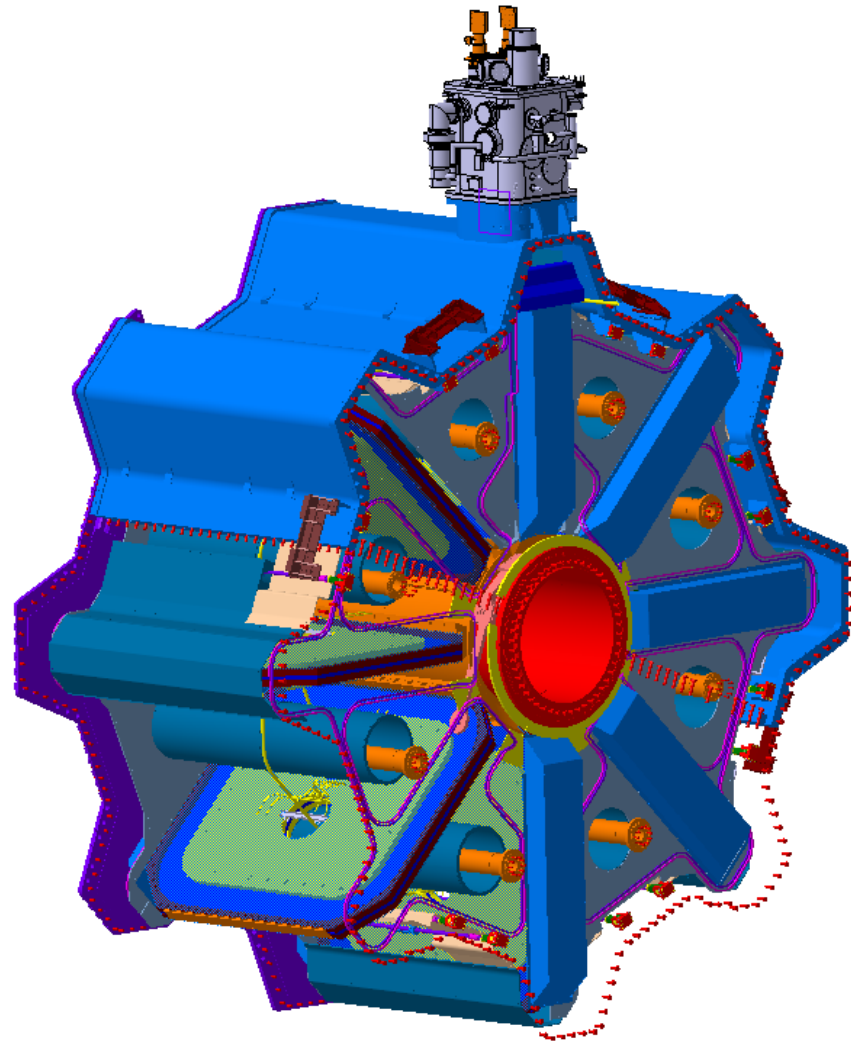


Investigation of Geometry Descriptions of End-Cap Toroid Magnet for ATLAS Simulation Software Infrastructure



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Georgian Technical University

SCCTW'2016

South-Caucasus Computing and Technology Workshop

Oct 6, 2016

- **Investigation of End-Cap Toroid**
- **Simplification of End-Cap Toroid**
- **Integration Conflict Checking of End-Cap Toroid**

Investigation of End-Cap Toroid

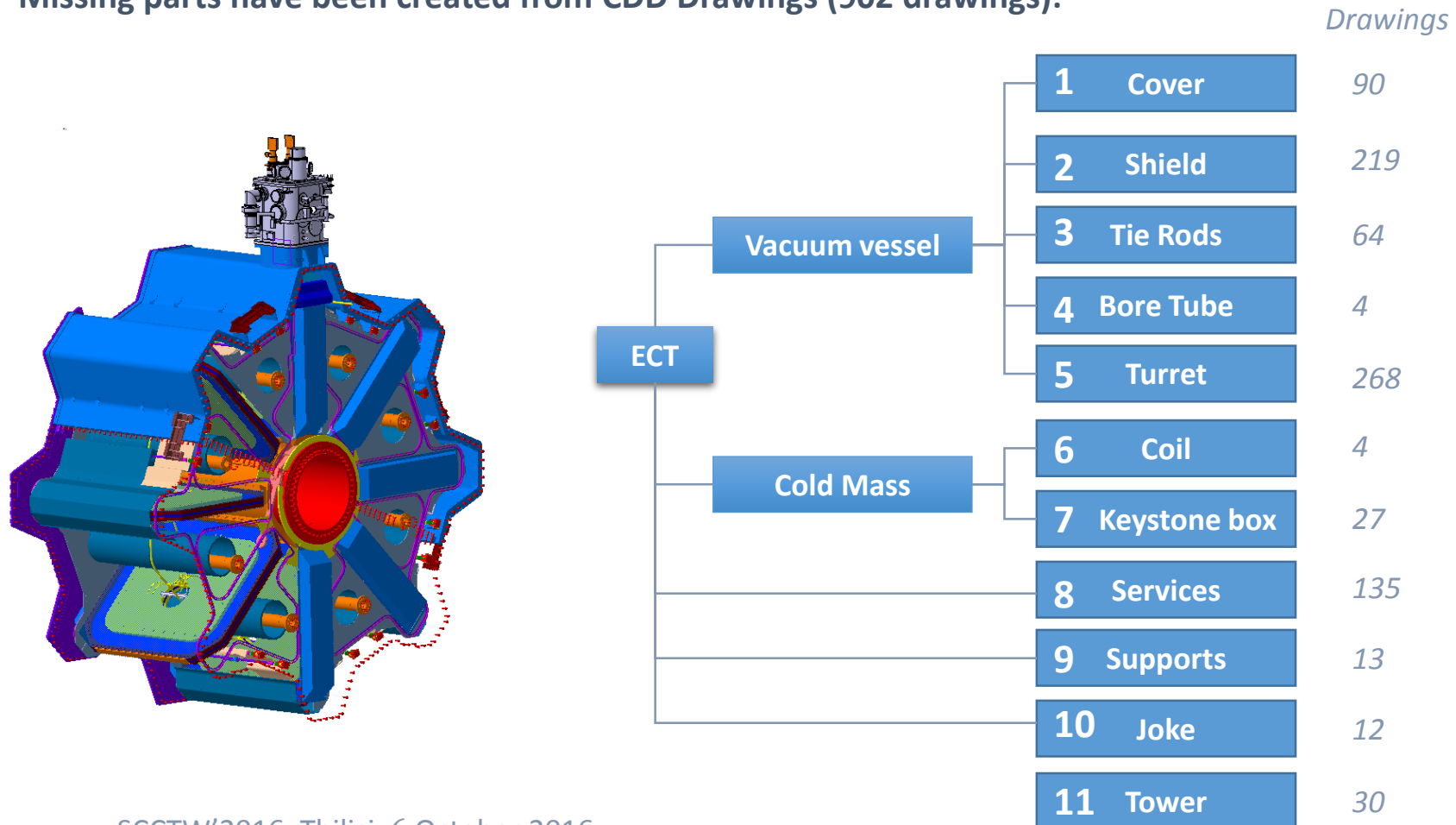
Sources

Source geometry has been taken from SmarTeam Engineering Database:

Path : ATLAS CURRENT/Detector System/Magnets ATLAS/Toroid Magnets ATLAS/Barrel Toroid Magnet ATLAS/End-cap Toroid Magnet

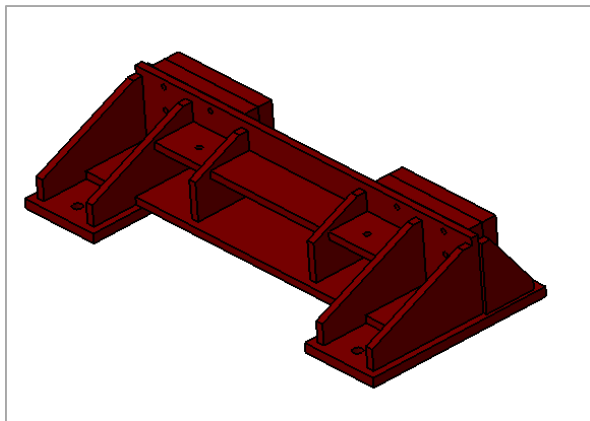
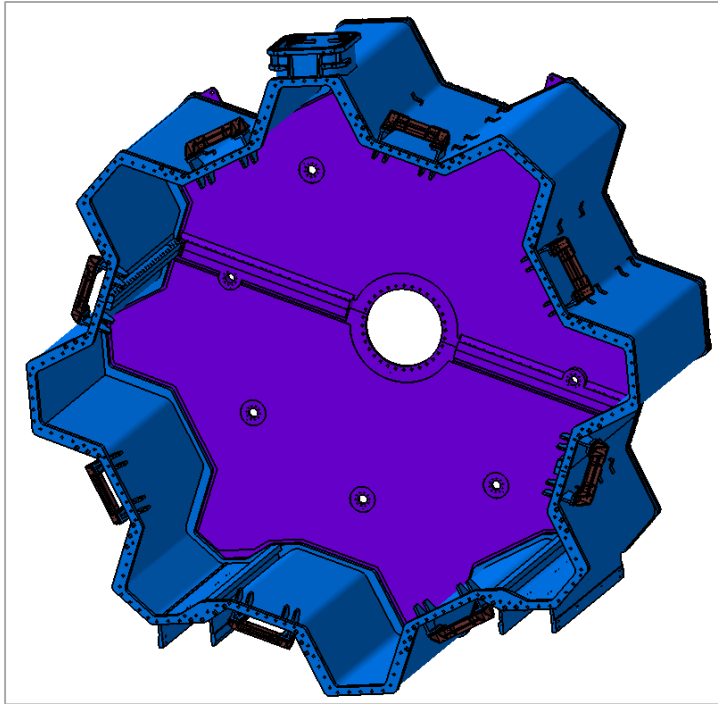
Model: ST0268528 ECT assembly side C (id: CAD000628534)

Missing parts have been created from CDD Drawings (902 drawings):



Vacuum Vessel / Cover

Cover

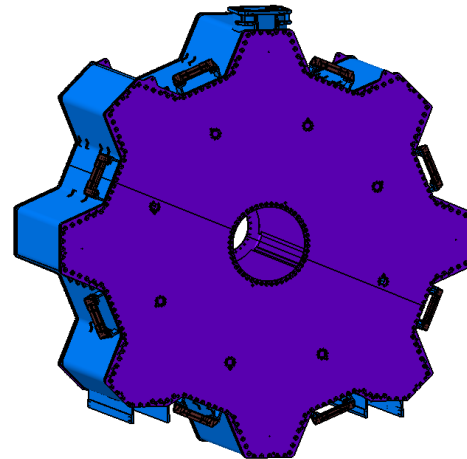


CATIA Model

Mass: 57'966 kgs

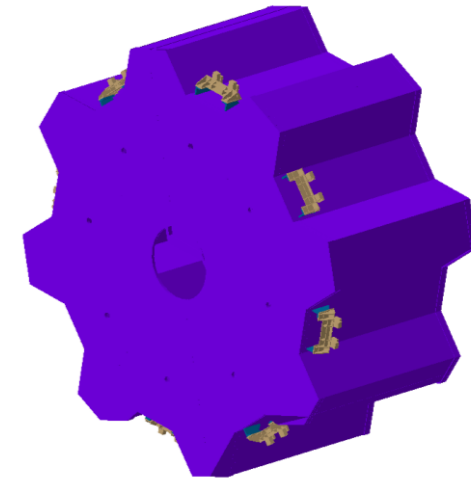
Difference: +781 kgs

1.3 %



XML Model

Mass: 57'185 kgs

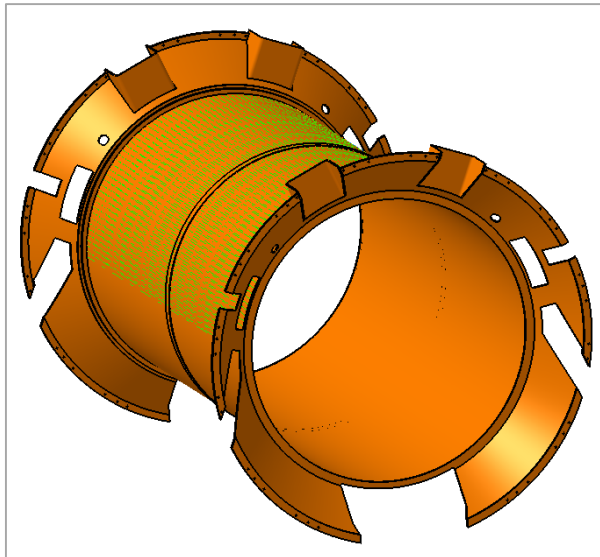
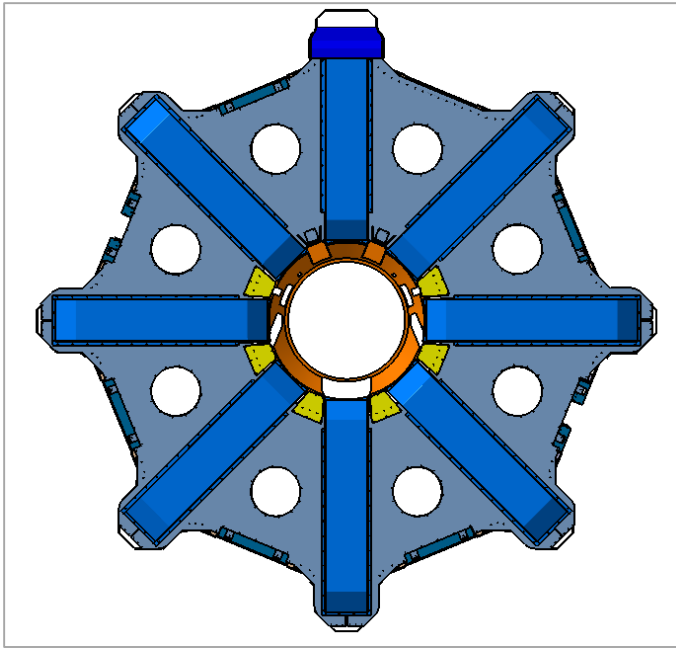


Cover

Geometry from CATIA		Total	20.8 m ³	57'966 kgs
<i>Cover</i>	<i>Aluminum</i>	2700	20.81	56180.52
<i>8 x Bracket</i>	<i>SSteel</i>	8000	0.22	1785.6
Geometry from XML		Total	20.3 m ³	57'185 kgs
<i>Envelop</i>	<i>Aluminium</i>	2700	19.33	52191
<i>Attachmant</i>	<i>Aluminium</i>	2700	0.9	2430
<i>CryoStopOutside</i>	<i>Aluminium</i>	2700	0.1	270
<i>CryoStopOutside</i>	<i>Iron</i>	7870	0.28	2203.6
<i>CryoStopOutside</i>	<i>Carbon</i>	2265	0.04	90.6
Difference				+781 kgs 1.3 %

Vacuum Vessel / Thermal Shielding

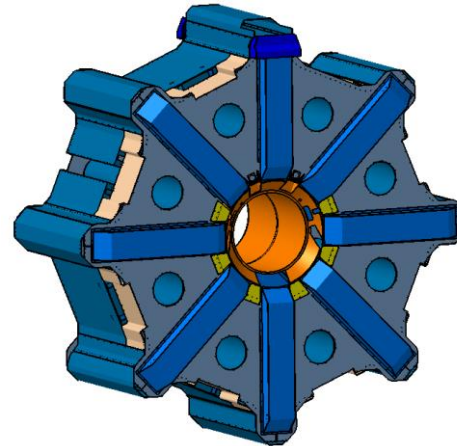
Thermal Shilding



CATIA Model

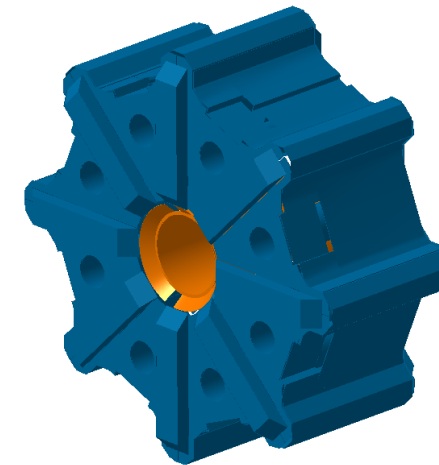
Mass: 15'988 kgs

Difference: +31 kgs
0.2 %



XML Model

Mass: 15'957 kgs

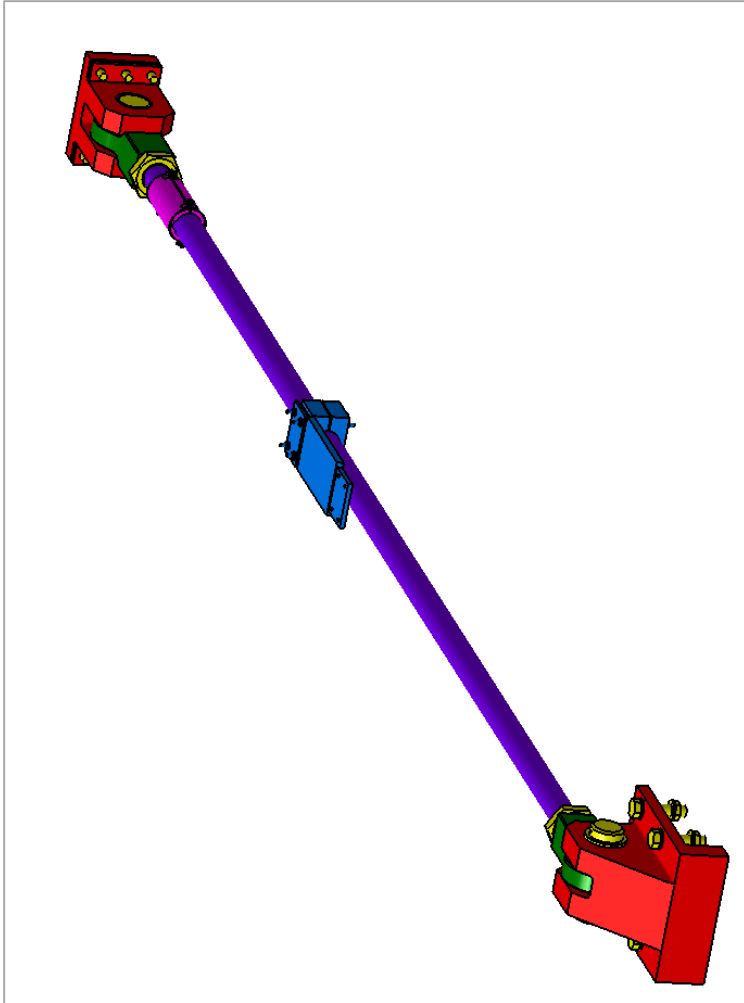


Thermal Shielding

Geometry from CATIA		Total	6.1 m ³	15'988 kgs
<i>shild</i>	<i>Aluminum</i>	5.9216	2700	15988
Geometry from XML		Total	45.6 m ³	15'957 kgs
<i>ThermelShielding</i>	<i>Aluminium</i>	2700	5.67	15309
<i>TC_CentralTube</i>	<i>Aluminum</i>	2700	0.24	648
Difference				+31 kgs 0.2 %

