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28 November, 2007

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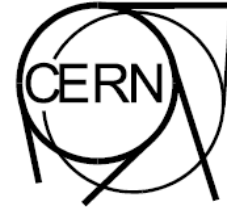
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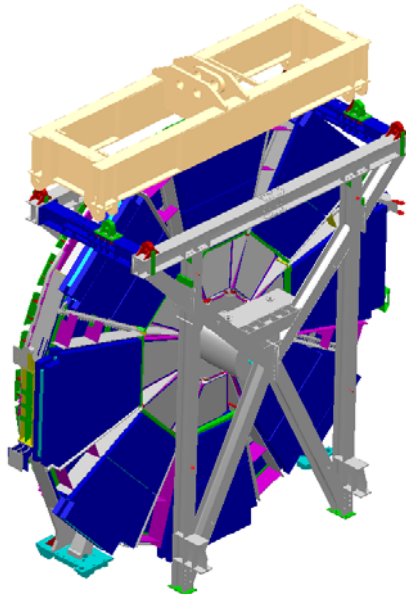
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SW + JD Disk Installation

REPORT (updated)

of Dynamical Conflict Checking



Done by: Georgian CAD/CAM Engineering Center

Platform: Dassault System CATIA V5R12

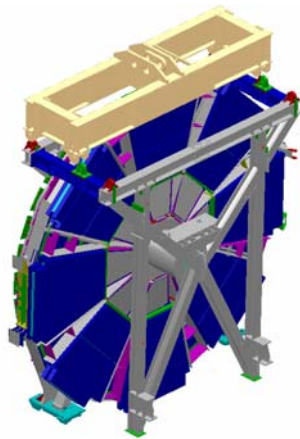
1. Dynamical Conflict Checking Strategy

- Two type of conflicts where considering - Clashes and Clearances
- Dynamical conflict checking is carrying out separately for each segment of SW+JD lifting path
- Cases, when the clearance between the moving SW+JD and the estimated environment around, was less than 80mm was not considered in detailed

2. Environment

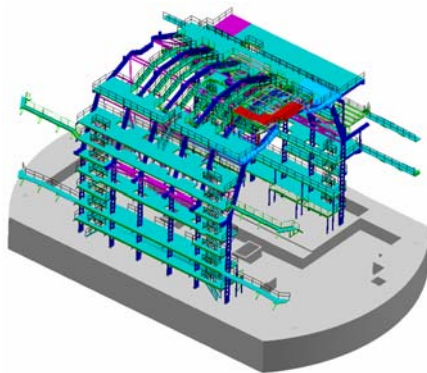
Environment for checking was chosen according to close location of objects to assumed path of SW+JD lifting.

1.



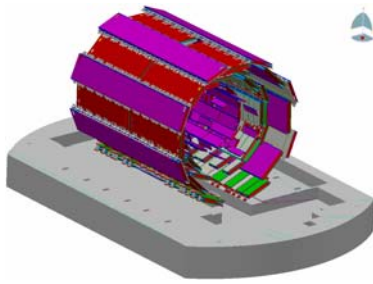
To be lifted Small Wheel + JD assembly with support structures

(Paloneer placed on 368mm from the frame according to Ian Palla's recommendation)



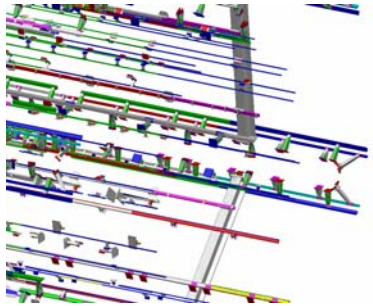
HS Structure + Civil Engineering

2.



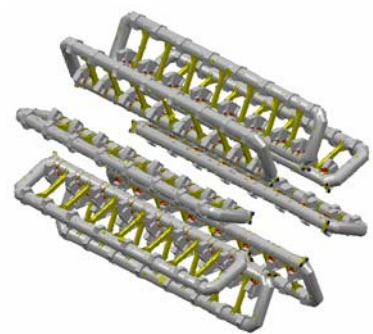
Muon Chambers

3.



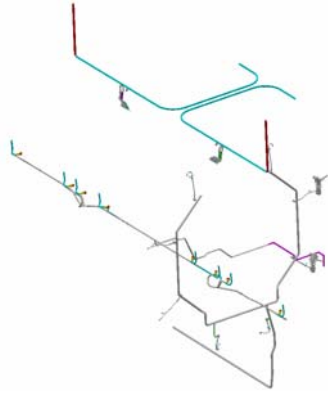
Muon Brackets

4.



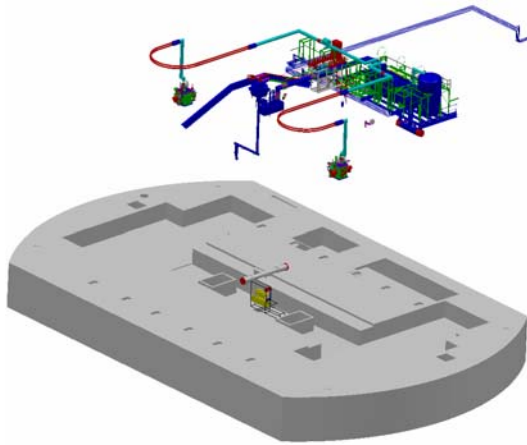
Vacuum Vessels

5.



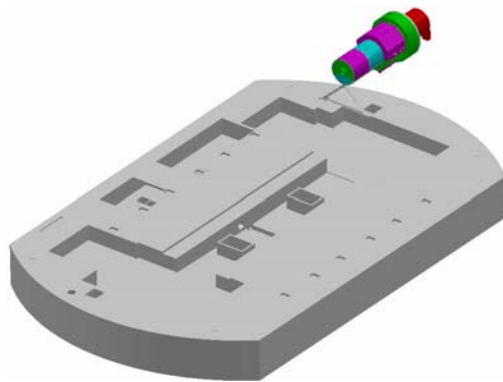
Services for Extended Calorimeter and Muon Spectrometer

6.



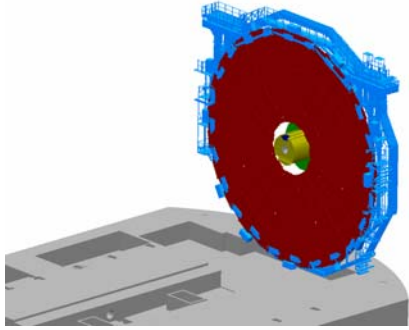
Cryogenics

7.



TX1S Shielding

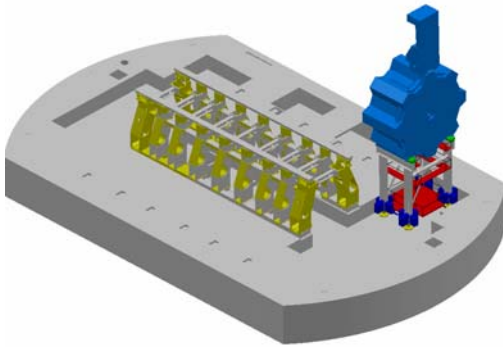
8.



TGC3 Chambers + BW Assembly

Chambers are positioned on $Z=19'046\text{mm}$ from $Z0$ according to Tatiana Kliutchnikova's information.

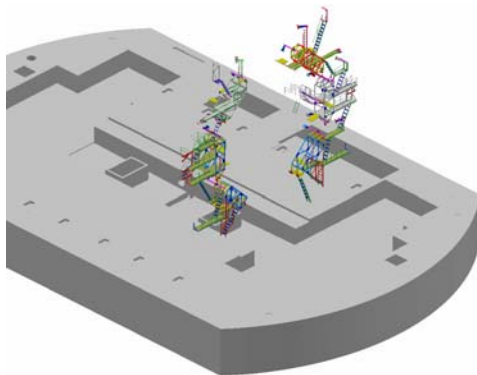
9.



End-Cap Toroid

Positioned in $Z=5'470\text{mm}$ and $X=-10'180\text{mm}$ from $Z0$ according to Tatiana Kliutchnikova's information.

10.

