Improvement of Passive Material Description in the GAP region of ATLAS Detector for Simulation

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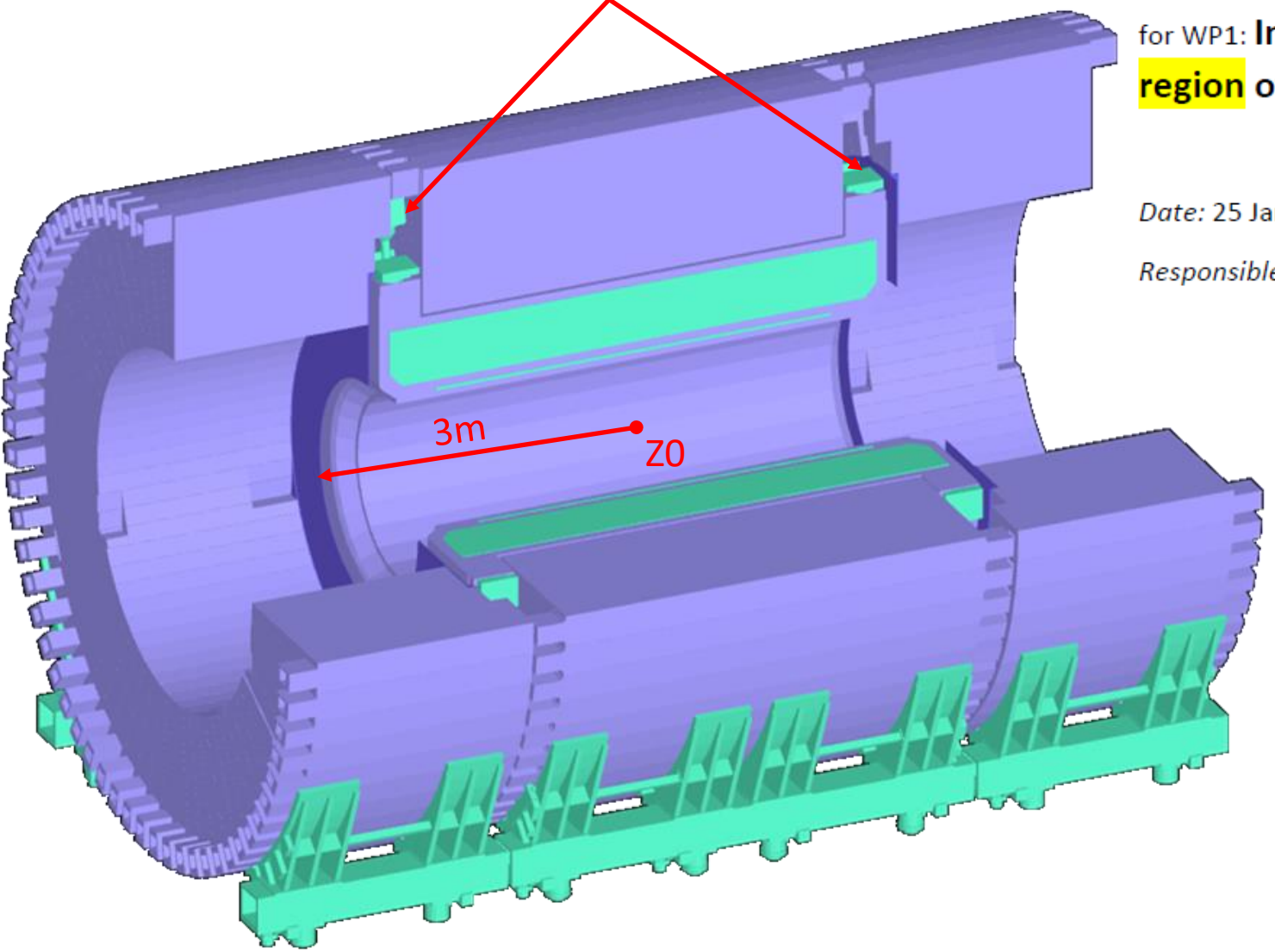
Responsible: Alexander Sharmazanashvili