Tie Rod

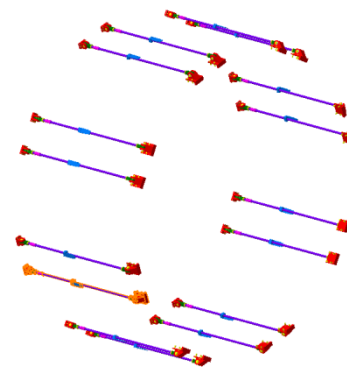
Tie Rod



CATIA Model

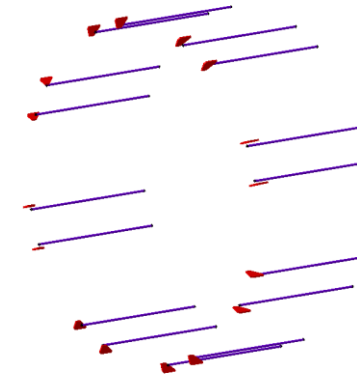
Mass: 3'077 kgs

Difference: +1'809 kgs
58.8 %



XML Model

Mass: 1'268 kgs

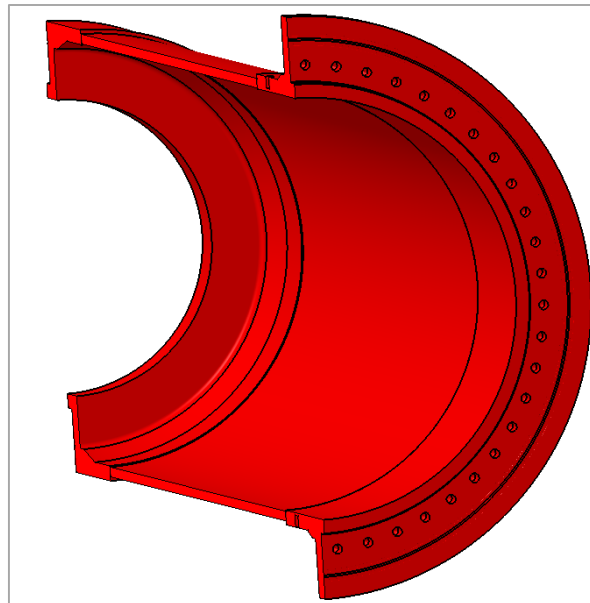
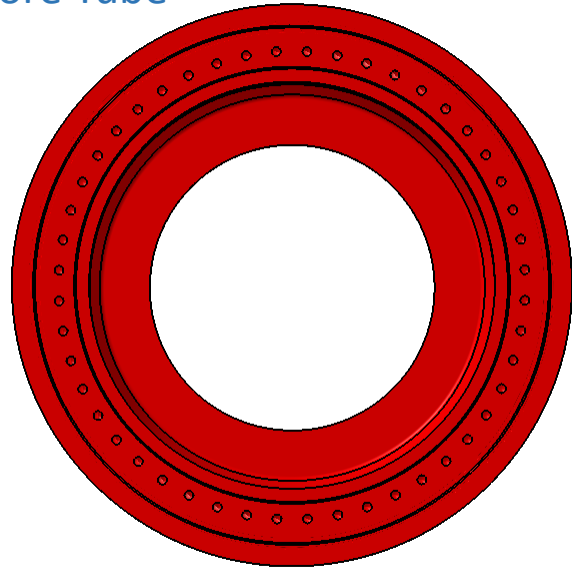


Tie Rod

Geometry from CATIA		Total	0.39 m ³	3'077.2 kgs
16 X Tie Rod	Steel	7850	0.39	3077.2
Geometry from XML		Total	0.2 m ³	1'268 kgs
CryoStopInside	Aluminium	2700	0.05	135
CryoStopInside	Iron	7870	0.144	1133.28
Difference				+1'809 kgs 58.8 %

Vacuum Vessel / BoreTube (Central Tube)

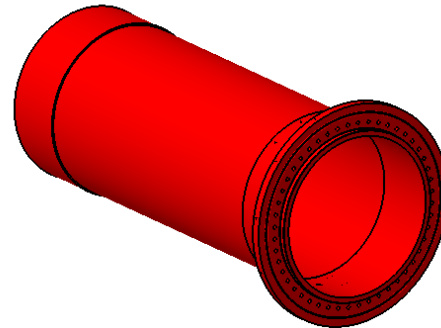
Bore Tube



CATIA Model

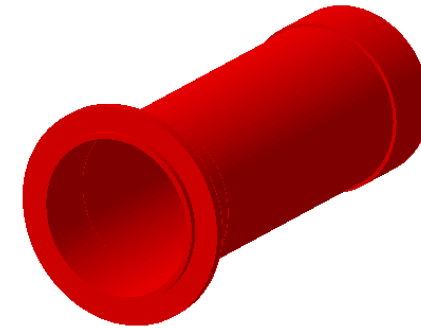
Mass: 13'433 kgs

**Difference: +3'225 kgs
24.0 %**



XML Model

Mass: 10'208 kgs

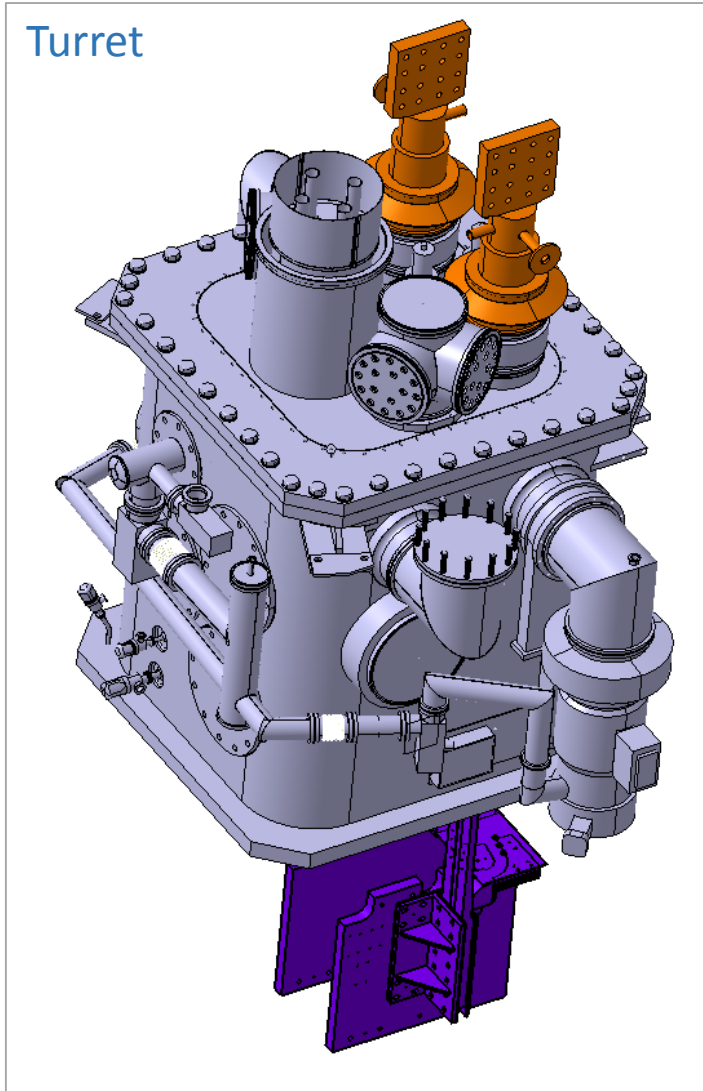


Bore Tube

Geometry from CATIA		Total	1.68 m ³	13'433 kgs
<i>Bore Tube(centr.tube) S Steel</i>		8000	1.6791	13432.8
Geometry from XML		Total	1.28 m ³	10'208 kgs
<i>EV_CentralTube ShielStwwl</i>		8000	1.276	10208
Difference				+3'225 kgs 24.0%

Turret

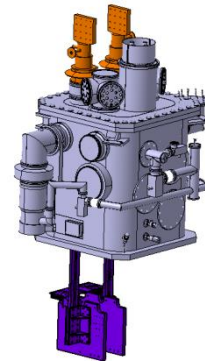
Turret



CATIA Model

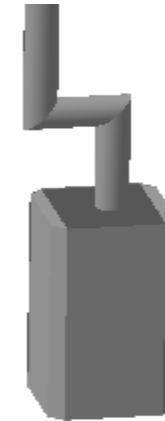
Mass: 2'476 kgs

Difference: **+964 kgs**
38.9 %



XML Model

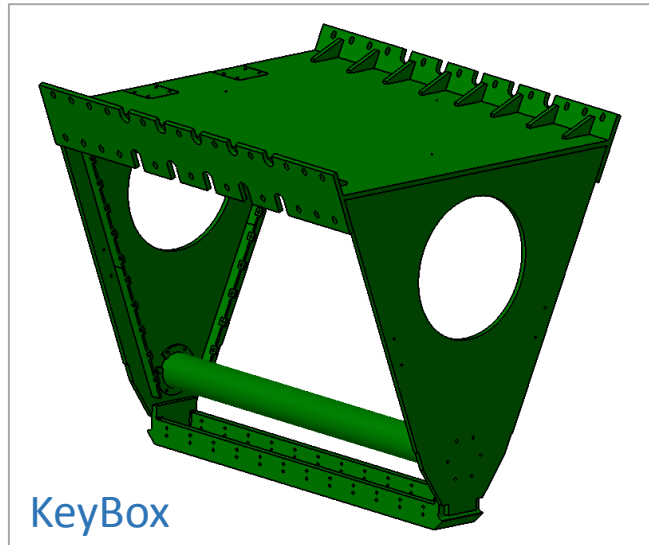
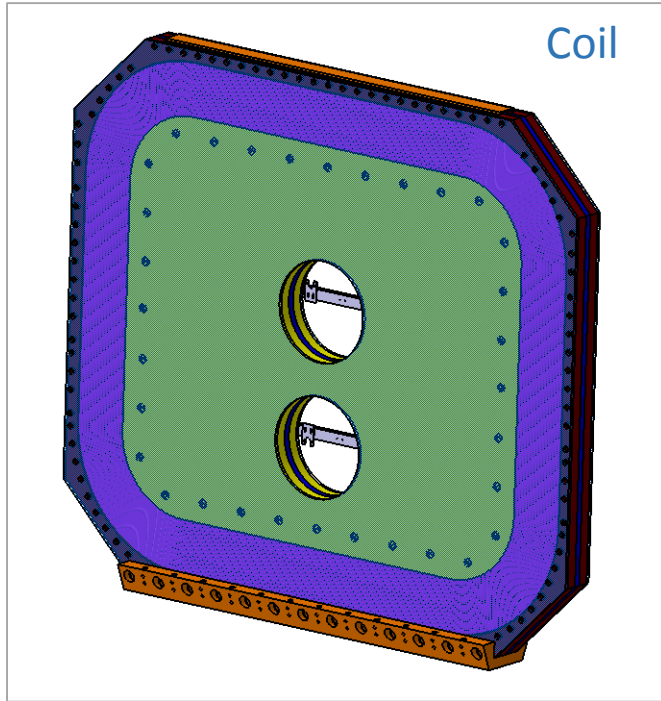
Mass: 1'512 kgs



Turret

Geometry from CATIA		Total	0.73 m ³	2'476 kgs	
Part1	Aluminum	2700	0.0201	54.27	
Part2	Cooper BS C101	8920	0.0062	55.304	
Part3	Epoxy Glass	1800	0.0019	3.42	
2 X Assembly			0.0564	225.988	
Part2	Aluminum	2700	0.577	1557.9	
Part3	Copper	8920	0.07	624.4	
Turret			0.647	2182.3	
SCT Turret Coil connection		Aluminum	2700	0.0249	67.23
Geometry from XML		Total	0.56 m ³	1'512 kgs	
ServTur		Aluminium	2700	0.56	1512
Difference				+964 kgs 38.9 %	

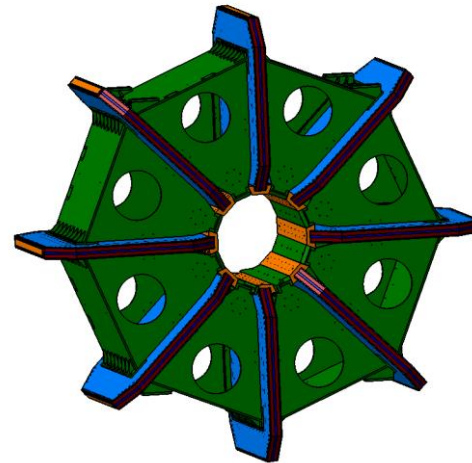
Cold Mass



CATIA Model

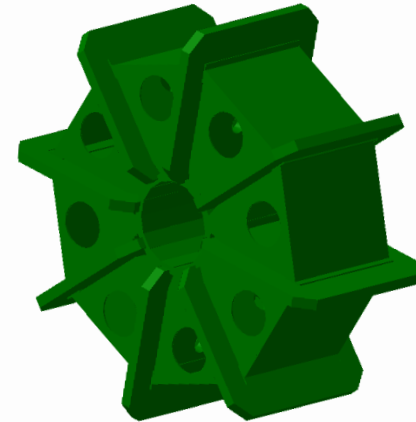
Mass: 116'740 kgs

**Difference: -6'272 kgs
5.4 %**



XML Model

Mass: 123'012 kgs

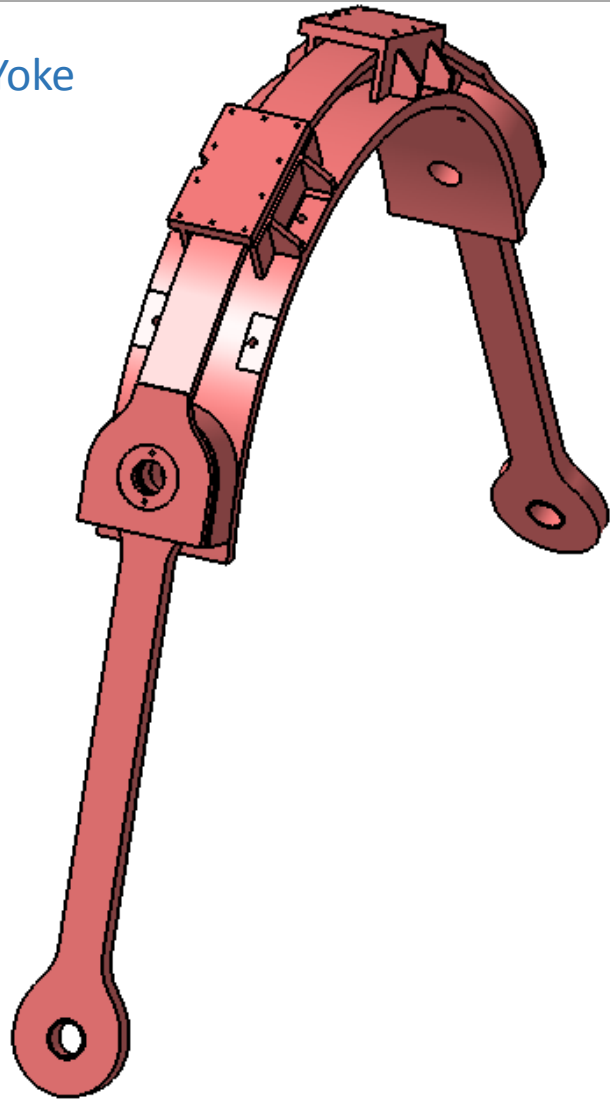


ColdMass

Geometry from CATIA		Total	43.24 m ³	116740 kgs
Coil	Aluminum	2700	0.0019	5.1
	Aluminum	2700	3.4439	9298.5
inner web	Aluminum	2700	0.1799	485.7
8 X Coil	Aluminum	2700	35.08	94716
8 X KeyBox	Aluminum	2700	8.157	22024
Geometry from XML		Total	45.6 m ³	123012 kgs
<i>ECT_ColdMass</i>	<i>Aluminium</i>	<i>2700</i>	<i>45.56</i>	<i>123012</i>
Difference				-6272 kgs 5.4%

Yoke

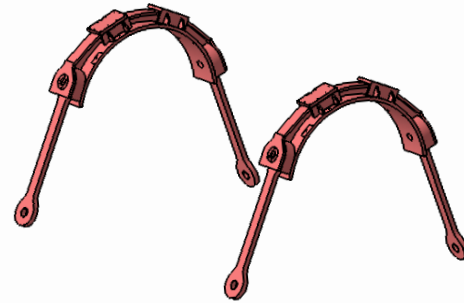
Yoke



CATIA Model

Mass: 1'820kgs

**Difference: +483 kgs
26.5%**



XML Model

Mass: 1'338kgs

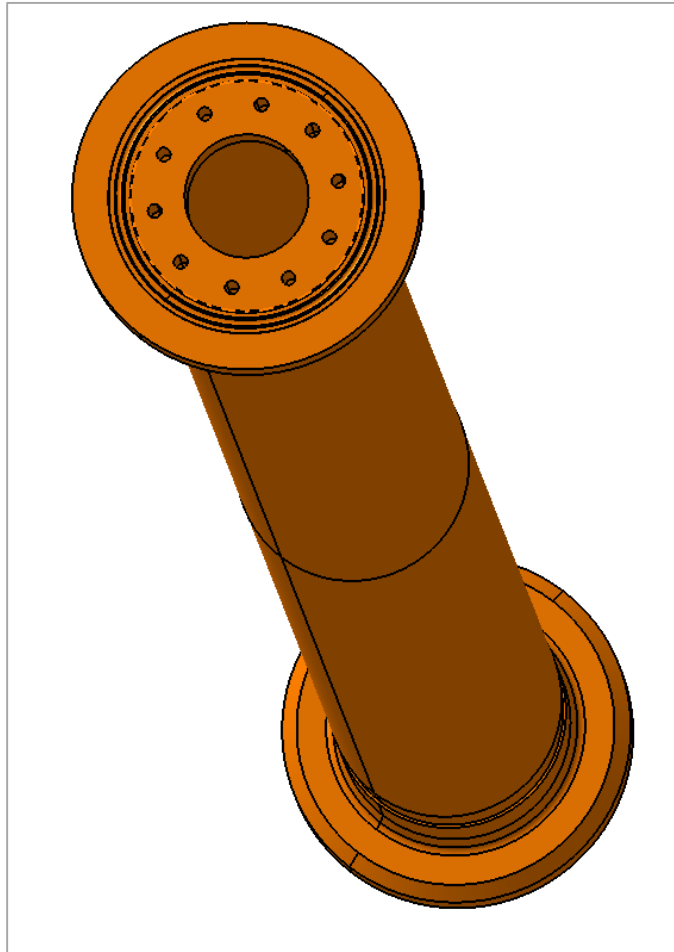


Yoke

Geometry from CATIA		Total	0.2319 m ³	1'820 kgs
<i>2 X Yoke</i>	<i>Steel</i>	8000	0.2319	1855,2
Geometry from XML		Total	0.17 m ³	1'338 kgs
<i>Yoke</i>	<i>Iron</i>	8000	0.17	1338
Difference				+483 kgs 26.5%

Stay Tube

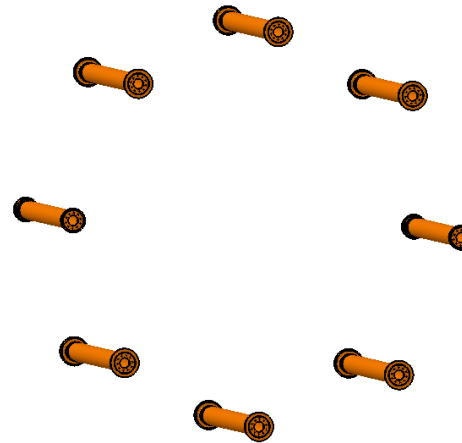
Stay Tube



CATIA Model

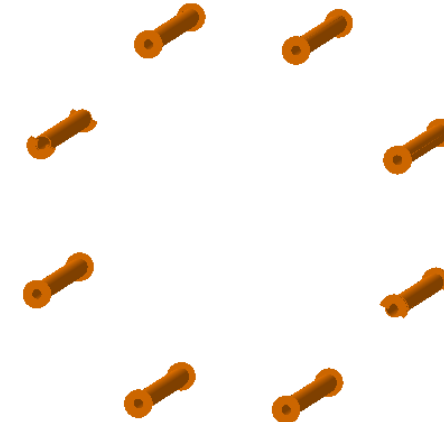
Mass: 2'028 kgs

Difference: -186 kgs
9.2%



XML Model

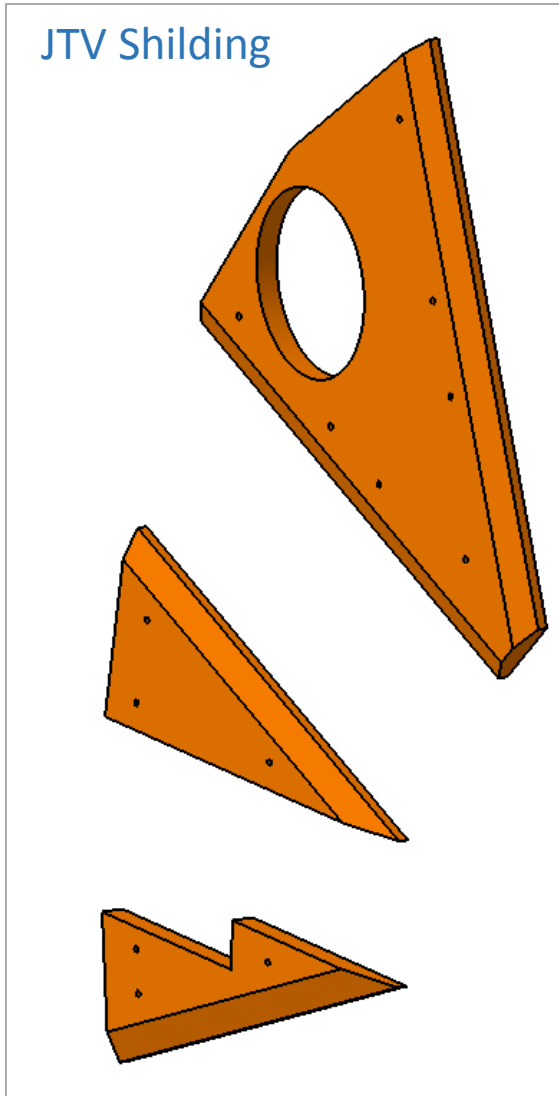
Mass: 2'214 kgs



Stay Tube

Geometry from CATIA		Total	0.75 m ³	2'028 kgs
8 X Stay Tube	Aluminum	2700	0.751	2027.7
Geometry from XML		Total	0.82 m ³	2'214 kgs
AlignTube	Aluminium	2700	0.82	2214
Difference				-186 kgs 9.2%

