

Passive Materials of NSW

SHARMAZANASHVILI Alexander
Georgian Technical University

SURMAVA Archil
Georgian Technical University

TSUTSKIRIDZE Niko
Georgian Technical University

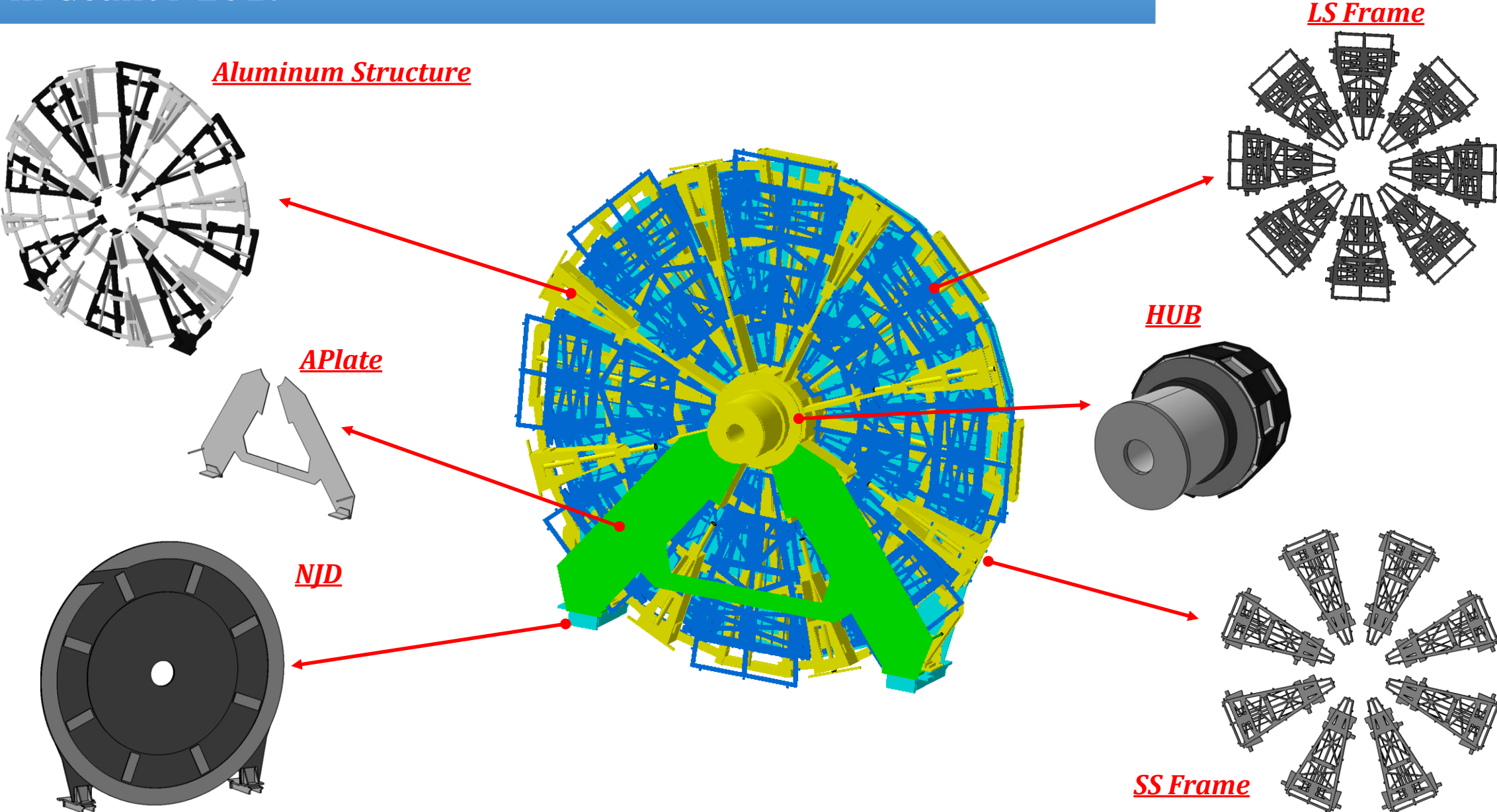


Project History

Project overall parameters:

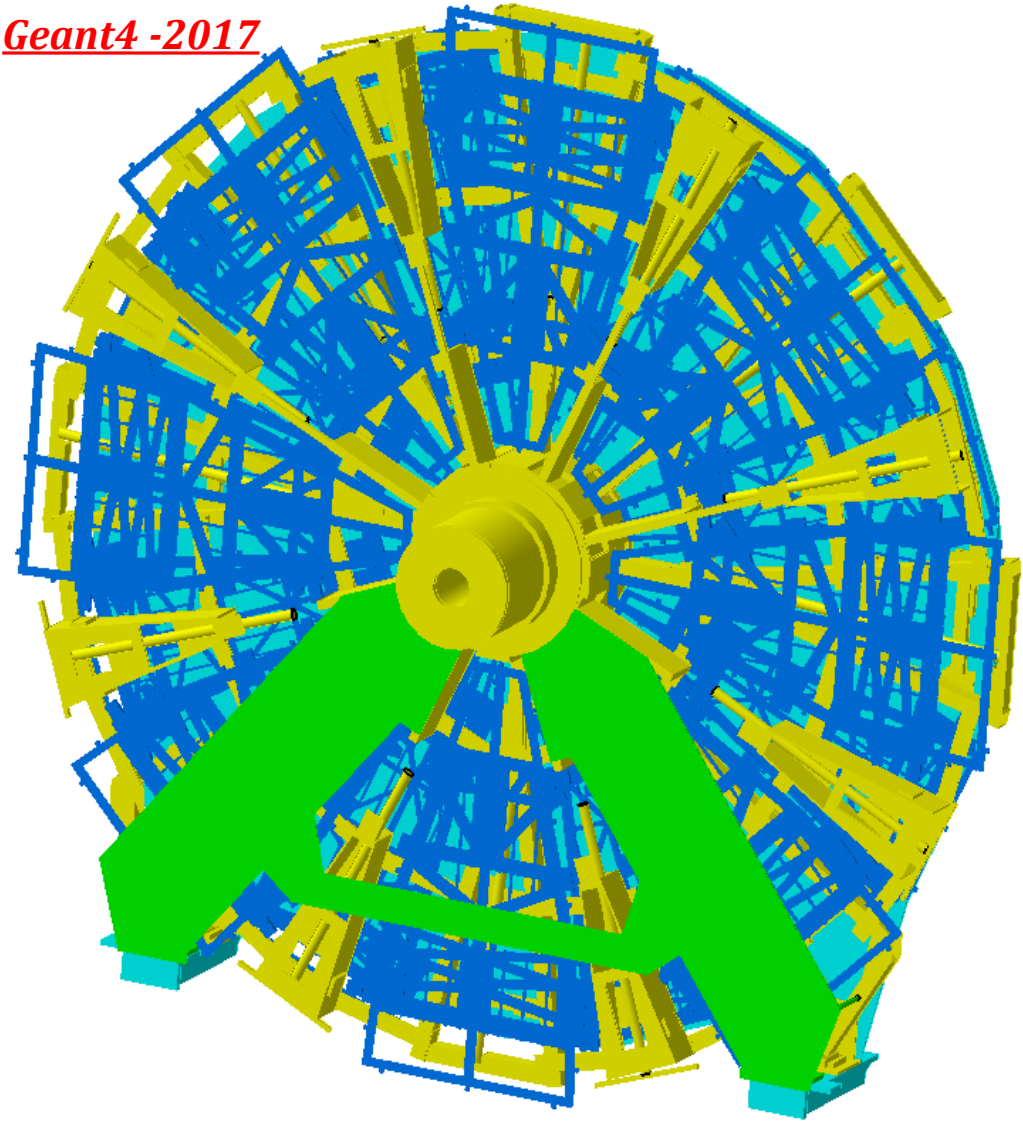
- Started: 3 May 2019
- Involved rotated manpower: 3 FTE
- Number of Tasks executed: 18
- Working days spent: 86 days

Geant4 description: [stations.v2.06.xml](#)
CATIA: [CAD001046457](#)

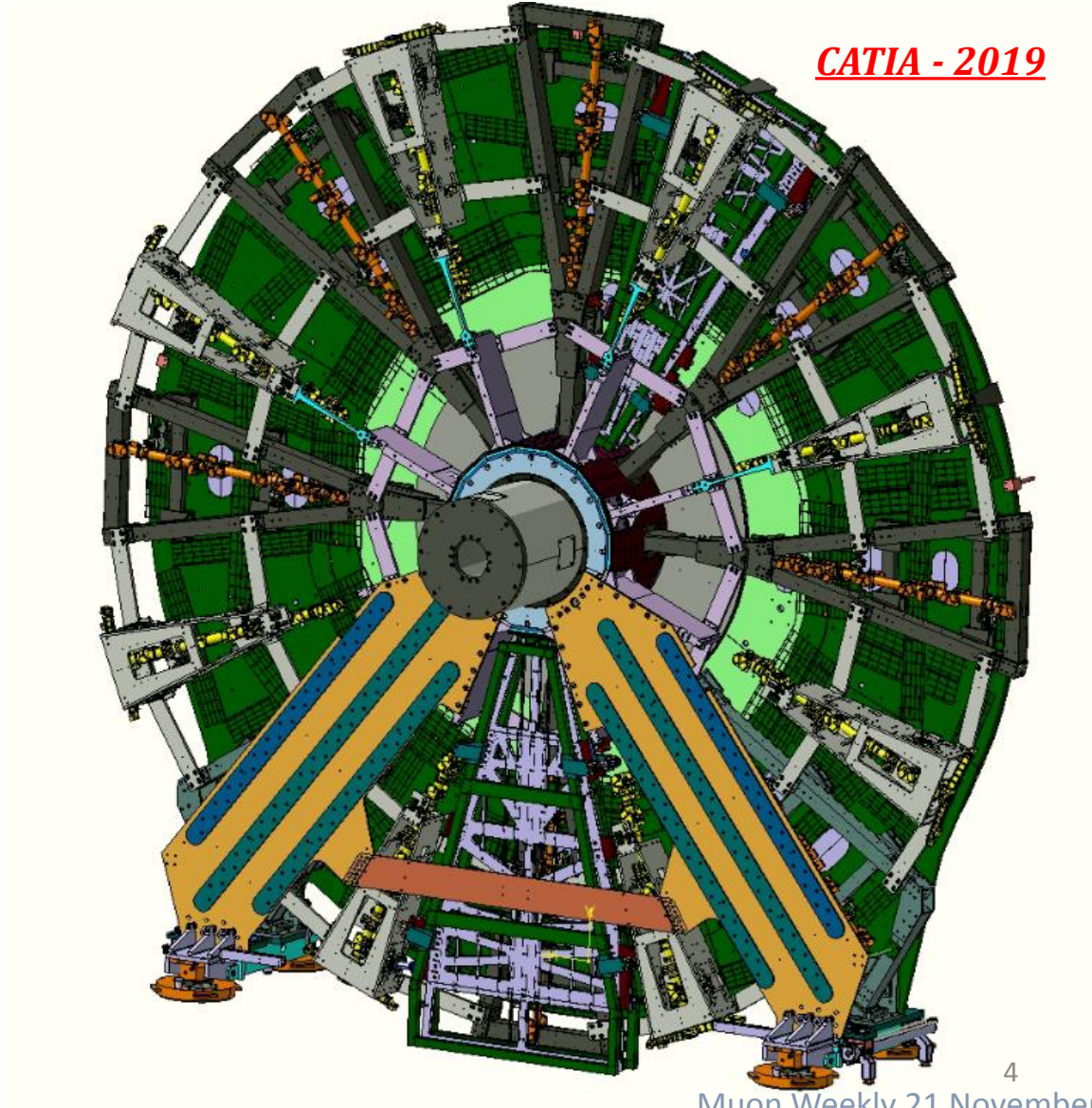


NSW: Geant4-2017 vs CATIA-2019

Geant4 -2017



CATIA - 2019

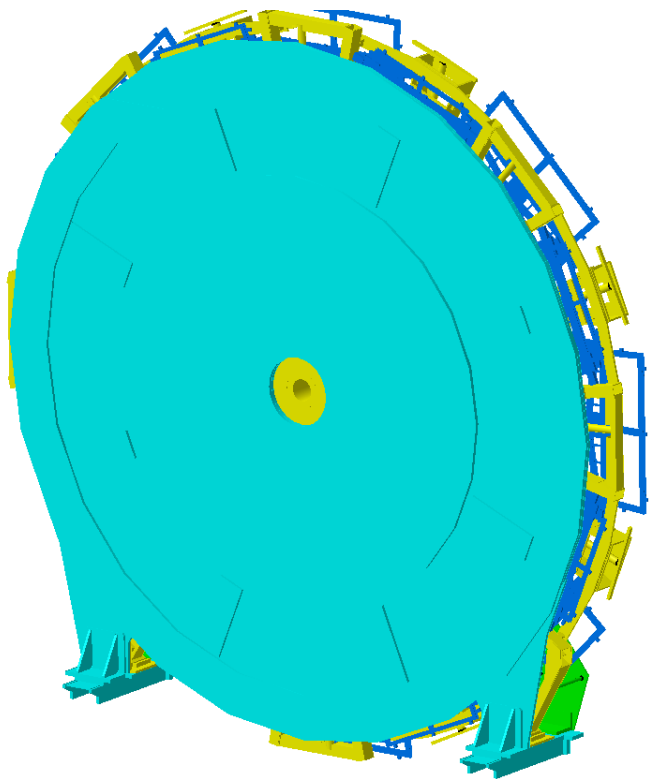


We have discovered missing components in 2017 Geant description:

1. Rim Plates
2. Cable Tray
3. Vertical shield HO
4. NJD Vert. Shield
5. NSW Movement
6. NSW LS Spoke/Ens support Mire/ rod and bumper