About

Working Plan

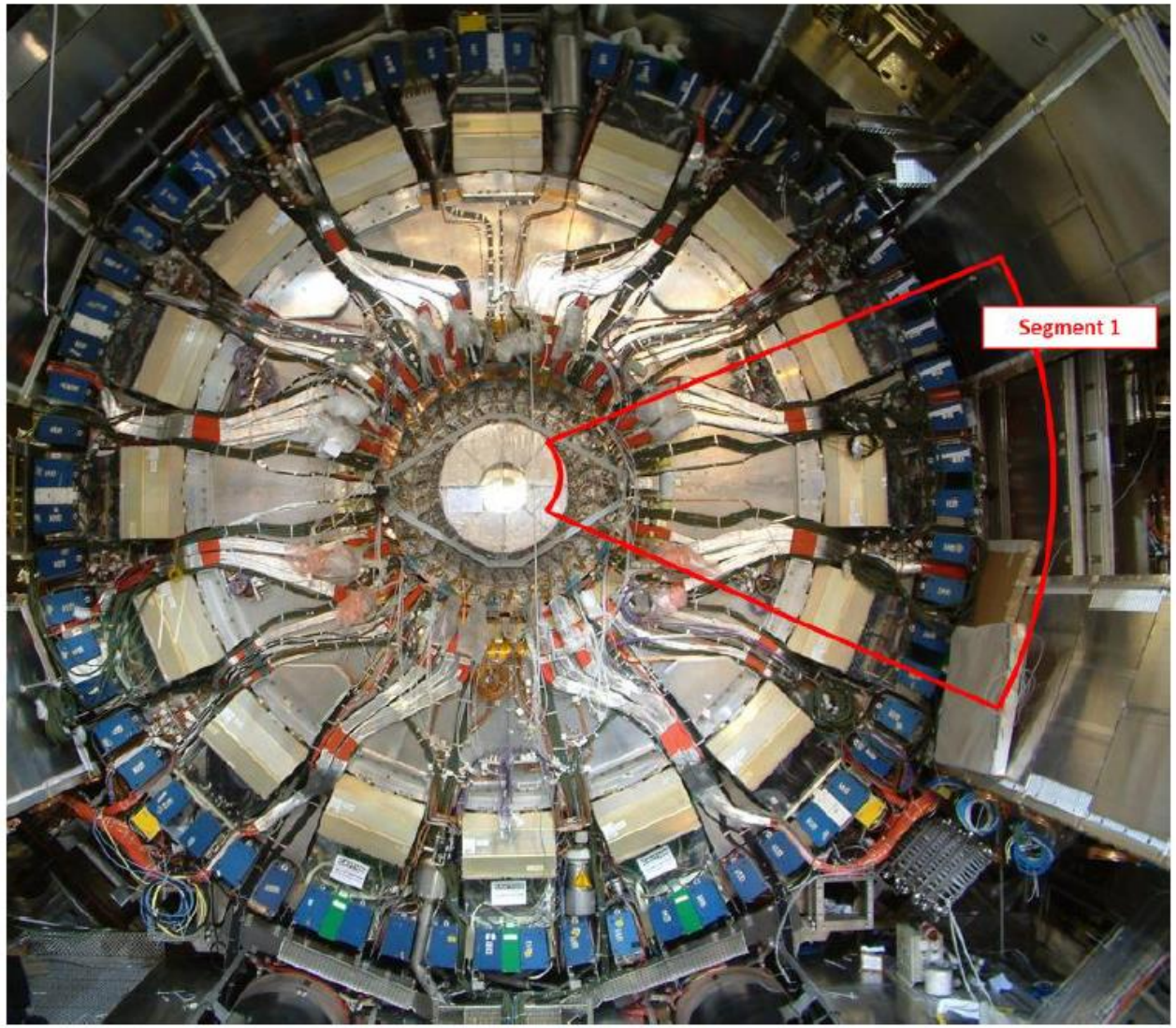


for WP1: **Improvement of Passive Material Description in the GAP region of ATLAS Detector for Simulation**