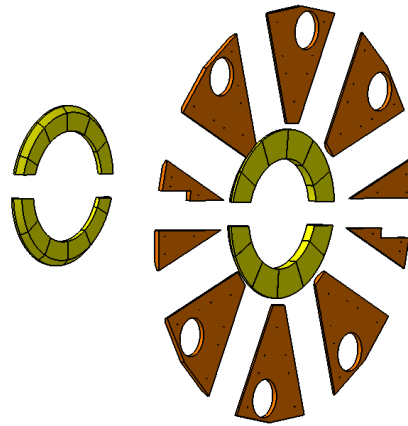
JTV Shielding



CATIA Model

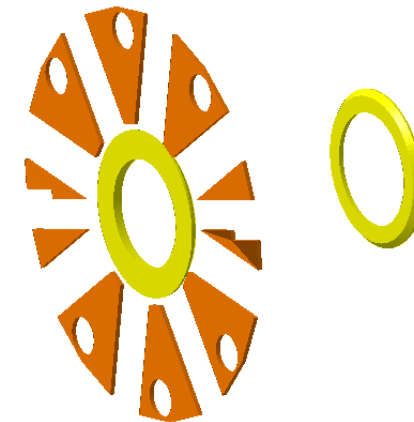
Mass: 4'161 kgs

**Difference: -349 kgs
8.4%**



XML Model

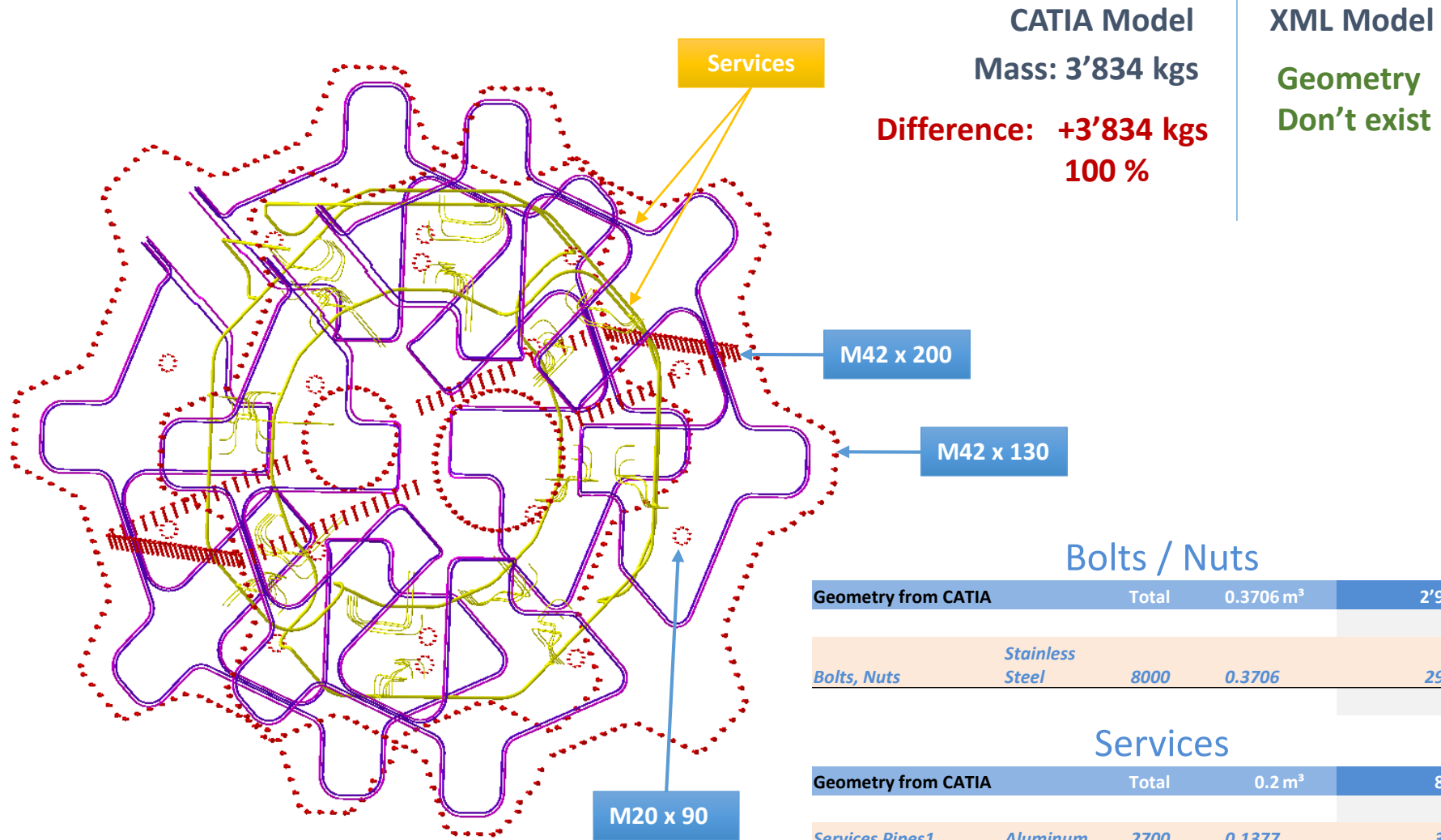
Mass: 4'510 kgs



JTV Shilding

Geometry from CATIA		Total	1.65 m ³	4'161 kgs
<i>JTV Shilding</i>	<i>Polyboron</i>	2520	0.9534	2402.568
<i>JTV rings</i>	<i>Polyboron</i>	2520	0.6978	1758.456
Geometry from XML		Total	1.79 m ³	4'510 kgs
<i>JTV_Shilding</i>	<i>PolyBornB</i>			
	4C	2520	1.02	2570.4
<i>JTV_Ring</i>	<i>PolyBornB</i>			
	4C	2520	0.77	1940.4
Difference				-349 kgs 8.4%

Bolts / Services



CATIA Model
Mass: 3'834 kgs
Difference: +3'834 kgs
100 %

XML Model
Geometry
Don't exist

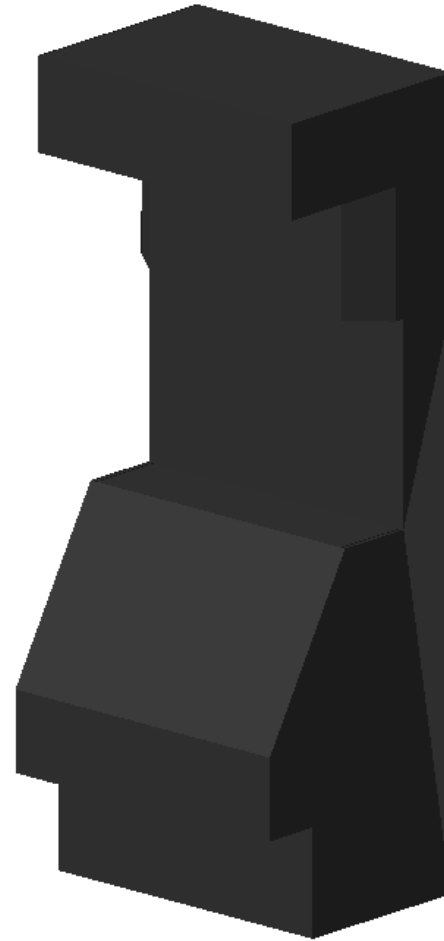
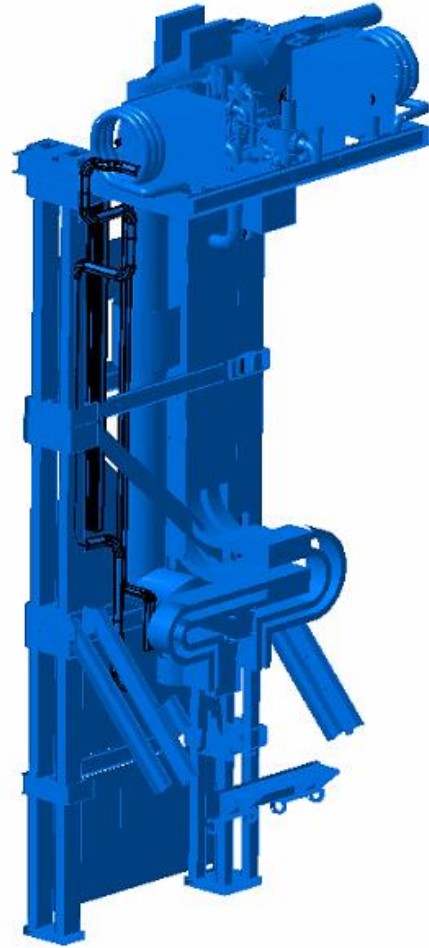
Bolts / Nuts

Geometry from CATIA		Total	0.3706 m ³	2'965 kgs
<i>Bolts, Nuts</i>	<i>Stainless</i>			
	<i>Steel</i>	8000	0.3706	2965

Services

Geometry from CATIA		Total	0.2 m ³	869 kgs
<i>Services Pipes1</i>	<i>Aluminum</i>	2700	0.1377	372
<i>Services Pipes2</i>	<i>Stainless</i>			
	<i>Steel</i>	8000	0.0621	497

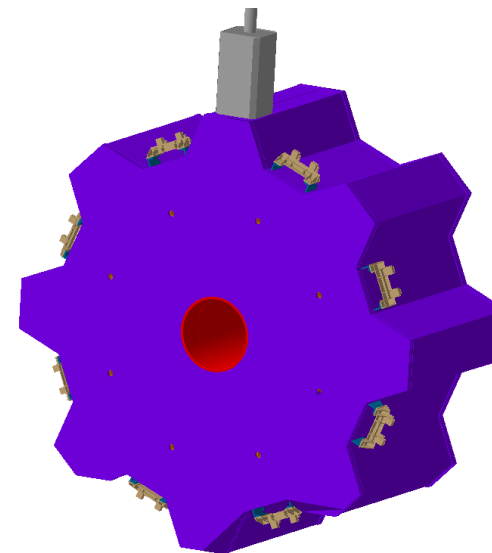
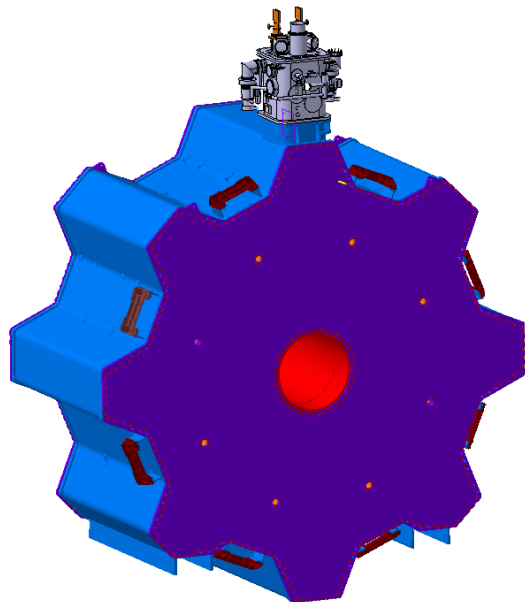
Tower have not been calculated



End-Cap Toroid

Result of Investigation

	CATIA	XML	Difference
1 Cold Mass	116740 kgs	123012 kgs	5.4%
2 Thermal Silding	15988 kgs	15957 kgs	0.2%
3 Cover	57966 kgs	57185 kgs	1.3%
4 BoreTube	13433 kgs	10208 kgs	24.0%
5 Yoke	1855 kgs	1338 kgs	26.5%
6 Stay Tube	2028 kgs	2214 kgs	9.2%
7 JTV Shilding	4161 kgs	4510 kgs	8.4%
8 Turret	2476 kgs	1512 kgs	38.9%
9 Tie Rod	3077 kgs	1268 kgs	58.8%
10 Bolts/	2965 kgs		100.0%
11 Services	869 kgs		100.0%
Total	221558	217204	

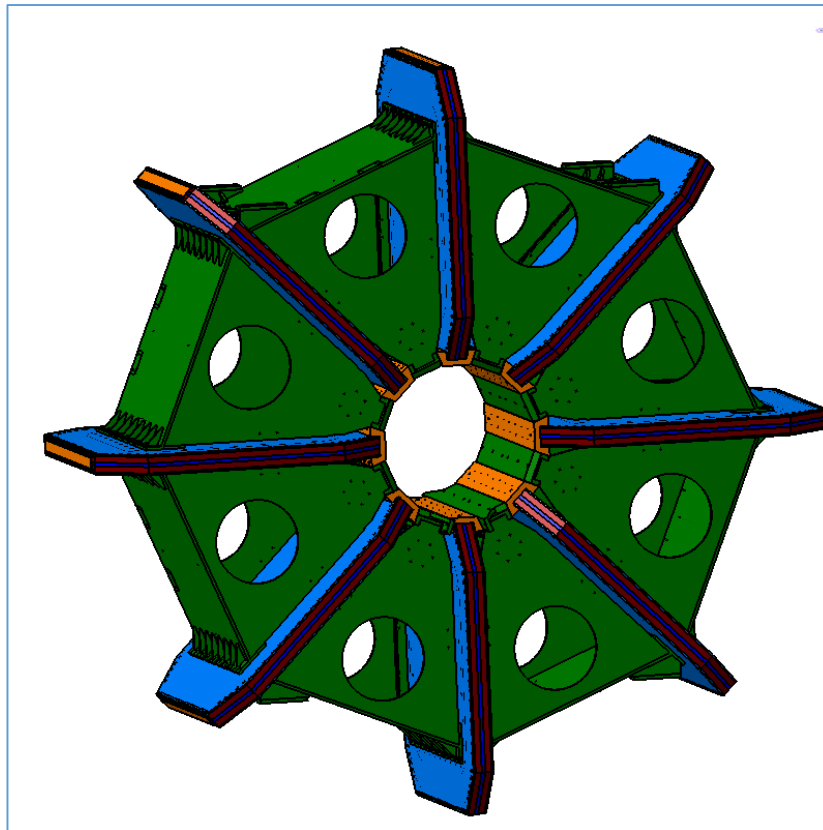


Simplification of End-Cap Toroid

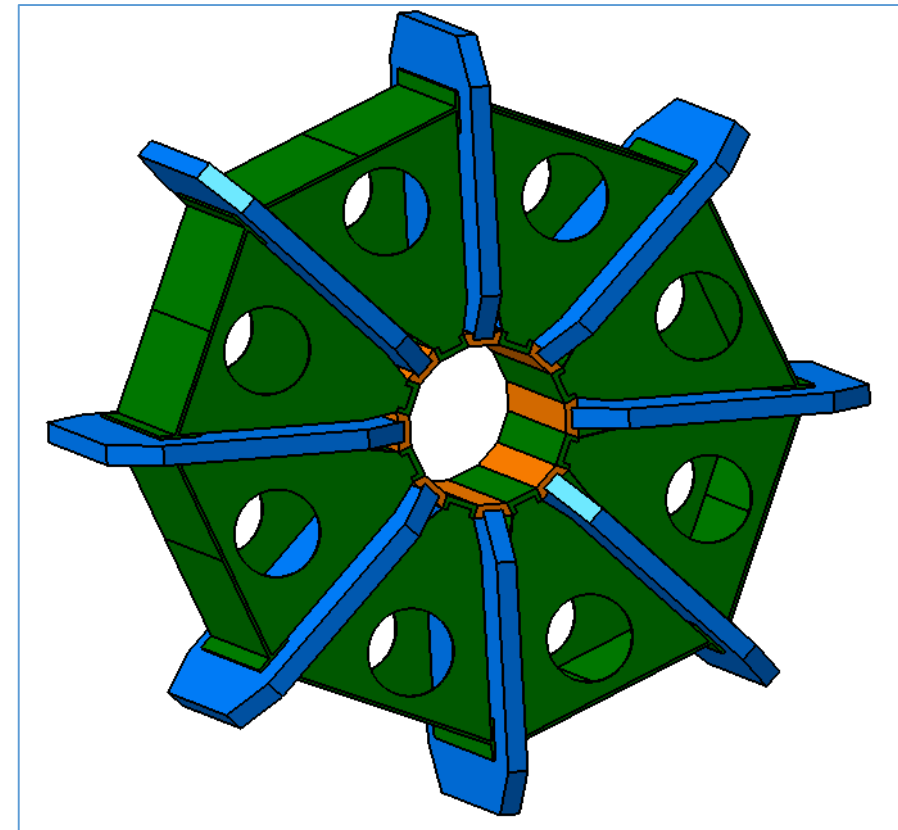
Cold Mass

	Detailed	Simplifield	Difference/ m ³	Detailed	Simplifield	Difference/ kgs	Material	
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			Density
Cold Mass	43,24	43,23	0,01	116`748	116`721	27	Aluminum	2700