#1: Rim Plates

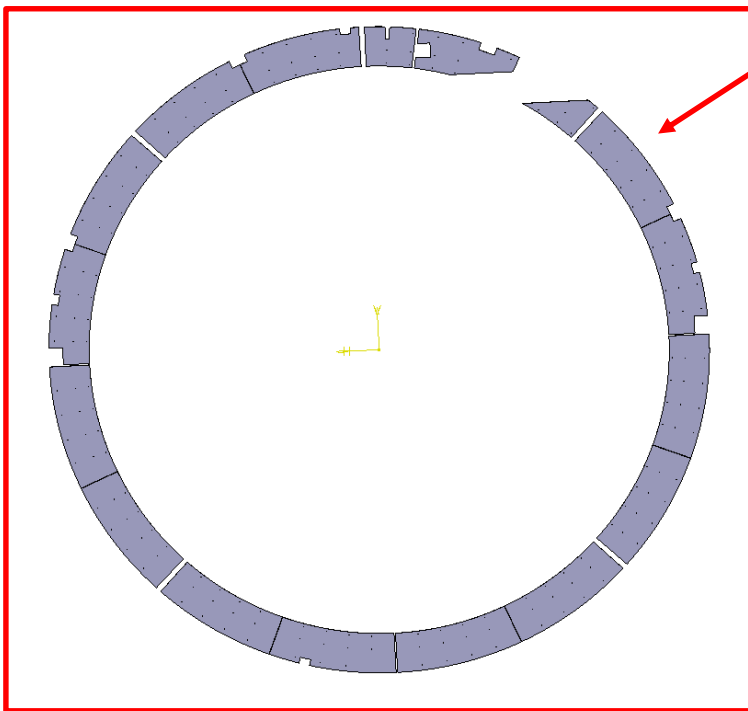
Geant4 - 2017



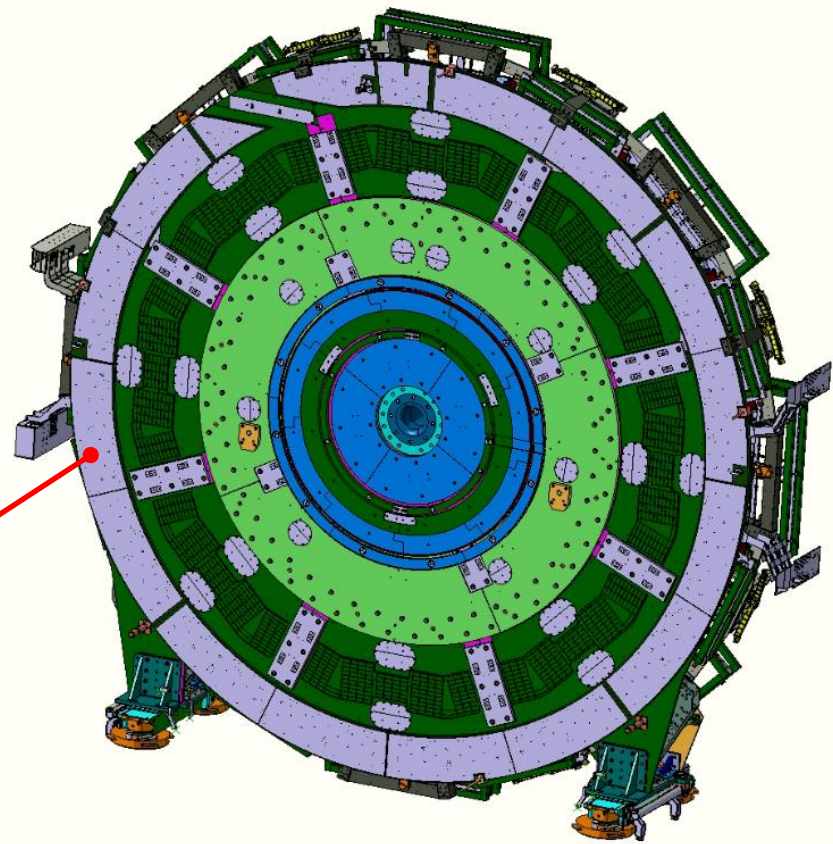
0.075 m³
VOLUME

205kg
WEIGHT

Rim Plates



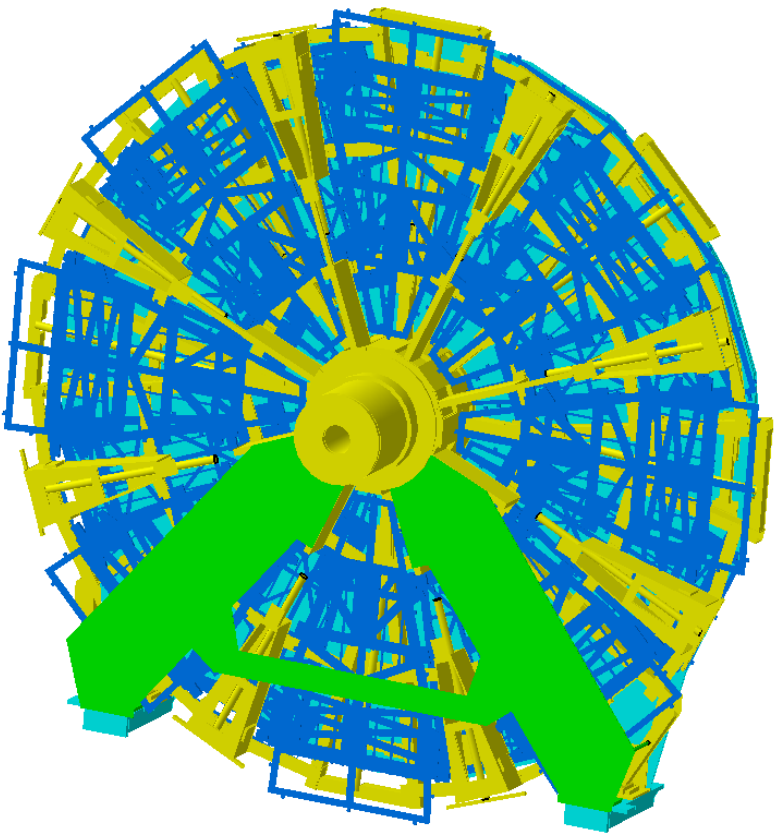
CATIA - 2019



Rim Plates don't exist in Geant4

#2: Cable Tray

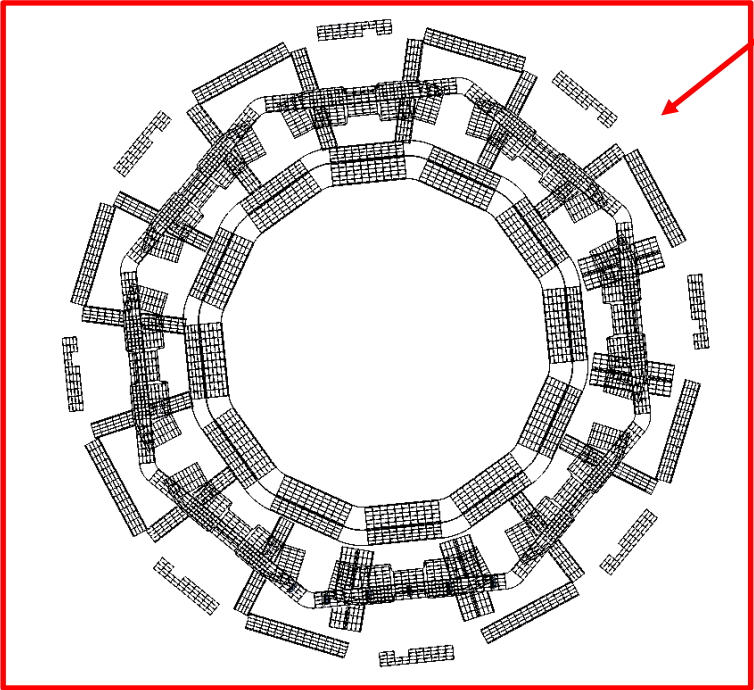
Geant4 - 2017



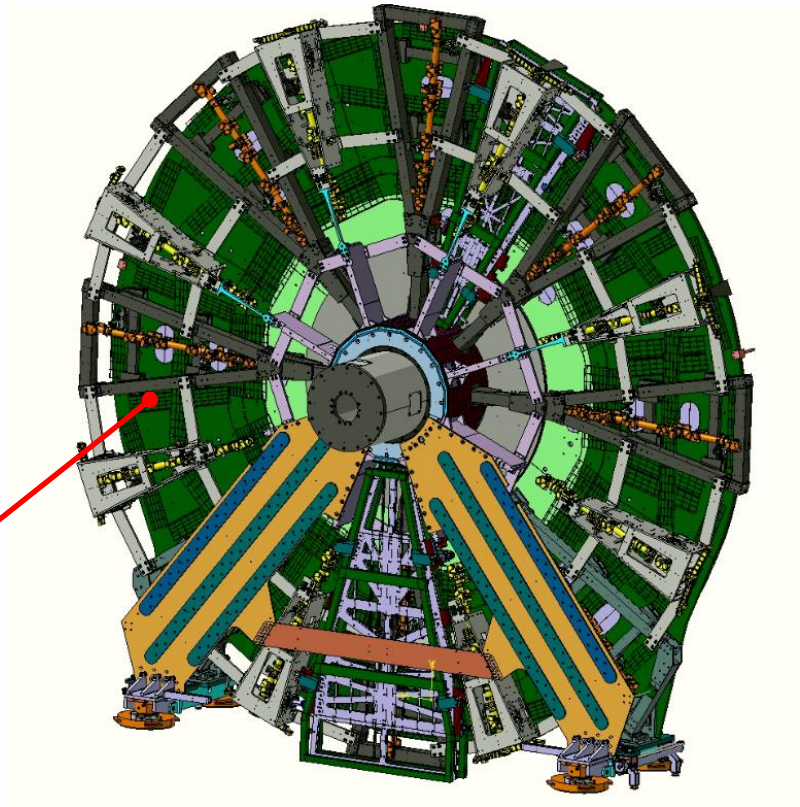
0.014 m³
VOLUME

113kg
WEIGHT

Cable Tray



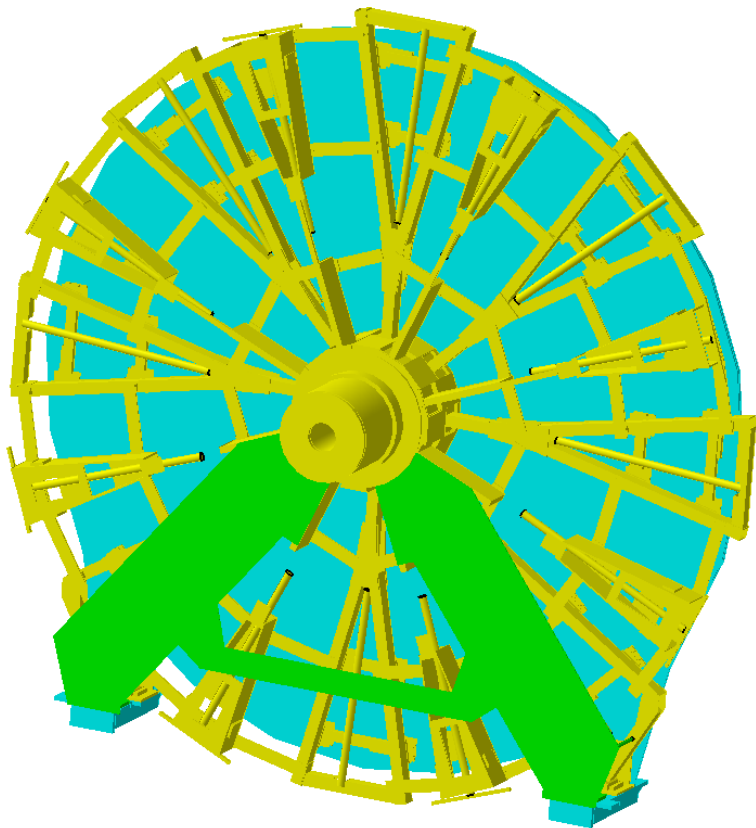
CATIA - 2019



Cable Tray doesn't exist in Geant4

#3: Vertical Shield HO

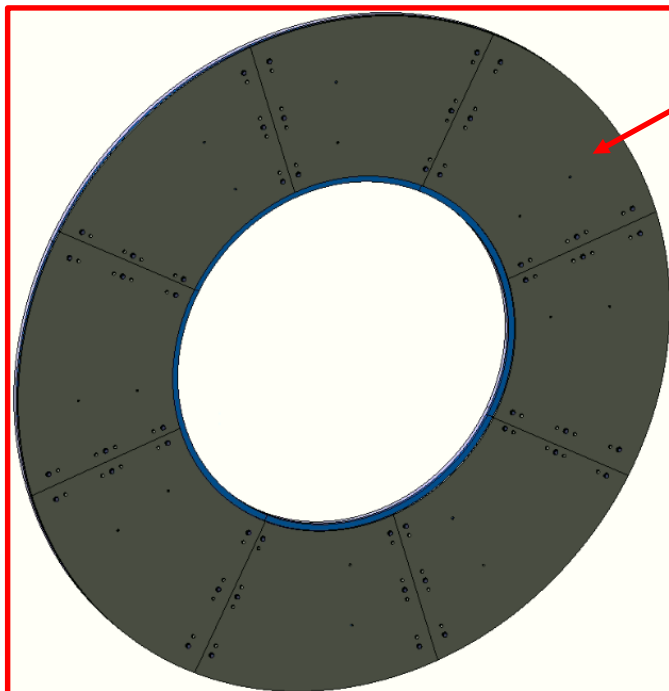
Geant4 - 2017



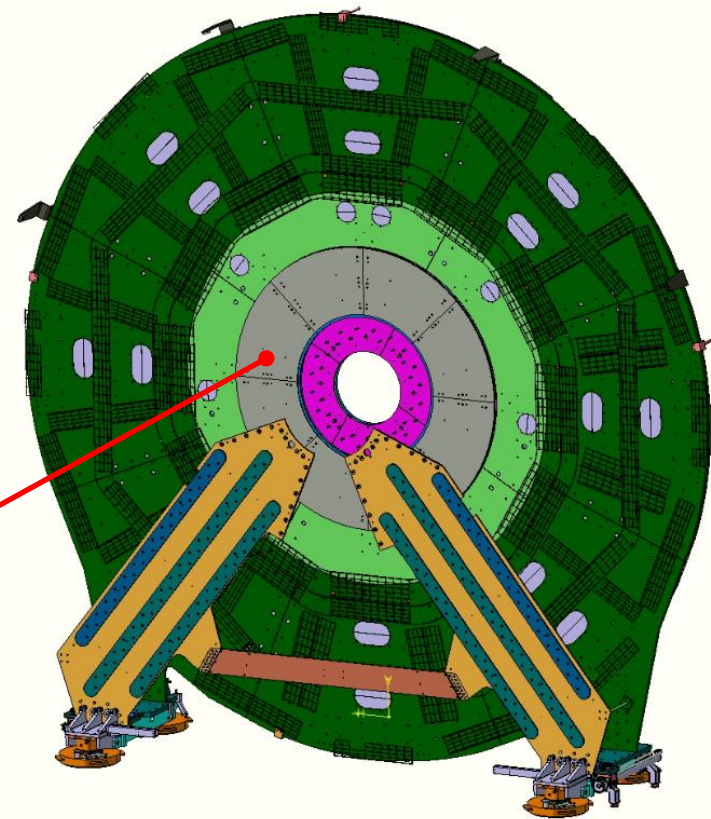
0.317 m³
VOLUME

960 kg
WEIGHT

Vertical Shield HO



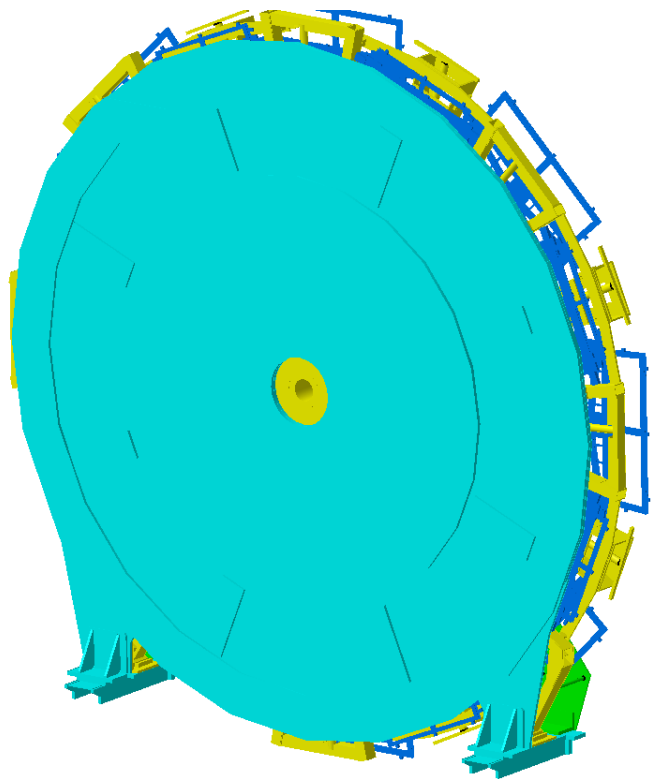
CATIA - 2019



Vertical Shield HO doesn't exist in Geant4

#4: Vertical Shield

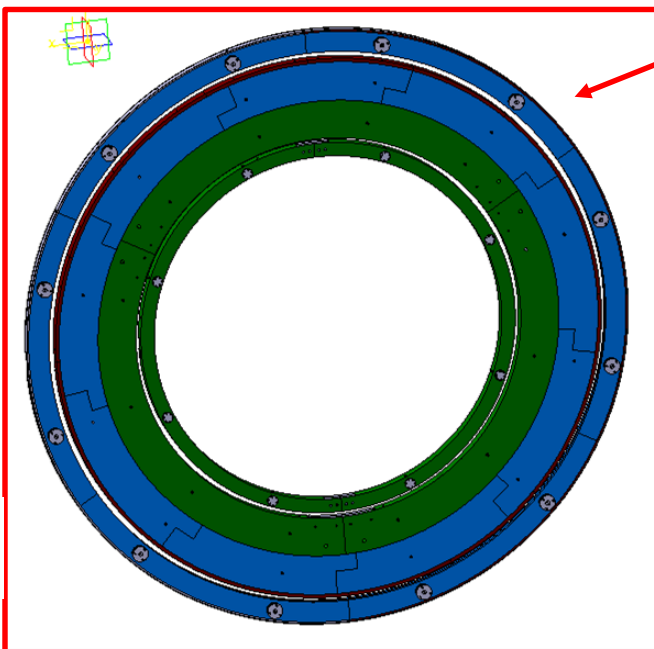
Geant4 - 2017



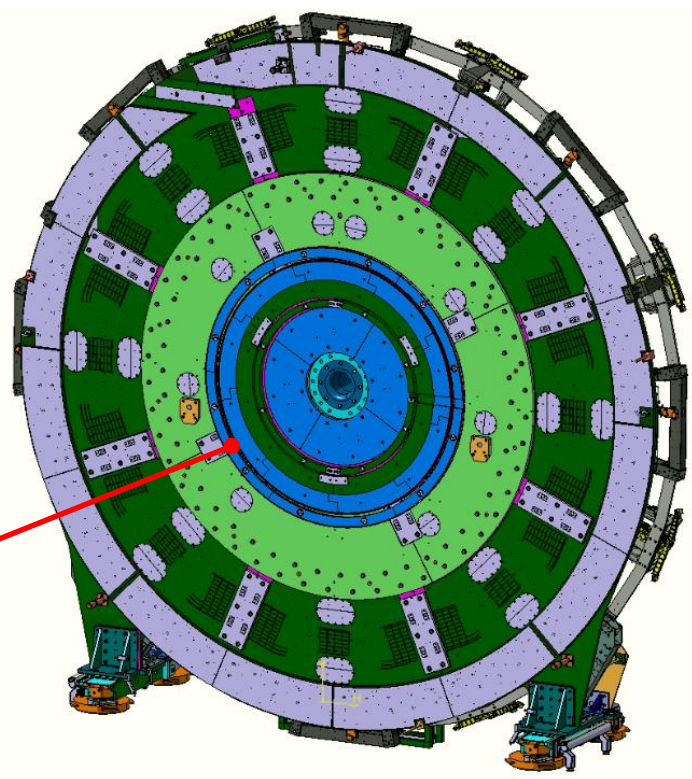
0.393 m³
VOLUME

1733 kg
WEIGHT

Vertical Shield



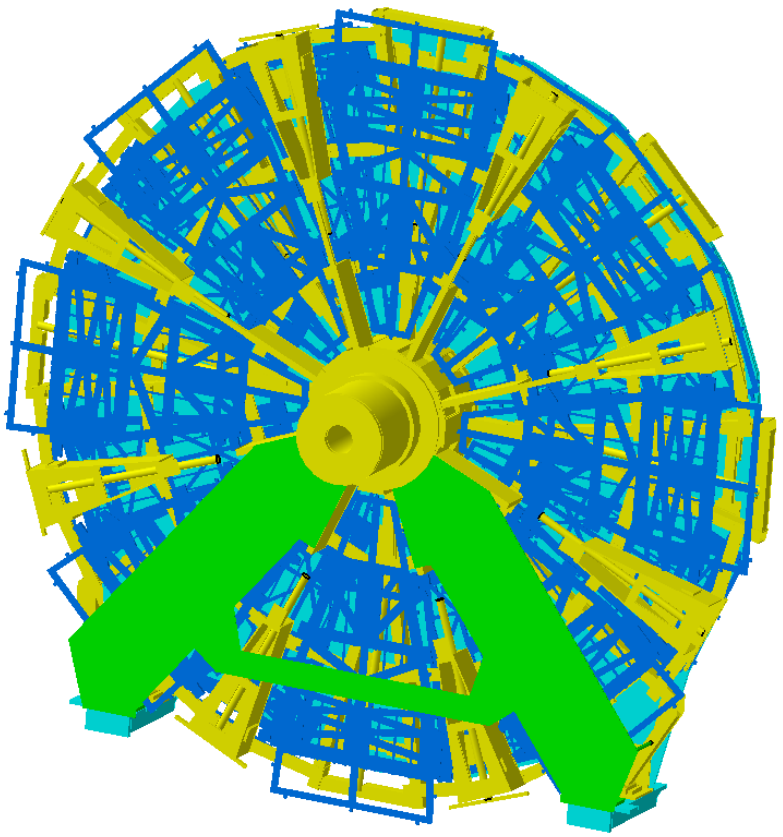
CATIA - 2019



Vertical Shield doesn't exist in Geant4

#5: NSW Movement

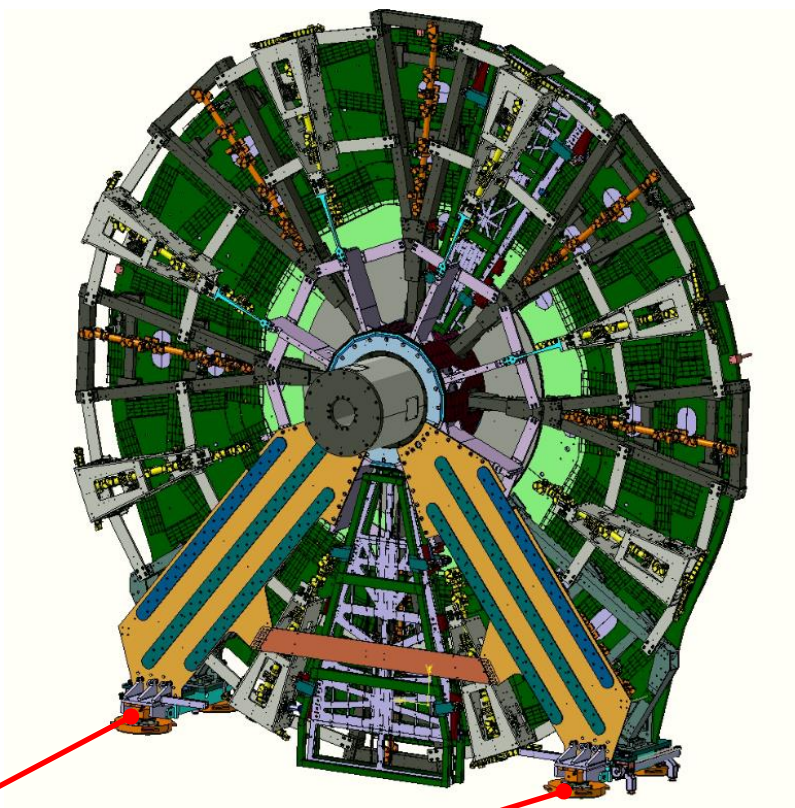
Geant4 - 2017



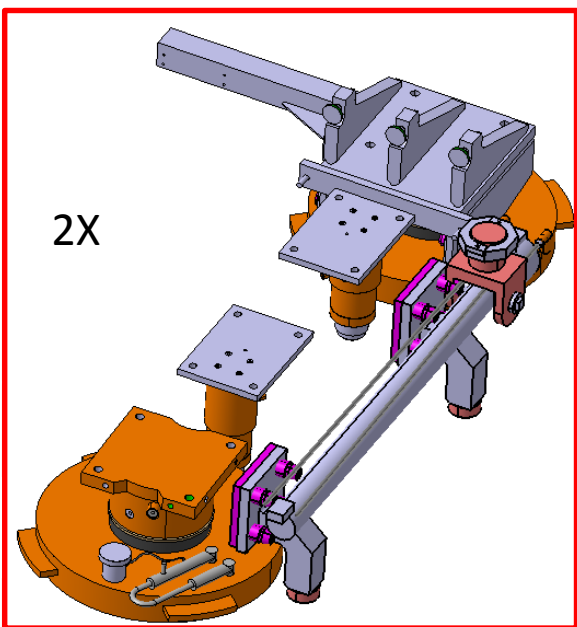
0.3466 m³
VOLUME

2720.8kg
WEIGHT

CATIA - 2019



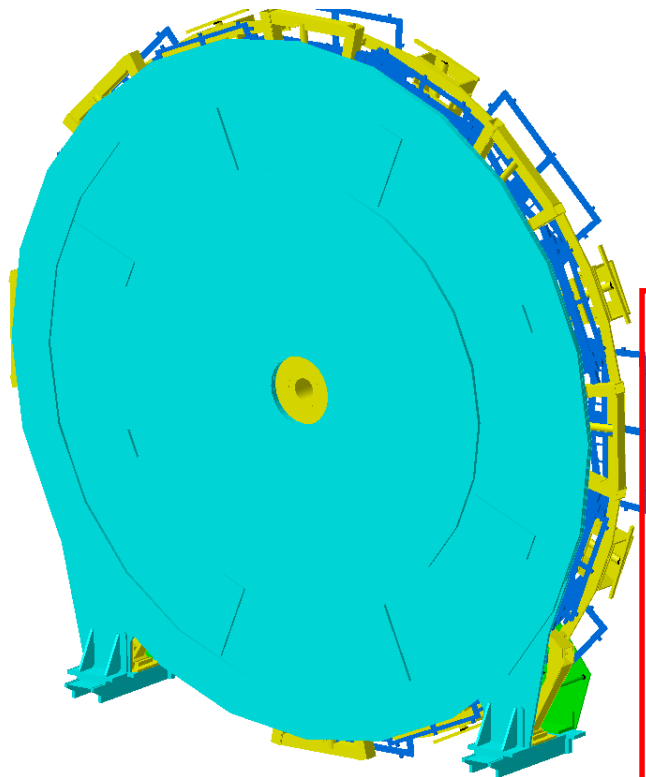
NSW Movement



NSW Movements don't exist in Geant4

#6: LS Spoke / Ens. support Mire / Rod and Bumper