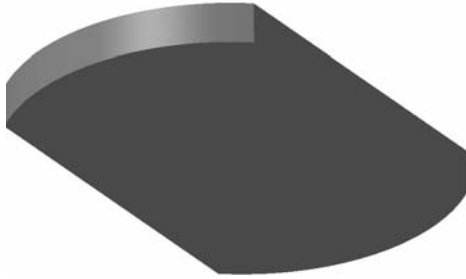


Forward Platforms

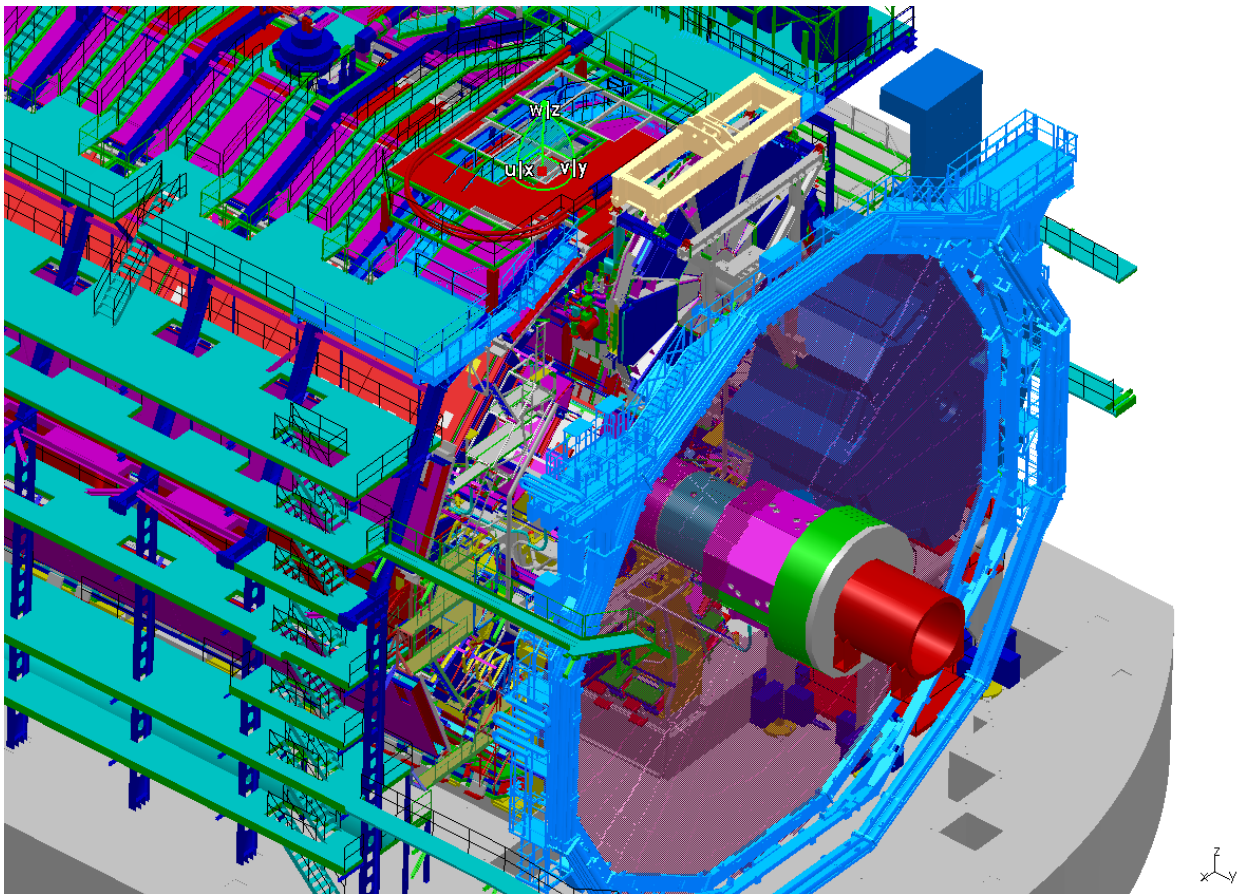
11.



Jib movement limitations
(Yellow ellipsoid)



Final environment for checking looks like above,



3. Predefined Path of ECT Lifting

5 segments have been separated.

1. On the segment#1 SW+JD is moving down starting from the on ground surface (figure.1). In this point altitude is 0 and SW+JD central point is coincidence with SCX1 ground floor. But it is not coincidence with beam

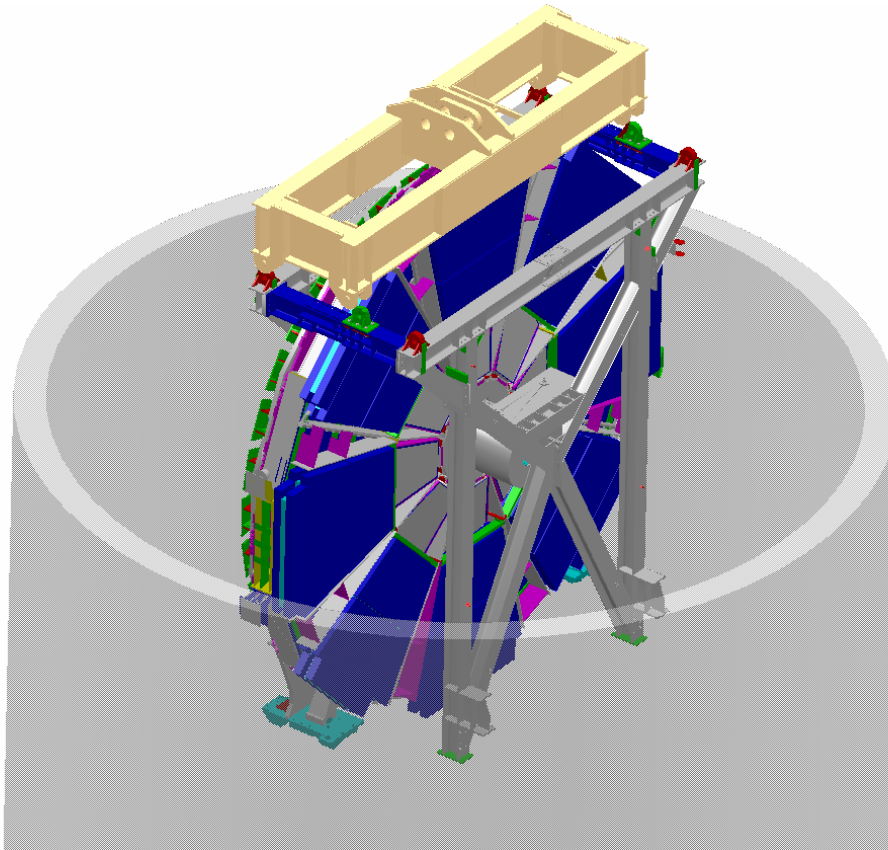


Figure 1 Start point of Segment#1

- and positioning on $X=298\text{mm}$ to avoid CLASH with ECT on segment#3. Movement is going on along the Z axis and finished on the altitude = 61.2m of SW+JD central point. Further vertical movement of SW+JD is restricted by the handrails of big wheel supports (figure 2). Distance between SW+JD and handrails is $\sim 1'900\text{mm}$.
2. Movement on segment#2 is carrying out along the Y axis in Z0 direction on the same altitude 61.2m. This is necessary to avoid conflicts with Big