Detailed model



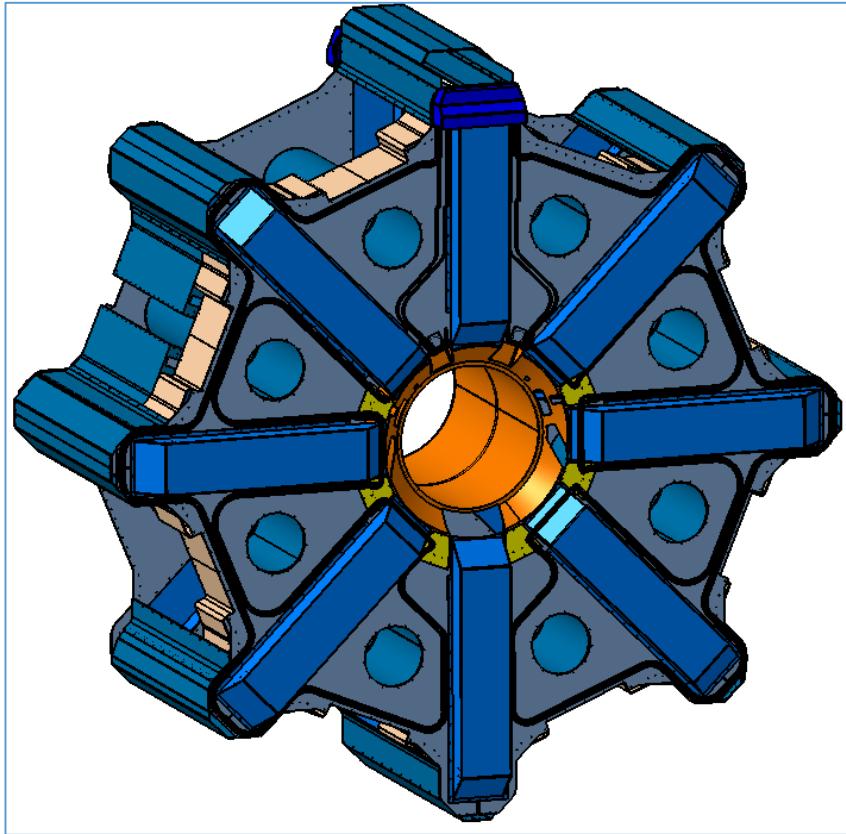
Simplifield model



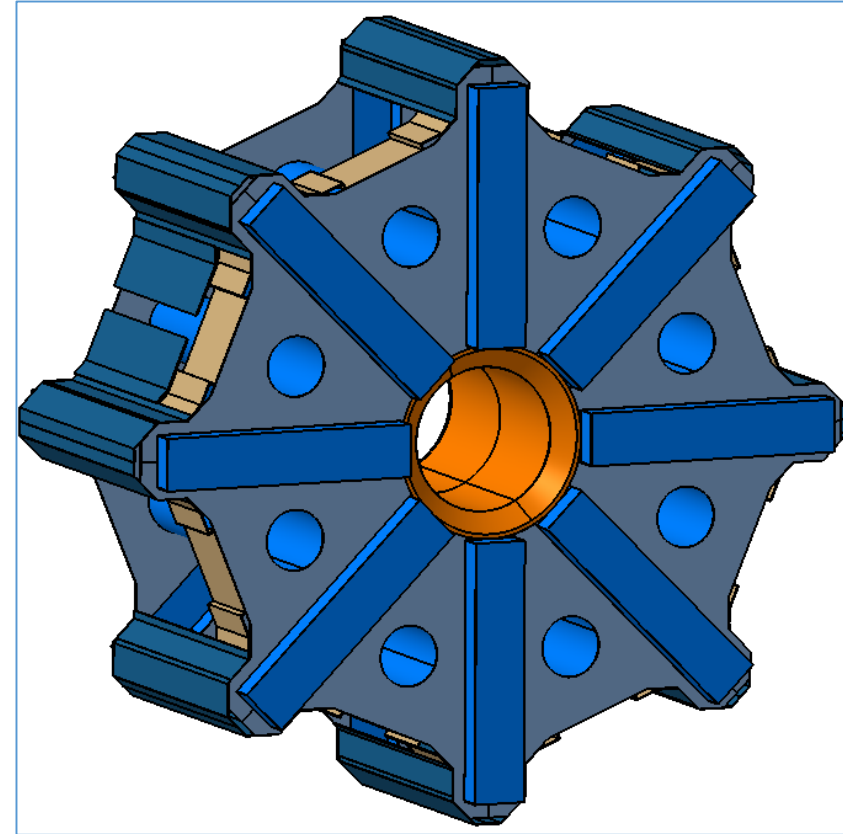
Thermal Shielding

	Detailed	Simplified		Detailed	Simplified		Material	
	Volume/ m ³	Volume/ m ³	Difference/ m ³	Mass/ kgs	Mass/ kgs	Difference/ kgs		Density
Thermal Silding	6,057	6,056	0,001	16`353	16`351	2,7	Aluminum	2700

Detailed model



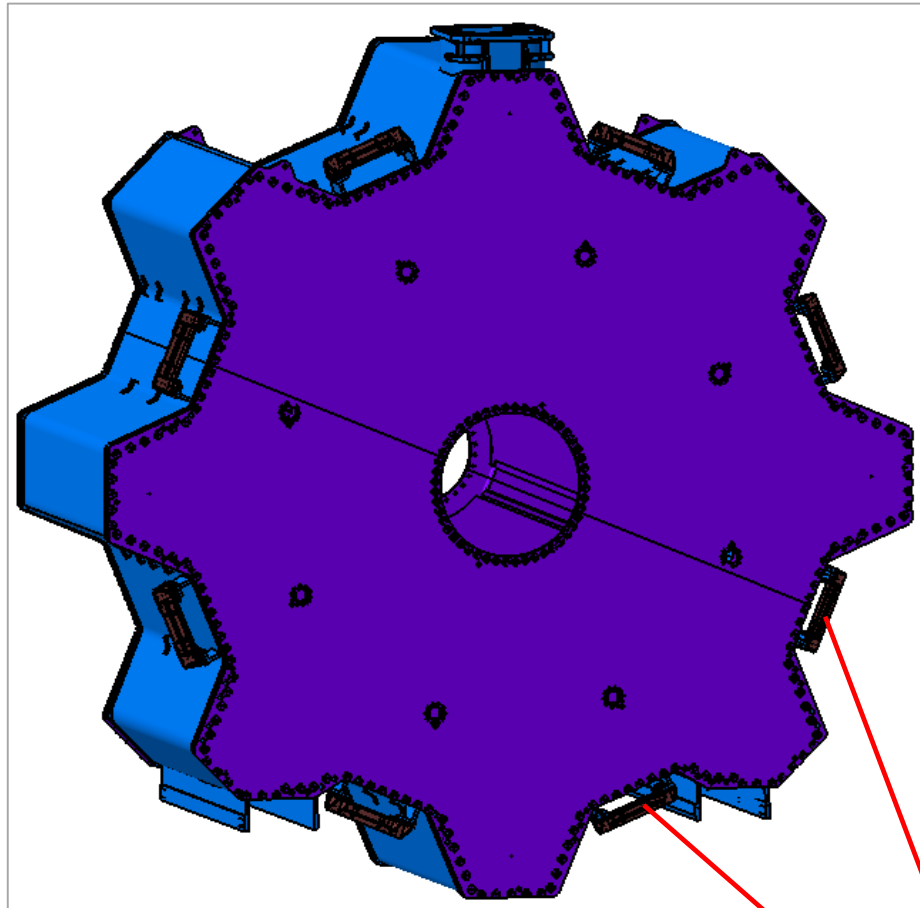
Simplifield model



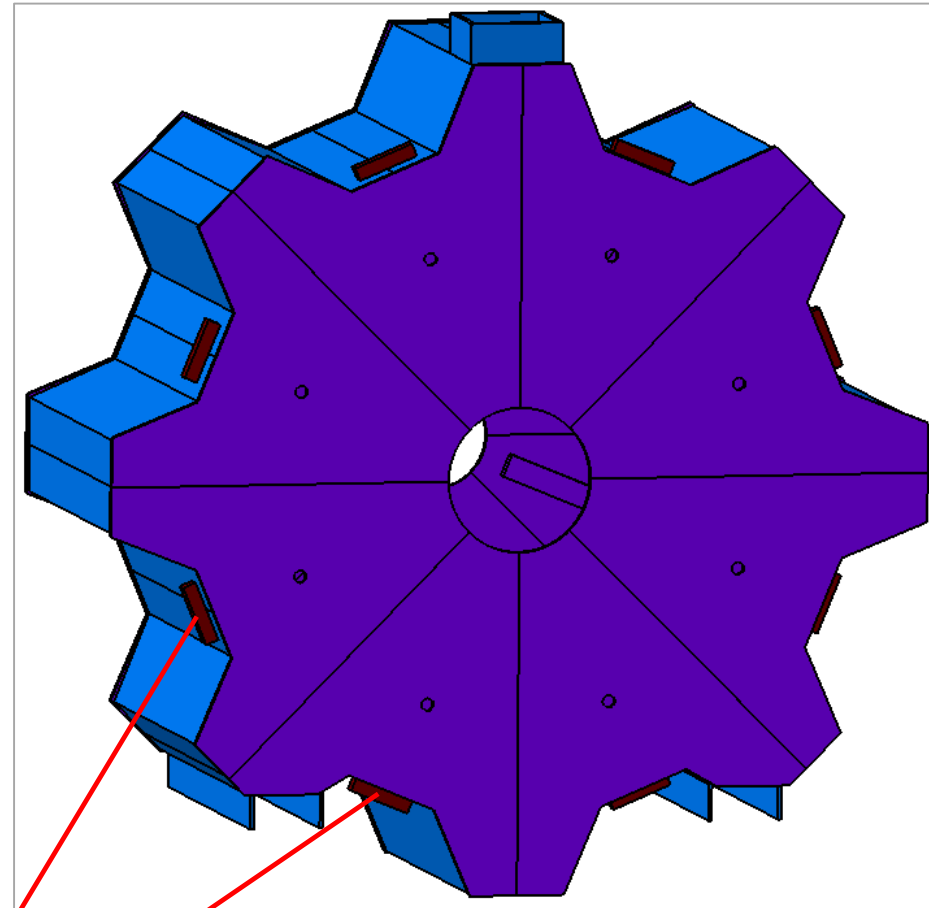
Cover/ Brackets

	Detailed	Simplified		Detailed	Simplified		Material	
	Volume/ m ³	Volume/ m ³	Difference/ m ³	Mass/ kgs	Mass/ kgs	Difference/ kgs		Density
Cover	20,8	20,804	-0,004	56'160	56'170,8	-10,8	Aluminum	2700
Brackets	0,22	0,2201	-0,0001	1760	1760,8	-0,8	Steel	8000

Detailed model



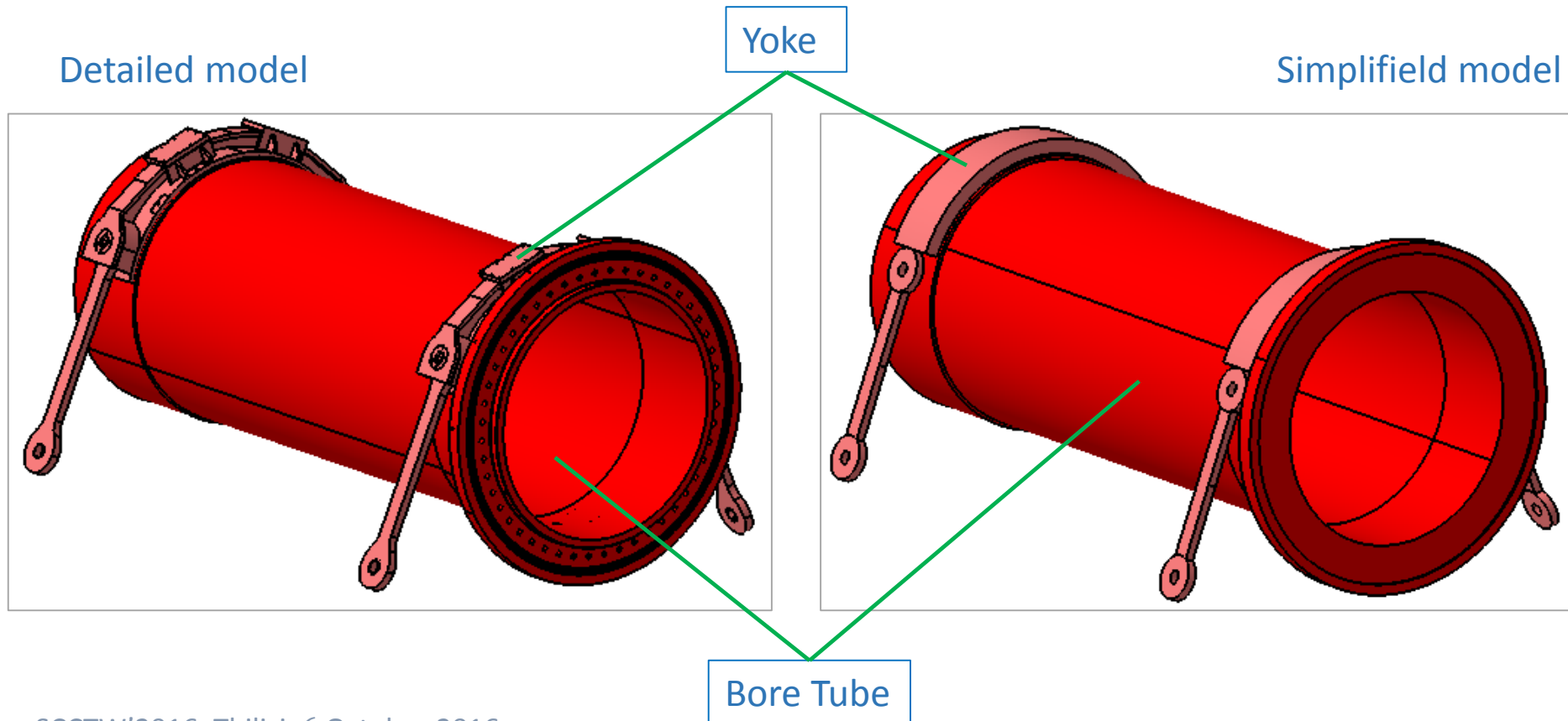
Simplified model



Brackets

BoreTube/ Yoke

	Detailed	Simplified		Detailed	Simplified		Material	
	Volume/ m ³	Volume/ m ³	Difference/ m ³	Mass/ kgs	Mass/ kgs	Difference/ kgs		Density
BoreTube	1,679	1,678	0,001	13'432	13'424	8	Steel	8000
Yoke	0,231	0,231	0	1848	1848	0	Steel	8000



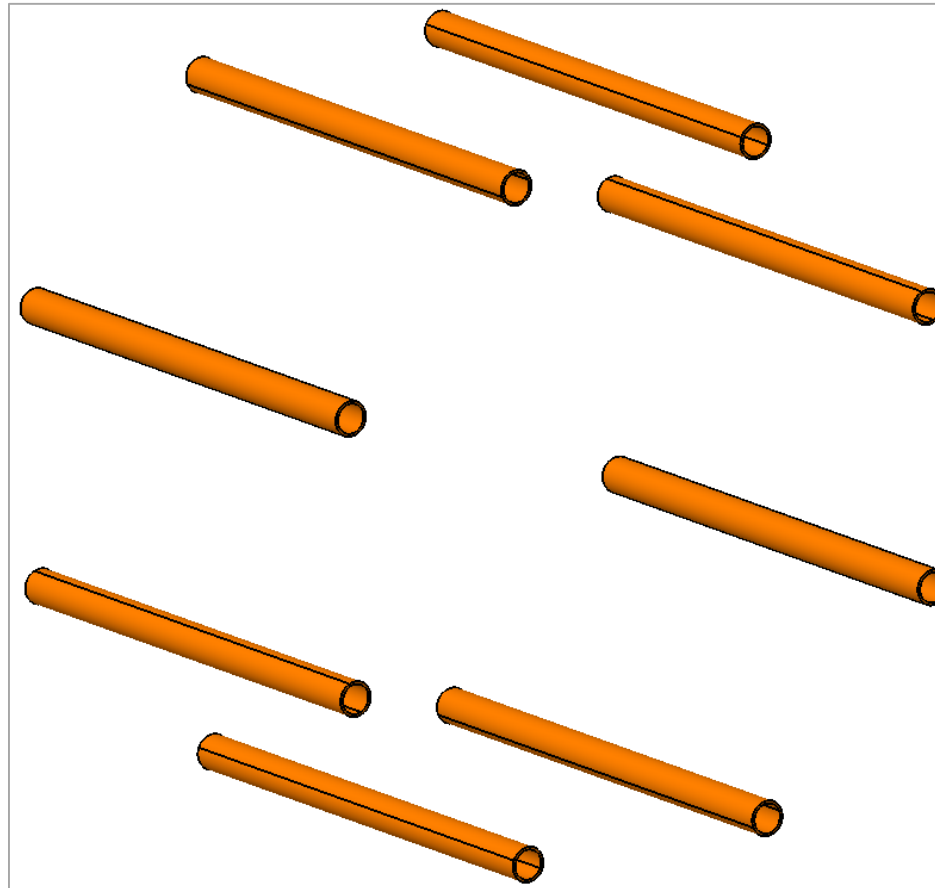
Stay Tube

	Detailed	Simplified	Difference/ m ³	Detailed	Simplified	Difference/ kgs	Material	Density
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			
Stay Tube	0,751	0,751	0	2027,7	2027,7	0	Aluminum	2700

Detailed model



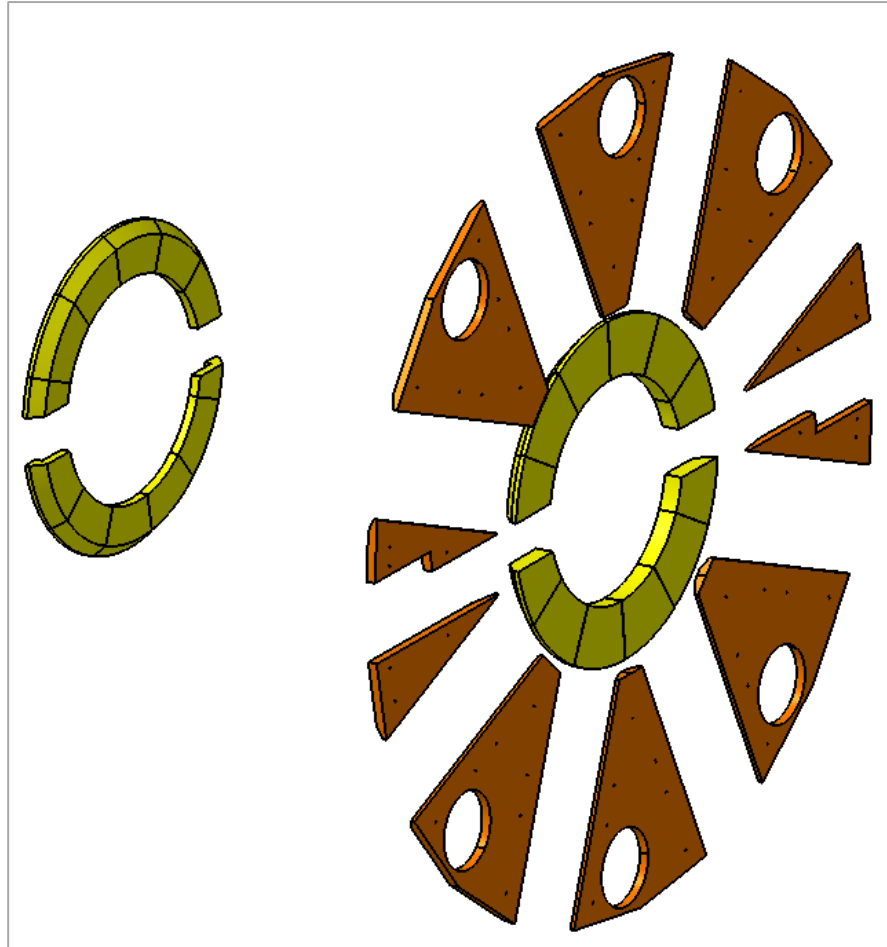
Simplifield model



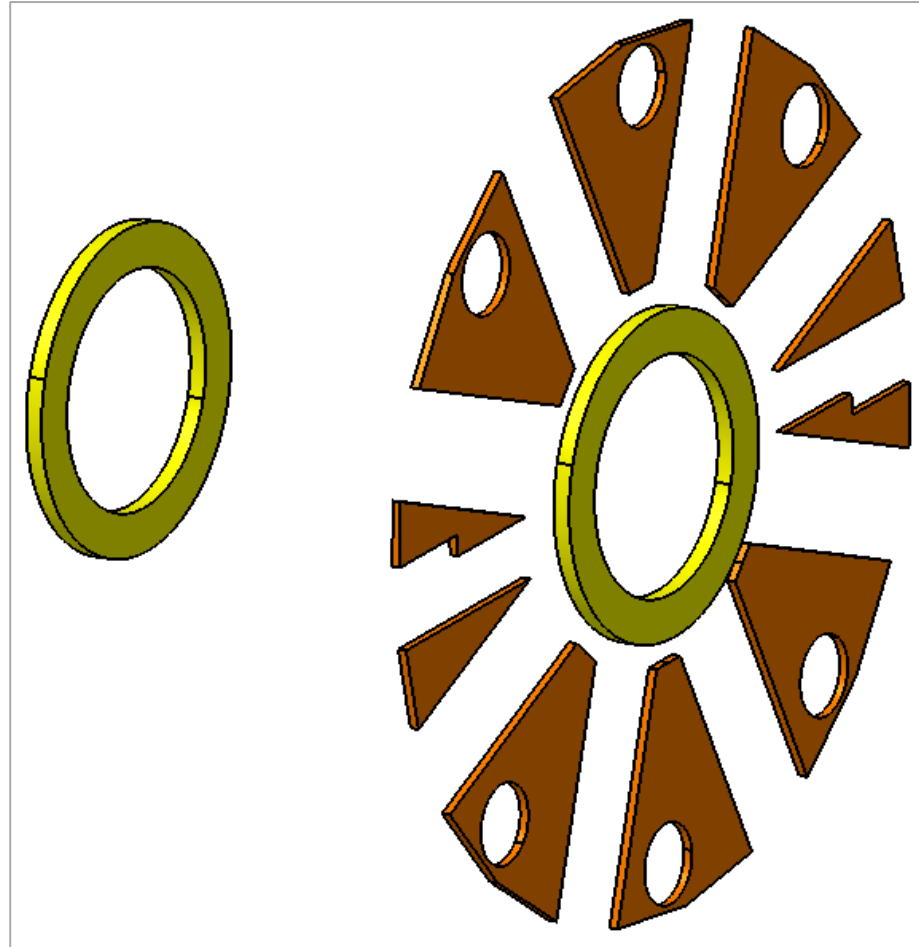
JTV Shielding

	Detailed	Simplified	Difference/ m ³	Detailed	Simplified	Difference/ kgs	Material	Density
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			
JTV Shilding	1,65	1,649	0,001	4158	4155,48	2,52	Polyboron	2520