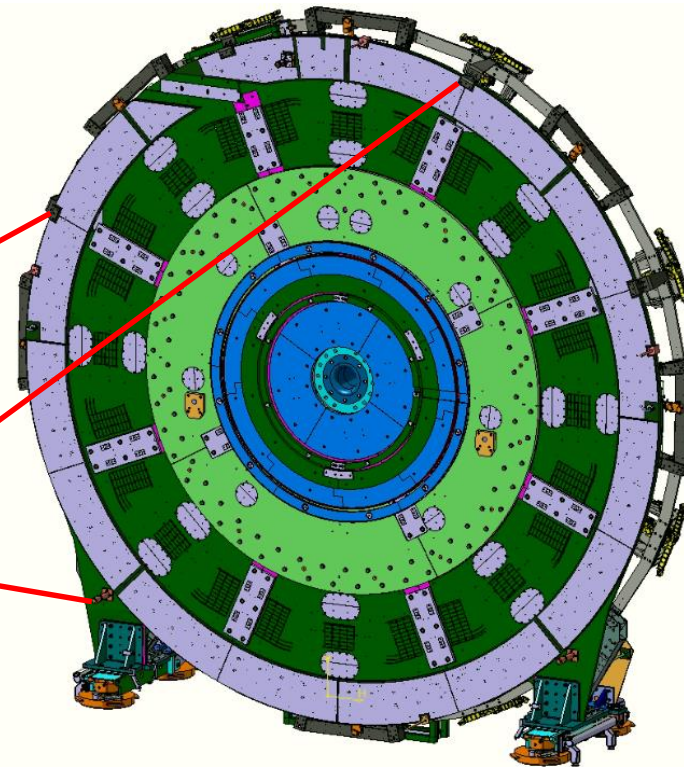
Geant4 - 2017



0.013 m³
VOLUME

102kg
WEIGHT

CATIA - 2019



Ens support Mire



LS Spoke



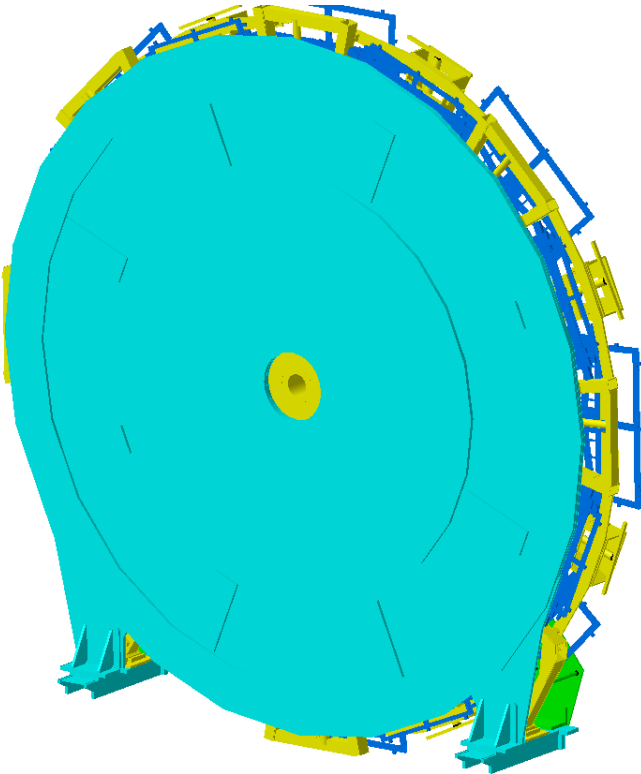
rod and bumper



LS Spoke / Ens support Mire / rod and bumper
don't exist in Geant4

All Missing Parts in NSW 2017

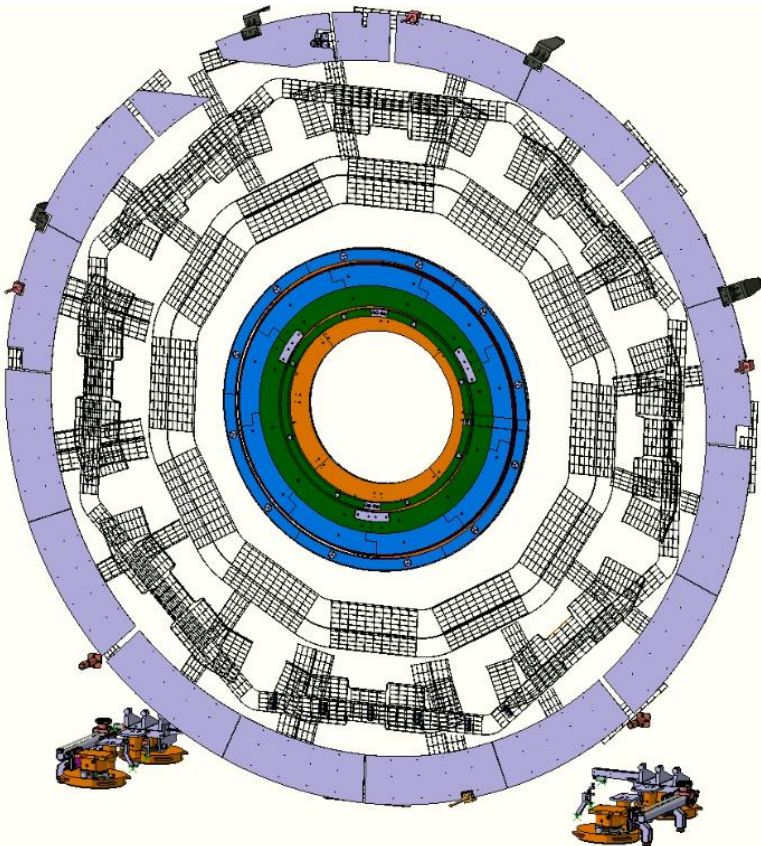
Geant4 - 2017



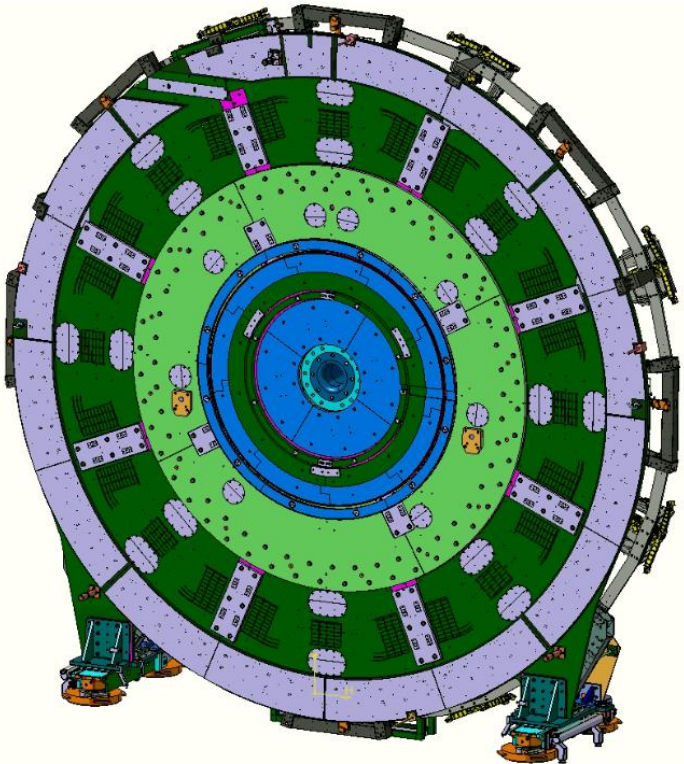
1.159 m³
VOLUME

5833 kg
WEIGHT

Missing Parts

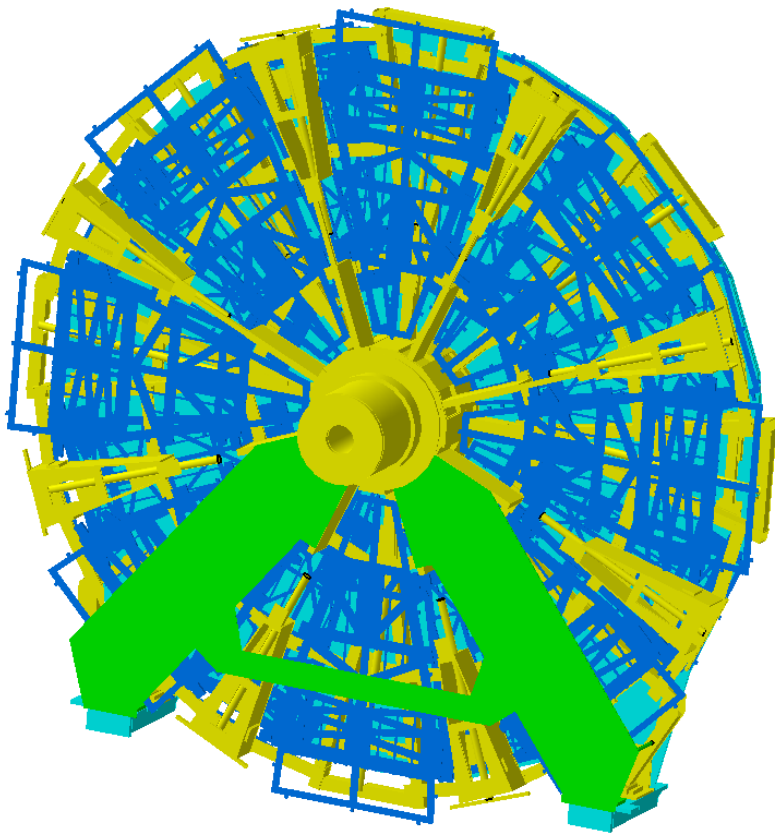


CATIA - 2019



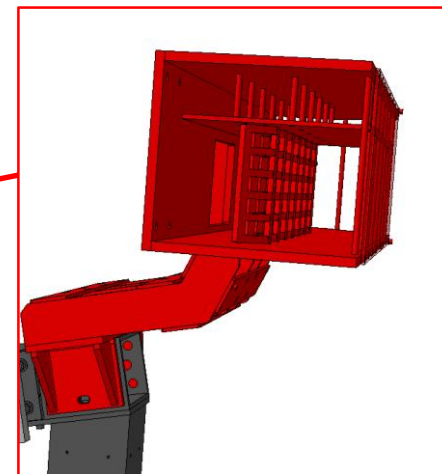
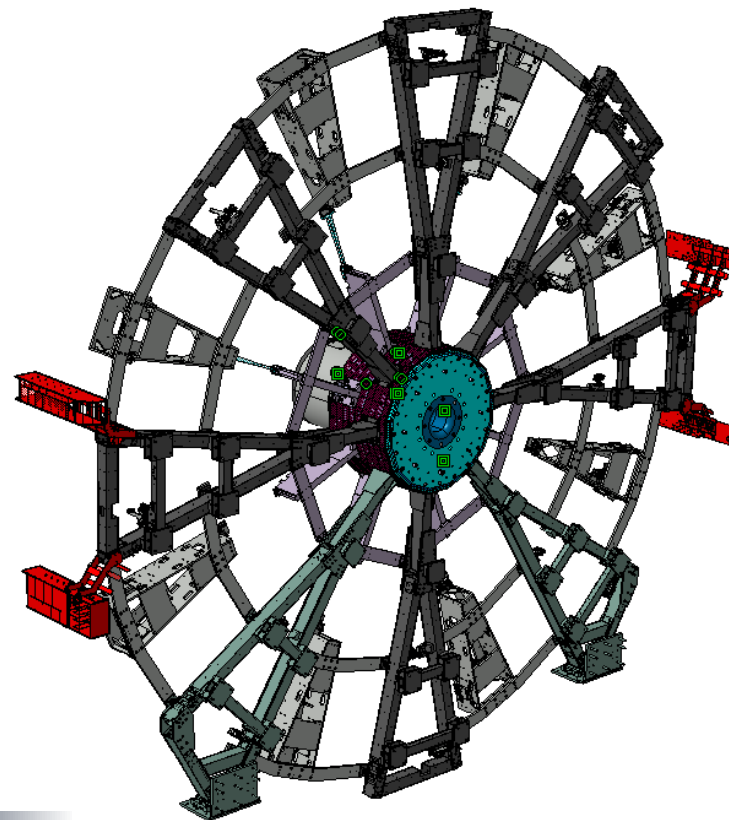
Question: Do we need NSW flexible chain brackets ?

Geant4 -2017



NSW flexible chain brackets
don't exist in Geant4

CATIA - 2019



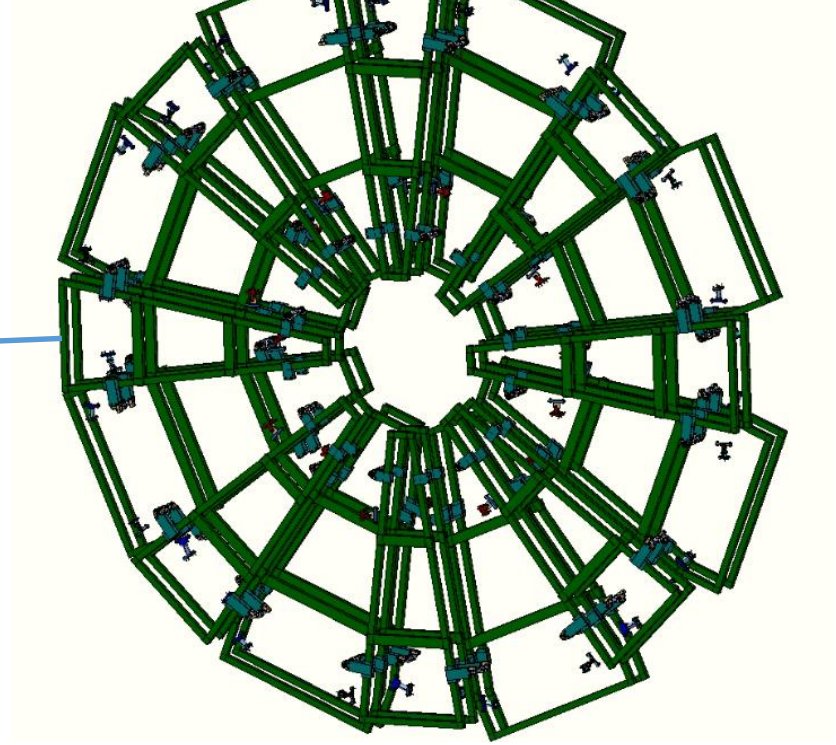
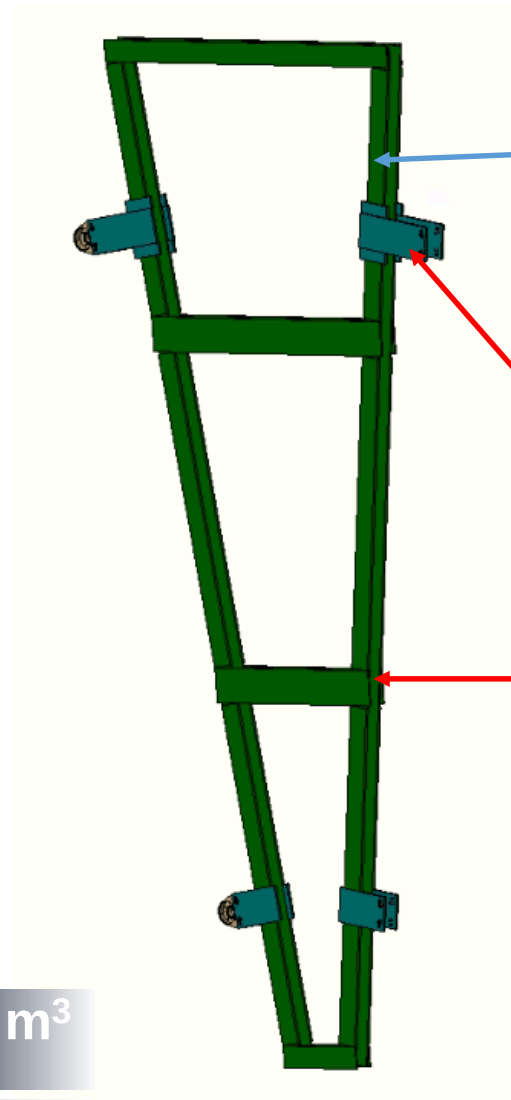
0.058 m³
VOLUME

157 kg
WEIGHT

List of Unknown Components

1. EIS (sTGC KMs) SS Frame
2. EIL (sTGC KMs) LS Frame
3. NSW Services - Rim Boxes
4. NSW Services - Rim Services
5. NSW Services - Rim Box Supports
6. NSW Services - LV crate concept
7. NSW Services - Scaffolding Attachment Envelope
8. NSW Services - Gas Manifolds
9. NSW Services – Main Pipes
10. NSW Services – Sec Pipes
11. NSW Services – Rim Crate
12. NSW Services – Alignment Boxes Support
13. NSW Services – Bottom bracket
14. NSW Services – Lower BrackerG Pipes
15. NSW Services – Routing Hydraulic Pipes