Date: 25 January, 2021

Responsible: Alexander Sharmazanashvili

General list of volumes to be done

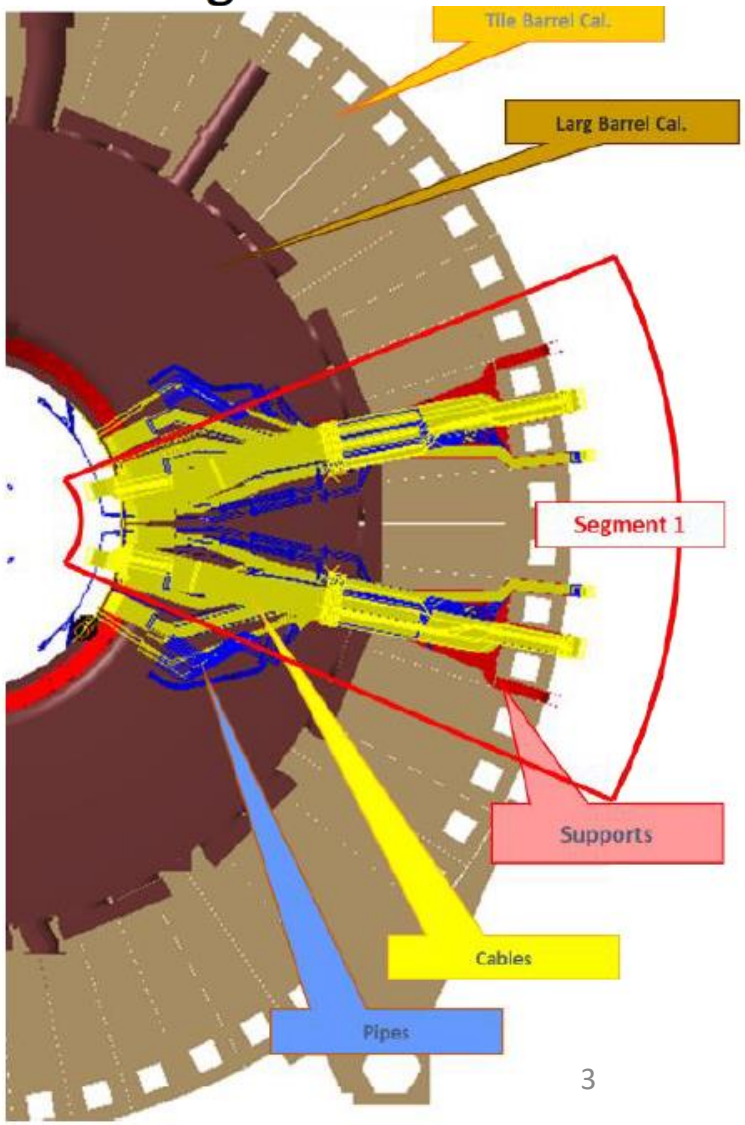


I. ID services in the GAP region

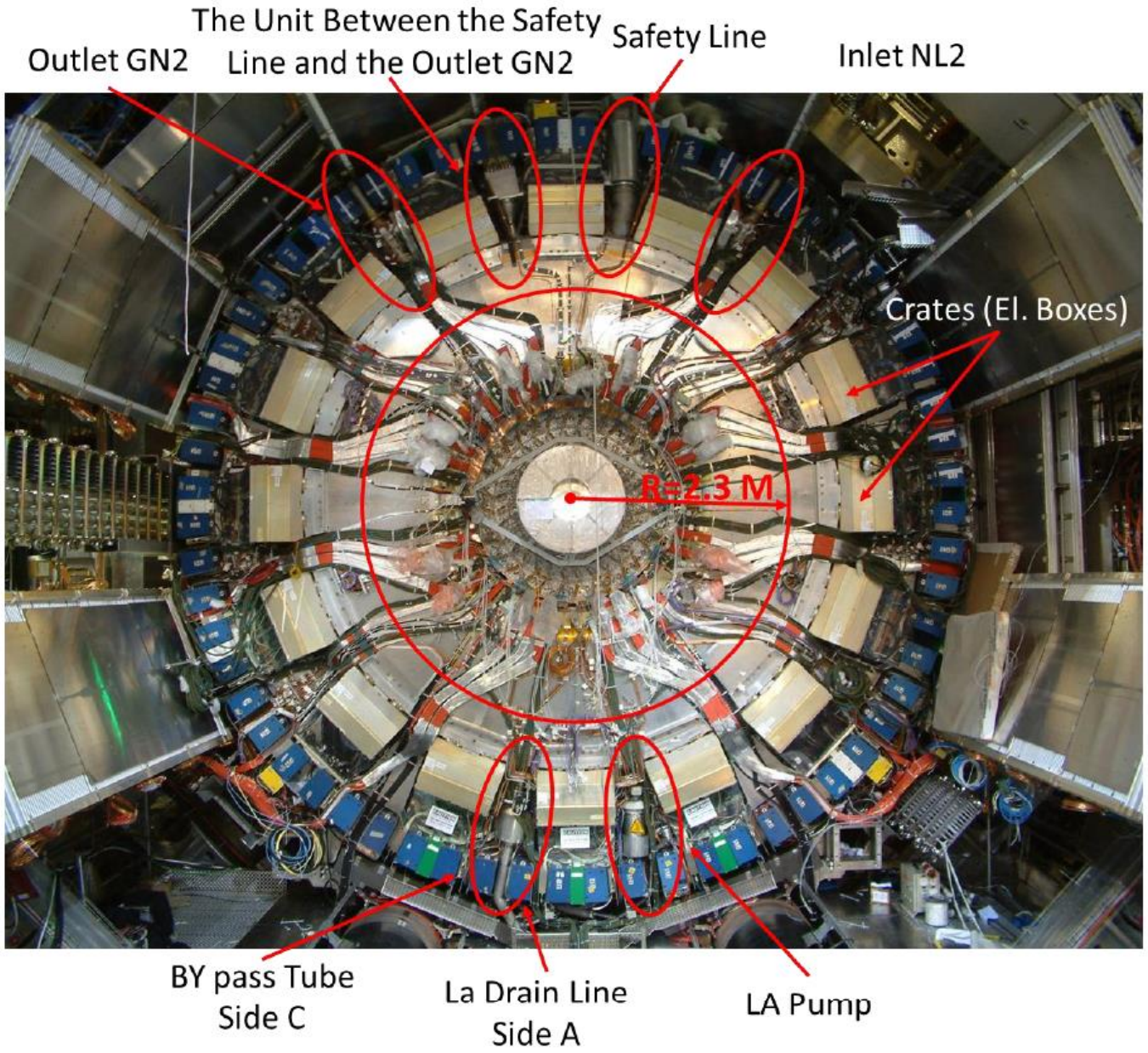
1.1 Supports

1.2 Cables

1.3 Pipes



General list of volumes to be done



II. Calorimeter gap services

1.4 LAr pump

1.5 Inlet NL2

1.6 Outlet GN2

1.7 Safety line (side C)

1.8 The Unit between Safety line and outlet GN2

1.9 LAr drain line

1.10 Bypass tube

Description of the Life Cycle

Each project will pass through the standard life cycle consists of 10 consecutive Steps:

N	Life cycle
1	Dump geometry model from the SmarTeam
2	Reproduction of the SmarTeam Model / Calculation Volume and Mass
3	Dump geometry model from the GeoModel
4	Compare analysis between GeoModel and Reproduced Models
5	Simplification of Reproduced Model
6	Internal Conflicts Checking
7	Integration Conflicts Checking
8	Preparation of AGDD/XML Description
9	Dump separate volumes of AGDD/XML Description through Geant4 (agdd->gdml-wrl) and compare to the simplified model
10	Upload results on GitLab

Each Step have its own output listed below:

