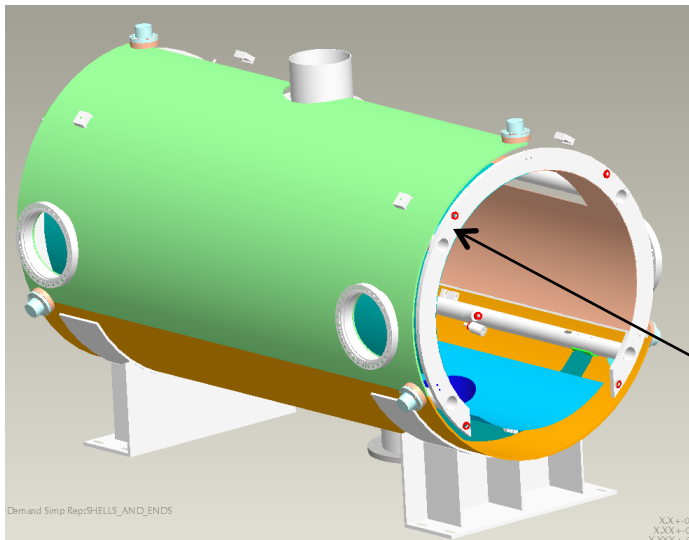
Lifting support



8. Vacuum chamber cylinder welding

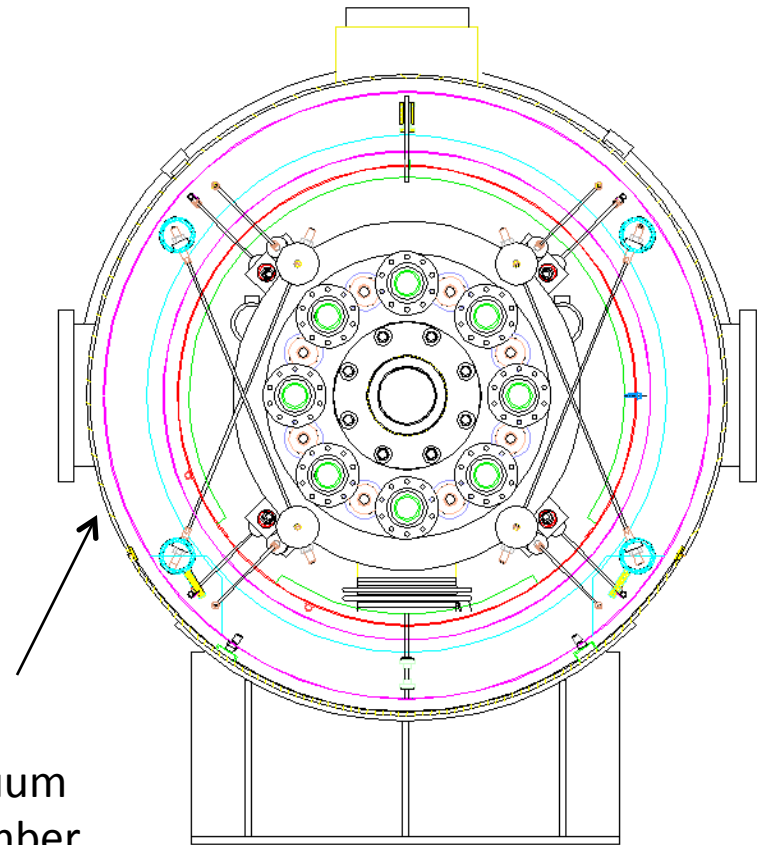


Ground Support



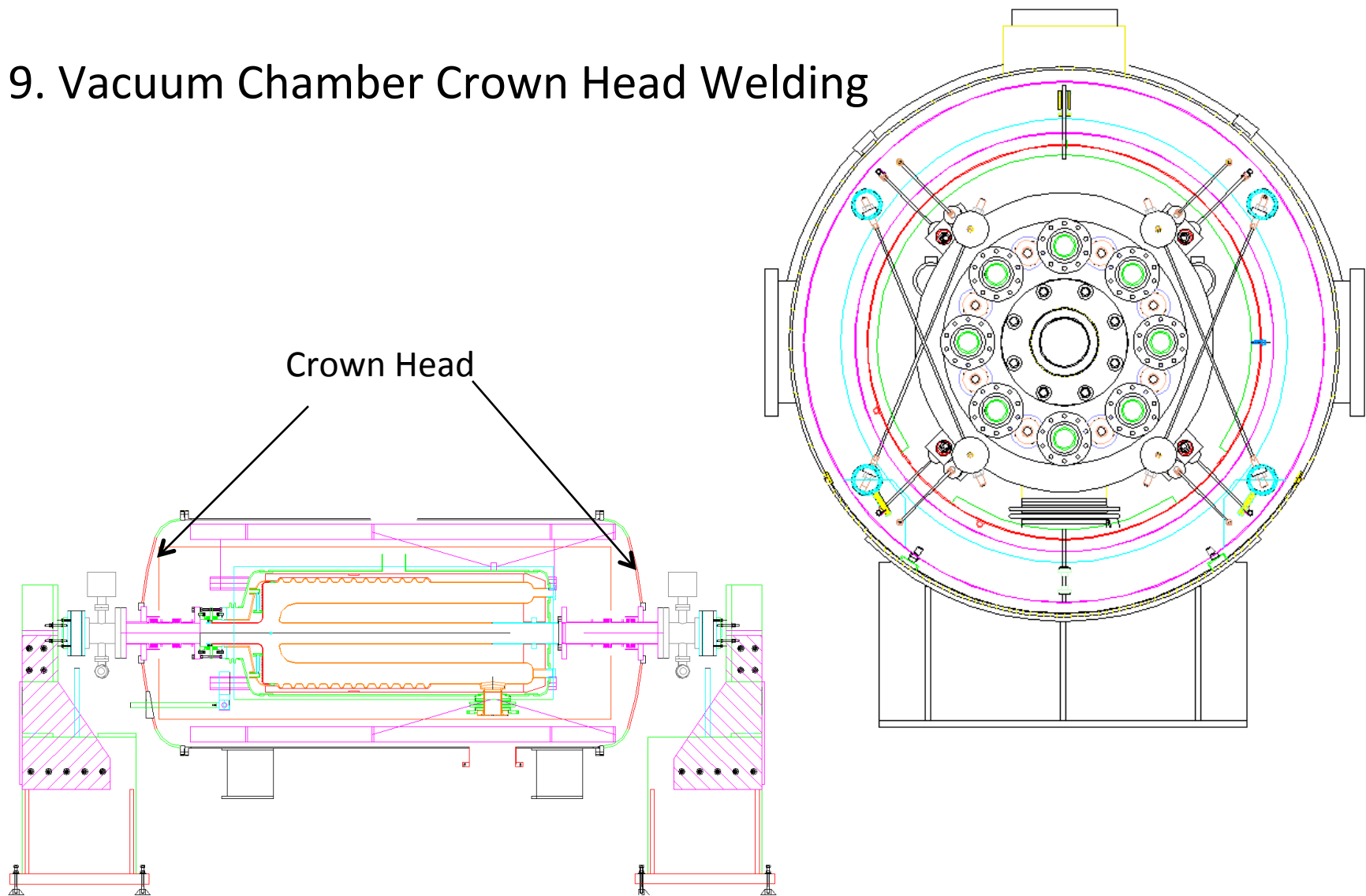
Demand Simp RepoSHELLS_AND_ENDS

XXX+0
XXX+0