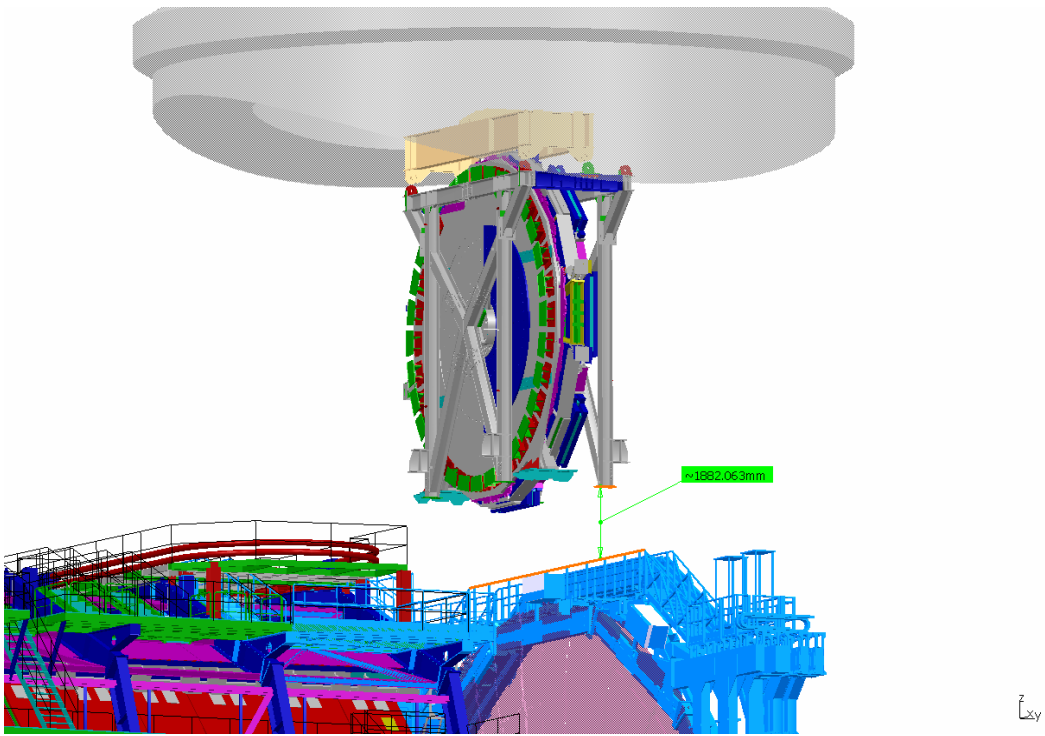


Figure 2 End point of Segment#1

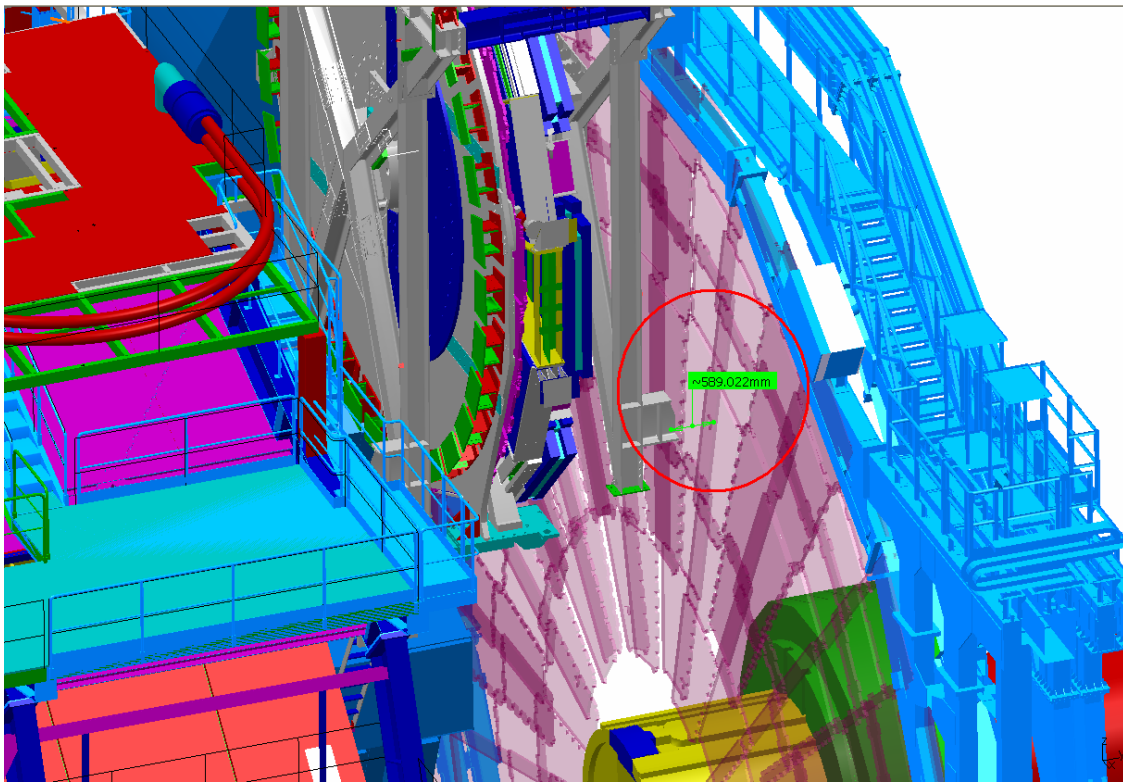


Figure 3 Clearance 589mm with Big Wheel Chambers, segment#3 altitude 70m

- Wheel Chambers during the vertical movement down on segment#3. Length of segment is 1.91m. This value makes possible to set the clearance up to 589mm between SW+JD and Big Wheels chambers during the further vertical movement on segment #3 (figure 3).
3. Movement on segment #3 is carrying out vertically down along the Z. It is starting on altitude 61.2m and finishing on altitude 80.0m. So SW+JD will be lifted down up to the truck (central point of assembly will be on $Z=189\text{mm}$). During the movement on the altitude 80.5m there is a clearance with ECT 100mm (figure 4).
 4. Finally at the end of segment#3 JD frame is positioning lower than the edge of ECT and movement on -X direction up to beam becomes possible. This is segment#4. So, Altitude is the same (80m). Length of movement is 294mm.

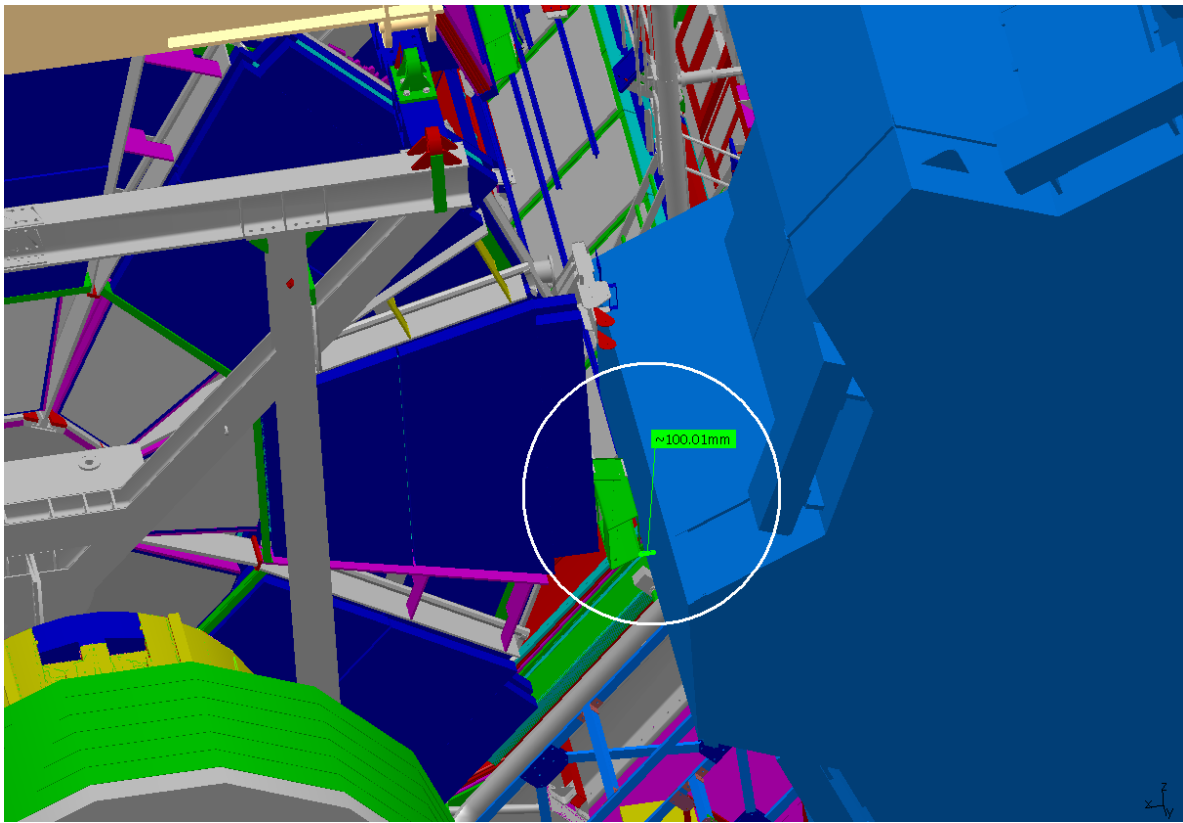
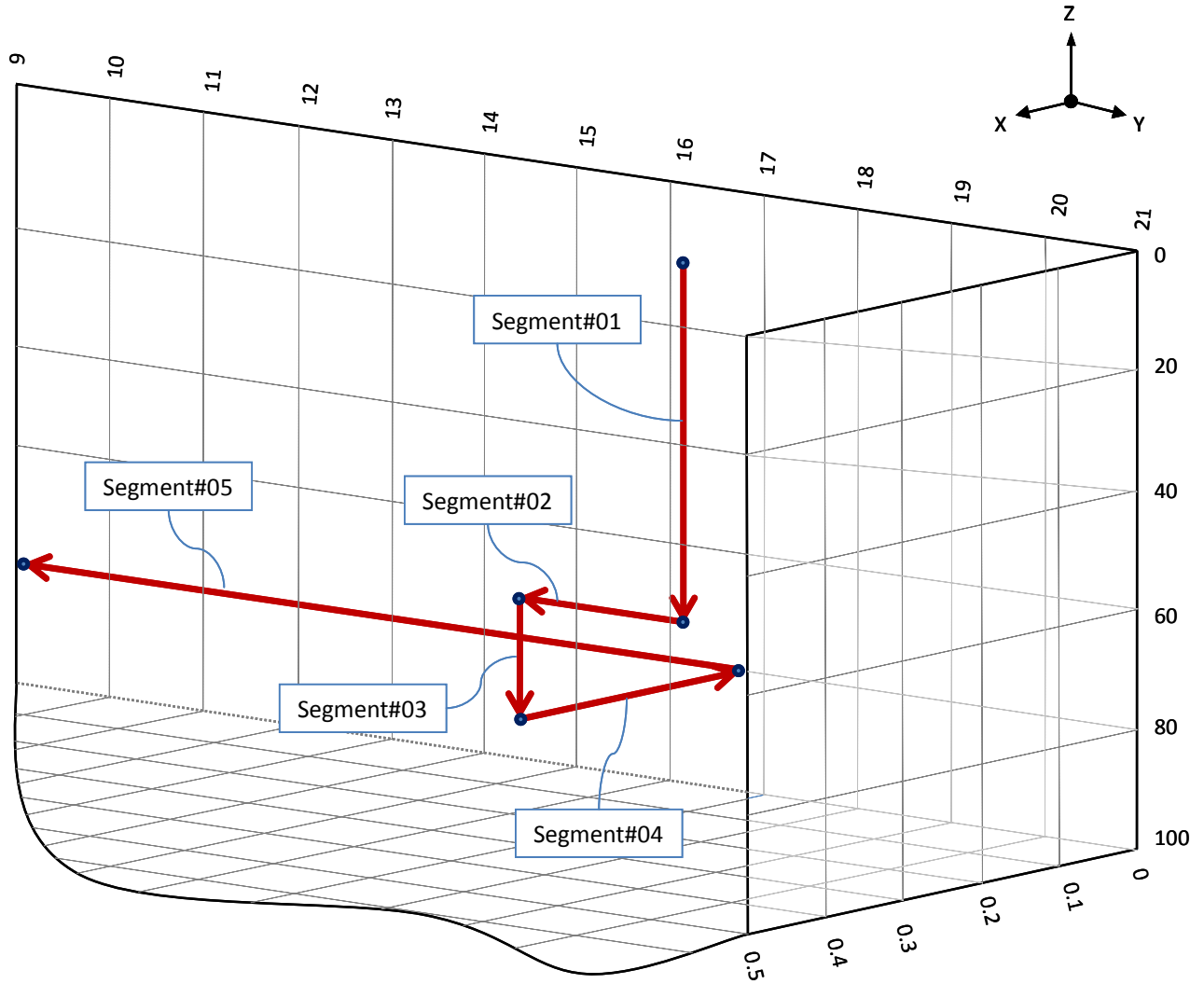


Figure 4 Clearance 100mm with ECT, segment#3 Altitude 80.5m

4 . Path Diagram

Thus, final path will be as follow,

All dimensions are given in meter



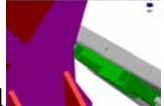
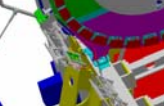







Coordinates in Z0 of support points of ECT Lifting path are presented in table.