N	Step	Output
1	1	CATIA geometry from the SmartTeam
2	2	Reproduces CATIA model
3	2	Technical report of the reproduction
4	3	Facet model from the GeoModel
5	4	Technical report of the Compare Analyses
6	5	Simplified CATIA model
7	5	Technical report of the simplification
8	6,7	Technical report of the Integration conflicts checking
9	8	XML code in AGDD file
10	9	Technical report of the Compare checking

Steps: 1-3-4-5-6-7-8-9-10 requires ~3 weeks of 1FTE for each project. For some projects Steps 1, 3 and 2 can go in parallel with involvement of 3FTE. For that project above mentioned 3 Weeks will be reduced up to the 2 weeks.

Step 2 is the most time consuming and complicated stage. Its duration will varey from 5 weeks to 7 weeks for 1FTE. Distribution of work on 2 or 3FTE's is impossible.

Distribution of Projects by the Quarter

1st Quarter January-February-March

Project #01: **LA Pump** (2.1)
Manpower: 1.5FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 3 Weeks
Total: 5 Weeks
Output: 10 documents

Project #02: **LA Drain Line / Side A** (2.6)
Manpower: 1.5FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 3 Weeks
Total: 5 Weeks
Output: 10 documents

2nd Quarter April-March-June

Project #03: **Bypass Tube** (2.7)
Manpower: 2FTE
Step 2: 3 Weeks
Steps 1-3-4-5-6-7-8-9-10: 3 Weeks
Total: 6 Weeks
Output: 10 documents

Project #04: **The Unit** (2.5)
Manpower: 1.5FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 3 Weeks
Total: 5 Weeks
Output: 10 documents

Distribution of Projects by the Quarter

3rd Quarter July-August -September

Project #05: **Inlet NL2** (2.2)
Manpower: 2FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Project #06: **Outlet GN2** (2.3)
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Project #07: **Safety Line / Side C** (2.4)
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

4th Quarter October-November-December

1. Project #08: **SEGMENT#01 ID services in the GAP region – Supprts, Cables, Pipes** (1.1, 1.2, 1.3)
   Manpower: 3FTE
   Step 2: 4 Weeks
   Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
   Total: 6 Weeks
   Output: 10 documents

Project #09: **SEGMENT#02 ID services in the GAP region – Supprts, Cables, Pipes** (1.1, 1.2, 1.3)
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Project #10: **SEGMENT#03 ID services in the GAP region – Supprts, Cables, Pipes**
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Modification of the Life Cycle

1	Dump geometry model from the SmarTeam
2	Reproduction of the SmarTeam Model / Calculation Volume and Mass
3	Dump geometry model from the GeoModel
4	Compare analysis between GeoModel and Reproduced Models
5	Calculation Absorption Length - CATIA Detailed vs. GeoModel
6	Simplification of Reproduced Model
7	Calculation Absorption Length - CATIA Detailed vs. CATIA Simplified
8	Internal Conflicts Checking
9	Integration Conflicts Checking
10	Modification of Simplified Model According to Conflicts 10.1. Modification of Simplified model in CATIA 10.2. Integration Conflicts Checking 10.3. Calculation Absorption Length - CATIA Detailed vs. CATIA Simplified (Modified)
11	Preparation of AGDD/XML Description
12	Dump separate volumes of AGDD/XML Description through Geant4 (agdd->gdml-wrl) and compare to the simplified mode
13	Upload results on GitLab

Remark.1. **The life cycle included 10 consecutive steps when we defined the deadlines. Then it increased from 10 to 13. Steps: 5, 7, 10.1, 10.2 and 10.3 required additional 1.5 weeks**

1st Quarter – **January - February - March**

Expected Deadlines

Project #01: **LA Pump** (2.1)