Detailed model



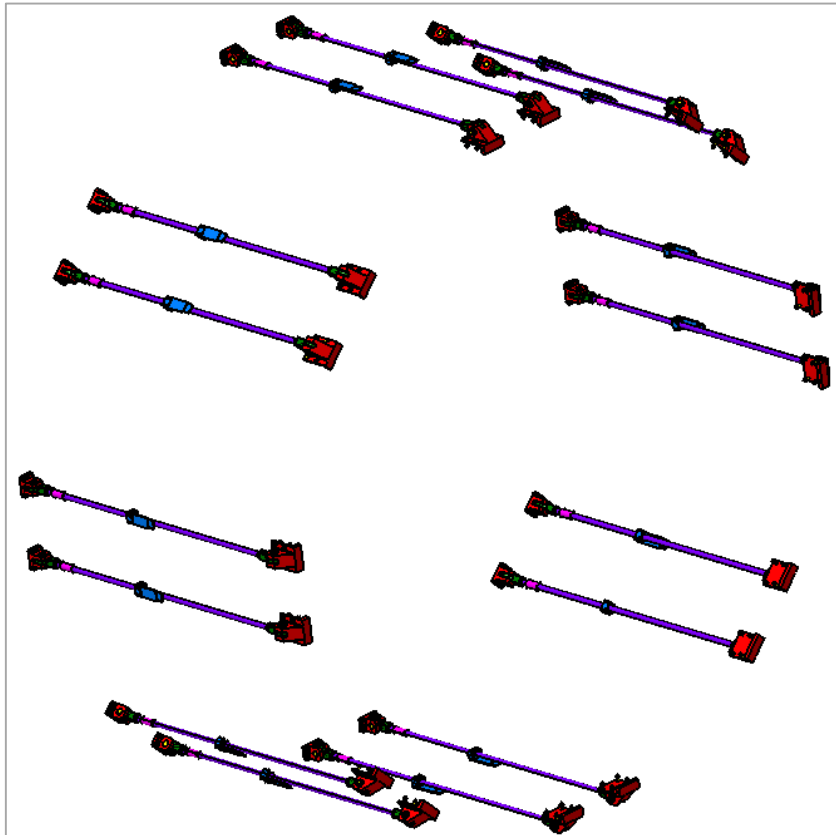
Simplifield model



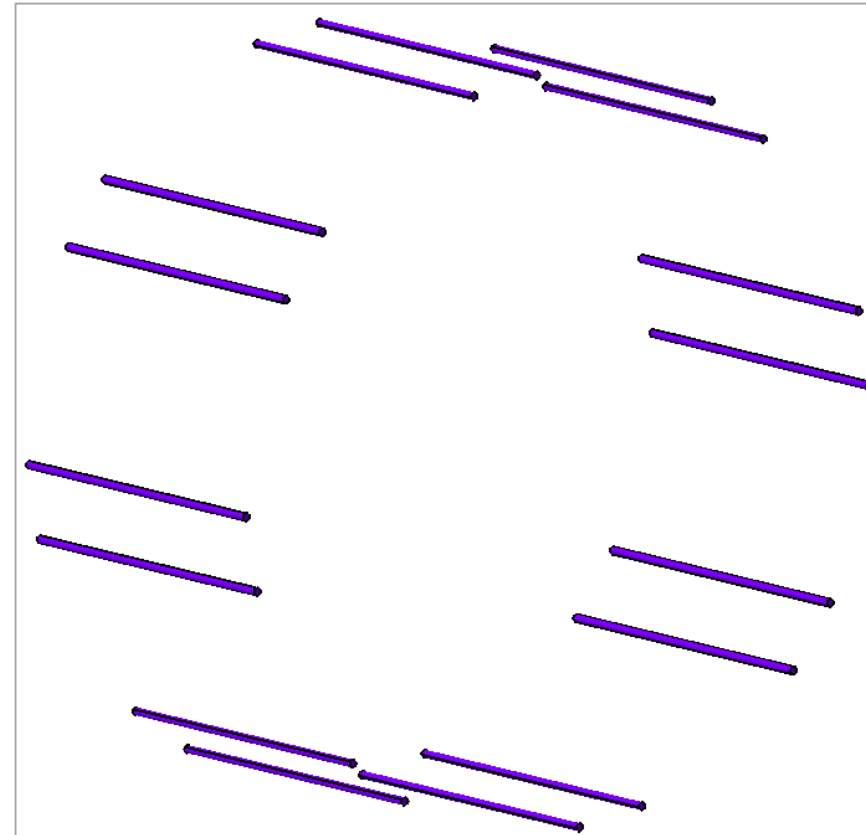
Tie Rod

	Detailed	Simplified	Difference/ m ³	Detailed	Simplified	Difference/ kgs	Material	Density
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			
Tie Rod	0,393	0,393	0	3144	3144	0	Steel	8000

Detailed model



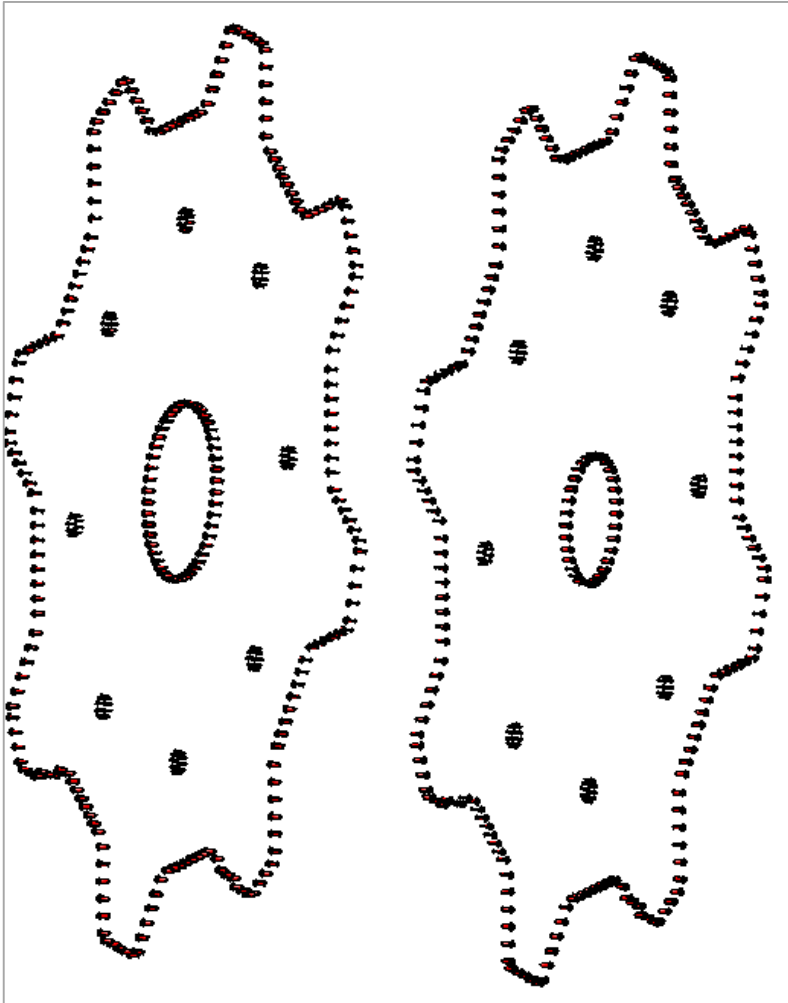
Simplifield model



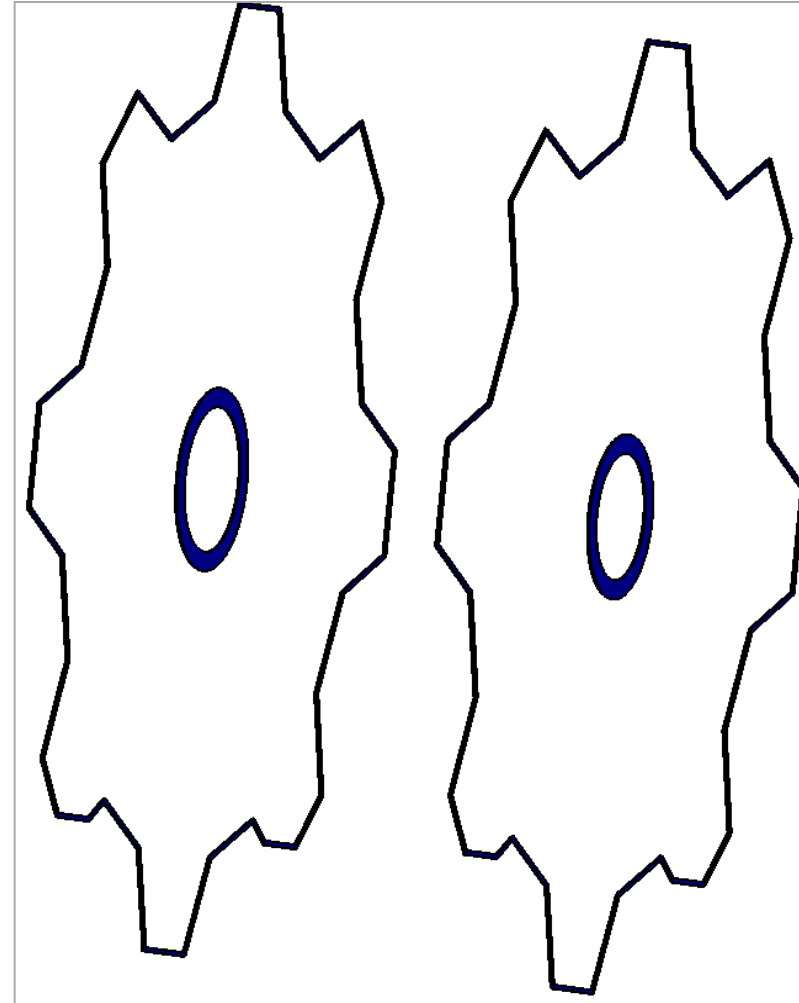
Bolts

	Detailed	Simplified	Difference/ m ³	Detailed	Simplified	Difference/ kgs	Material	Density
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			
Bolts/	0,371	0,371	0	2968	2968	0	Steel	8000

Detailed model

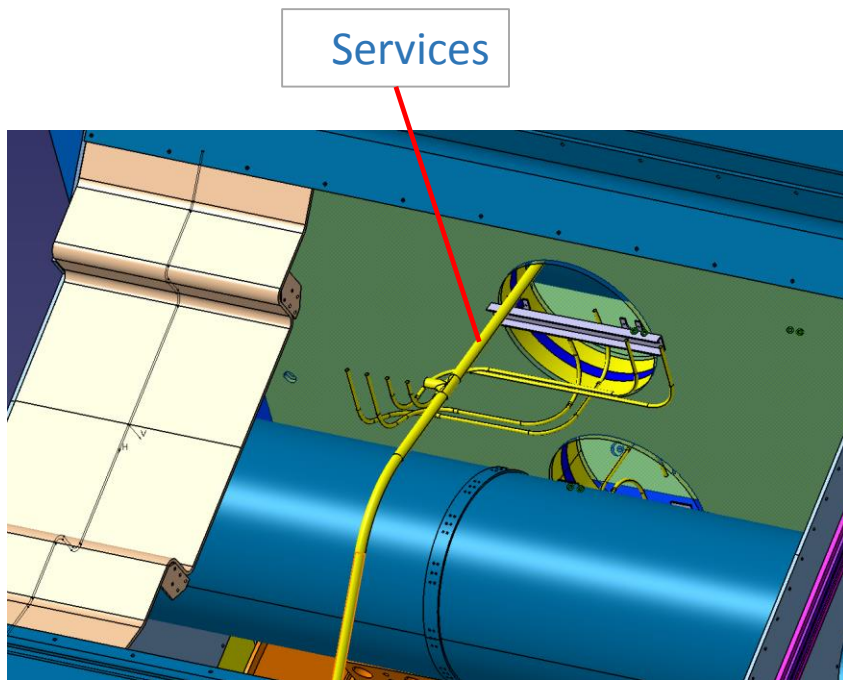


Simplifield model

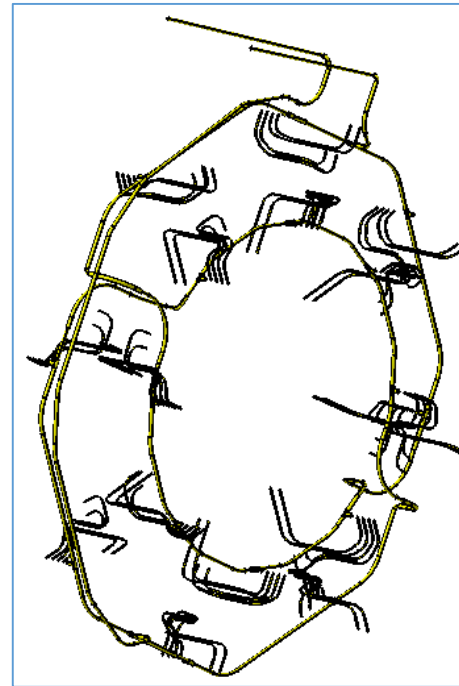


Services

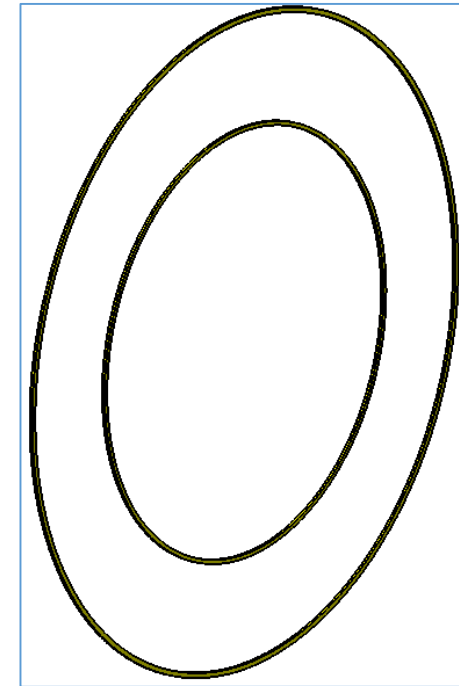
	Detailed	Simplified		Detailed	Simplified		Material	
	Volume/ m ³	Volume/ m ³	Difference/ m ³	Mass/ kgs	Mass/ kgs	Difference/ kgs		Density
Services	0,06	0,06	0	480	480	0	Steel	8000



Detailed model



Simplifield model



End-Cap Toroid Simplification

Result of Simplification

	Detailed	Simplified	Difference/ m ³	Detailed	Simplified	Difference/ kgs	Material	Density
	Volume/ m ³	Volume/ m ³		Mass/ kgs	Mass/ kgs			
Cold Mass	43,24	43,23	0,01	116`748	116`721	27	Aluminum	2700
Thermal Silding	6,057	6,056	0,001	16`353	16`351	2	Aluminum	2700
Cover	20,8	20,804	-0,004	56`160	56`170,8	-10,8	Aluminum	2700
Brackets	0,22	0,2201	-0,0001	1760	1760,8	-0,8	Steel	8000
BoreTube	1,679	1,678	0,001	13`432	13`424	8	Steel	8000
Yoke	0,231	0,231	0	1848	1848	0	Steel	8000
Stay Tube	0,751	0,751	0	2027,7	2027,7	0	Aluminum	2700
JTV Shilding	1,65	1,649	0,001	4158	4155,48	2,52	Polyboron	2520
Tie Rod	0,393	0,393	0	3144	3144	0	Steel	8000
Bolts/	0,371	0,371	0	2968	2968	0	Steel	8000
Services	0,06	0,06	0	480	480	0	Steel	8000