Points	X	Y	Z
1	0mm	17'700.00mm	80'211.00mm
2	0mm	17'700.00mm	19'890.00mm
3	0mm	16'181.00mm	19'890.00mm
4	0mm	16'181.00mm	7'890.00mm
5	0mm	15'876.00mm	7'890.00mm
6	0mm	15'876.00mm	190.00mm

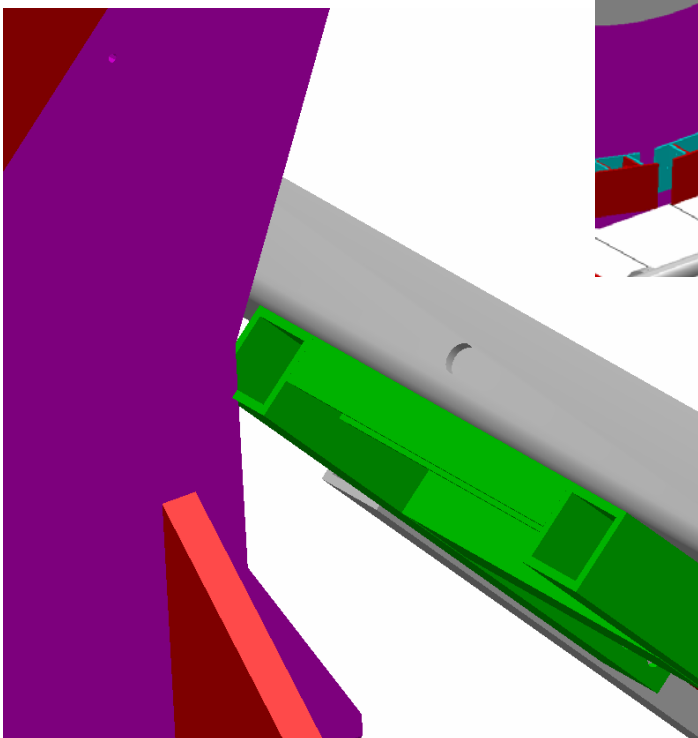
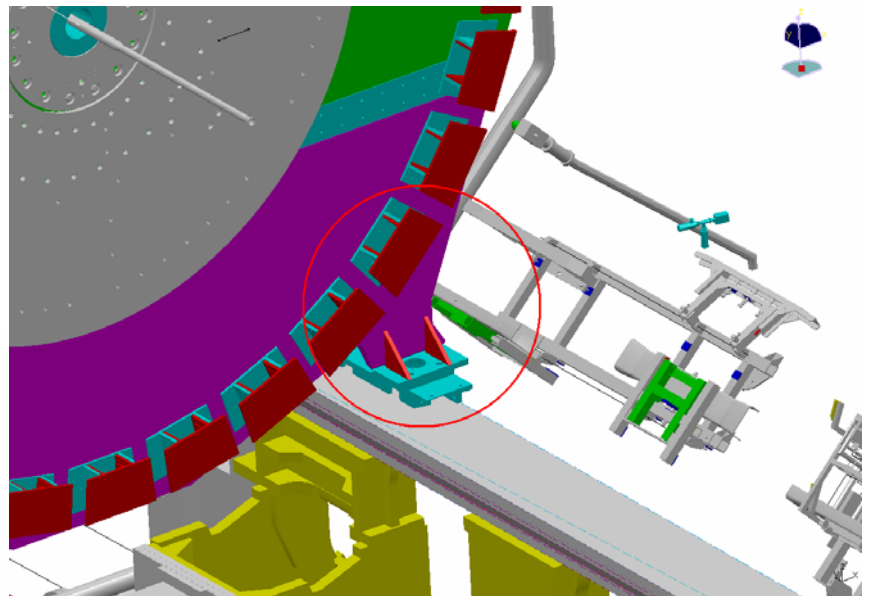
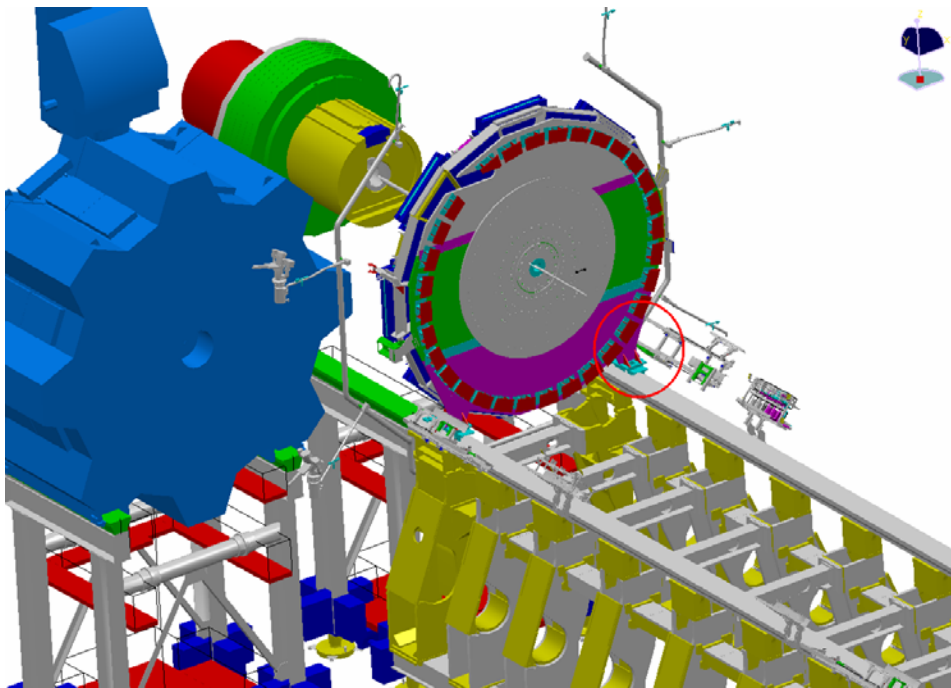
5. CONFLICTS SUMMARY

There are no conflicts on segments: #1, #2, #3, #4.

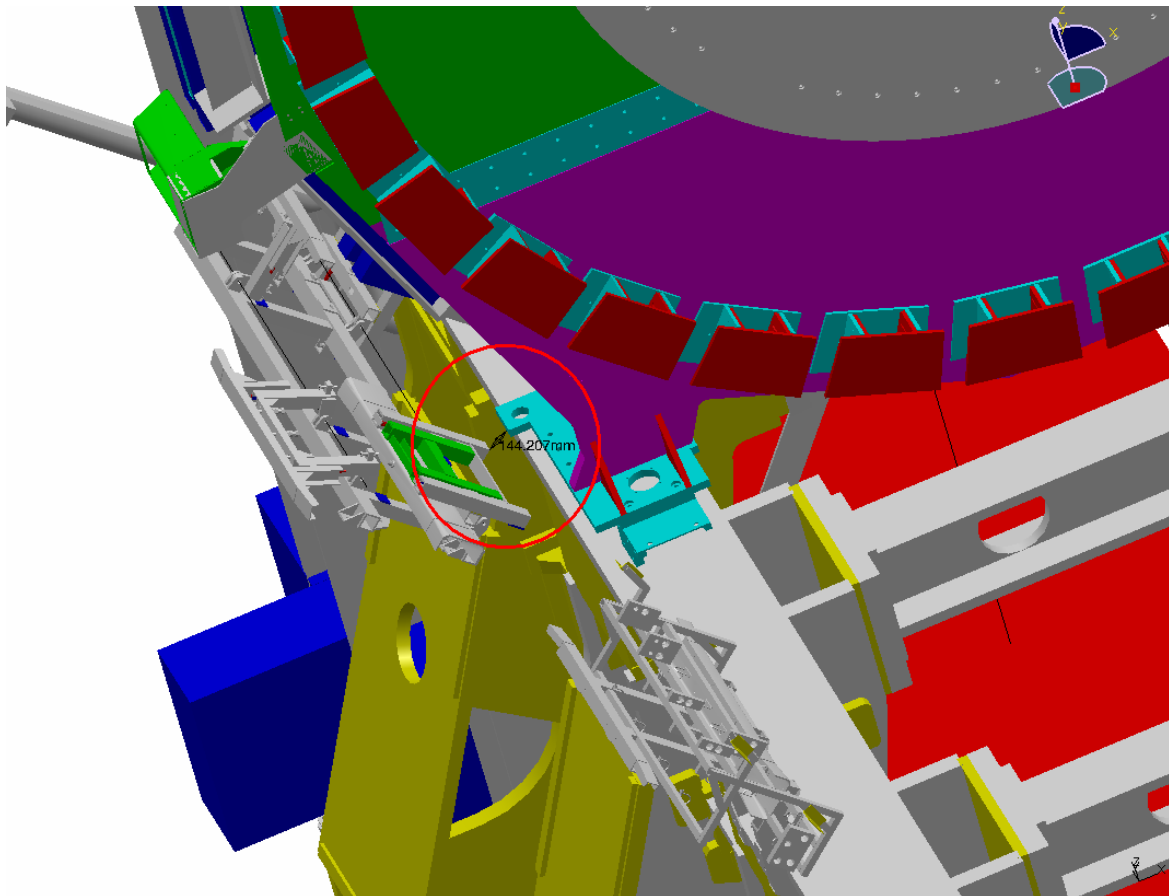
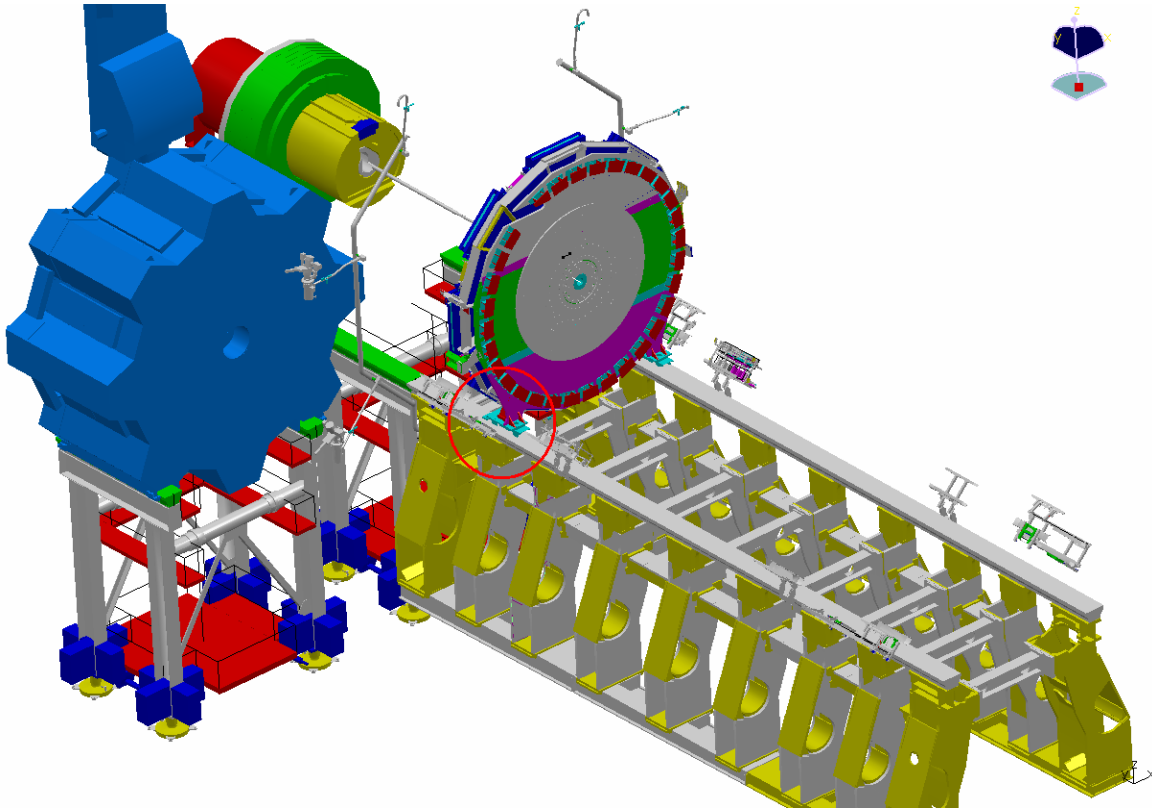
2 Clashes and 7 Clearances were detected on Segment#5.