Manpower: 1.5FTE

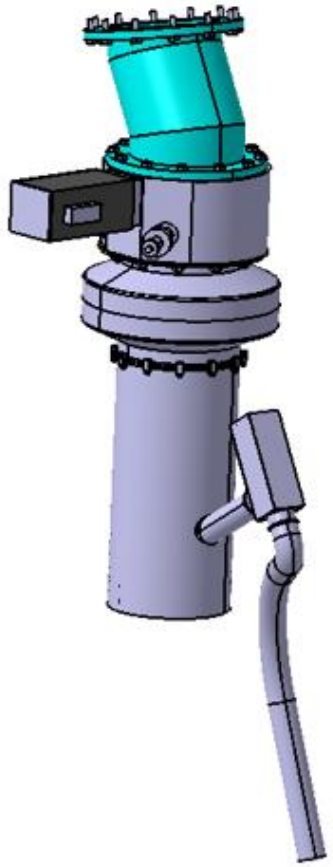
Step 2: 2 Weeks

Steps 1-3-4-5-6-7-8-9-10: 3 Weeks

Total: 5 Weeks

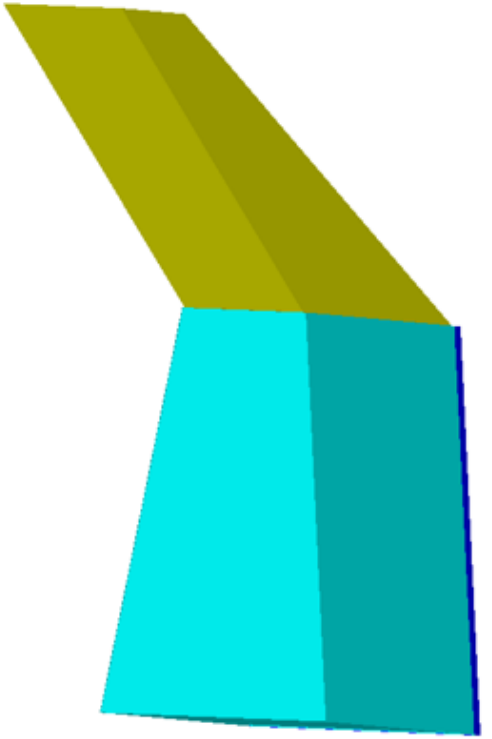
Output: 10 documents

CATIA Model



Volume (m^3)	0.0135
Mass (kg)	61.8
Material	Aluminum/Stainless Steel/Copper/Oil/Plastic
Density (kg/m^3)	2700 / 7820 / 8960 / 950 / 1000

GeoModel

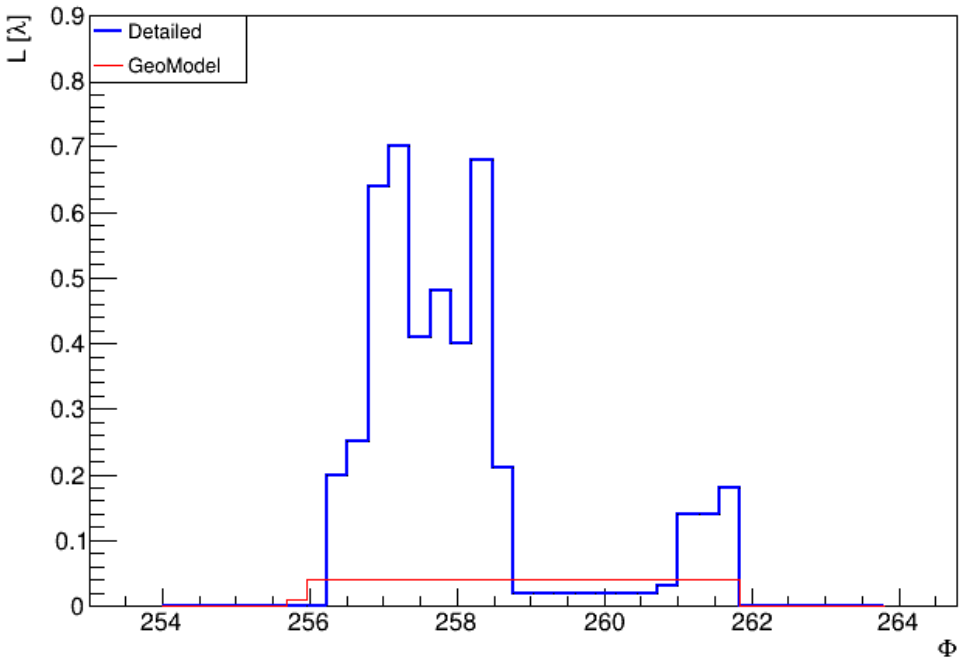


Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

1st Quarter – January - February - March | Calculation of Absorption Length (λI) – Line 1