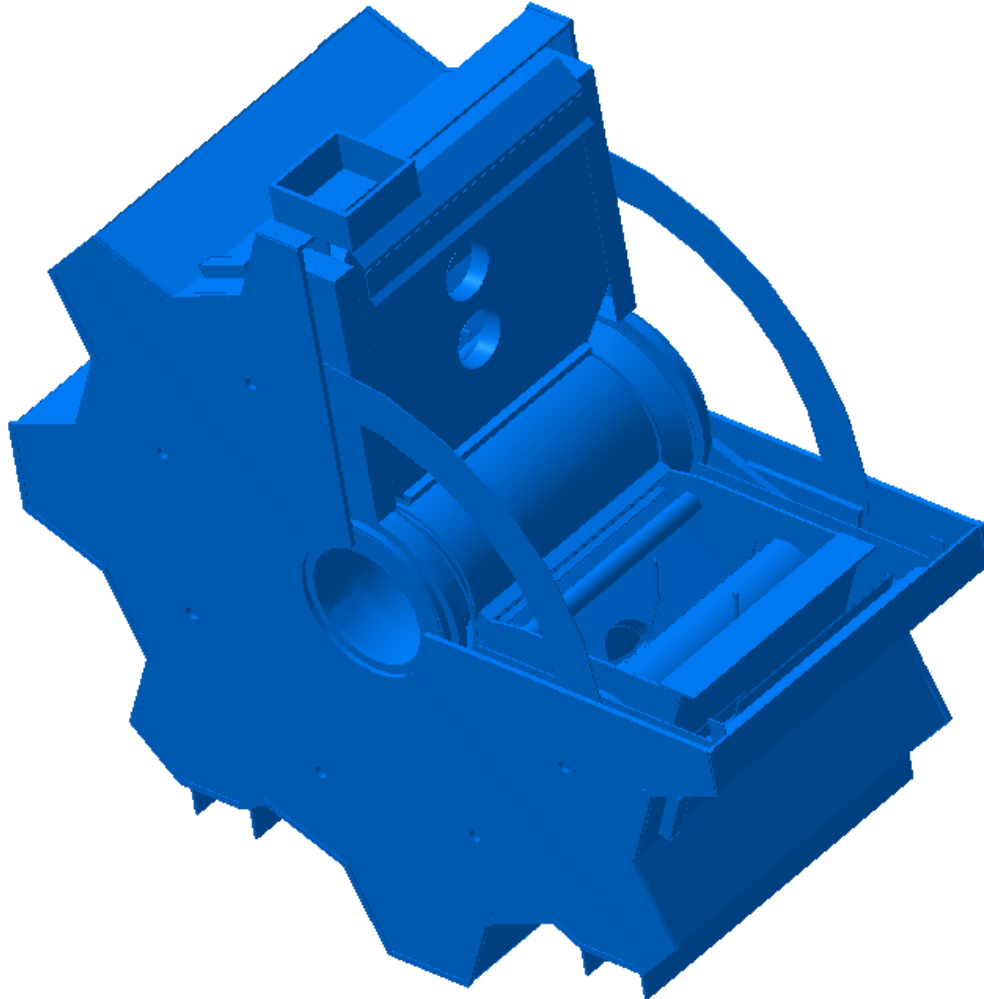
XML code of ECT

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2 <section name = "End-Cap"
3 version = "1.0"
4 date = "20 March 2016"
5 author = "GCCG"
6 top_volume = "ECT_Toroids">
7
8 <!-- start ECT -->
9 <!-- start Cover-->
10 <!-- start Cover_plate -->
11 <gvxy name="Plate2" material="Aluminium" dz="72.4">
12 <gvxy_point X_Y="5179.1;11456.1"/>
13 <gvxy_point X_Y="4315.1;617.1"/>
14 <gvxy_point X_Y="4315.1;-617.1"/>
15 <gvxy_point X_Y="5179.1;-11456.1"/>
16 <gvxy_point X_Y="4935.1;-2044.1"/>
17 <gvxy_point X_Y="540.95;-224.068859"/>
18 <gvxy_point X_Y="540.95;224.068859"/>
19 <gvxy_point X_Y="4935.1;2044.1"/>
20 </gvxy>
21 <tubs name="Tubel" mat="578" <posXYZ volume="ECT_Coil_Cover" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 180. ; -45. " />
22 <tubs name="Tubel2" mat="579" <posXYZ volume="Shell_coil_cover" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -45. " />
23 <tubs name="Tubel3" mat="580" <posXYZ volume="keystones" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -247.5 " />
24 <subtraction name="Cov" <posXYZ volume="Stay_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 292.5 " />
25 <posXYZ volume="Plate" <posXYZ volume="JTV_Shielding_1" X_Y_Z=" 0. ; 0. ; 2345.7" rot=" 0. ; 0. ; -247.5 " />
26 <posXYZ volume="Tubel" <posXYZ volume="JTV_Shielding_2" X_Y_Z=" 0. ; 0. ; 2345.7" rot=" 0. ; 0. ; -247.5 " />
27 <posXYZ volume="Tubel2" <posXYZ volume="inner_web" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 135 " />
28 </subtraction> <posXYZ volume="ECT_Coil" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 135 " />
29 <gvxy name="Plate_feet" <posXYZ volume="Thermal_Shielding_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -67.5 " />
30 <gvxy_point X_Y="615" <posXYZ volume="Shield_plate_1" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -90. " />
31 <gvxy_point X_Y="109" <posXYZ volume="Shield_plate_2" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 292.5 " />
32 <gvxy_point X_Y="220" <posXYZ volume="Plate_connection" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 202.5" />
33 <gvxy_point X_Y="261" <posXYZ volume="shell_connection_box" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 22.5" />
34 <gvxy_point X_Y="350" <posXYZ volume="services_1" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 180." />
35 <gvxy_point X_Y="37" <posXYZ volume="services_2" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 180." />
36 </composition>
37 <gvxy_point X_Y="44" <composition name="C" <posXYZ volume="Stay_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 67.5 " />
38 <gvxy_point X_Y="0." <posXYZ volume="C" <posXYZ volume="JTV_Shielding_3" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -112.5 " />
39 </gvxy> <posXYZ volume="E" <posXYZ volume="E" <posXYZ volume="ECT_Coil" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; -90 " />
40 <subtraction name="C" <posXYZ volume="Thermal_Shielding_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 67.5 " />
41 <posXYZ volume="Pl" <posXYZ volume="Shield_plate_1" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 45. " />
42 <posXYZ volume="Tul" <posXYZ volume="services_1" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 315. " />
43 <posXYZ volume="Tul" <posXYZ volume="services_2" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 315. " />
44 </subtraction>
45 <subtraction name="C" <!-- end one sector -->
46 <posXYZ volume="Pl" <!-- start Central Parts -->
47 <posXYZ volume="Tul" <composition name="central_parts" >
48 <posXYZ volume="Tul" <posXYZ volume="Shielding_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
49 <subtraction name="P" <posXYZ volume="Bore_Tube" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
50 <posXYZ volume="P" <posXYZ volume="Bolts" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
51 <posXYZ volume="T" <posXYZ volume="Yoke" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
52 <posXYZ volume="T" <posXYZ volume="Yoke" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 180. ; 0 " />