Interference	Product 1	Product 2	Type	Value	Status
	SW+JD	AT732762MQ (SUPPORTS OUTER, S.11/S.15 FC INTER)	Clash	6.4 mm	Not inspected
	SW+JD	AT732762MQ (SUPPORTS OUTER, S.11/S.15 FC INTER)	Clearance	144 mm	Not inspected
	SW+JD	AT612360MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 10)	Clearance	24.4 mm	Not inspected
	SW+JD	AT612361MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 6)	Clearance	78.9 mm	Not inspected
	SW+JD	AT612362MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 8)	Clearance	11.3 mm	Not inspected
	SW+JD	AT612363MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 2)	Clearance	41 mm	Not inspected
	SW+JD	AT612364MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 10)	Clearance	31.5 mm	Not inspected
	SW+JD	AT612365MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 16)	Clearance	76.2 mm	Not inspected
	SW+JD	AT612369MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 10)	Clash	1.3 mm	Not inspected

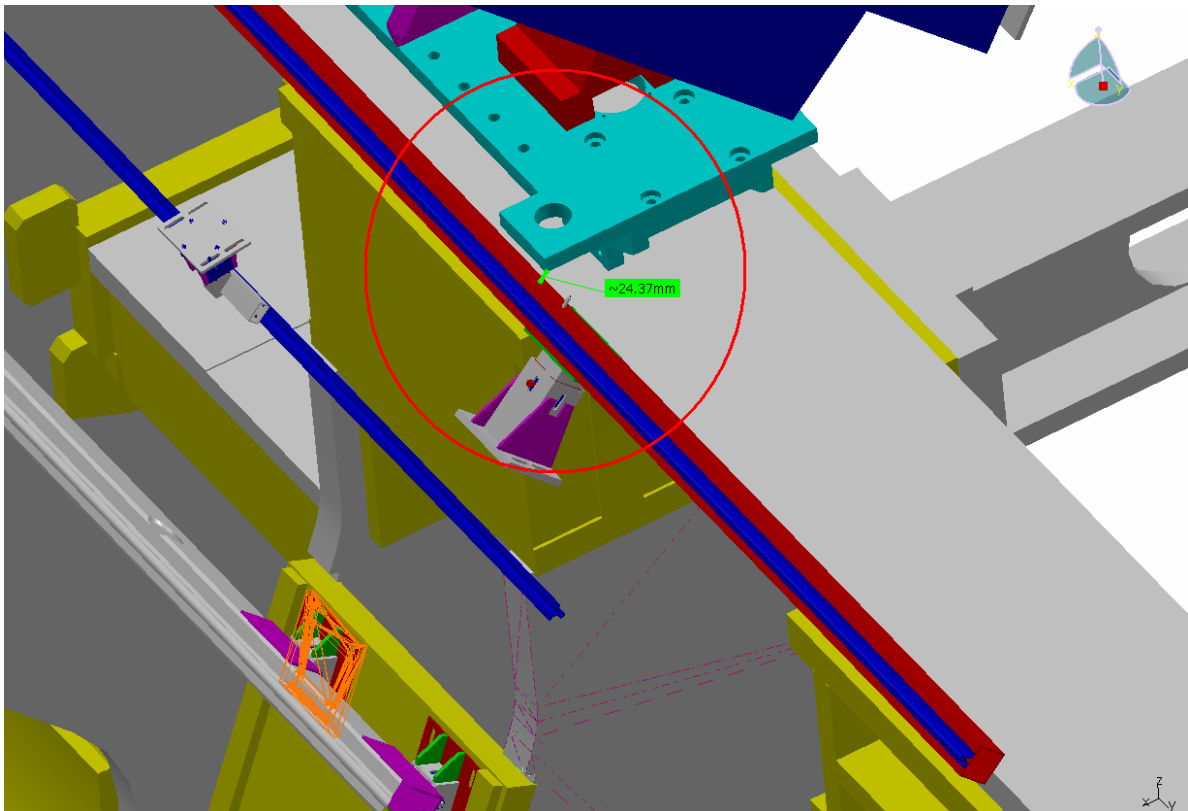
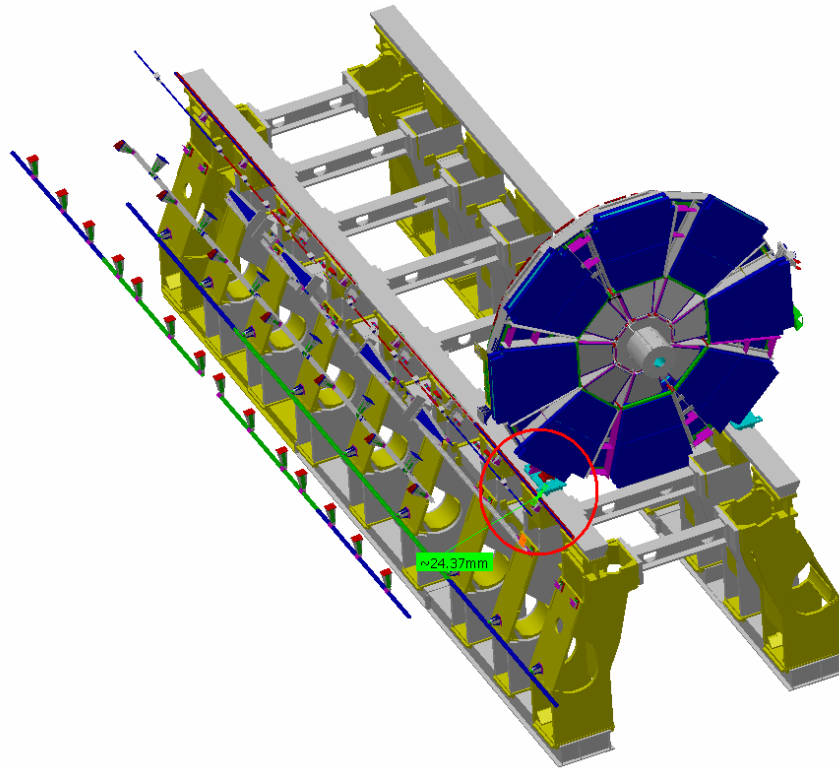
1	SW+JD	AT732762MQ (SUPPORTS OUTER, S.11/S.15 FC INTER)	Clash	6.4 mm	Not Inspected
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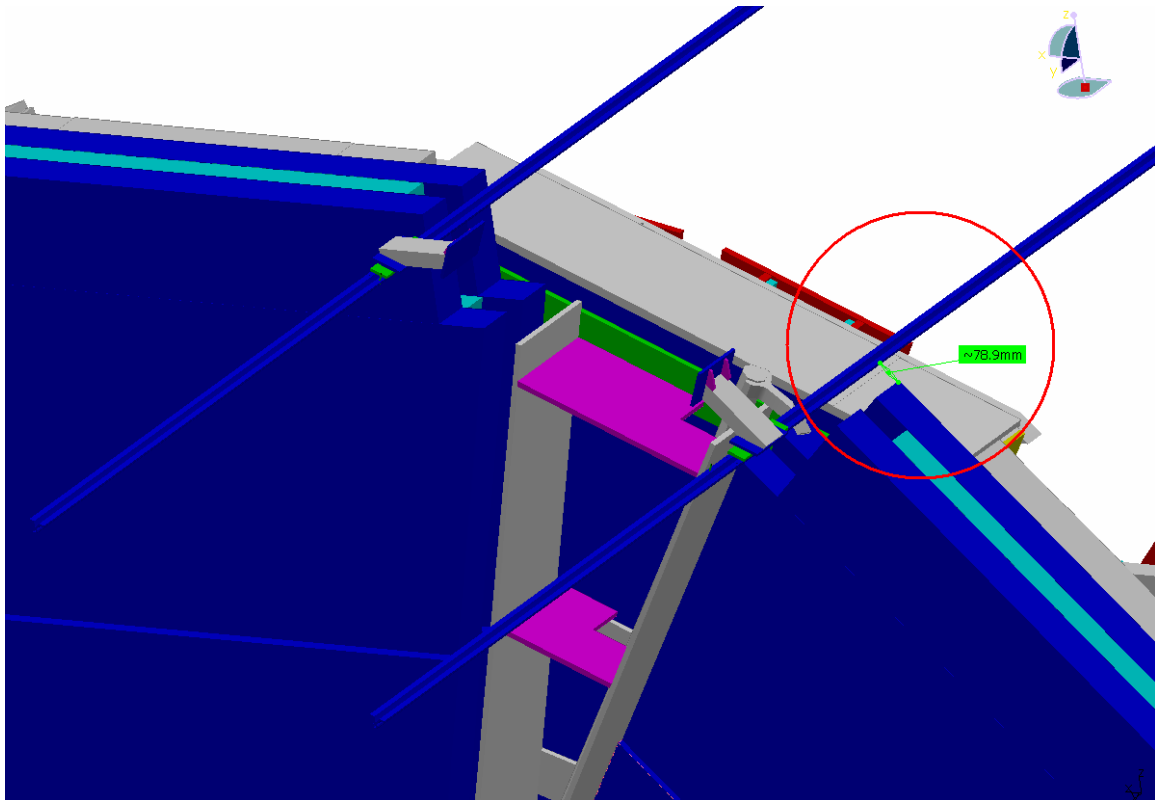
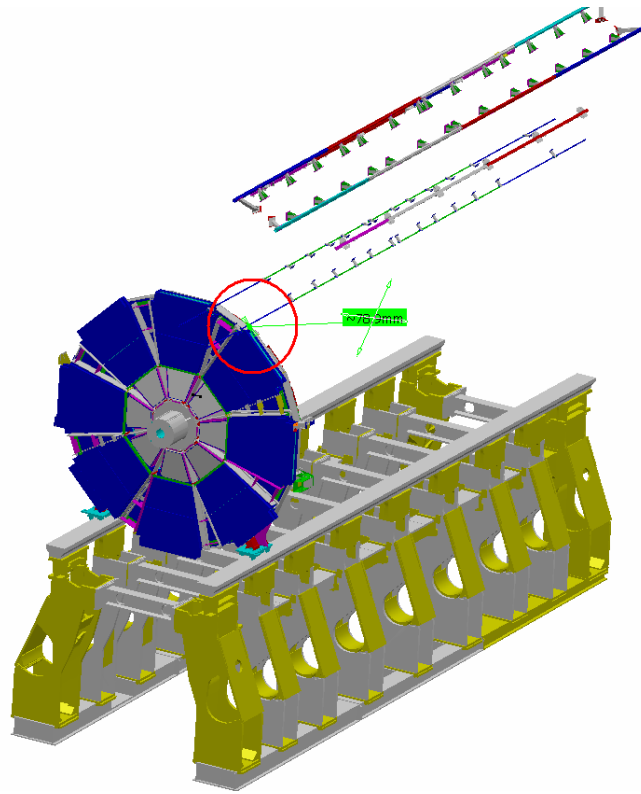
2	SW+JD	AT732762MQ (SUPPORTS OUTER, S.11/S.15 FC INTER)	Clearance	144 mm	Not Inspected
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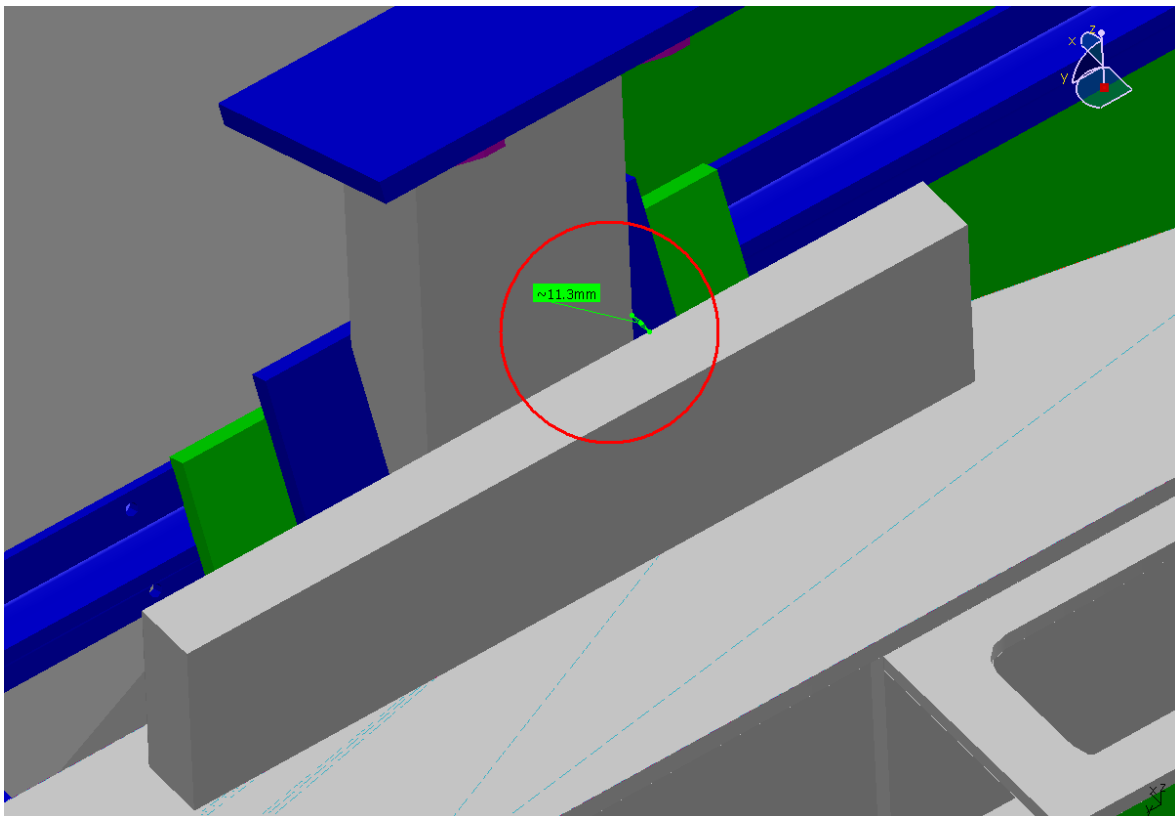
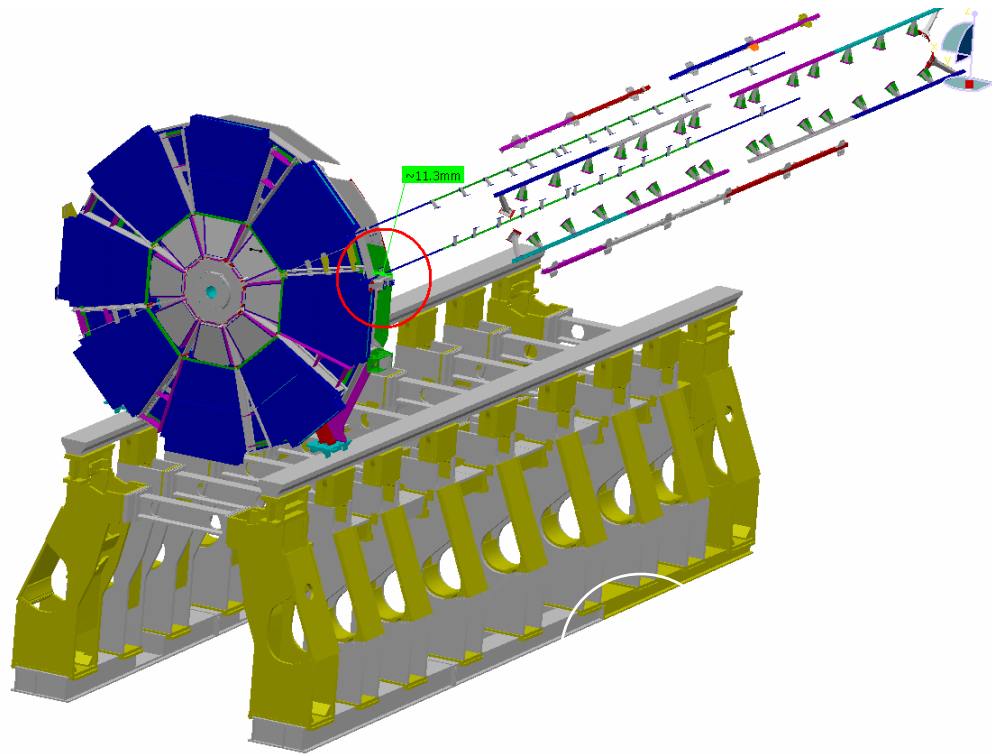
3	SW+JD	AT612360MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 10)	Clearance	24.4 mm	Not Inspected