1. EIS (sTGC KMs) SS Frame

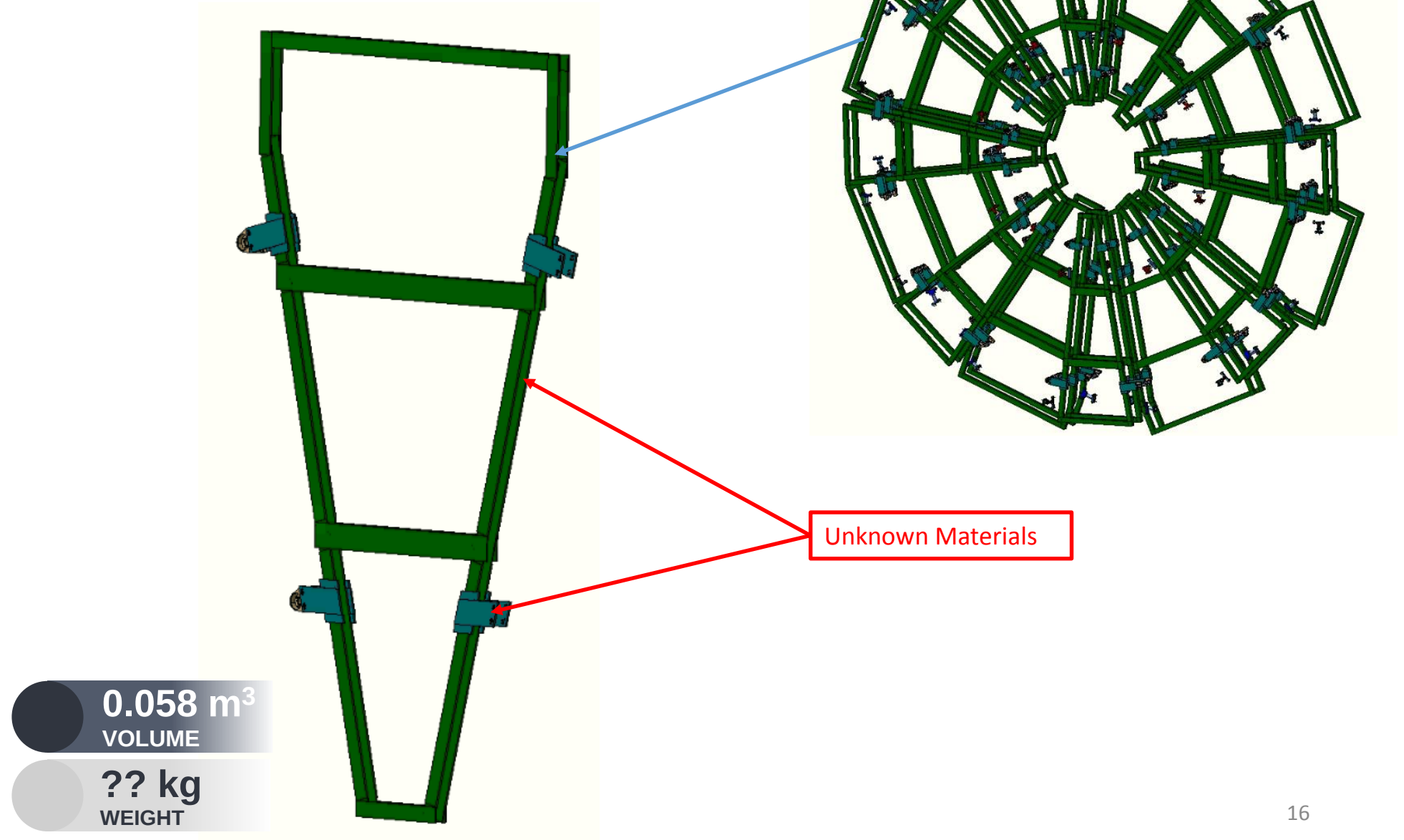


Unknown Materials

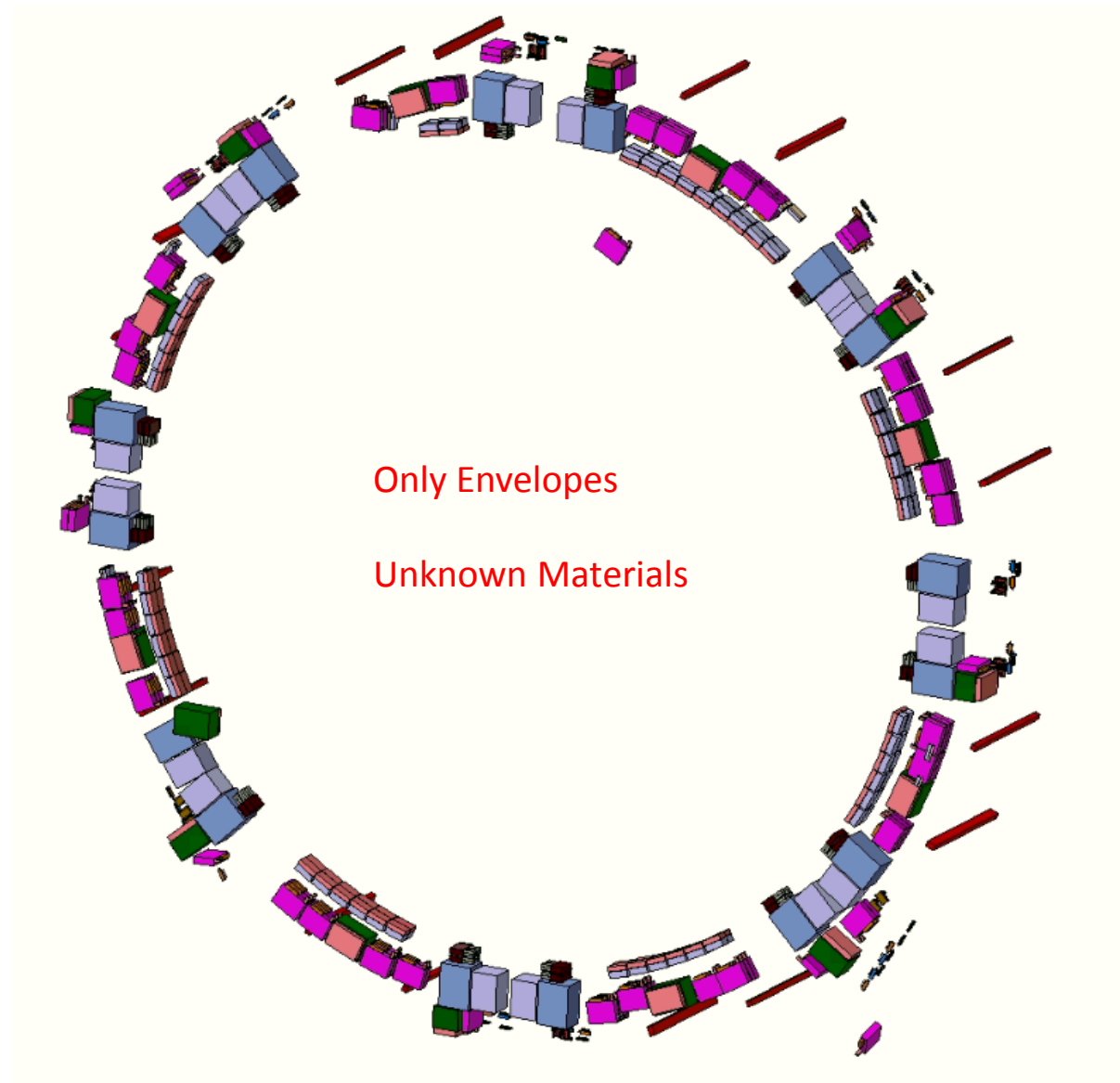
0.058 m³
VOLUME

?? kg
WEIGHT

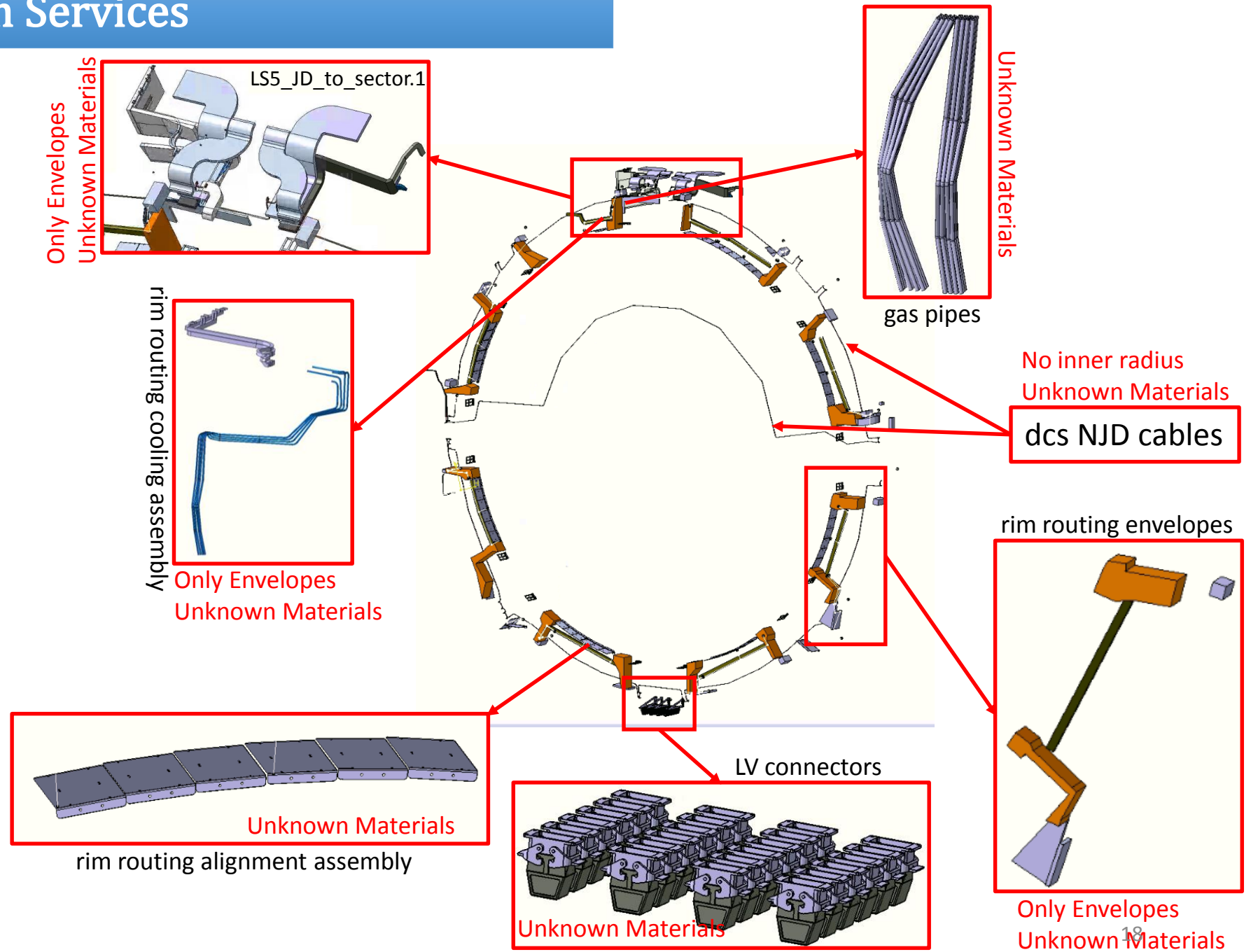
2. EIL (sTGC KMs) LS Frame



3. NSW Services - Rim Boxes

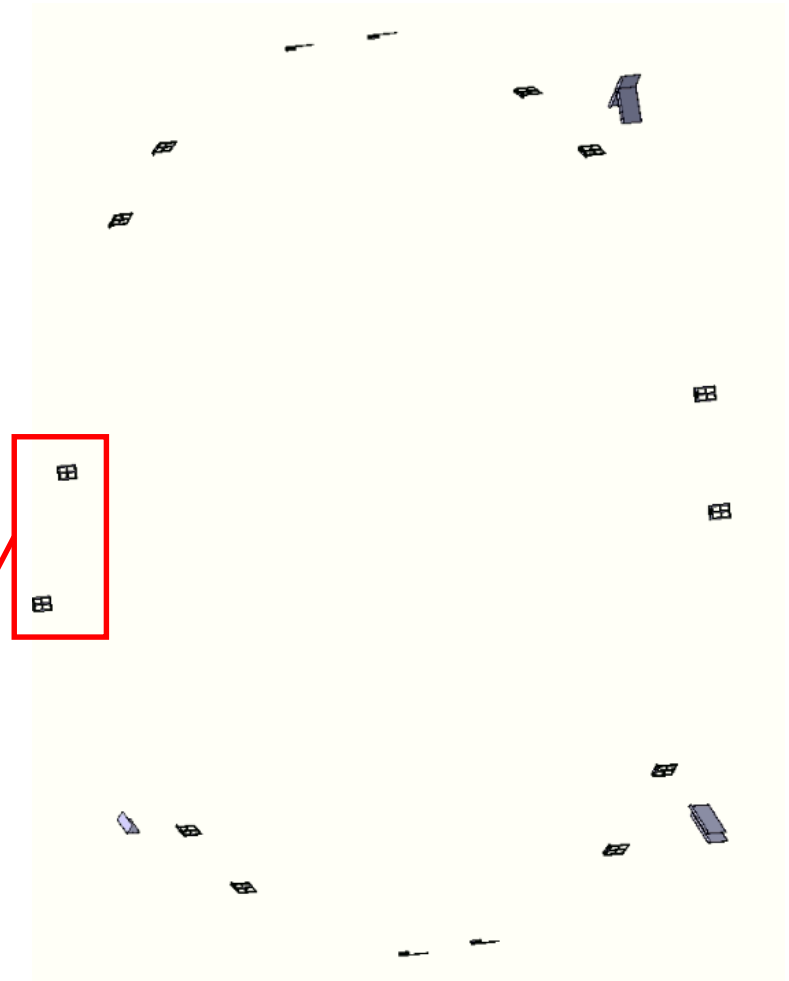
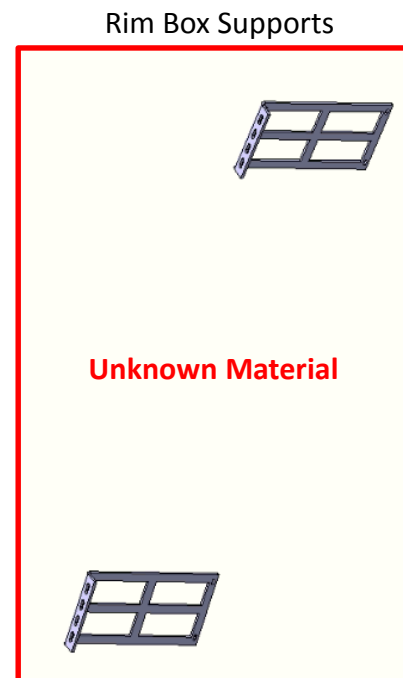


4. NSW Services - Rim Services



5. NSW Services - Rim Box Supports

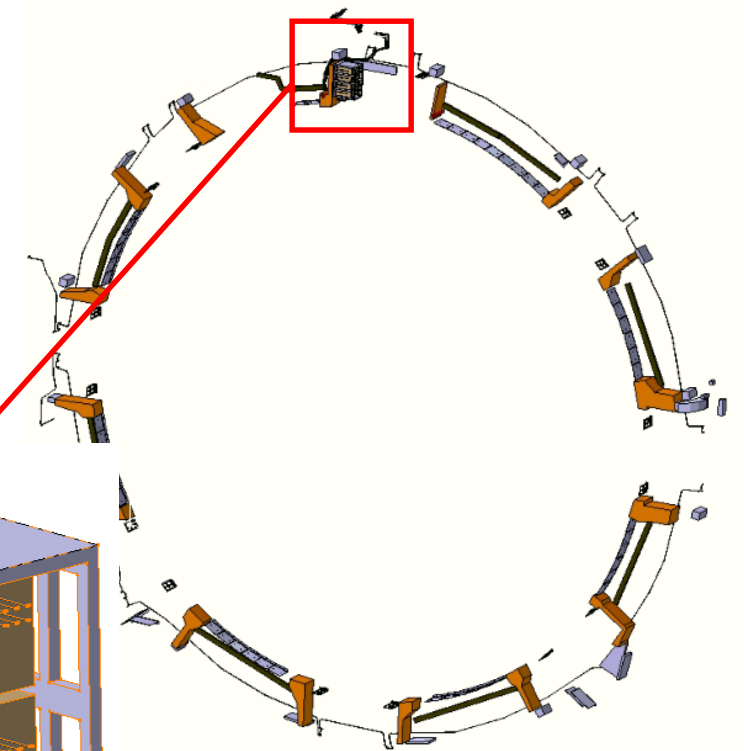
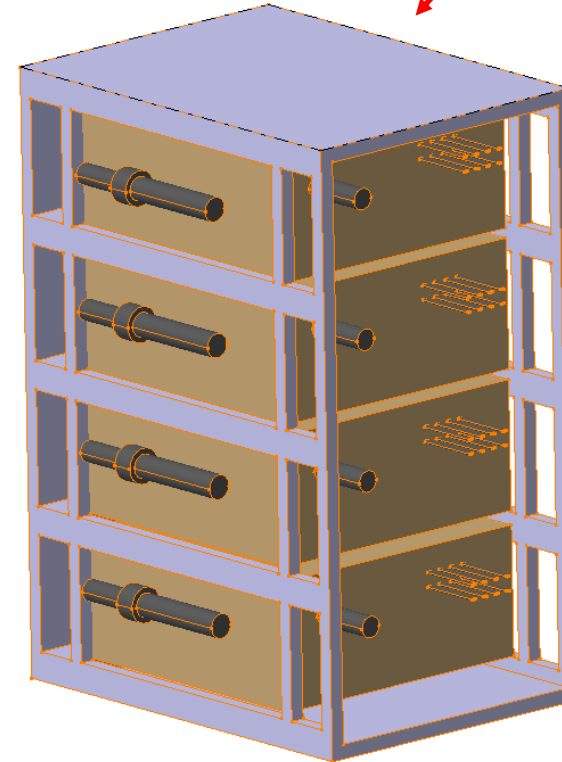
? Not Relevant ?



6. NSW Services - LV crate concept

? Not Relevant ?

LV crate concept

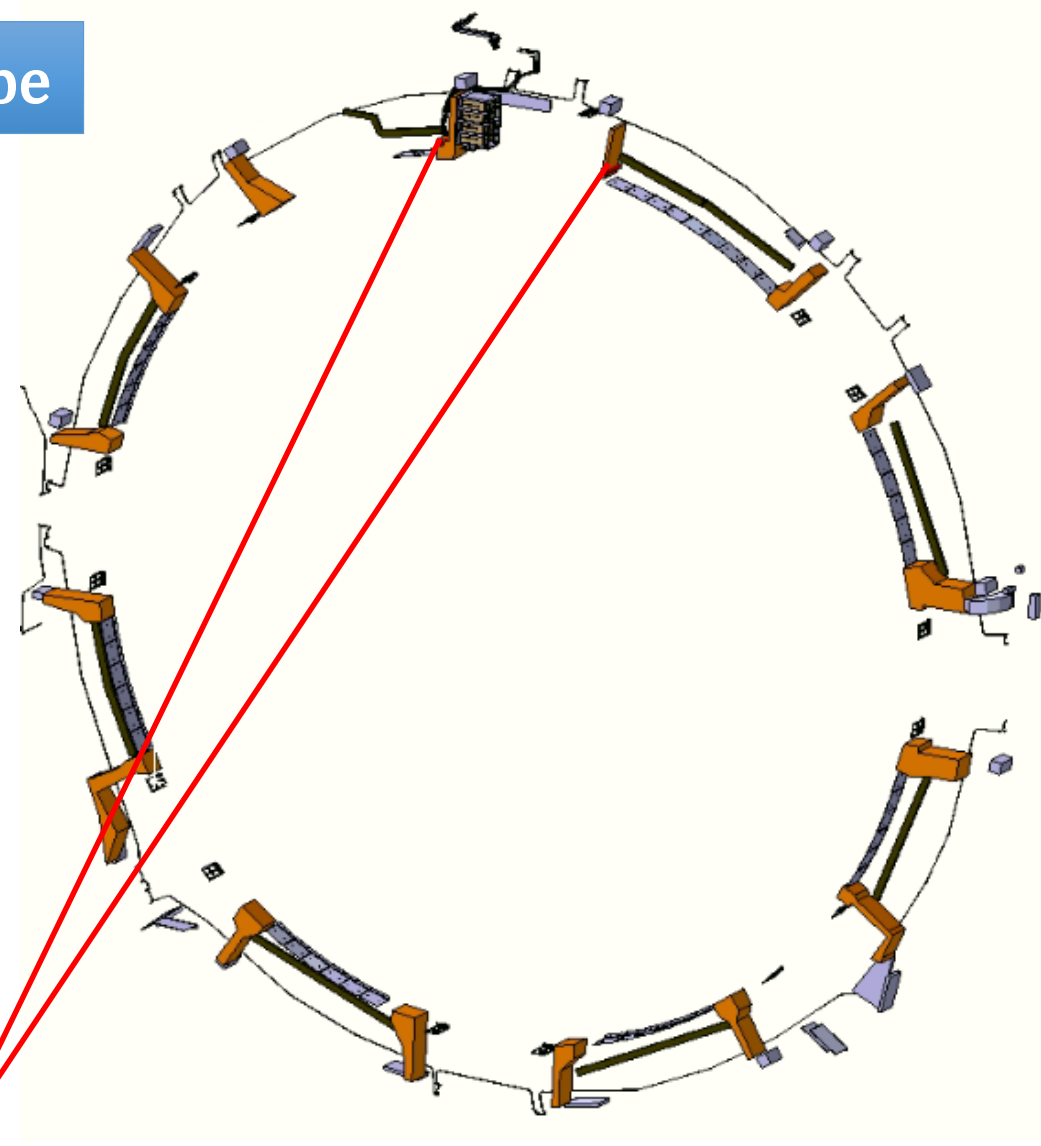


Envelopes

Unknown Material

7. NSW Services - Scaffolding Attachment Envelope

? Not Relevant ?