53 <posXYZ volume="T" <posXYZ volume="JTV_Shielding_Ring" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
54 </subtraction> </composition>
55 <box name="Plate oc" <!-- end Central Parts -->
<!-- start full ECT -->
<composition name="Full ECT" >
<posXYZ volume="sector_2" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
<posXYZ volume="sector_4" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
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<posXYZ volume="sector_8" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
<posXYZ volume="sector_10" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
<posXYZ volume="sector_12" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
<posXYZ volume="sector_14" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
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<posXYZ volume="central_parts" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
</composition>
<!-- end Full ECT-->
<!-- start ECT Side A-->
<composition name="ECT Side A" >
<posXYZ volume="Full_ECT" X_Y_Z=" 0. ; 0. ; 10406." rot=" 0. ; 180. ; 0 " />
</composition>
<!-- end ECT Side A-->
<!-- start ECT Side C-->
<composition name="ECT Side C" >
<posXYZ volume="Full_ECT" X_Y_Z=" 0. ; 0. ; -10406." rot=" 0. ; 0. ; 0 " />
</composition>
<!-- end ECT Side C-->
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<posXYZ volume="ECT_Side_A" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
<posXYZ volume="ECT_Side_C" X_Y_Z=" 0. ; 0. ; 0." rot=" 0. ; 0. ; 0 " />
</composition>
<!-- end ECT -->
</section>
```

Integration Conflict Checking of End-Cap Toroid

Internal Conflicts of ECT

ECT After Modification



There Was Internal Conflicts

Check Clash

Results

Number of interferences: 390 (Clash:94, Contact:296, Clearance:0)

Filter list: Clash No filter on value All statuses

List by Conflict List by Product Matrix

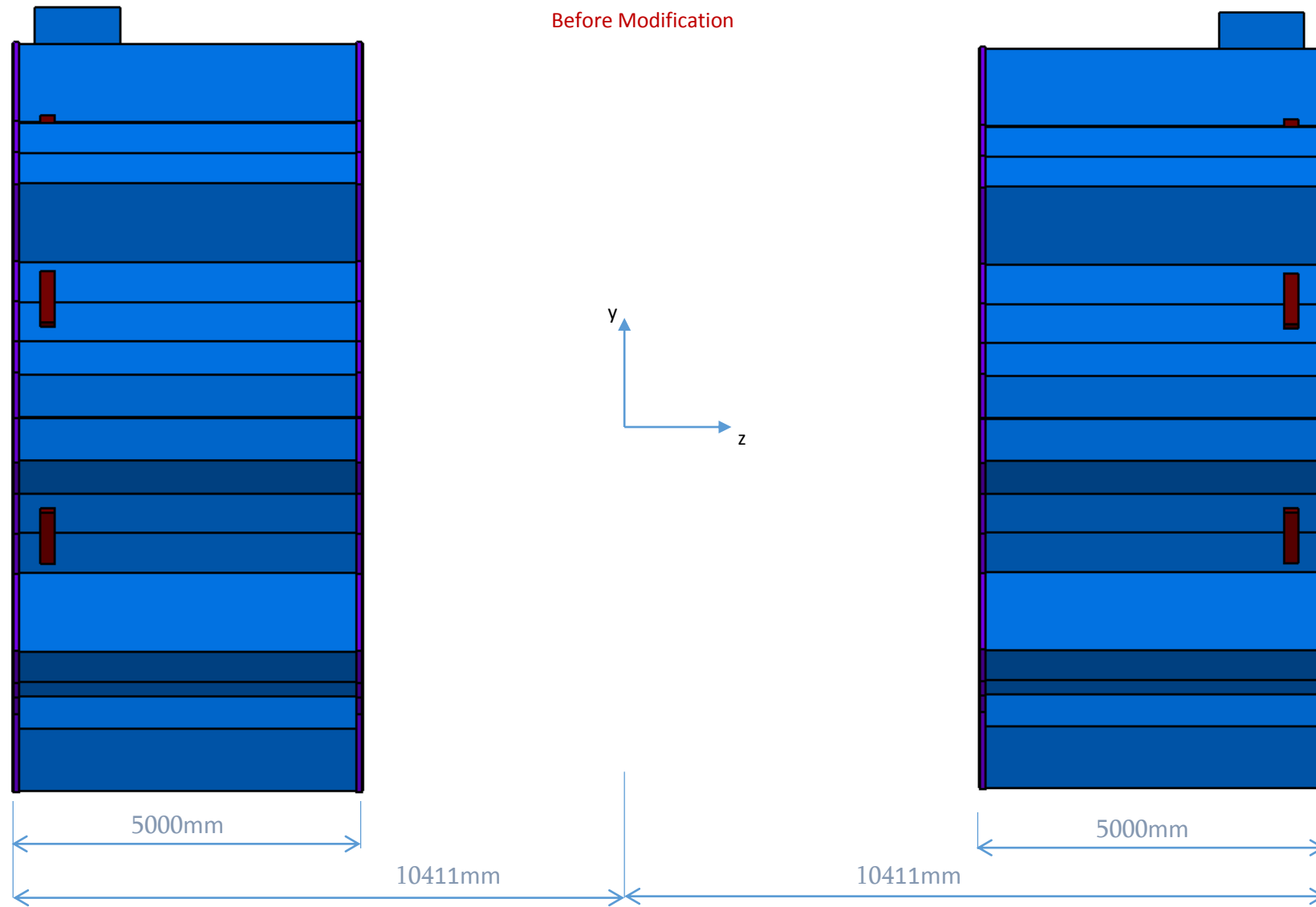
No.	Product 1	Product 2	Type	Value	Status	Comment
1	BoreTube (Cen...	youk (yok)	Clash	-3,88	Relevant	
2	BoreTube (Cen...	youk (yok)	Clash	-5,83	Relevant	
3	BoreTube (Cen...	plate2 (plate2.2)	Clash	-24,56	Relevant	
4	BoreTube (Cen...	plate2 (plate2.3)	Clash	-24,56	Relevant	
5	BoreTube (Cen...	plate2 (plate2.4)	Clash	-24,56	Relevant	
6	BoreTube (Cen...	plate2 (plate2.5)	Clash	-24,56	Relevant	
7	BoreTube (Cen...	plate2 (plate2.6)	Clash	-24,56	Relevant	
8	BoreTube (Cen...	plate2 (plate2.7)	Clash	-24,56	Relevant	
9	BoreTube (Cen...	fexebtan pla2 (...)	Clash	-24,56	Relevant	
10	BoreTube (Cen...	plate1 (plate1.2)	Clash	-24,56	Relevant	
11	BoreTube (Cen...	plate1 (plate1.3)	Clash	-24,56	Relevant	
12	BoreTube (Cen...	plate1 (plate1.4)	Clash	-24,56	Relevant	
13	BoreTube (Cen...	plate1 (plate1.5)	Clash	-24,56	Relevant	
14	BoreTube (Cen...	plate1 (plate1.6)	Clash	-24,56	Relevant	
15	BoreTube (Cen...	plate1 (plate1.7)	Clash	-24,56	Relevant	
16	BoreTube (Cen...	fexebtan pla1 (...)	Clash	-24,56	Relevant	
17	BoreTube (Cen...	JTV IP (JTV IP.1)	Clash	-77,65	Relevant	
18	BoreTube (Cen...	3 (3)	Clash	-4,65	Relevant	
19	BoreTube (Cen...	4 (4)	Clash	-21,6	Relevant	
22	youk (yok)	shua cilindri (...)	Clash	-18,32	Relevant	
25	support (tie ro...	Symmetry of S...	Clash	-38,27	Relevant	
26	support (tie ro...	shua cilindri (...)	Clash	-100,7	Relevant	
27	cilindri (suppo...	Symmetry of S...	Clash	-104,8	Relevant	
28	cilindri (suppo...	coil box (coil ...)	Clash	-79,6	Relevant	

Deselect More >>

OK Apply Cancel

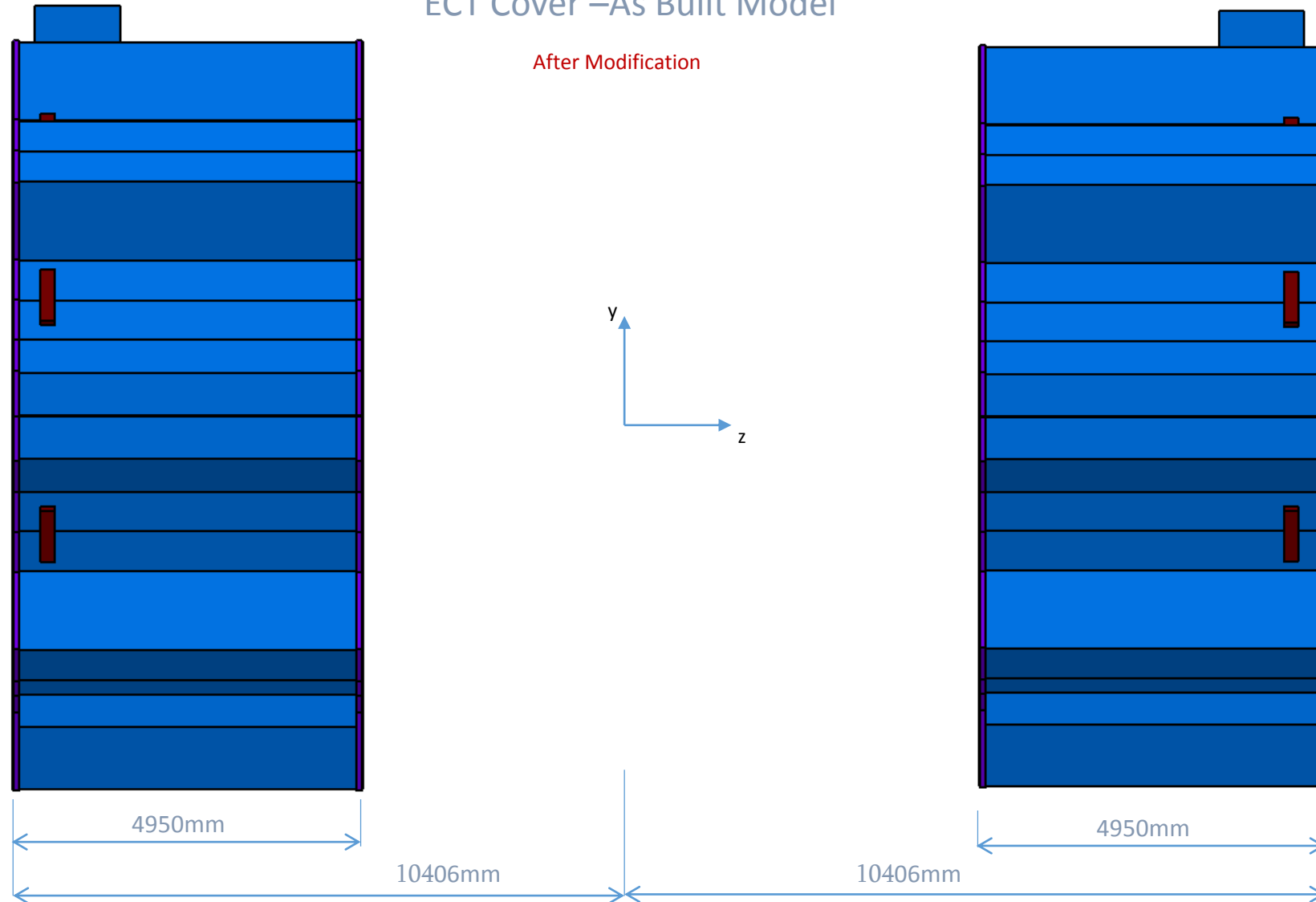
Modification of End-Cap

ECT Cover –SmarTeam Model



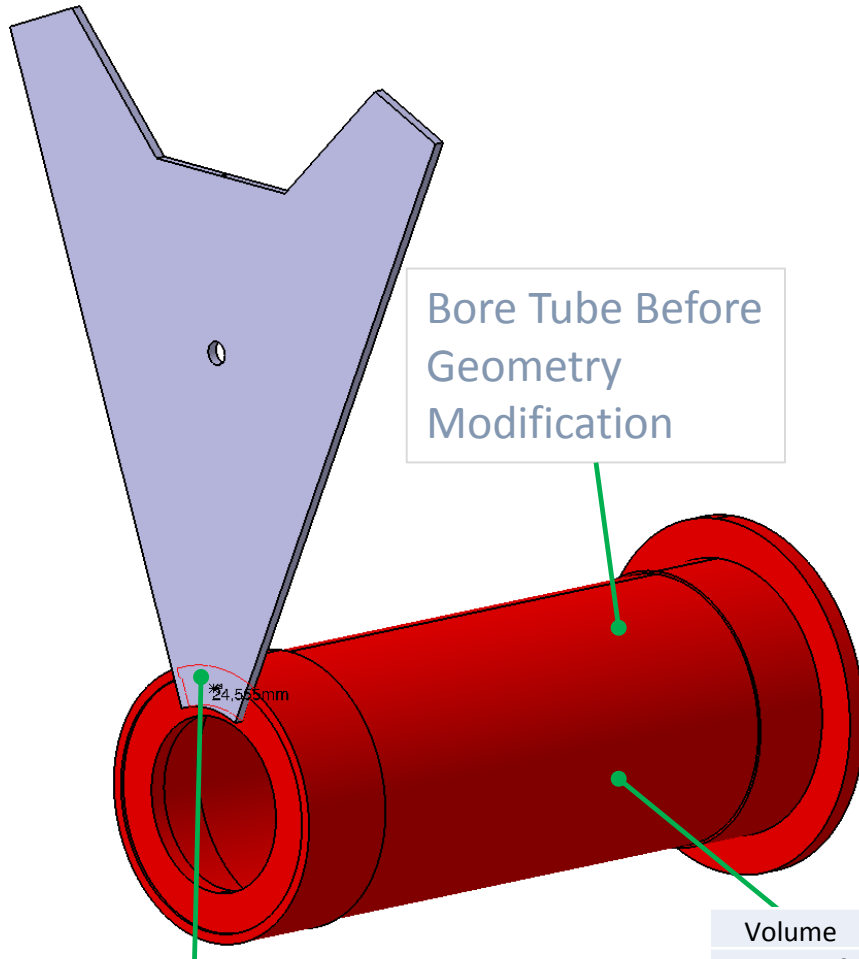
Modification of End-Cap

ECT Cover –As Built Model



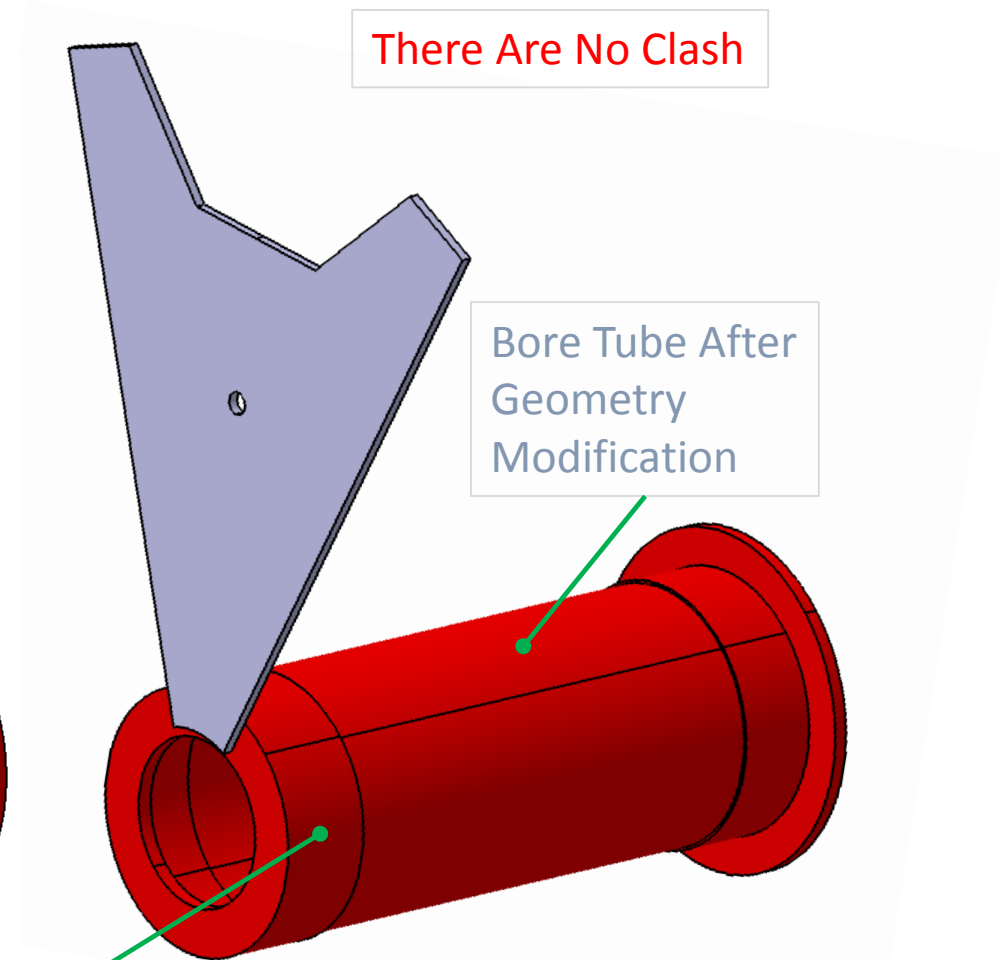
Internal Conflicts of ECT

Clash 24,555mm
Between Cover and Bore
Tube



Clash 24,555mm

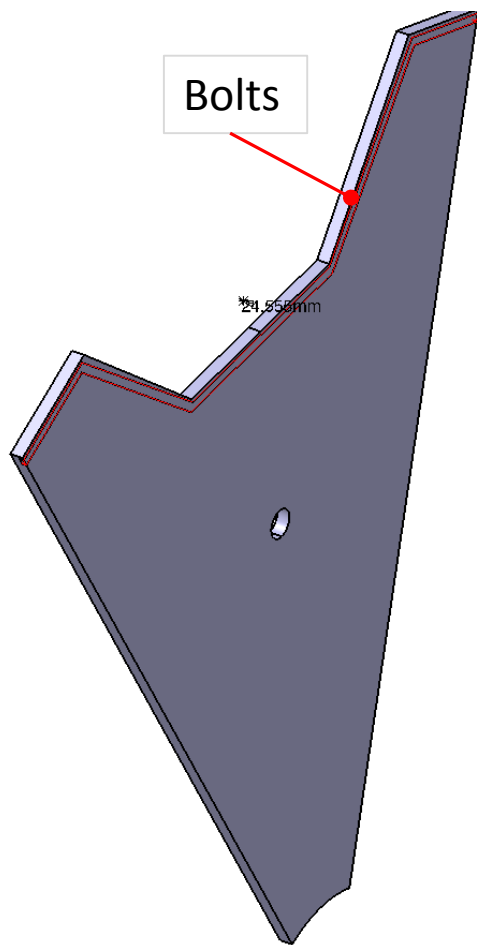
There Are No Clash



Volume	Volume
1,678m ³	1,679m ³

Internal Conflicts of ECT

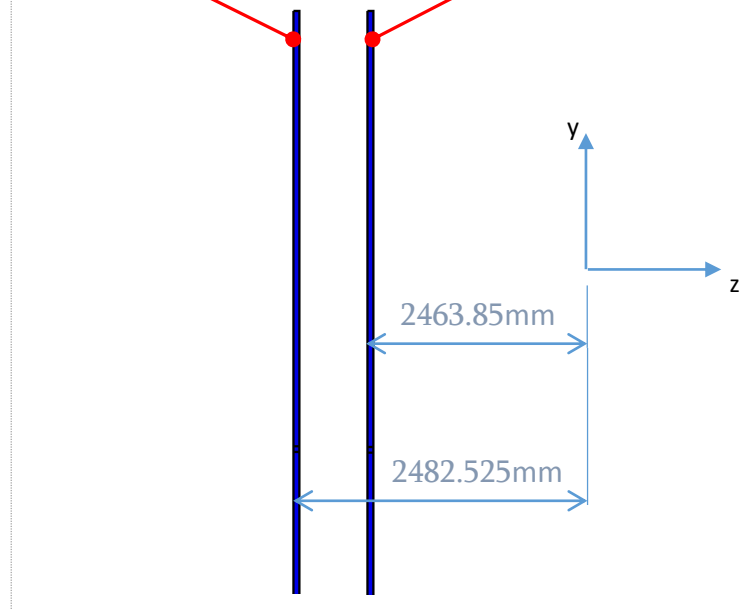
Clash 24,555mm
Between Cover and Bolts



Clash 24,555mm