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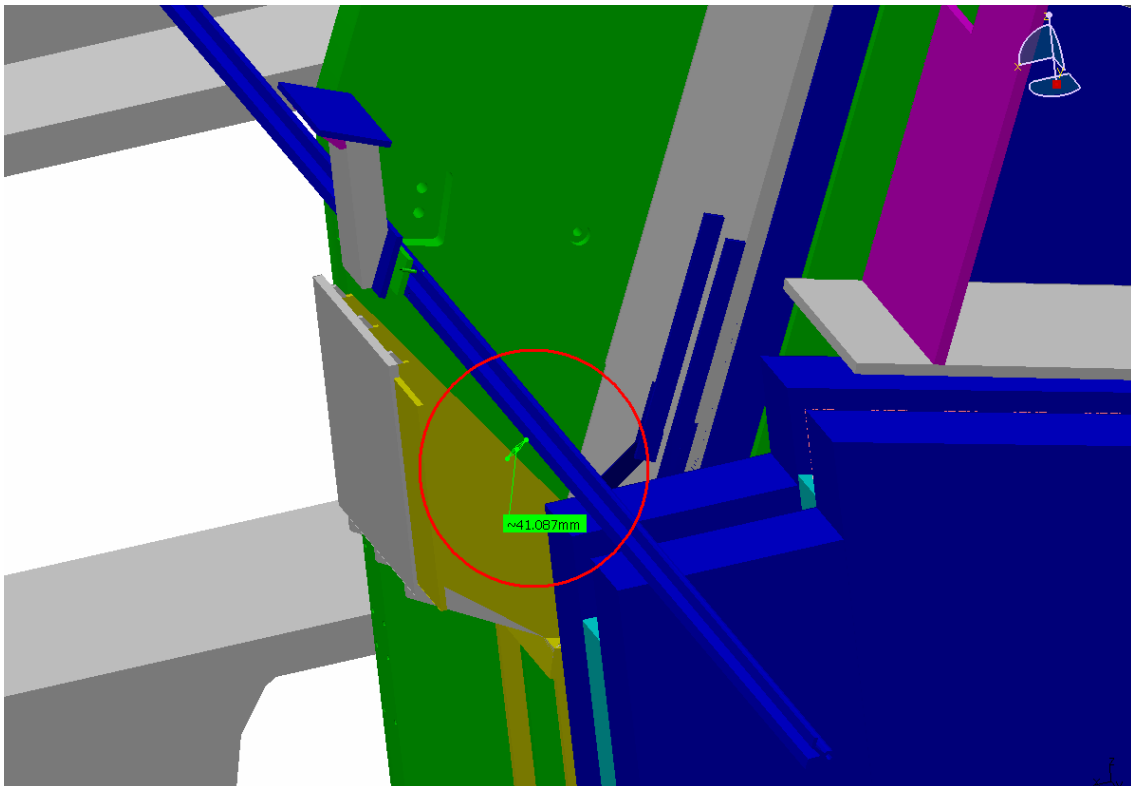
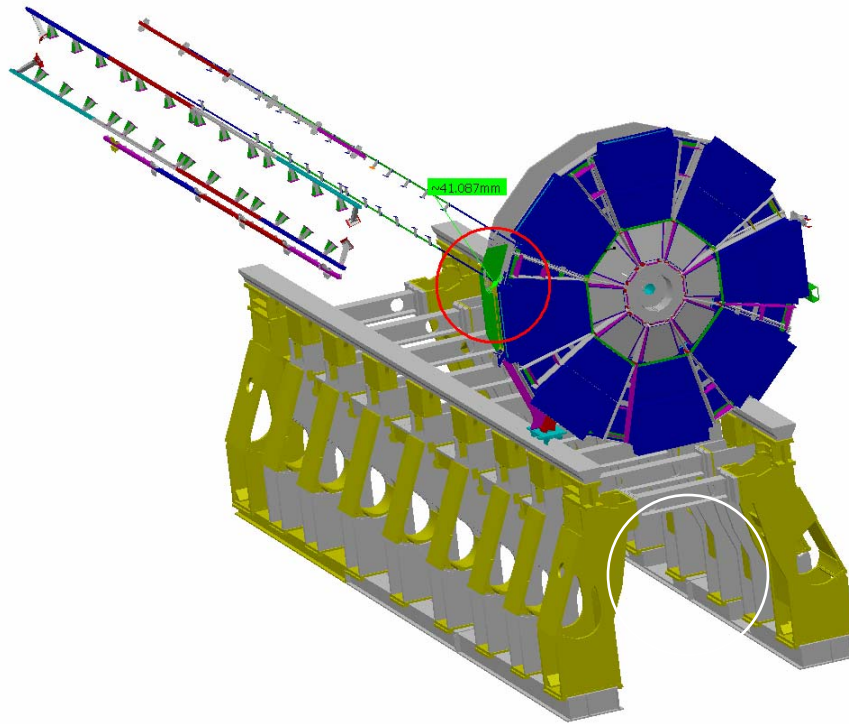
4	SW+JD	AT612361MQ (ATL_MUONS.BARREL_SUPPORTS, Sector 6)	Clearance	78.9 mm	Not inspected
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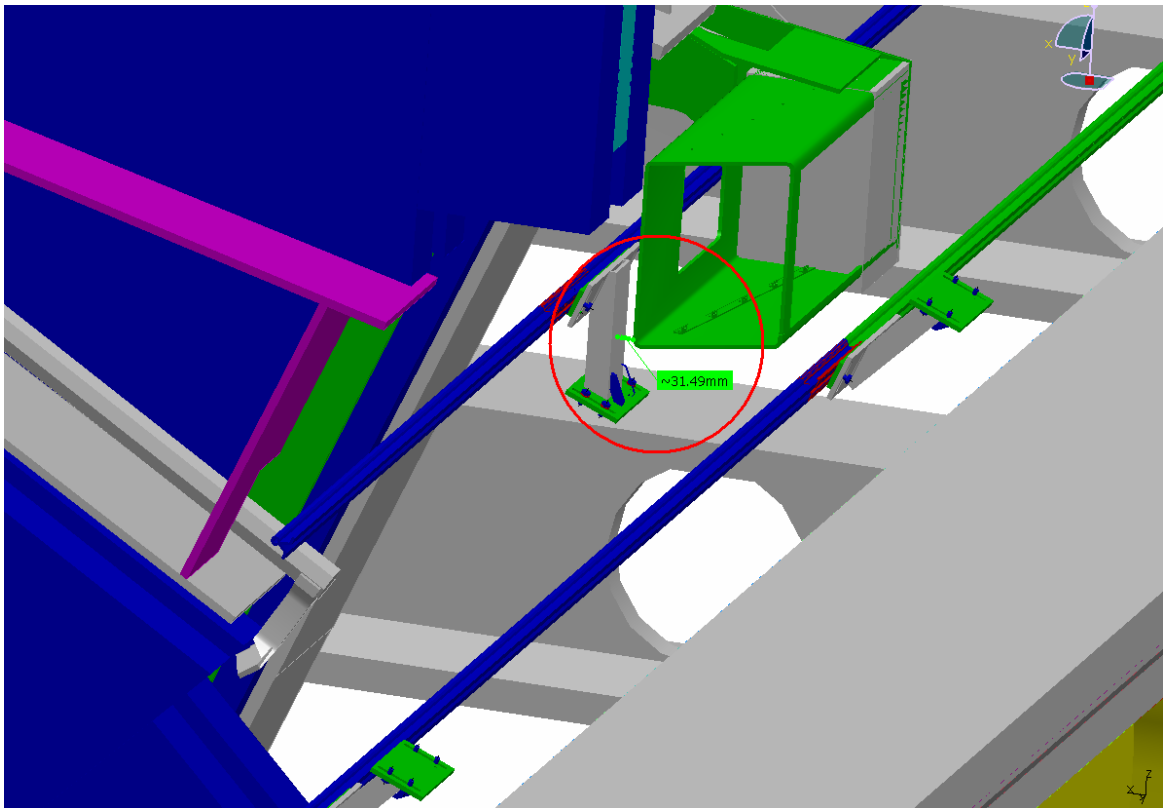
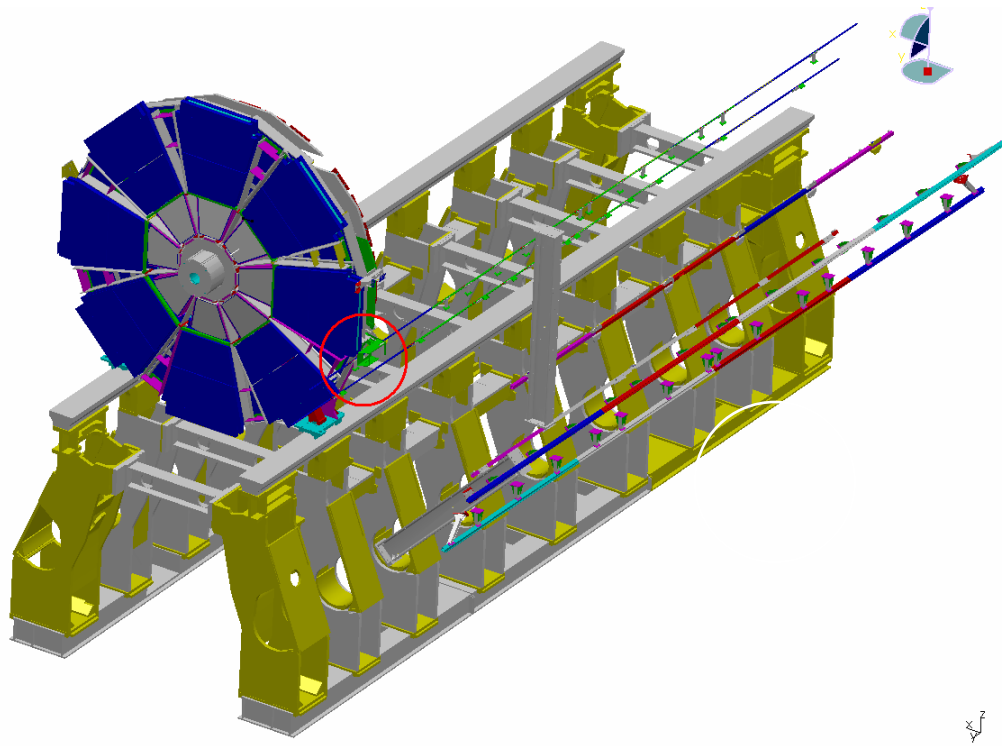
5	SW+JD	AT612362MQ (ATL_MUONS_BARREL_SUPPORTS, Sector 8)	Clearance	11.3 mm	Not inspected
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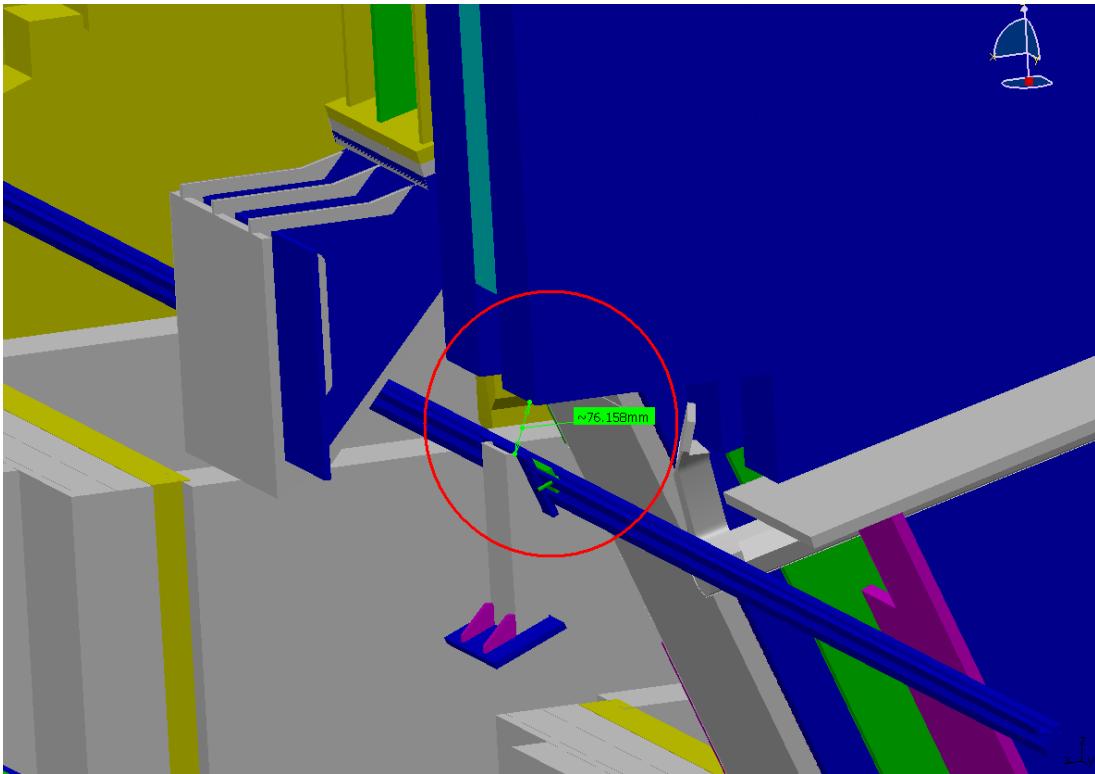
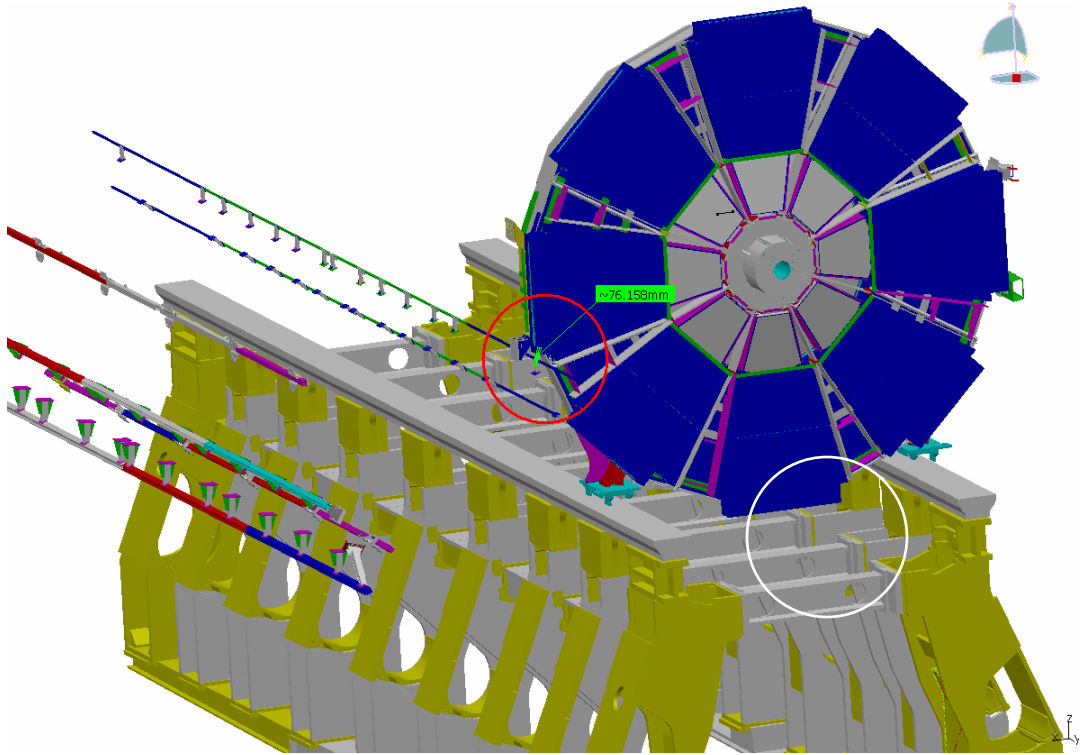
6	SW+JD	AT612363MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 2)	Clearance	41 mm	Not inspected