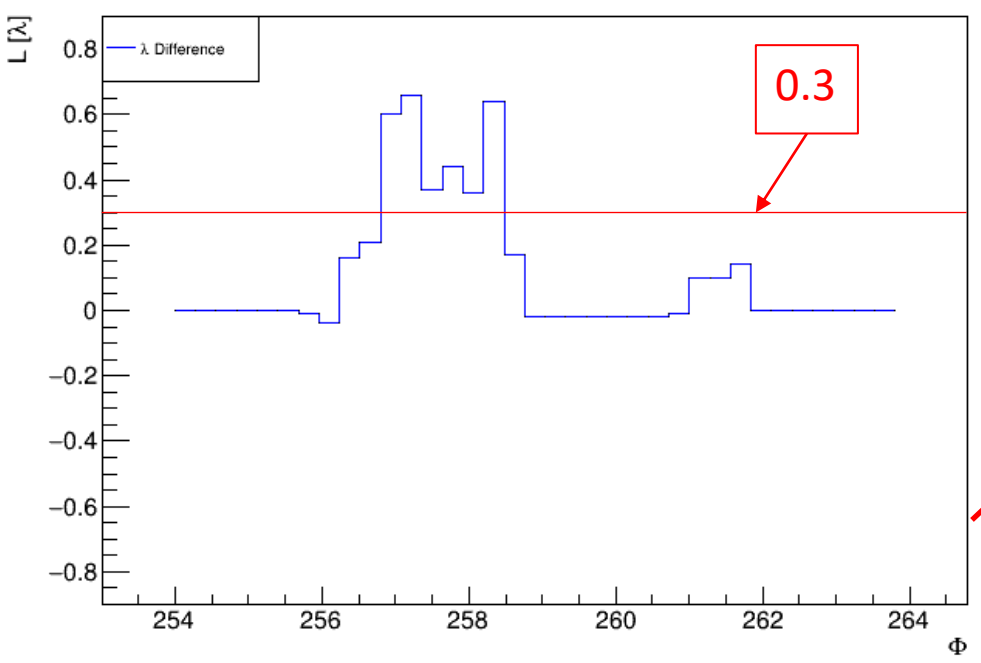
Detailed vs GeoModel

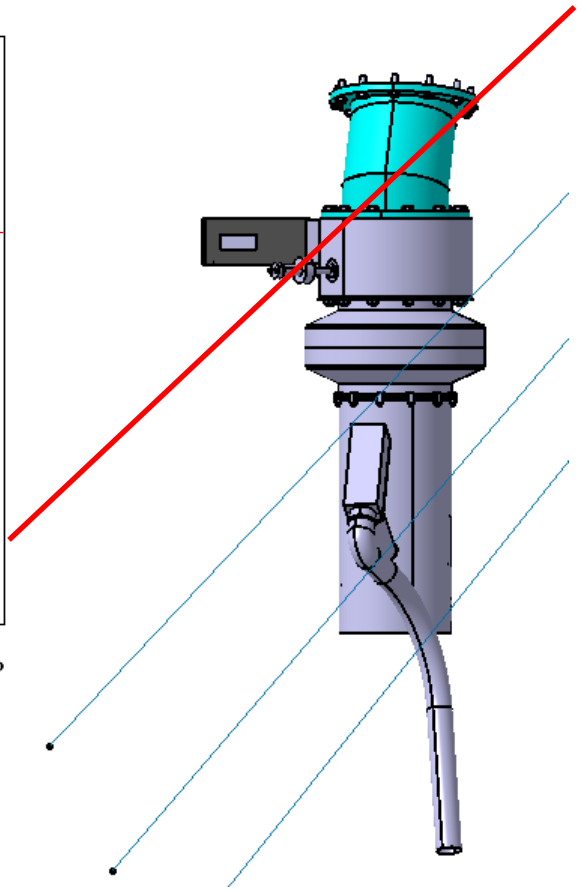
η = 0.93



Difference

η = 0.93





Project overall parameters	
Started	24 February, 2021
Involved manpower	1FTE + 2FTE for calculation of absorption length
Number of task executed	15
Working days spent	25

Remark.2.