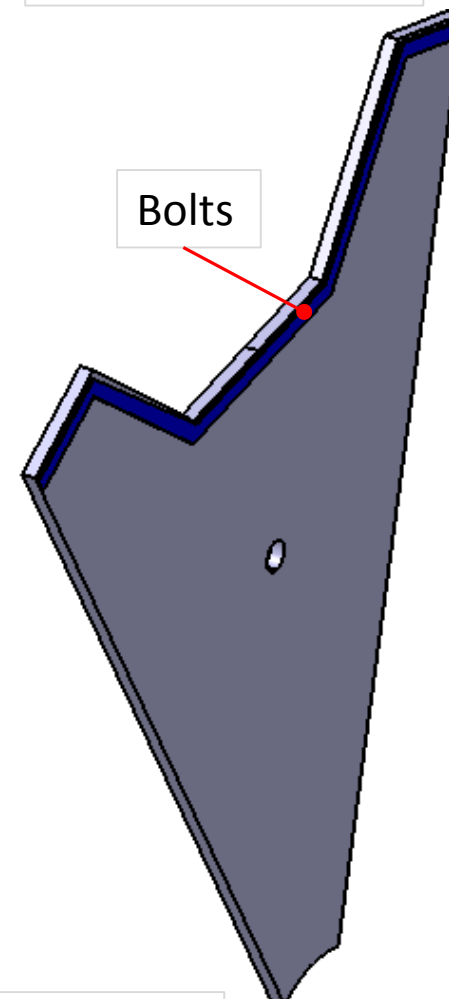
Bolts New
Position

Bolts Old
Position



Total Volume of Bolts (old)	Total Volume of Bolts (New)
0,147m ³	0,147m ³

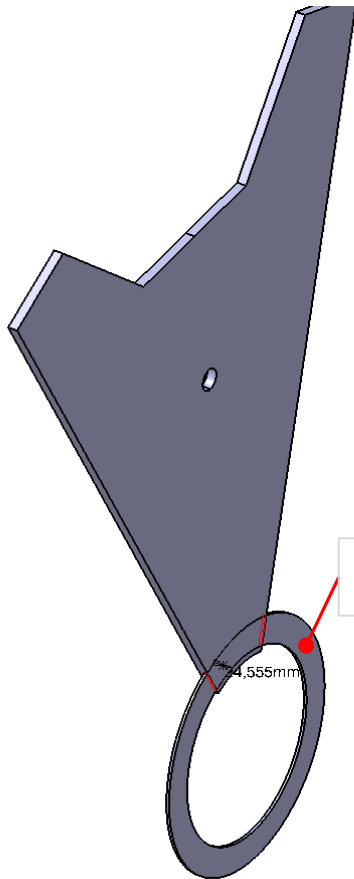
After Move and
Geometry
Modification



There Are No Clash

Internal Conflicts of ECT

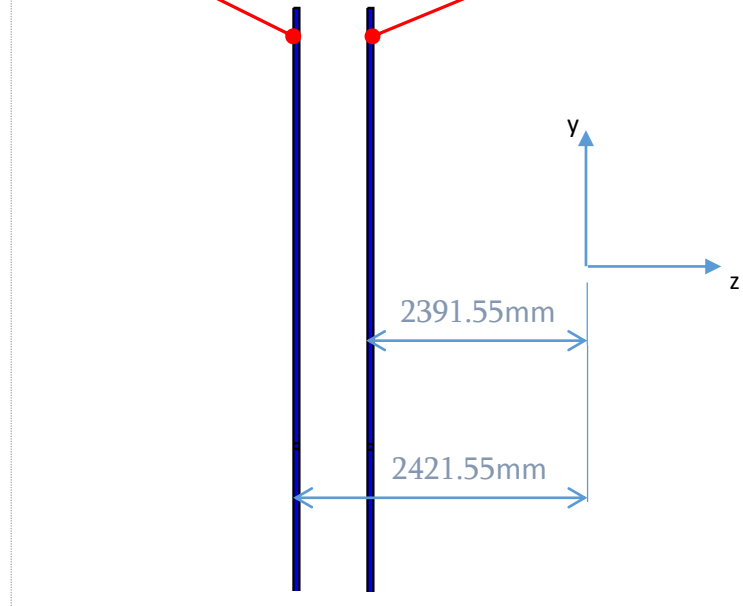
Clash 24,555mm
Between Cover and Bolts
Side A



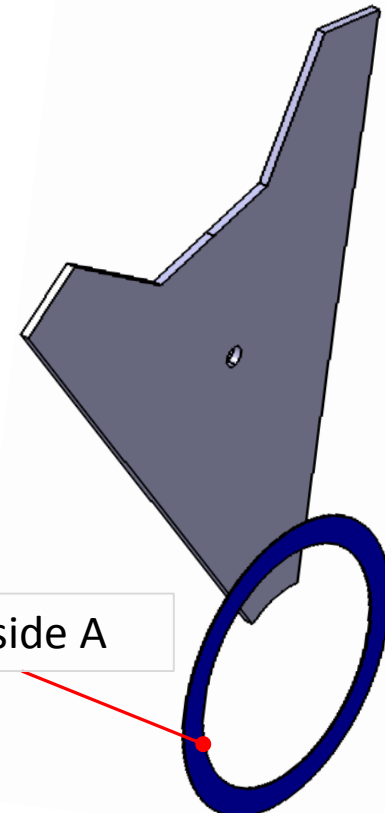
Bolts side A

Bolts Old
Position

Bolts New
Position



After Move and
Geometry
Modification



Bolts side A

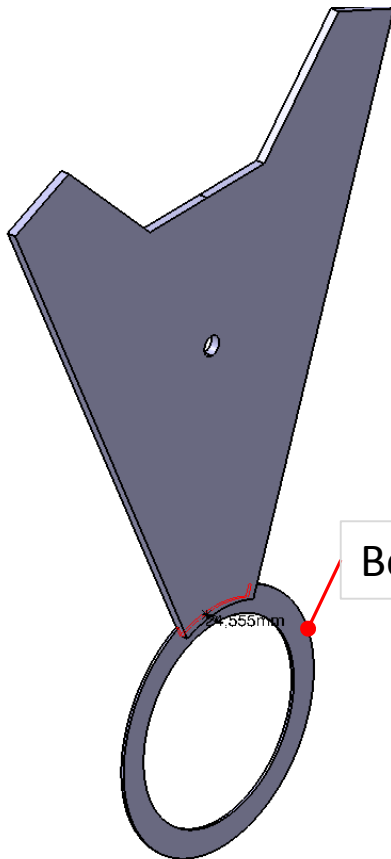
Total Volume of Bolts (old)	Total Volume of Bolts (New)
0,147m ³	0,147m ³

Clash 24,555mm

There Are No Clash

Internal Conflicts of ECT

Clash 24,555mm
Between Cover and Bolts
Side C

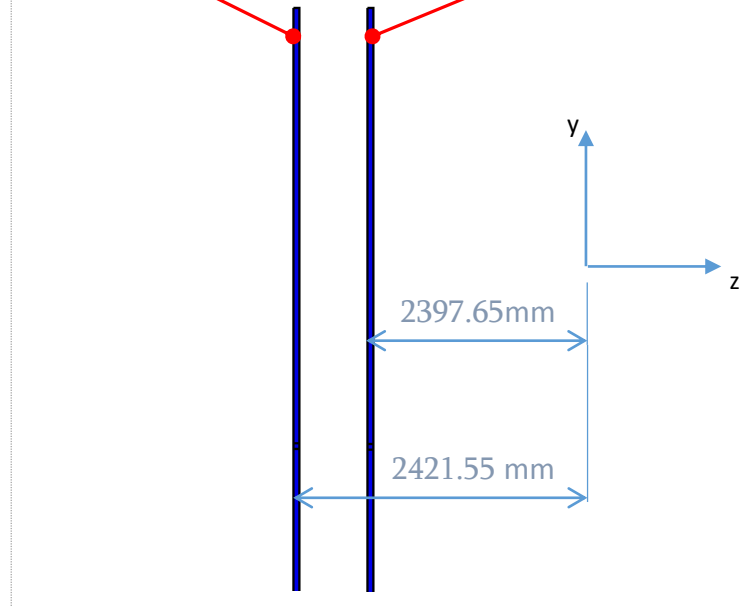


Bolts side C

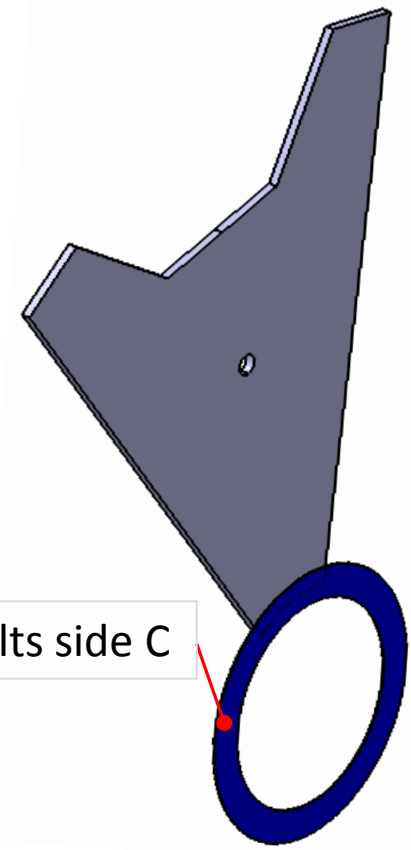
Clash 24,555mm

Bolts Old
Position

Bolts New
Position



After Move and
Geometry
Modification



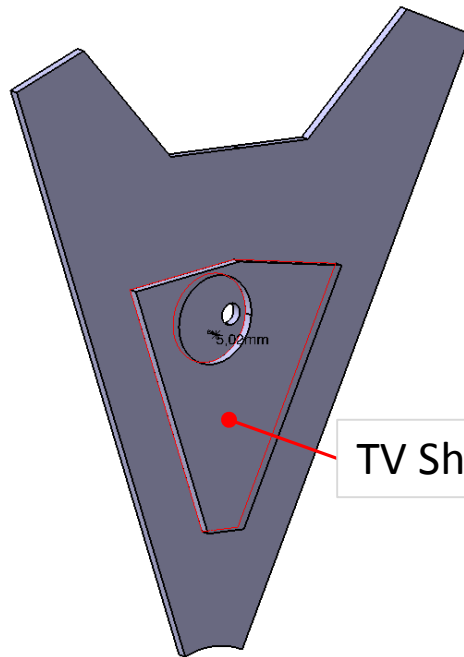
Bolts side C

There Are No Clash

Total Volume of Bolts (old)	Total Volume of Bolts (New)
0,147m ³	0,147m ³

Internal Conflicts of ECT

Clash 5,02mm
Between Cover and TV
Shielding

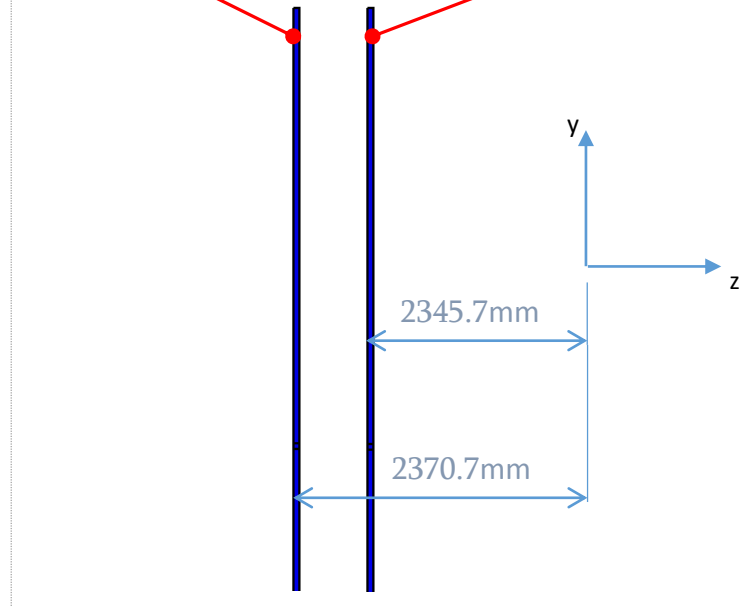


TV Shielding

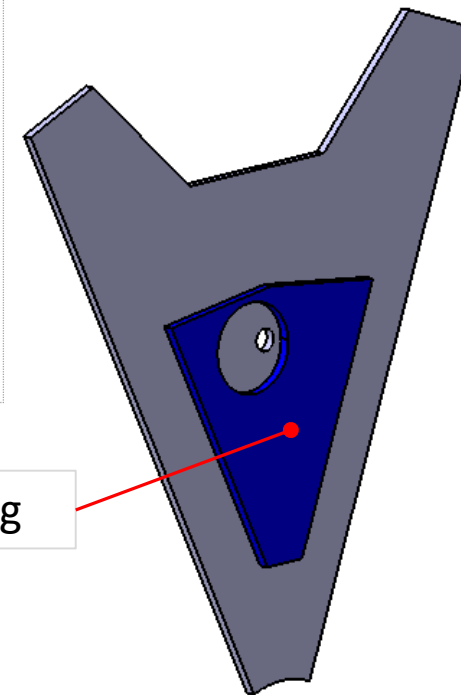
Clash 5,02mm

TV Shielding
Old Position

TV Shielding
New Position



After Move

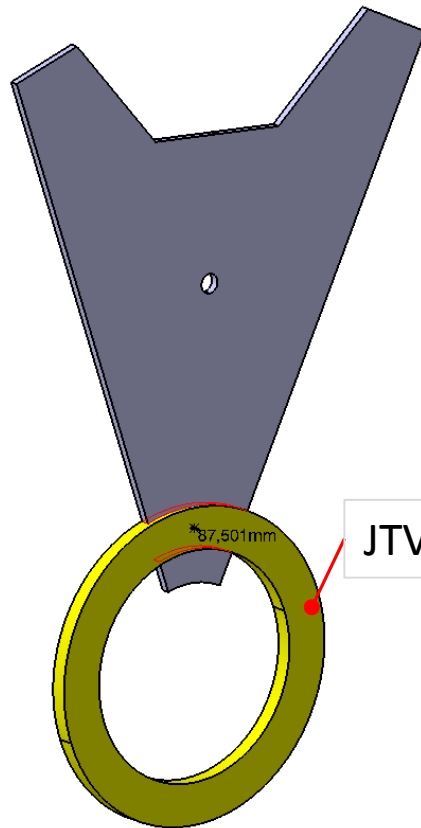


TV Shielding

There Are No Clash

Internal Conflicts of ECT

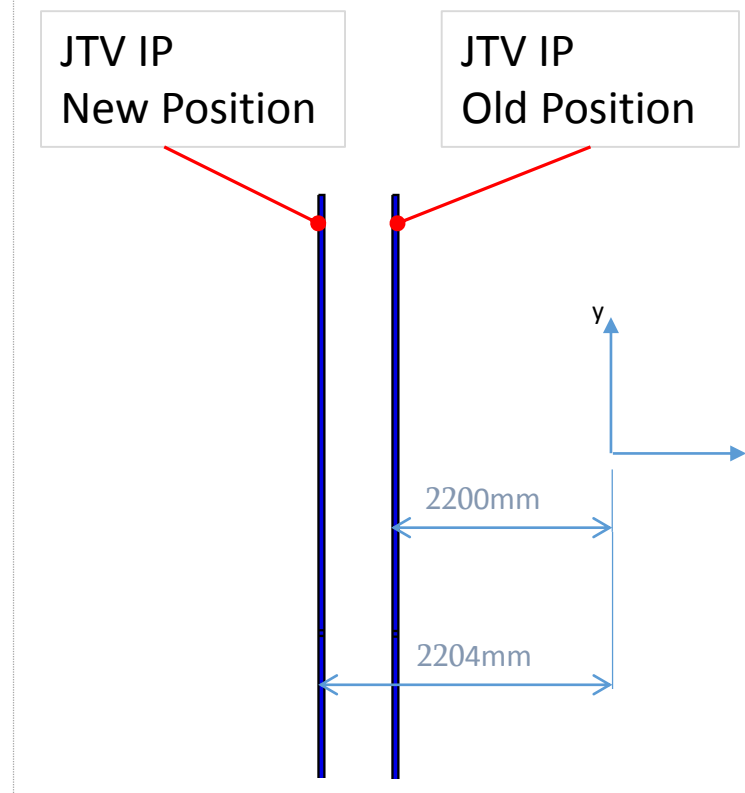
Clash 87,501mm
Between Cover and JTV IP



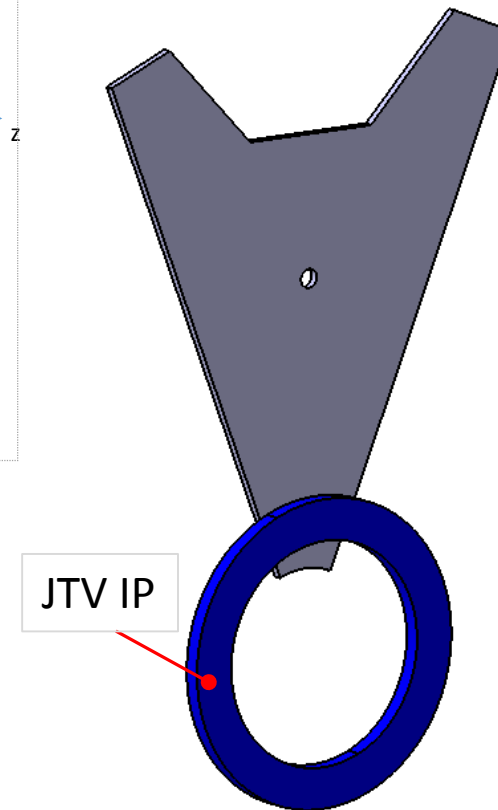
Clash 87,501mm

JTV IP
New Position

JTV IP
Old Position



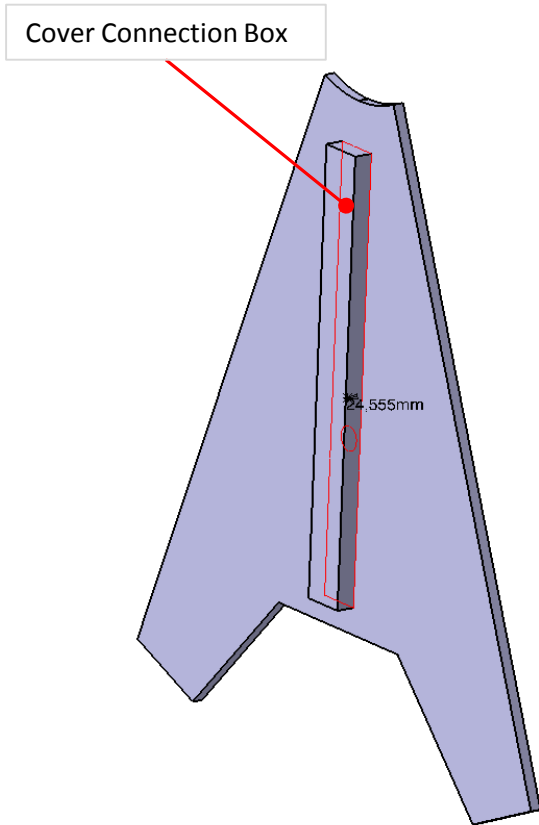
After Move



There Are No Clash

Internal Conflicts of ECT

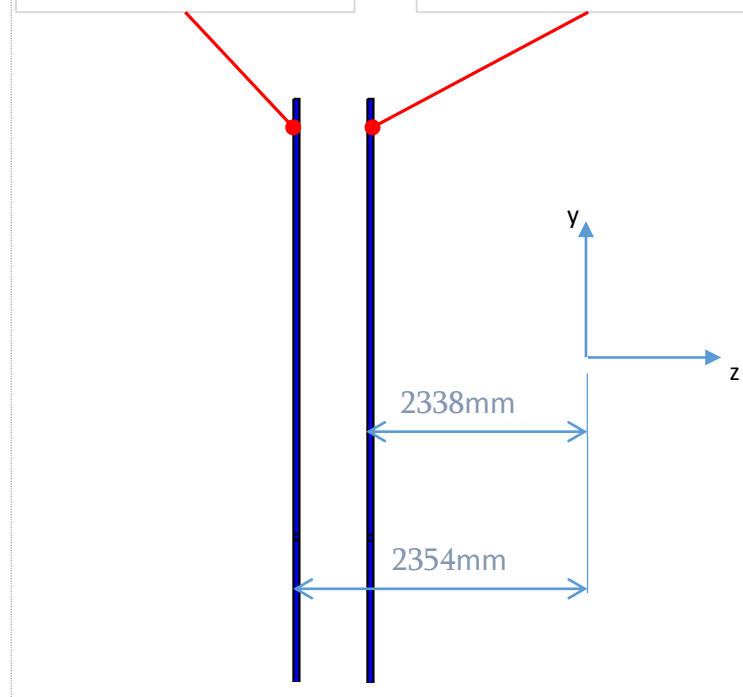
Clash 24,555mm
Between Cover and JTV IP



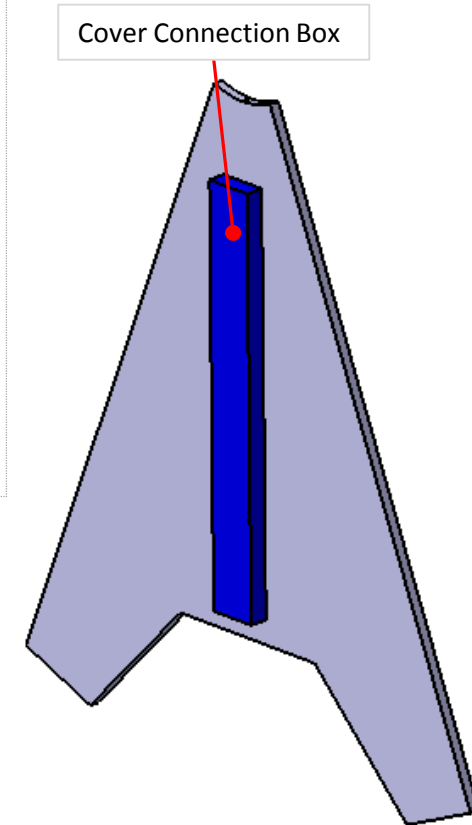
Clash 24,555mm

Cover Connection Box
Old Position

Cover Connection Box
New Position



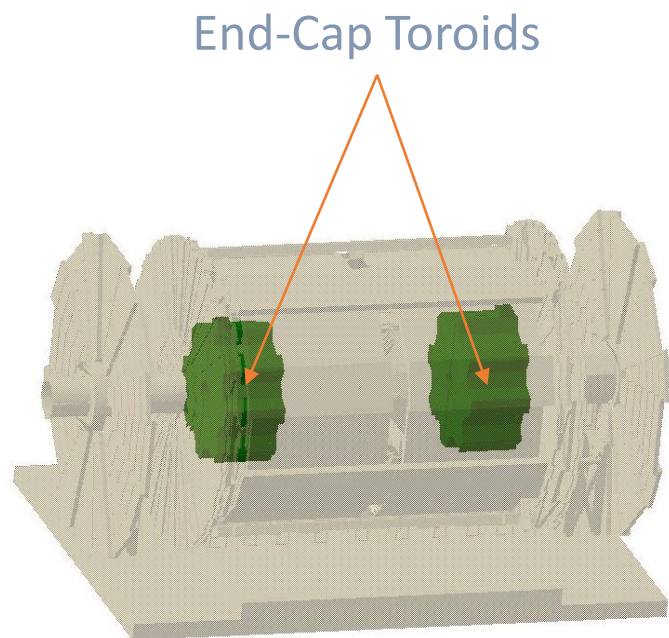
After Move and
Geometry
Modification



There Are No Clash

Integration Conflicts of ECT

Checked Clashes With Following Geometries:

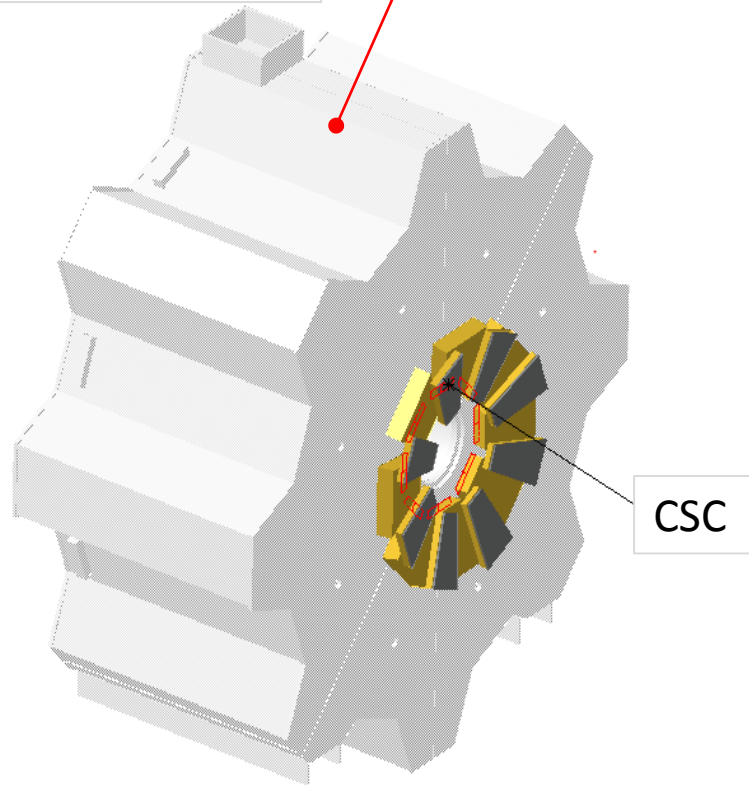


N	Name	Source
1	Solenoid	GDML, AGDD/XML version R.07.01
2	Feet	GDML, AGDD/XML version R.07.01
3	RailAssembly	GDML, AGDD/XML version R.07.01
4	pp2	GDML, AGDD/XML version R.07.01
5	sercicesAtZO	GDML, AGDD/XML version R.07.01
6	MBAP_AccessPlatform	GDML, AGDD/XML version R.07.01
7	MBWH_BigWheels	GDML, AGDD/XML version R.07.01
8	SADL_CalorimeterSaddle	GDML, AGDD/XML version R.07.01
9	MDTRail	GDML, AGDD/XML version R.07.01
10	HFTruckRail	GDML, AGDD/XML version R.07.01
11	RUN2_Services	GDML, AGDD/XML version R.07.01
13	SHIELD	VP1, AGDD/XML version R.07.01
14	MDT	VP1, AGDD/XML version R.07.01
15	TGC	VP1, AGDD/XML version R.07.01
16	CSC	VP1, AGDD/XML version R.07.01
17	INN	VP1, AGDD/XML version R.07.01
18	OUTER	VP1, AGDD/XML version R.07.01

Integration Conflicts of ECT

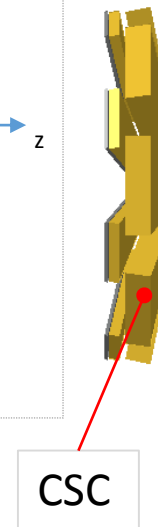
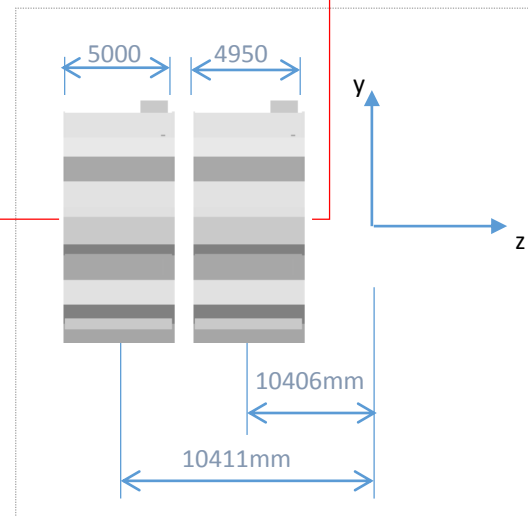
ECT Before New Move and Geometry Modification

Clash 2,73mm
Between ECT and CSC



Clash 2,73mm

ECT After New Move and Geometry Modification

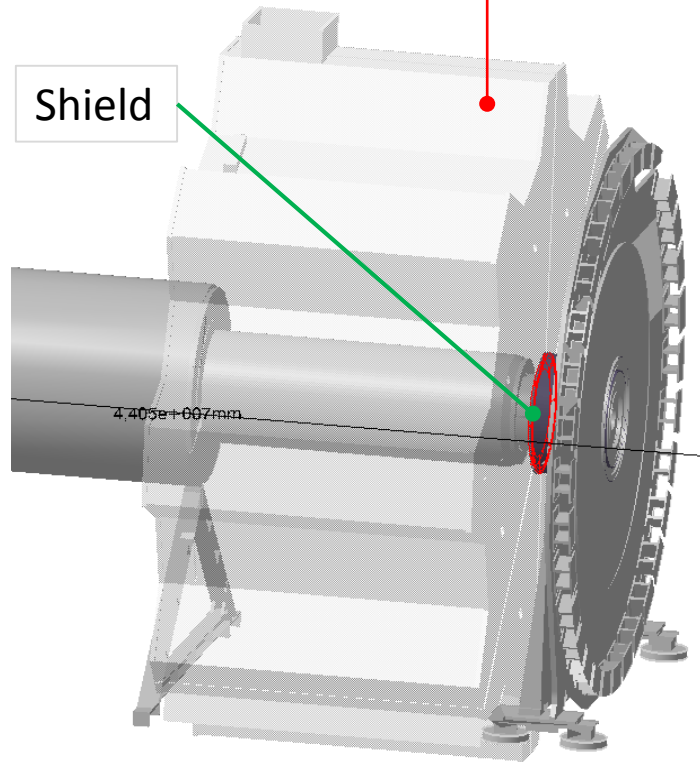


There Are No Integration Conflicts

Integration Conflicts of ECT

ECT Before New Move and Geometry Modification

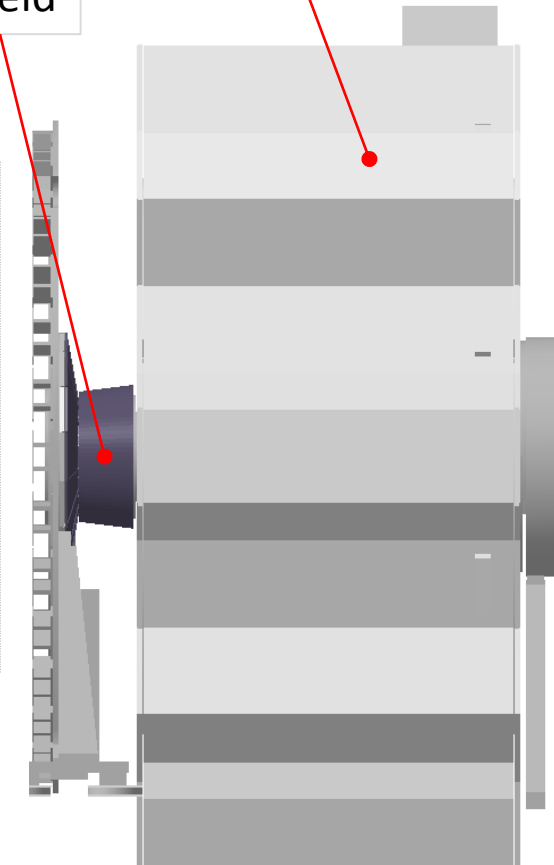
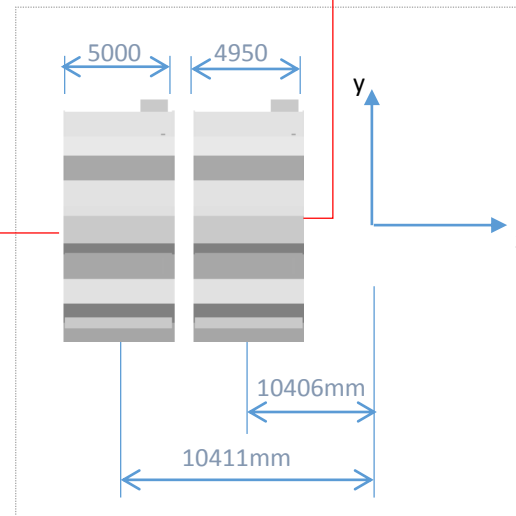
Clash 2,73mm
Between ECT and Shield



Clash 4,4mm

ECT After New Move and Geometry Modification

Shield

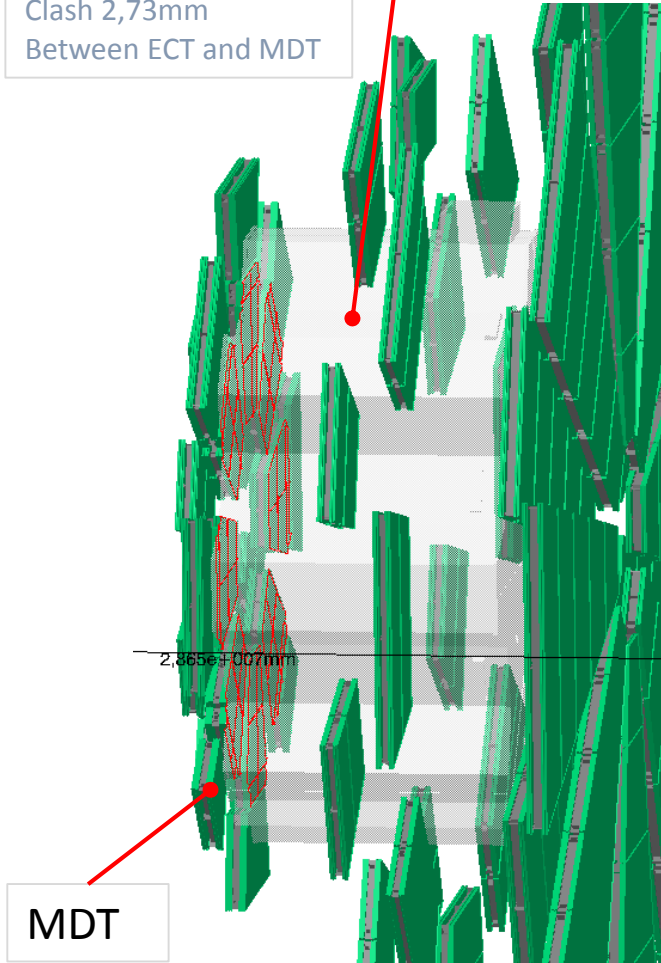


There Are No Integration Conflicts

Integration Conflicts of ECT

ECT Before New Move and Geometry Modification

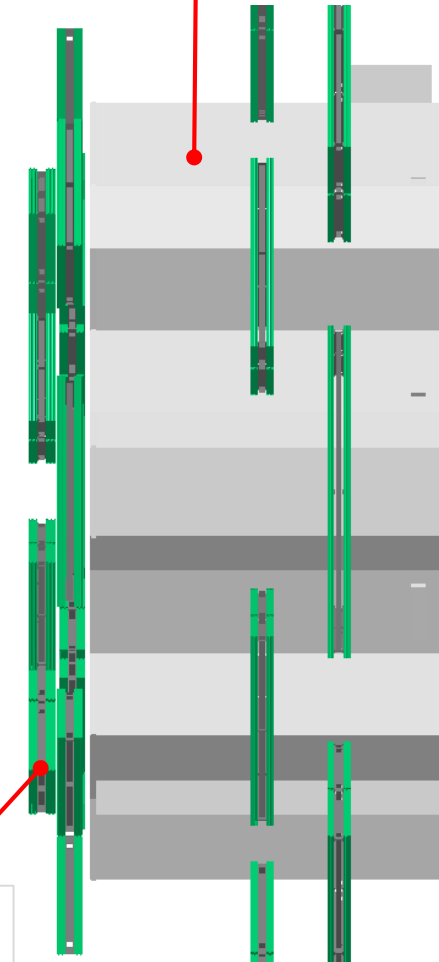
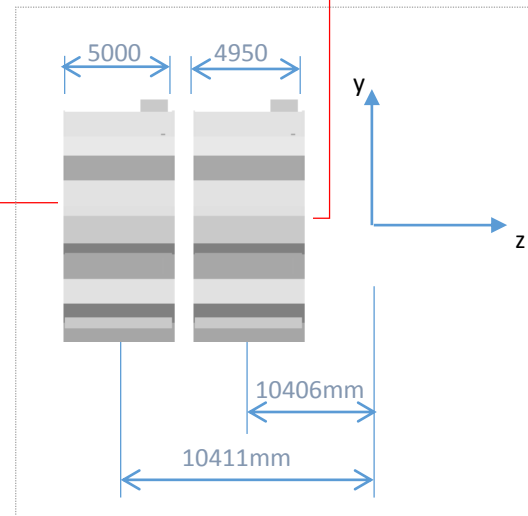
Clash 2,73mm
Between ECT and MDT



MDT

Clash 2,86mm

ECT After New Move and Geometry Modification



MDT

There Are No Integration Conflicts

Thank you for Attention



- **Besik Kekelia**
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