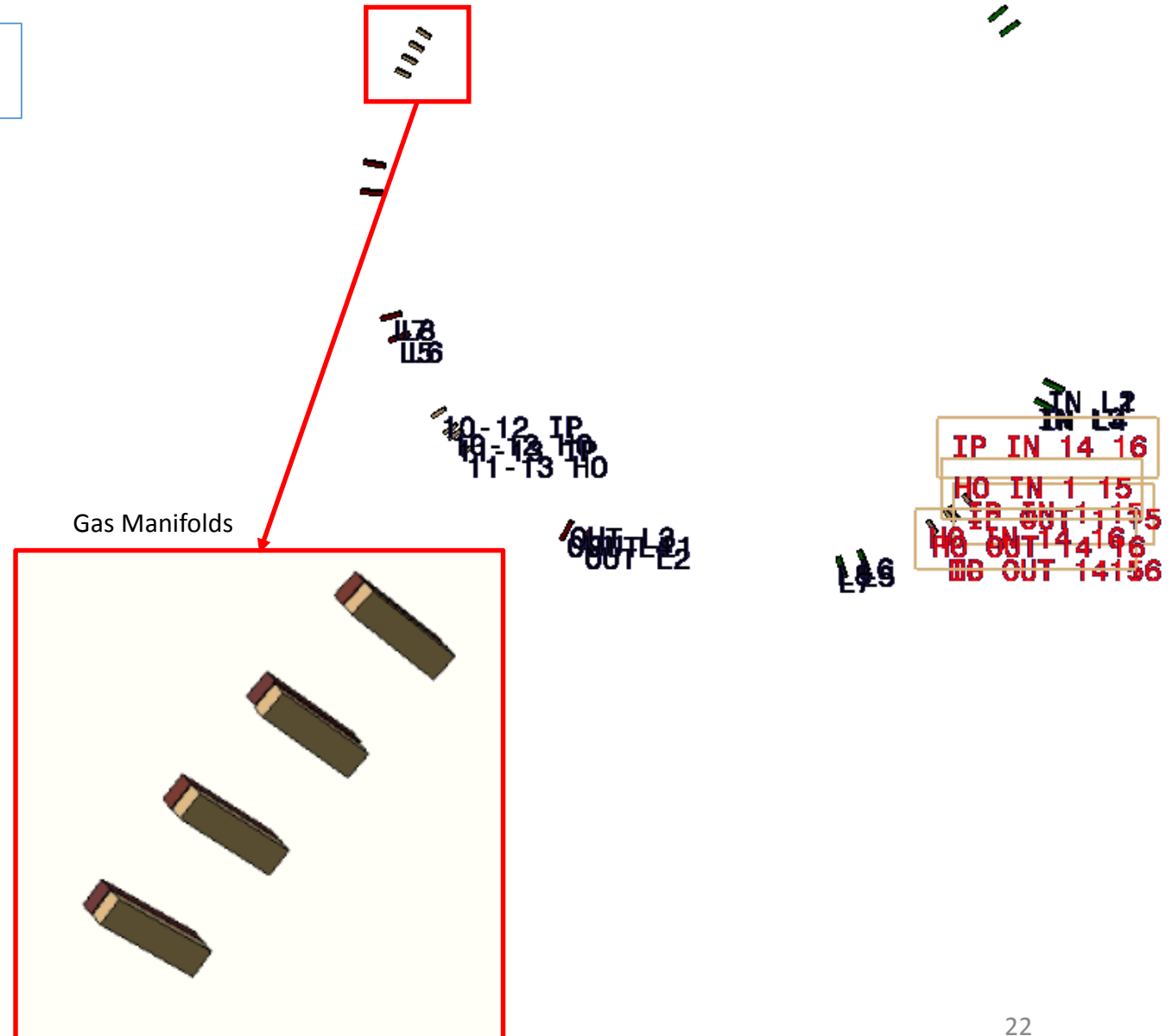


Unknown Material

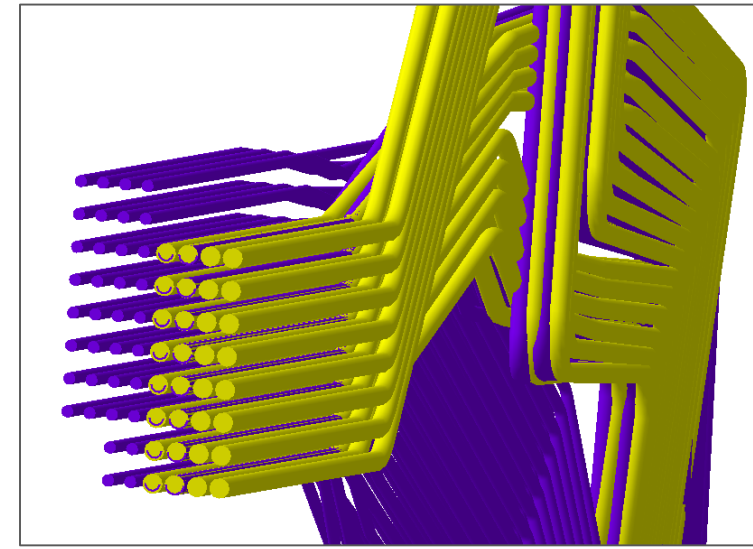
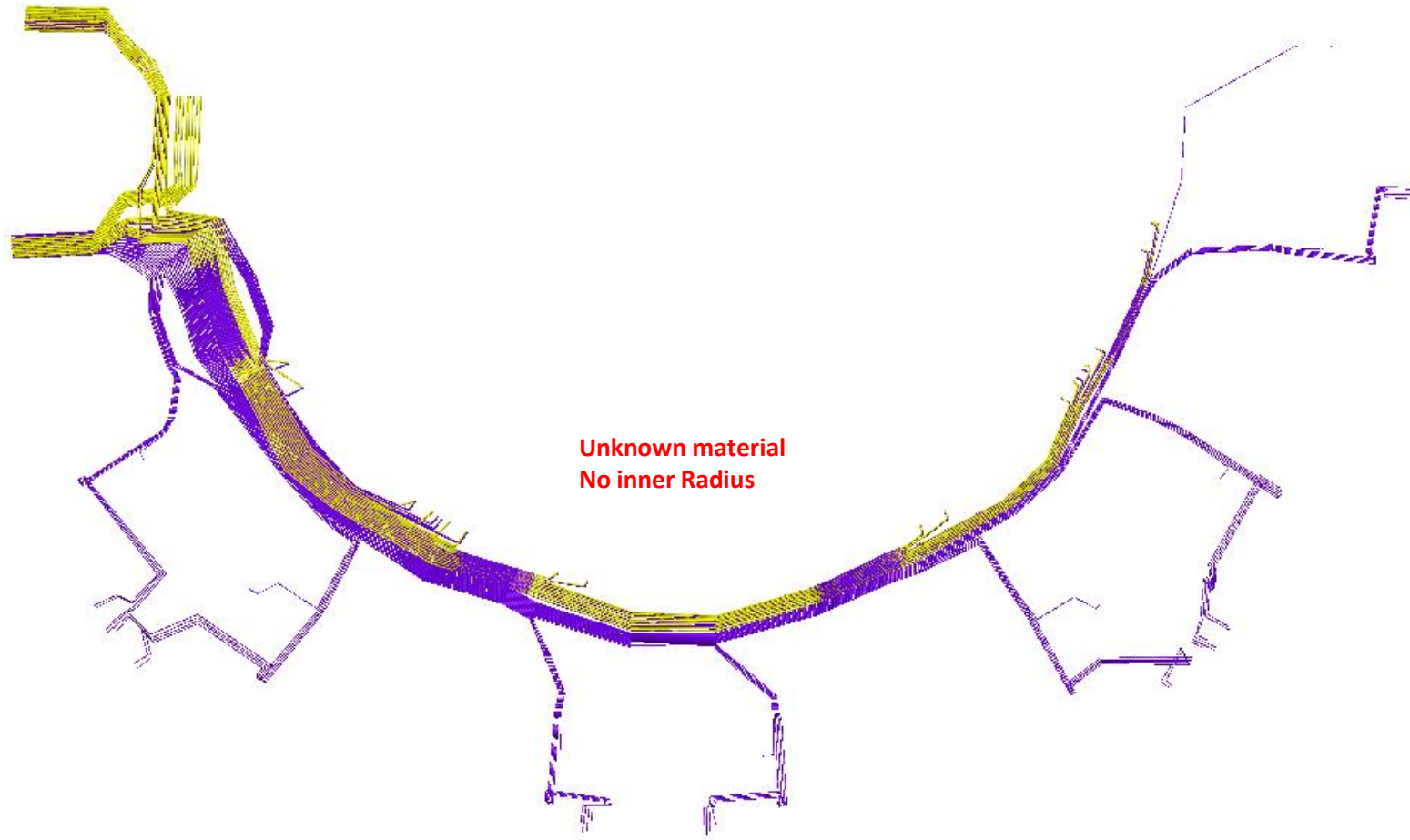


8. NSW Services - Gas Manifolds

? Not Relevant ?



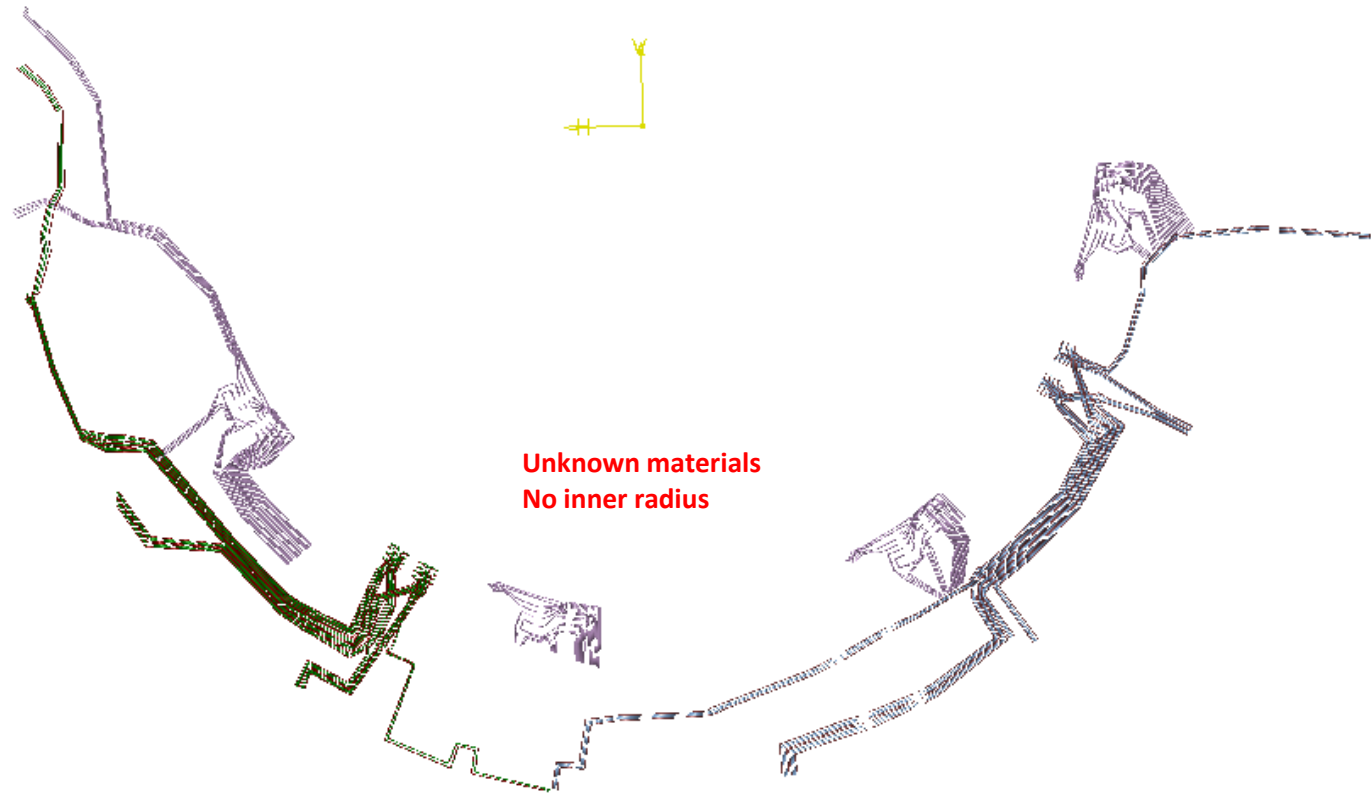
9. NSW Services – Main Pipes



10. NSW Services – Sec Pipes

- ST0749021_01 (ST0749021_01.1)NSW Rim Services C
- ST0819963_01 (Product1.4)NSW JD Services assembly
 - ST0734141_01 (Part1.5)NSW Services JD NO GO Areas
 - ST0820380_01 (ST0820380_01.1)NSW_Services_Fixation_Assembly
 - ST0842733_01 (Product1.1)NSW JD Trays
 - ST0848844_01 (Product1.11)gas manifolds
 - ST0894440_01 (Part5.1)detailed routing NSW JD IP pipes
 - ST0898845_01 (Part1.2)detailed routing NSW JD HO cables
 - ST0913143_01 (ST0913143_01.1)NSW NJD bottom main pipe routing
 - ST0924734_01 (ST0924734_01.1)NSW NJD bottom sec pipe routing**
- ST0942394_01 (ST0942394_01.1)Rim Crate Assembly
- ST0965977_01 (Product1.5)Alignment boxes support
- ST0996890_01 (ST0828380_01.1)BOTTOM_BRACKET_SECTOR_1_ASS
- ST0993924_01 (ST0993924_01.1)NSW_MM_LOWER BRACKET_G_PIPES_ASS
- Constraints

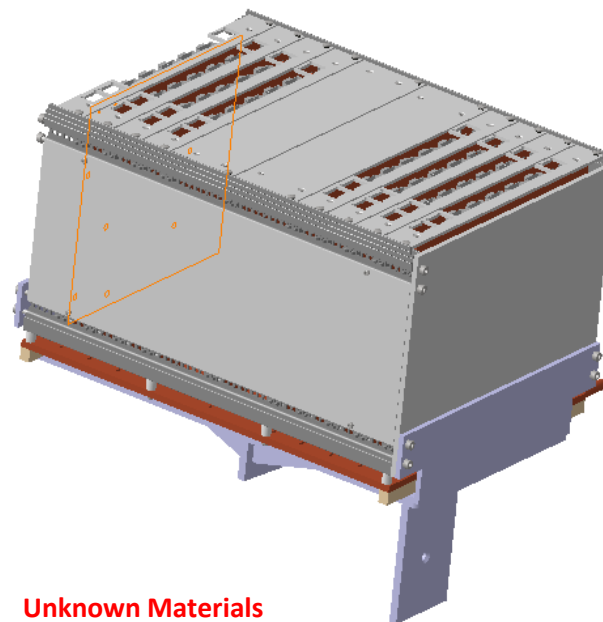
Applications



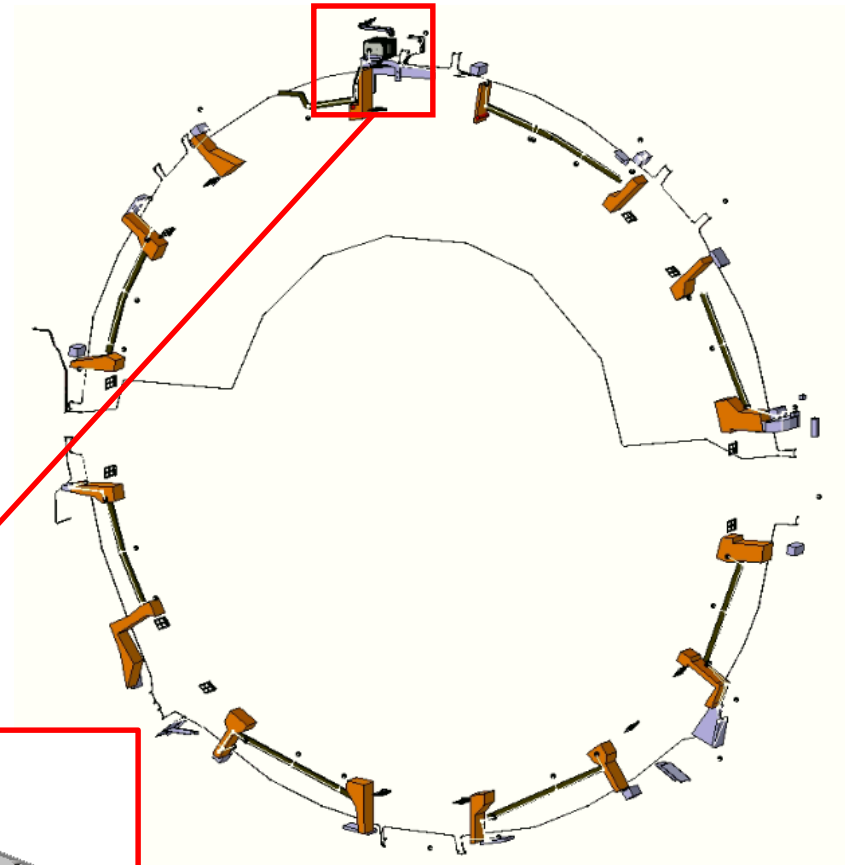
11. NSW Services – Rim Crate

? We don't know what is it ?