XXX+0

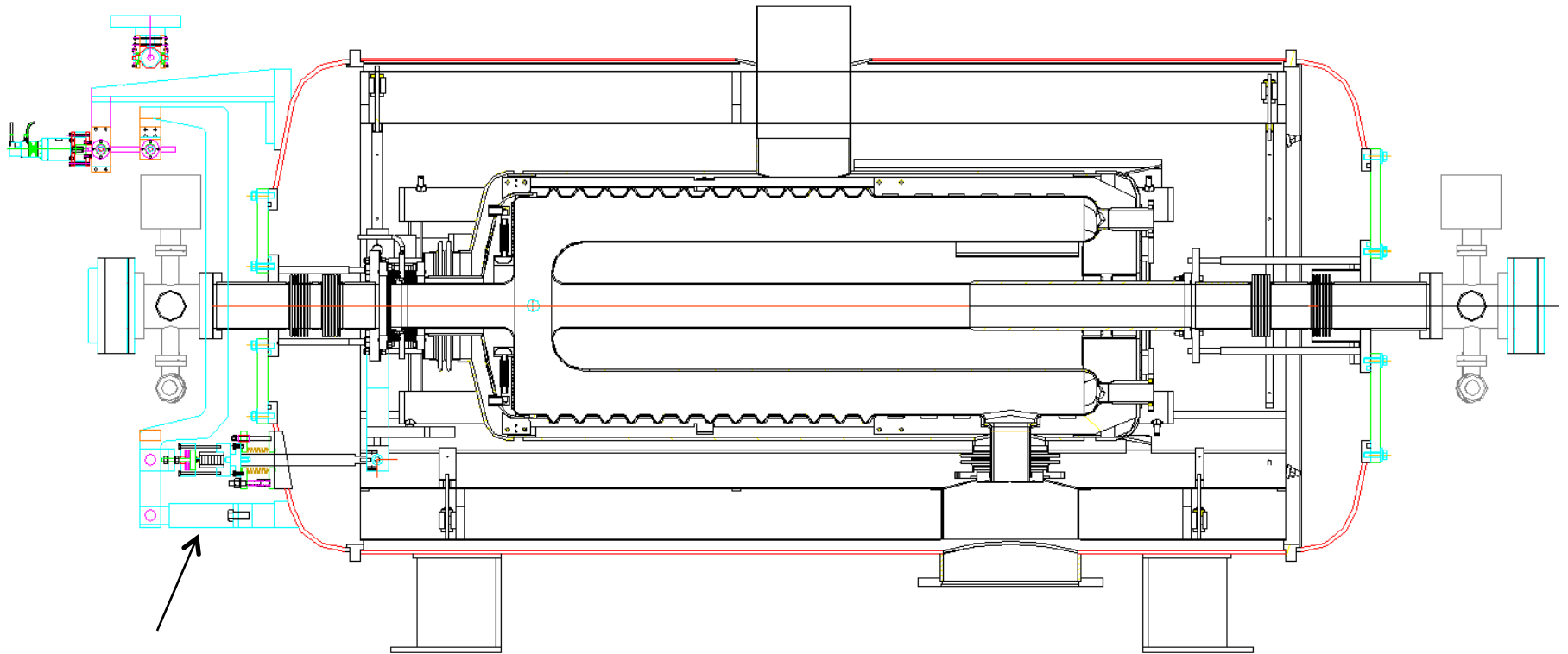


Vacuum chamber cylinder

9. Vacuum Chamber Crown Head Welding

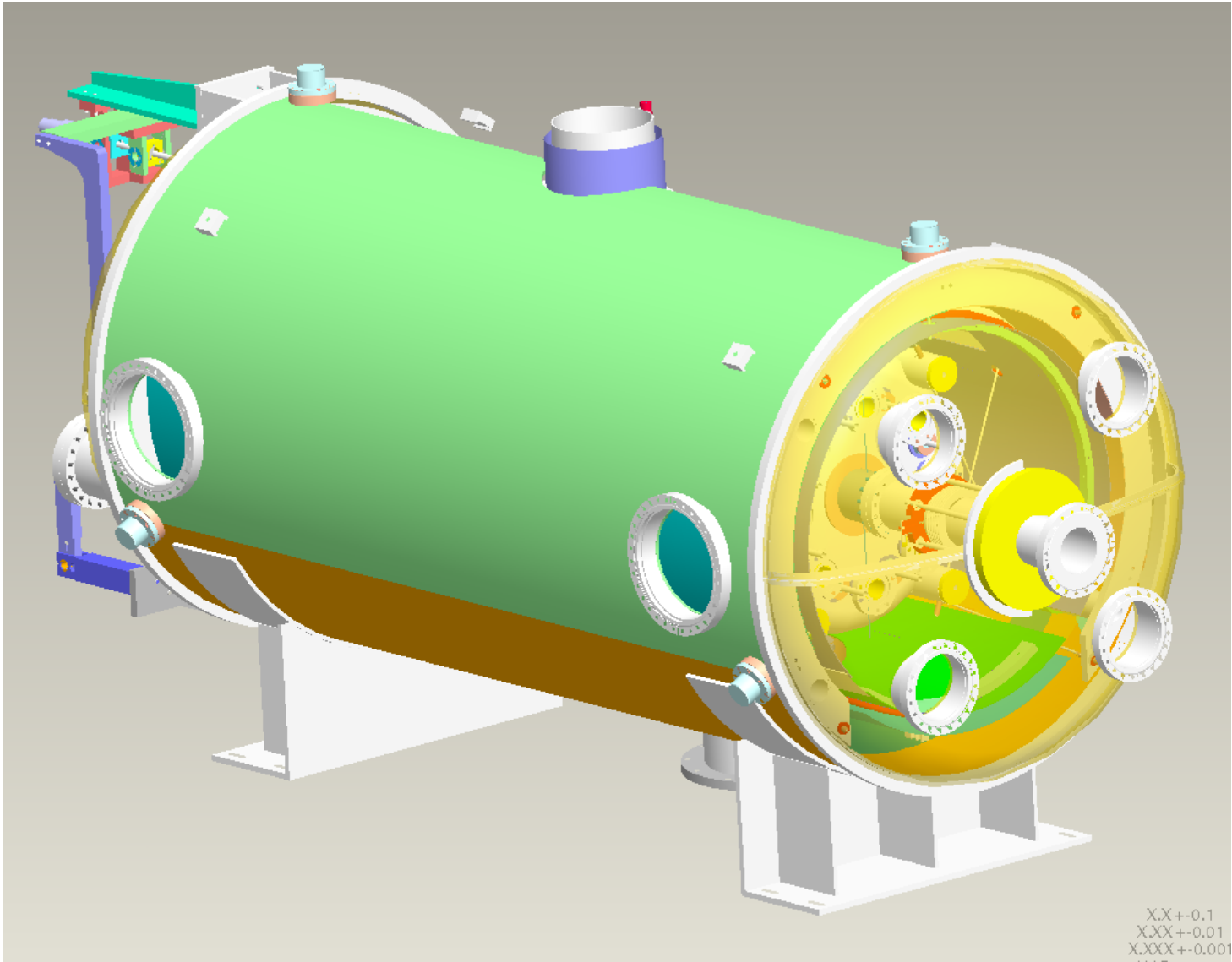


10. Assemble the mechanical tuner Drive



Mechanical
Tuner

Finished Cryomodule



RHIC 56 MHz Cryomodule

External Review

03/08/11

- Process Tooling

BCP/HPR Cage Fabrication Complete	06/14/11
BCP/HPR Adapters Fabrication Complete	06/20/11
Liftcart & Mounts Specified & Procured	08/23/11
Rollcart / Flipcart Fabrication Complete	09/02/11
Weld Fixtures Fabrication Complete	10/24/11
VTF Mounting Fixture Fabrication Complete	08/31/11
String Assembly Tooling Fabrication Complete	01/30/12
Cryomodule Assembly Tooling	04/11/12
Cryomodule Installation Tooling	06/21/11