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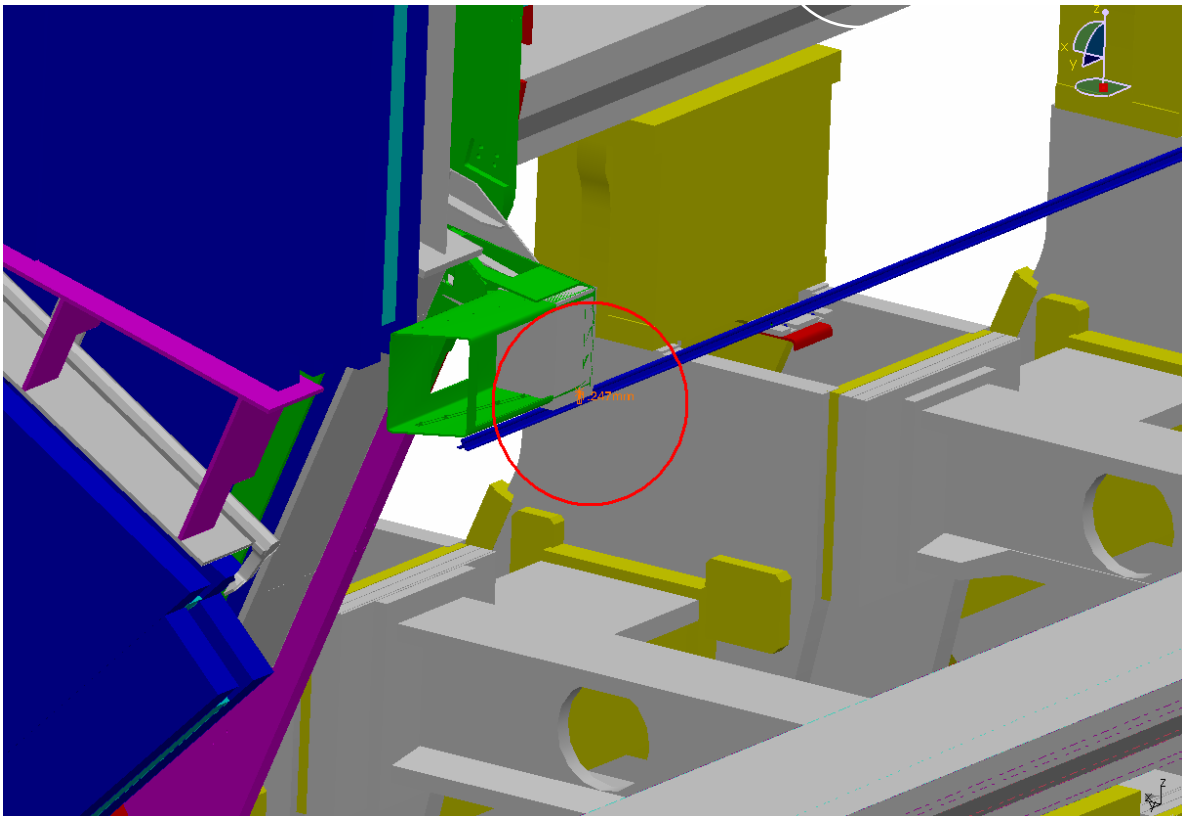
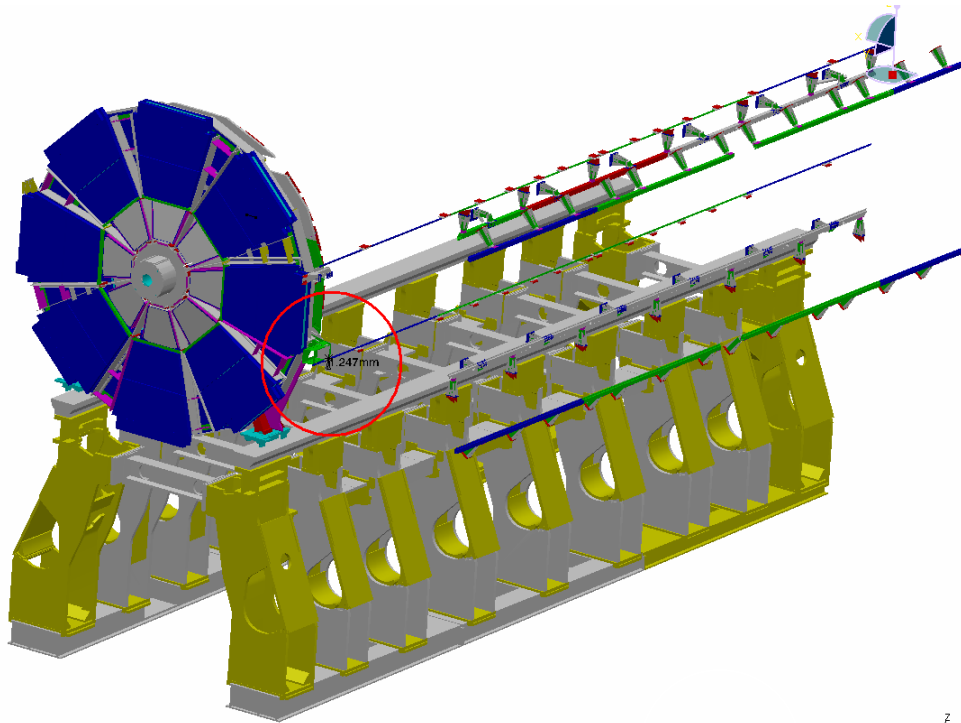
7	SW+JD	AT612364MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 10)	Clearance	31.5 mm	Not inspected
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8	SW+JD	AT612365MQ (ATL_MUONS,BARREL_SUPPORTS, Sector 16)	Clearance	76.2 mm	Not inspected
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9	SW+JD	AT612369MQ (ATL_MUONS_BARREL_SUPPORTS, Sector 10)	Clash	1.3 mm	Not inspected
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5. CONCLUSIONS

SW+JD lifting down can be realized according to suggested path of movement in case of fixing Clash/Clearance conflicts with Muon Brackets&Rails and with Support structures during the final movement inside the detector.