Rim Crate

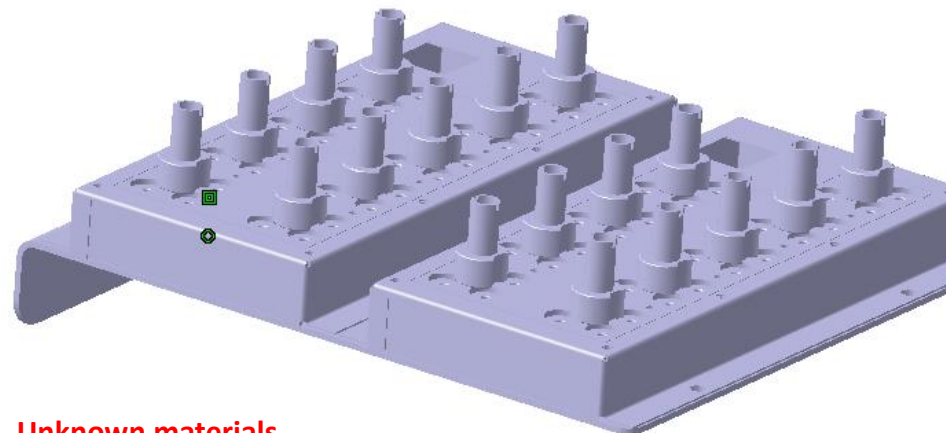
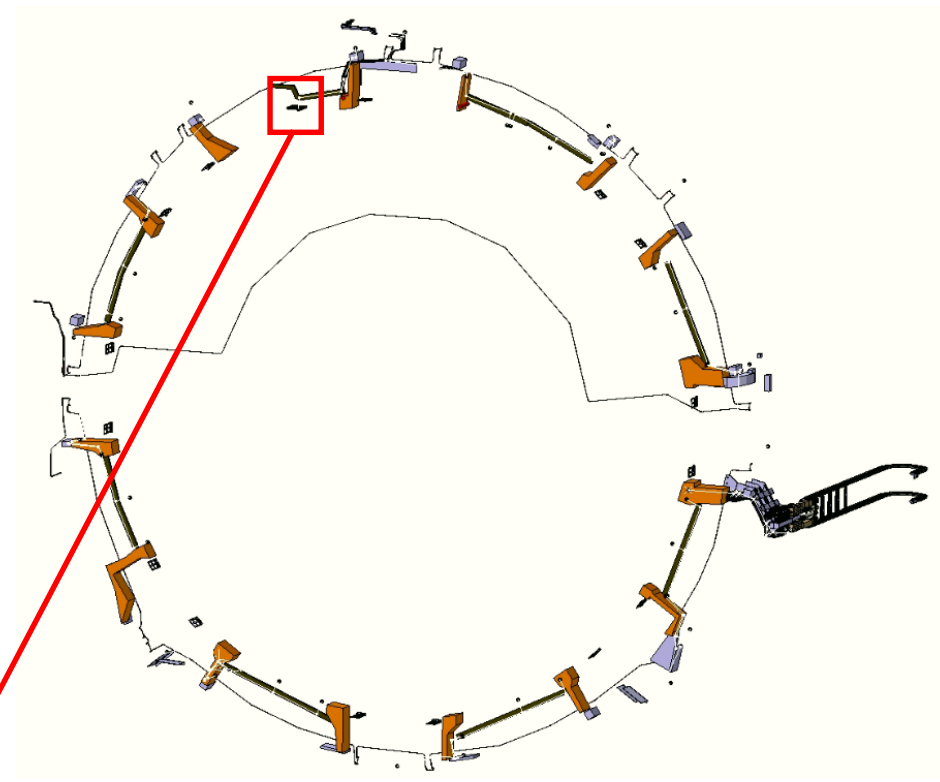


Unknown Materials



12. Services – Alignment Boxes Support

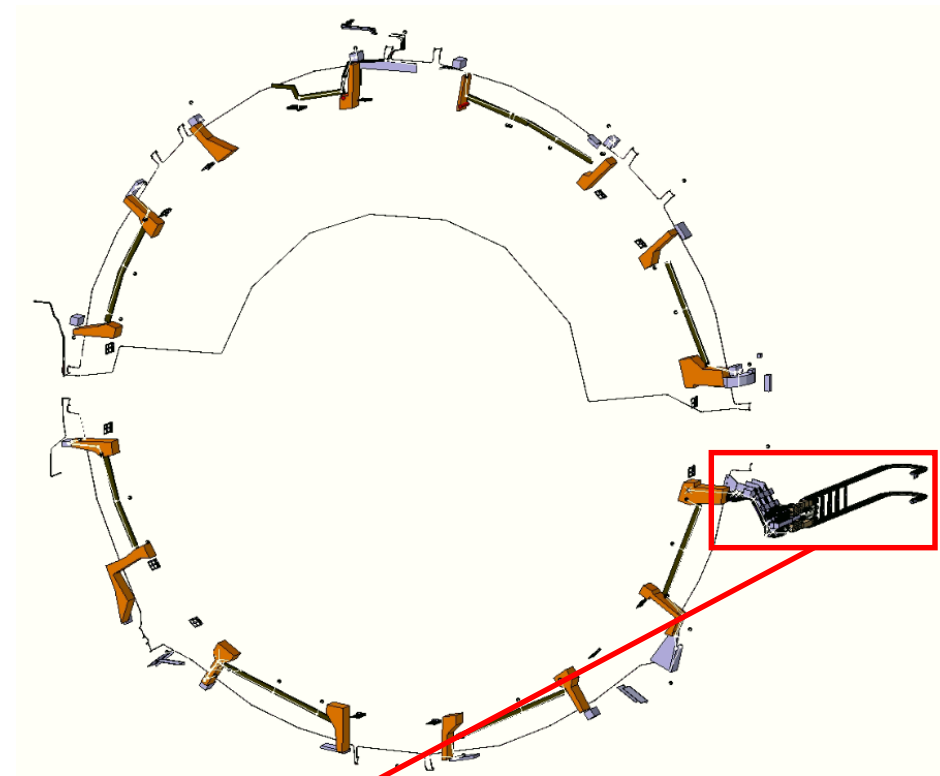
? Not Relevant ?



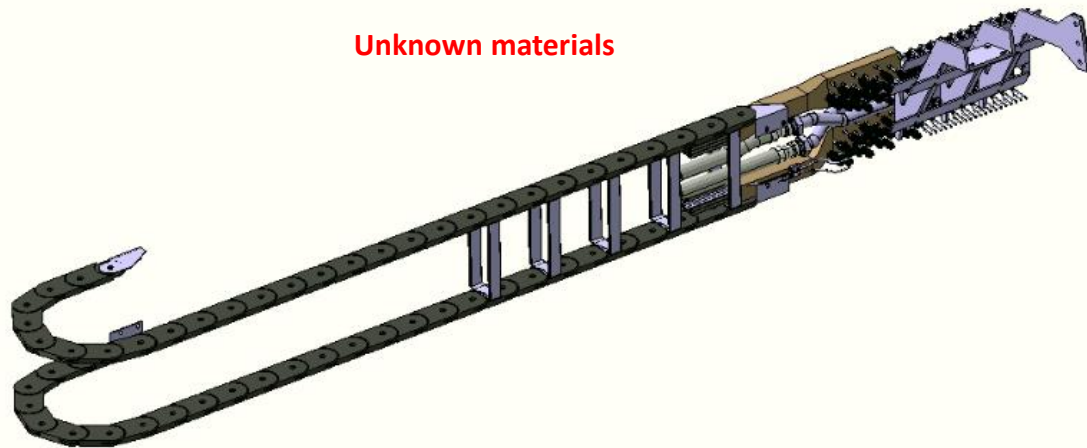
Unknown materials

13. NSW Services – Bottom bracket

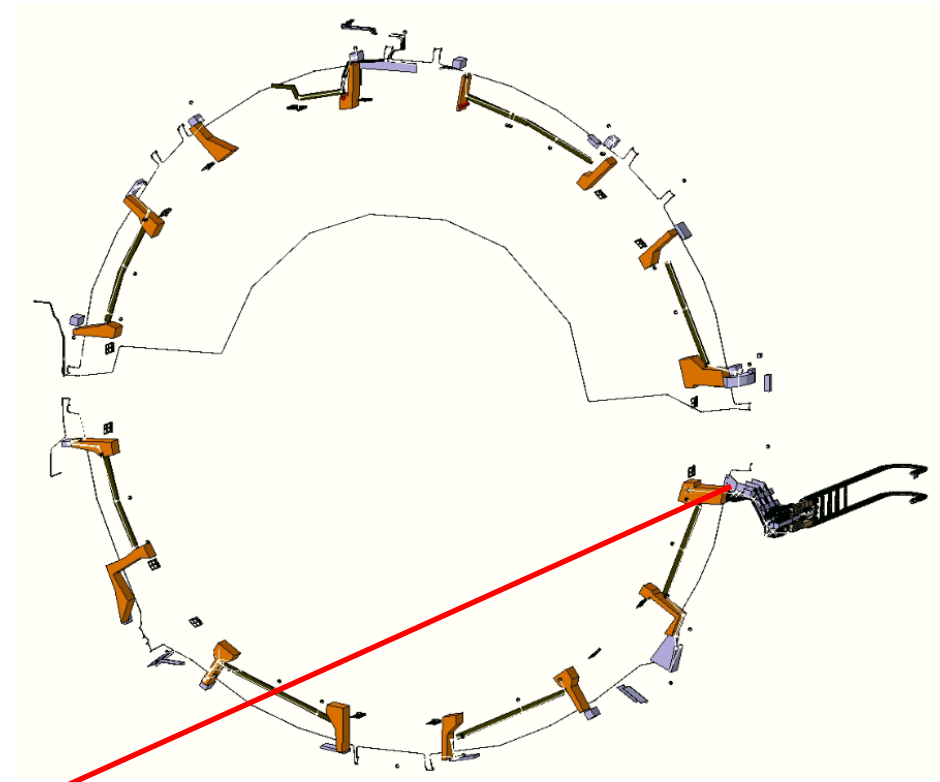
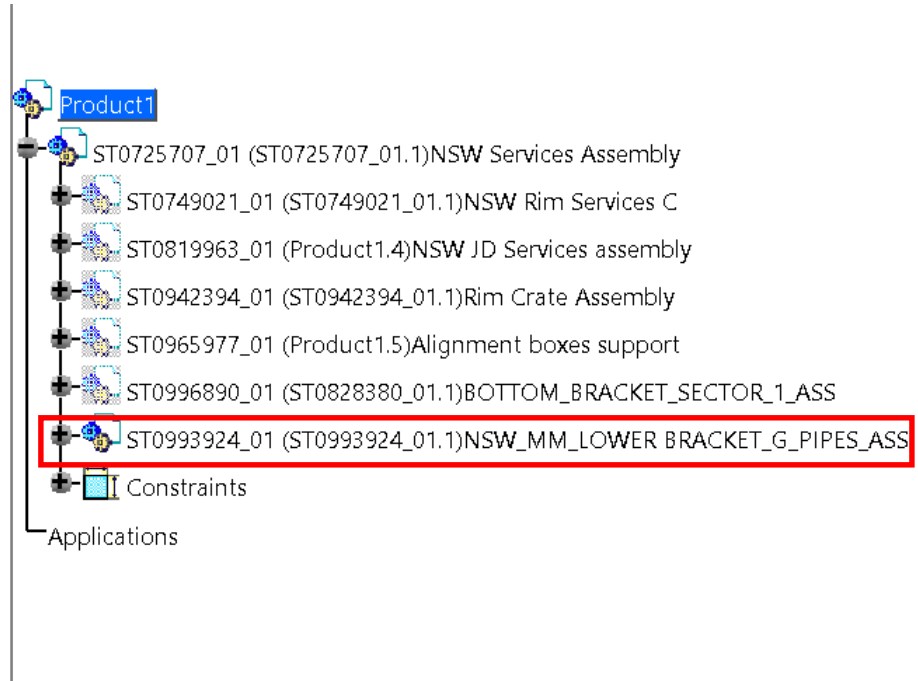
? We don't know what is it ?



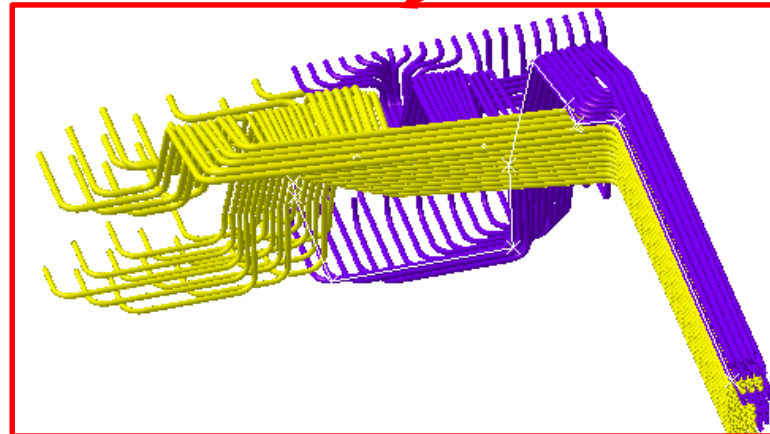
Unknown materials



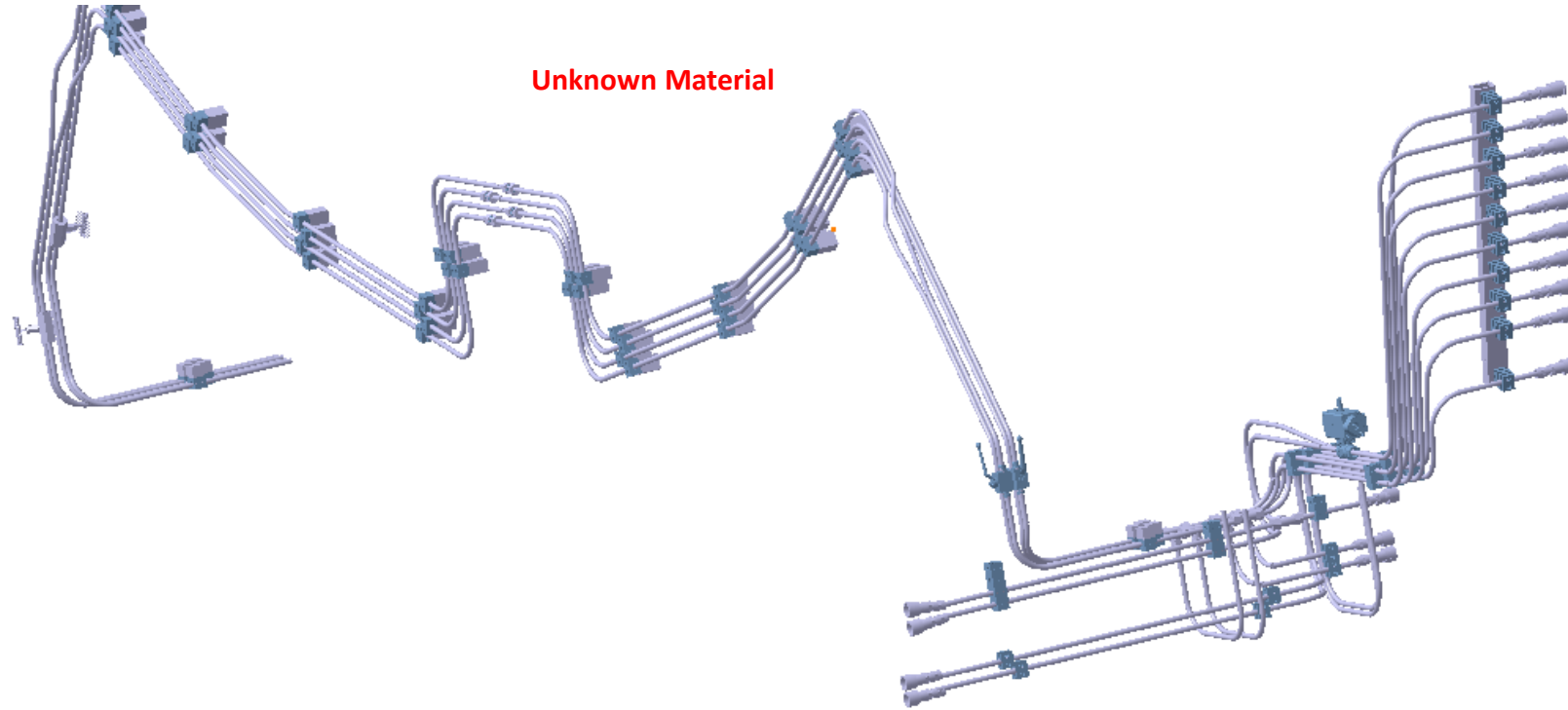
14. NSW Services – Lower BrackerG Pipes



Unknown Material



15. NSW Services – Routing Hydraulic Pipes



Final Status of Unknown Components

#	Component	Relevance
1	EIS (sTGC KMs) SS Frame	
2	EIL (sTGC KMs) LS Frame	
3	NSW Services - Rim Boxes	
4	NSW Services - Rim Services	
5	NSW Services - Rim Box Supports	
6	NSW Services - LV crate concept	
7	NSW Services - Scaffolding Attachment Envelope	
8	NSW Services - Gas Manifolds	
9	NSW Services – Main Pipes	
10	NSW Services – Sec Pipes	
11	NSW Services – Rim Crate	
12	NSW Services – Alignment Boxes Support	
13	NSW Services – Bottom bracket	
14	NSW Services – Routing Hydraulic Pipes	

Simplification of NSW missing parts

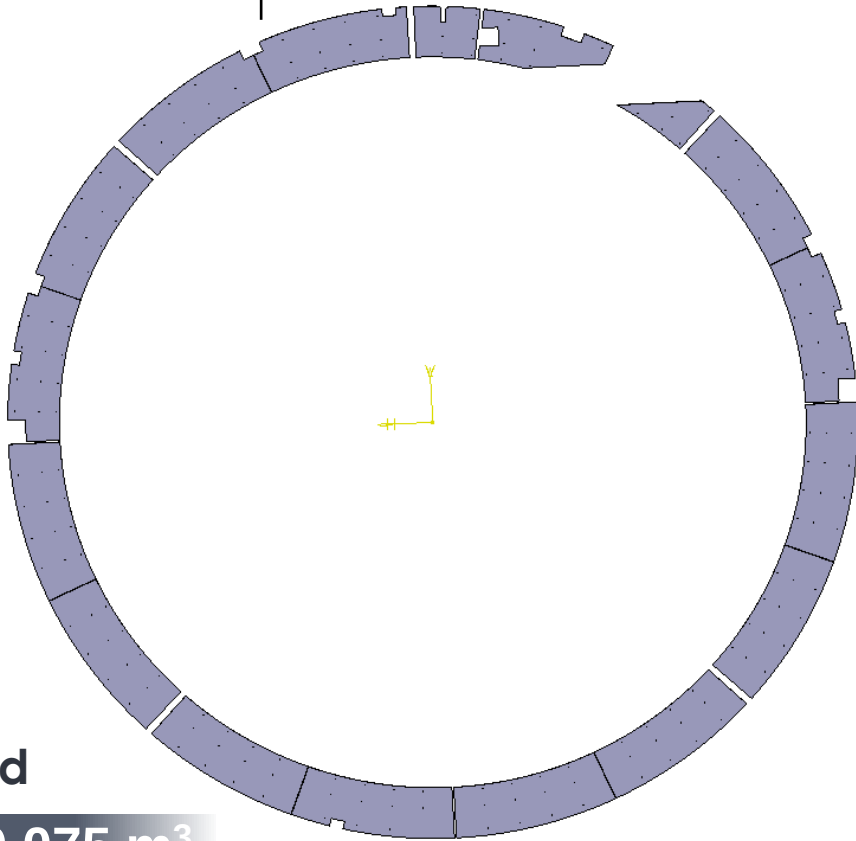
1. Rim Plates
2. Cable Tray
3. Vertical shield HO
4. NJD Vert. Shield
5. NSW Movement
6. NSW LS Spoke/Ens support Mire/ rod and bumper

Sharmazanashvili
Georgian Team: Niko Tsutskiridze
Archil Surmava

1. Rim Plates

Material	Density
Aluminum	2700

Detailed

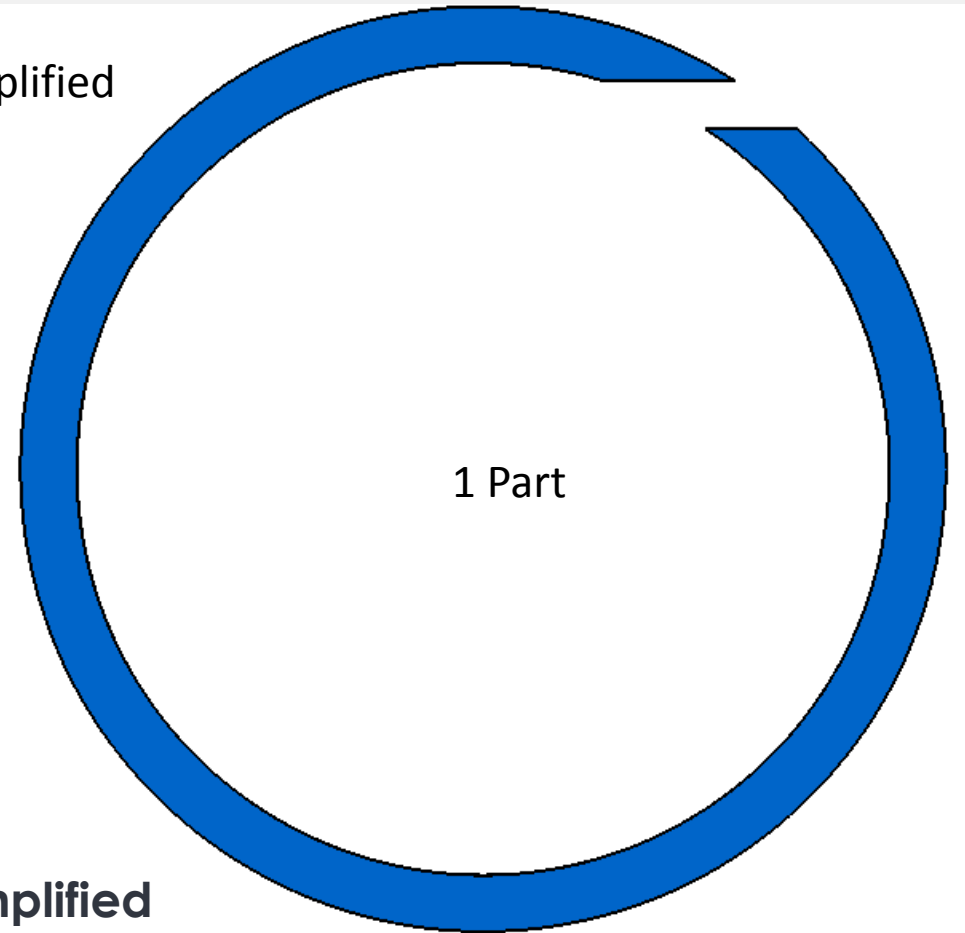


Detailed

0.075 m³
VOLUME

205kg
WEIGHT

Simplified



Simplified

0.075 m³
VOLUME

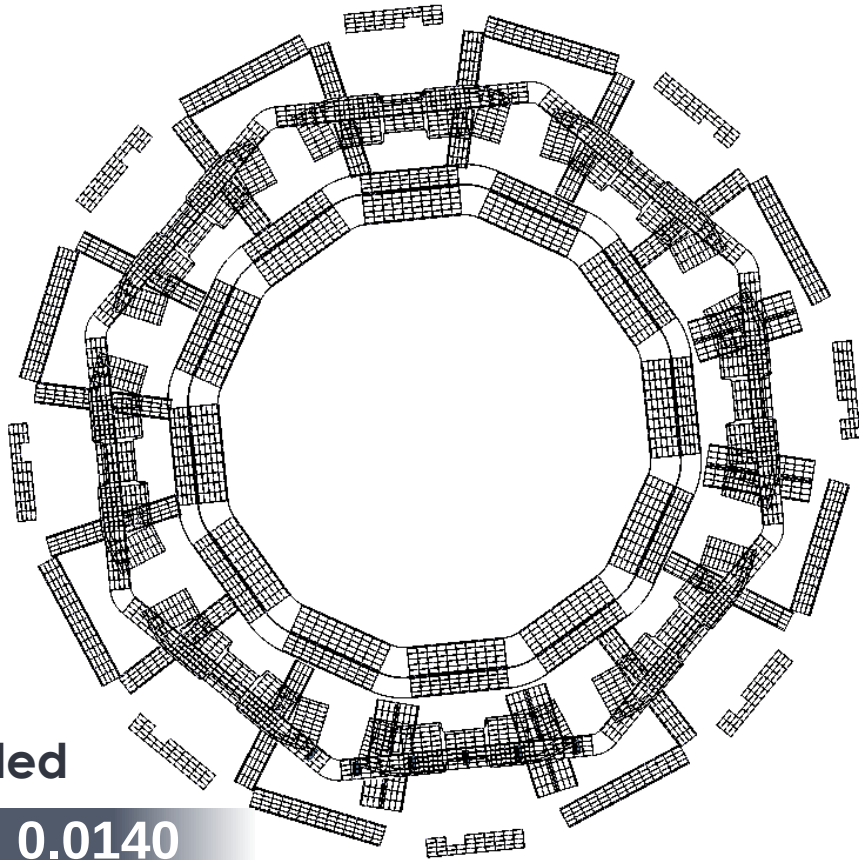
205 kg
WEIGHT

Diff. 0kg

2. Cable Tray

Material	Density
SSteel	8000

Detailed

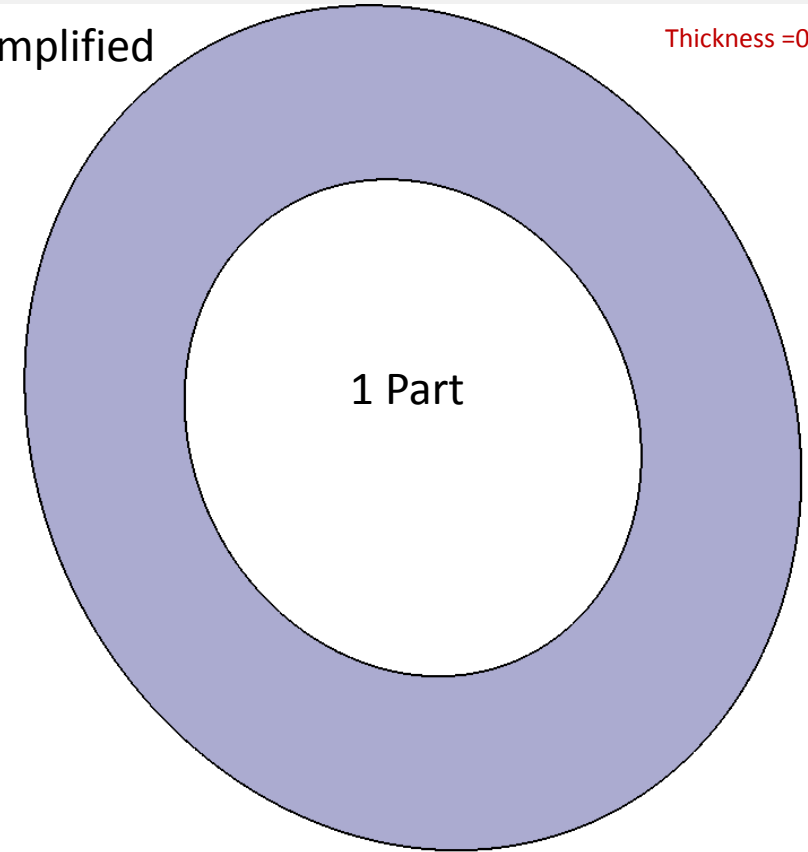


Detailed

0.0140
VOLUME

113kg
WEIGHT

Simplified



Thickness = 0.5mm

1 Part

Simplified

0.0143 m³
VOLUME

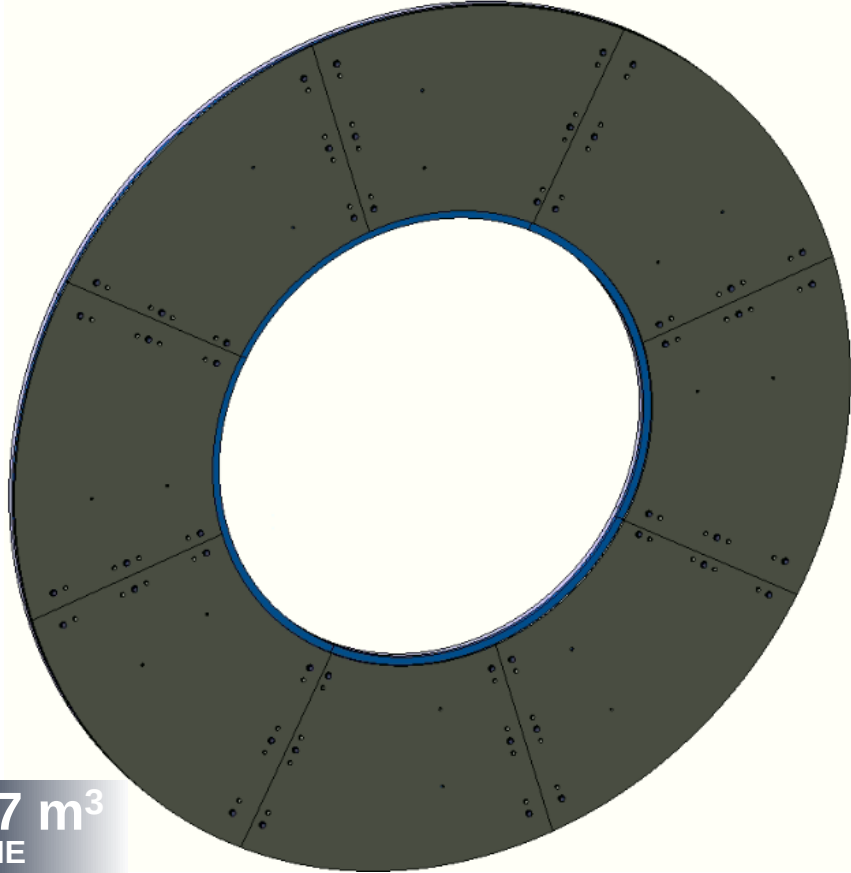
115 kg
WEIGHT

Diff. 2kg

3. Vertical shield H0

Material	Density	Volume (m ³)	Weight (kg)
HD PE Borotron® 5% HD050	1010	0.255	257.6
Lead	11340	0.062	703
		Total:	960.6

Detailed

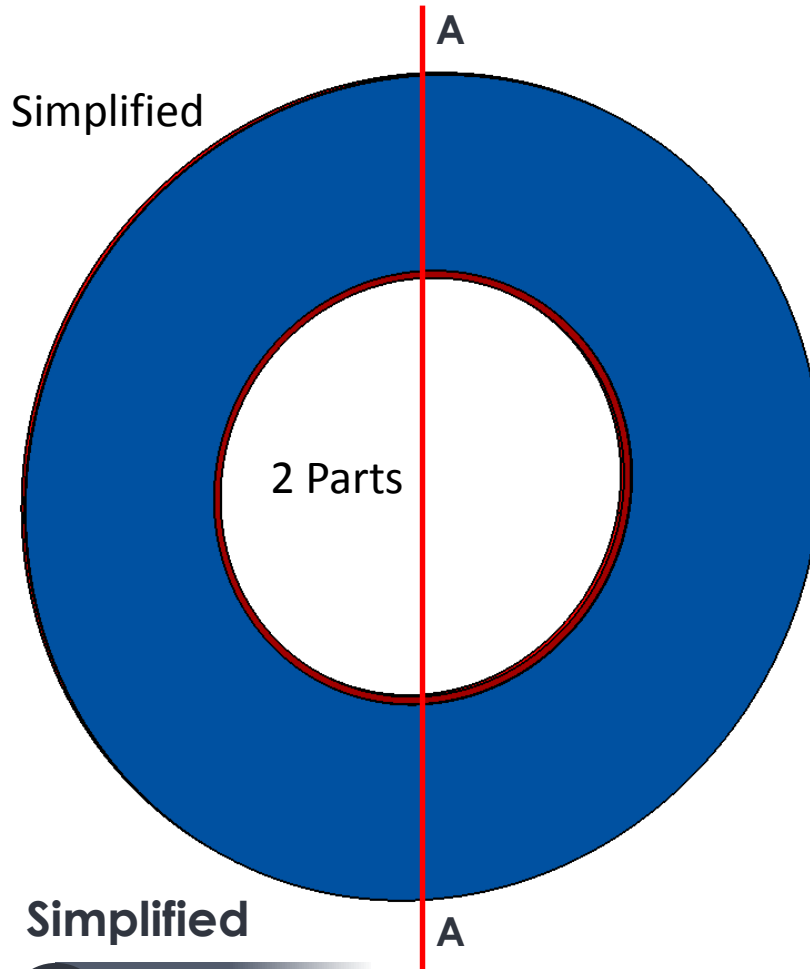


Detailed

0.317 m³
VOLUME

960 kg
WEIGHT

Simplified

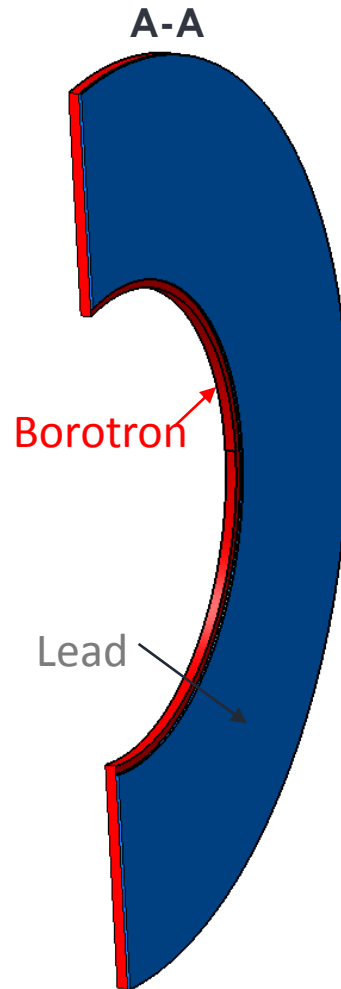


Simplified

0.317 m³
VOLUME

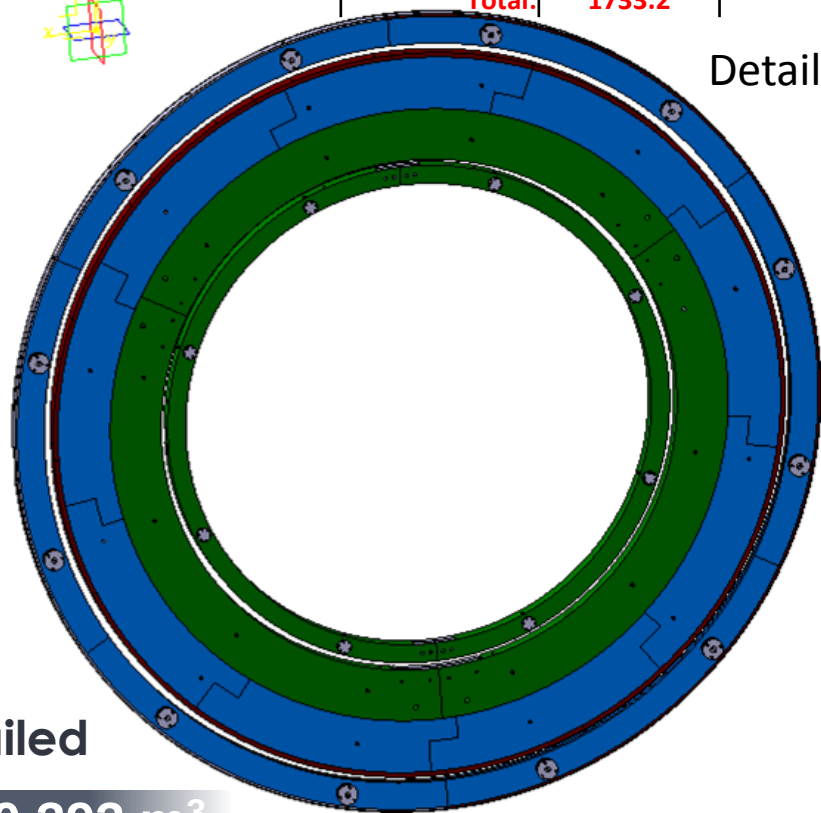
960 kg
WEIGHT

Diff. 0kg



4. NJD Vert. Shield

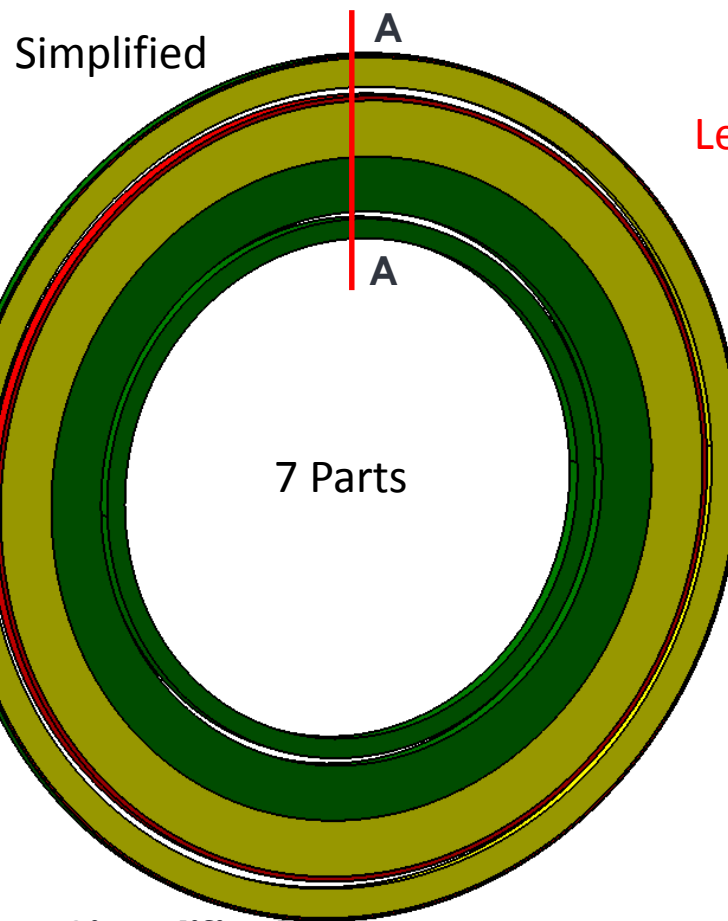
Material	Density	Volume (m ³)	Weight (kg)
HD PE Borotron® 5% HD050	1010	0.21	212.1
SSteel	8000	0.1625	1300
Lead	11340	0.0195	221.13
Total:			1733.2



Detailed

0.393 m³
VOLUME

1733 kg
WEIGHT



Simplified

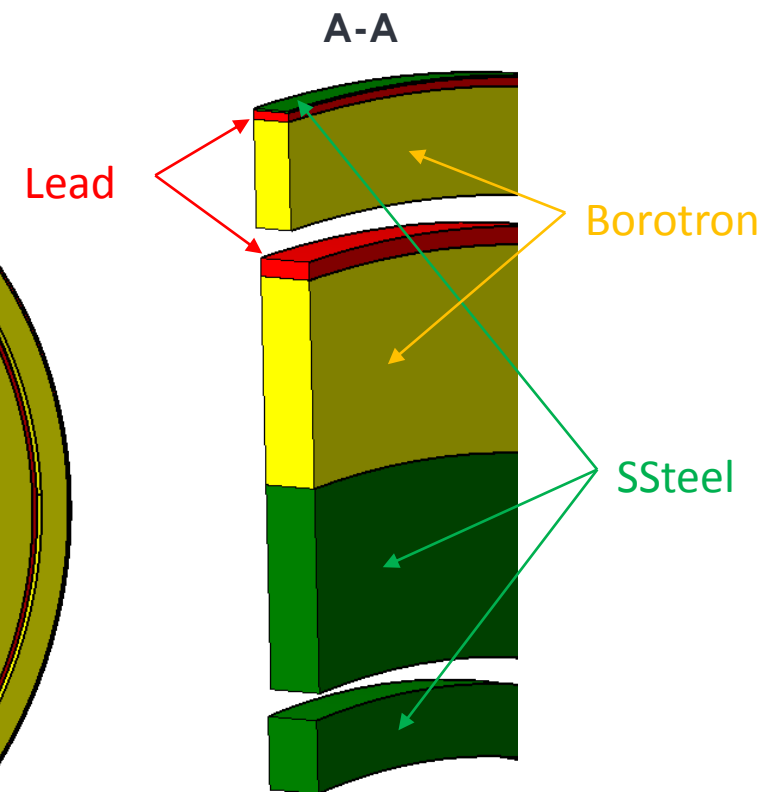
7 Parts

Simplified

0.395 m³
VOLUME

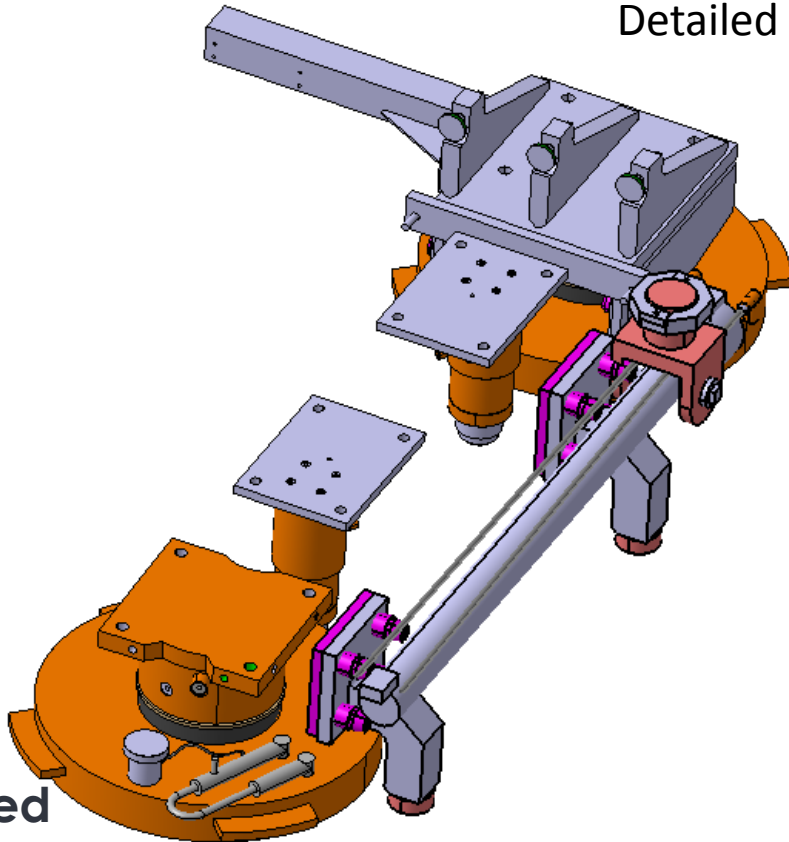
1741 kg
WEIGHT

Diff. 8 kg



5. NSW Movement

Detailed

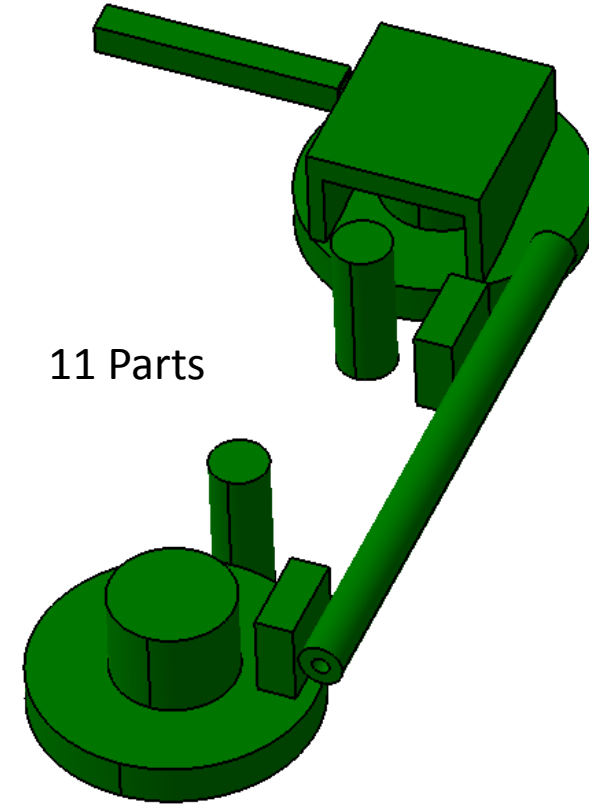


Detailed

0.1733 m³
VOLUME

1360.4kg
WEIGHT

Simplified



11 Parts

Simplified

0.1733 m³
VOLUME

1360.4kg
WEIGHT

Diff. 0kg

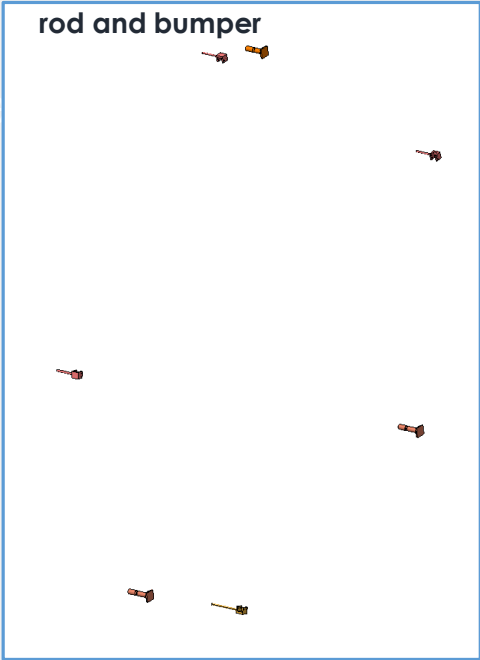
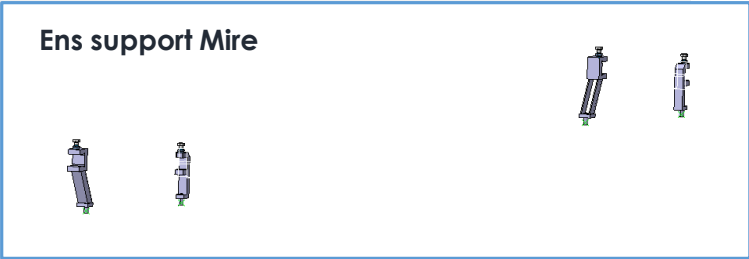
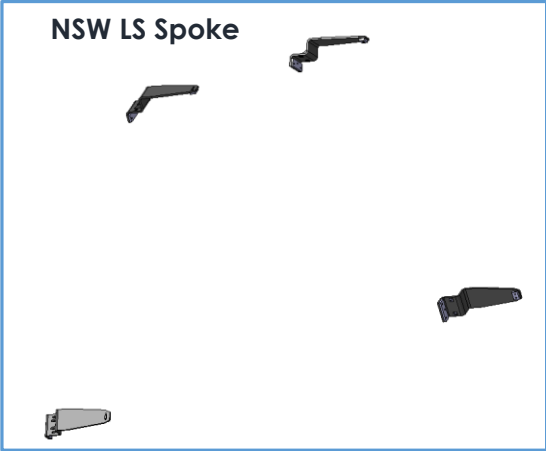


2 x per side = 2'720.8 kg



6. NSW LS Spoke/Ens support Mire/ rod and bumper

Material	Density
Steel	7850



Detailed

Detailed

0.013 m³
VOLUME

102kg
WEIGHT

Simplified

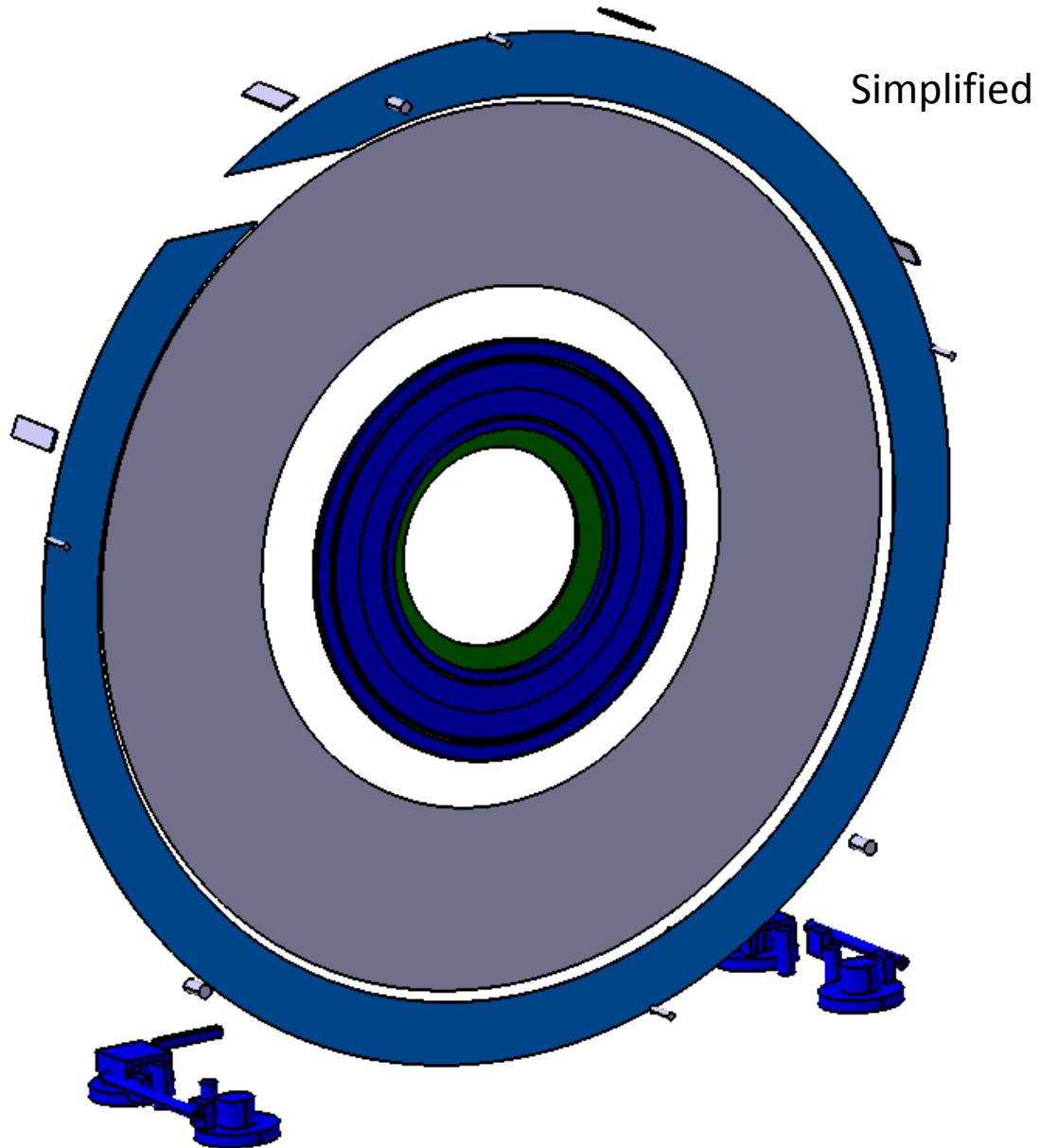
0.013 m³
VOLUME

102kg
WEIGHT

Diff. 0kg

11 Parts

All Simplified Parts



44 Parts
Per Side

Simplified

5'843 kg
WEIGHT

Diff. 10 kg

AGDD/XML coding & Integration Conflict Checking

Fragment of new AGDD/XML Description

```
!-- NSW movement -->
:tubs name="JD_PAD" material="Iron" Rio_Z="0.; 352.75; 105." nbPhi="36" />
:tubs name="JD_TOP_Pad" material="Iron" Rio_Z="0.; 155.8; 226.4" nbPhi="36" />
:tubs name="BJ_asse" material="Iron" Rio_Z="0.; 73.; 380." nbPhi="36" />
:box name="XbracketN" material="Iron" X_Y_Z="95.88; 230.; 218." />
:tubs name="VerinN" material="Iron" Rio_Z="22.5; 55.65; 1477." nbPhi="36" />

:box name="Bracket_FC_Main" material="Iron" X_Y_Z="613.; 80.; 80." />
:box name="Bracket_FC_CutBox" material="Iron" X_Y_Z="650.; 57.; 57." />

:subtraction name="Bracket_FC">
  <posXYZ volume="Bracket_FC_Main" />
  <posXYZ volume="Bracket_FC_CutBox" />
:/subtraction>

:gvxy name="NSW_Extension_Main" material="Iron" dz="436.">
  <gvxy_point X_Y="-239.4; -126.1"/>
  <gvxy_point X_Y="-239.4; 126.1"/>
  <gvxy_point X_Y="239.4; 126.1"/>
  <gvxy_point X_Y="239.4; -52.78"/>
  <gvxy_point X_Y="-139.4; -126.1"/>
:/gvxy>

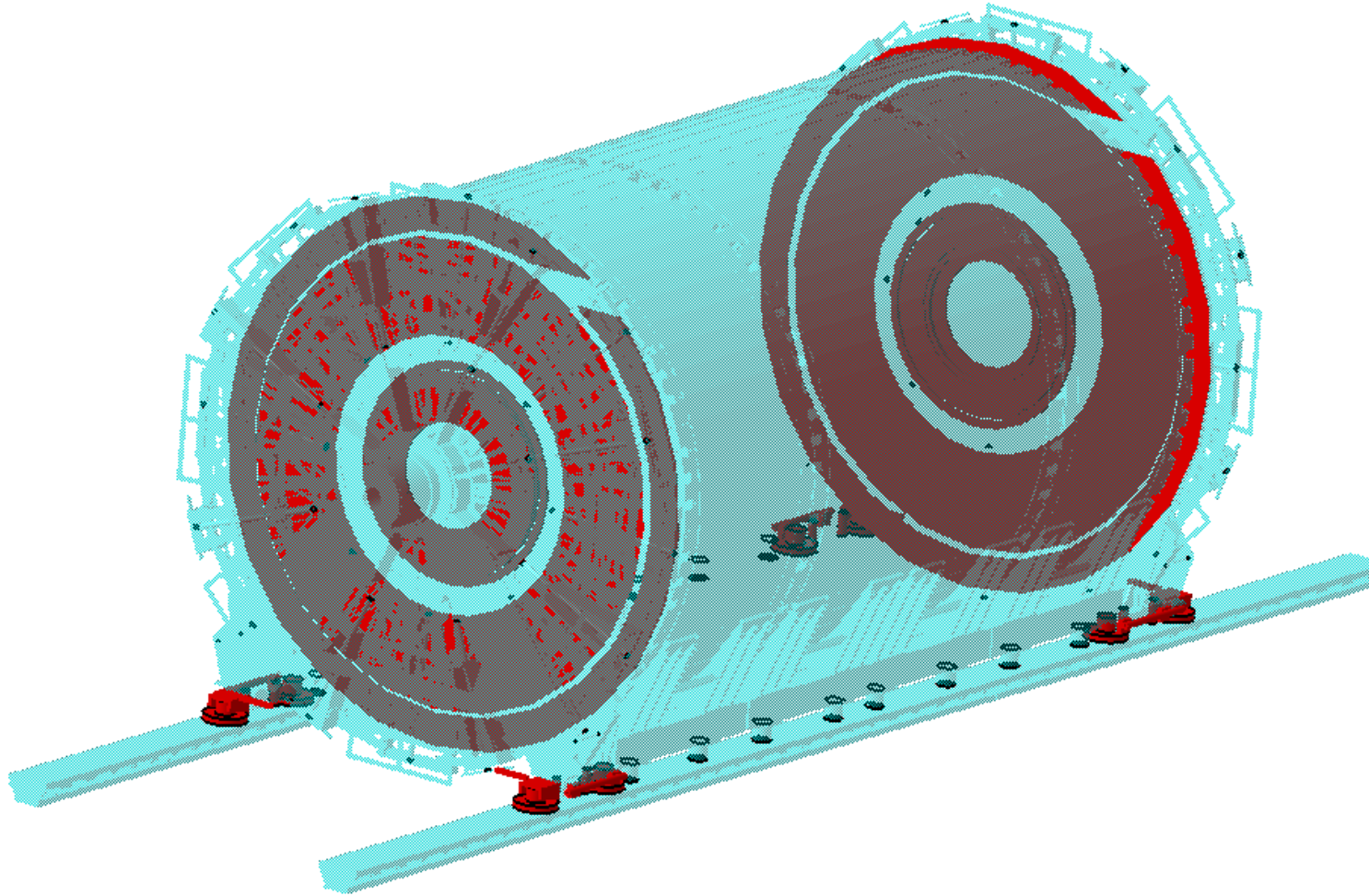
:box name="NSW_Extension_CutBox" material="Iron" X_Y_Z="314.; 270.2; 480." />

:subtraction name="NSW_Extension">
  <posXYZ volume="NSW_Extension_Main" rot="0. ; 90. ; 0." />
  <posXYZ volume="NSW_Extension_CutBox" X_Y_Z="0.; -58.2; 0." />
:/subtraction>
```



Integration Conflict Checking

There are no Internal and External Conflicts (Clashes and Contacts)



Integration of new AGDD/XML Description into the “stations.v2.06.xml”

In order to add new description in the “stations.v2.06.xml” file, 2 steps are required:

Step 1. Add new AGDD/XML description in the „stations.v2.06.xml“ file from line 1784

```
1779
1780 <composition name="A_Plate" >
1781   <posXYZ volume="A_Plate_SideA" />
1782   <posXYZ volume="A_Plate_SideC" />
1783 </composition>
1784 ←
1785 </section>
1786
1787 <!-- ===== Poisitionning all Volumes in NSW===== -->
```

Stem 2. Add “<posXYZ volume="NSW_Missing_Parts" />” tag in the “NewSmallWheel” section

```
1791 <composition name="NewSmallWheel">
1792   <posXYZ volume="NSW_sTGC" X_Y_Z="0.;0.;0."/>
1793   <posXYZ volume="NSW_MM" X_Y_Z="0.;0.;0." />
1794   <posXYZ volume="NSW_Spacer" />
1795   <posXYZ volume="NSW_Aluminum_Structure_and_HUB" />
1796   <posXYZ volume="NJD_Disk" />
1797   <posXYZ volume="A_Plate" />
1798   <posXYZ volume="NSW_Missing_Parts" />
1799 </composition>
```

Results on GitLab

2nd-push ▾

atlas-g4-xml / NSW / NSW_Missing_Parts / + ▾

History

Find file

Web IDE

Download ▾

 **Simplification Report**
Niko Tsutskiridze authored 1 minute ago

80b878e5 

Name	Last commit	Last update
..		
 .gitkeep	Vertical Shielding HO, NJD Vert Shield, Cable Tray...	21 hours ago
 3DModelofMissingParts.wrl	.wrl file of AGDD/XML implementation	21 hours ago
 ConflictChecking_and_Codding.pdf	Reports of "Integration conflicts checking and AG...	20 hours ago
 NSW_MissingParts.XML	Update NSW_MissingParts.XML	20 hours ago
 simplification.pdf	Simplification Report	1 minute ago

Comments are welcome,

Thanks!