- Calculation of Absorption Length was required from Tile Call group
- We spent 1.5 months for RD tasks (About Absorption Length)
- So, we started **first project** in 24 February instead of January (2 months late)

1st Quarter – **January - February - March**

Expected Deadlines

Project #02: **LA Drain Line / Side A** (2.6)

Manpower: 1.5FTE

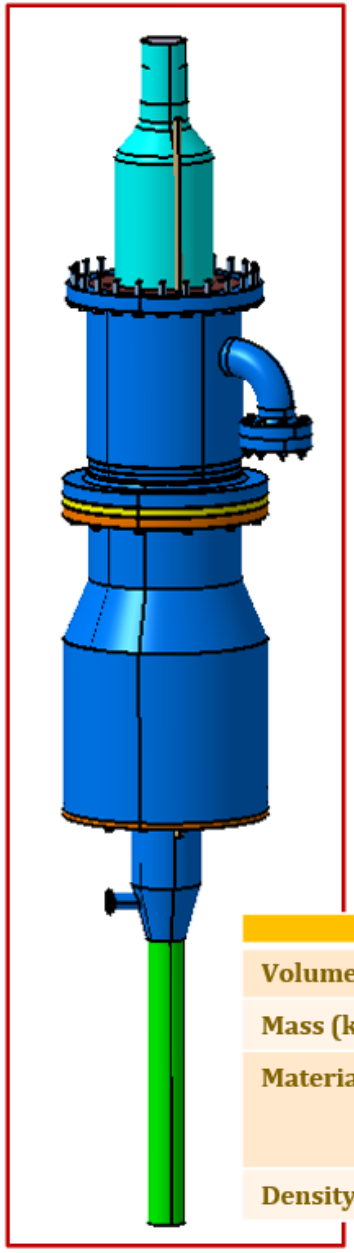
Step 2: 2 Weeks

Steps 1-3-4-5-6-7-8-9-10: 3 Weeks

Total: 5 Weeks

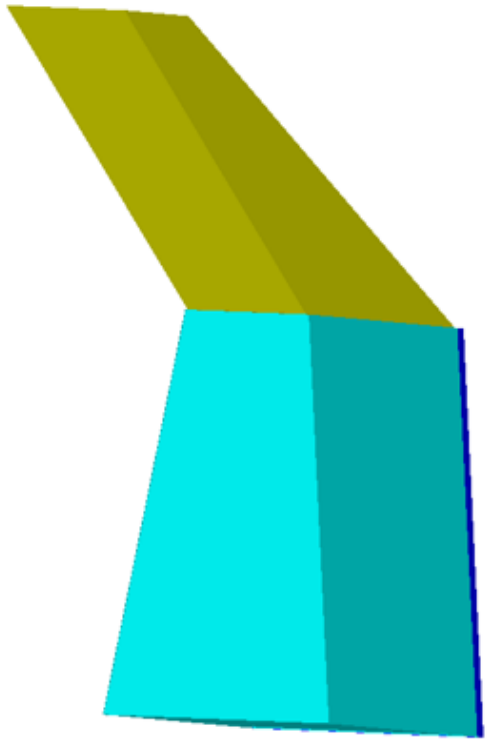
Output: 10 documents

CATIA Model



Volume (m^3)	0.0217
Mass (kg)	98
Material	Stainless Steel / Polycarbonate / Liquid Argon
Density (kg/m^3)	7870 / 1000 / 1396

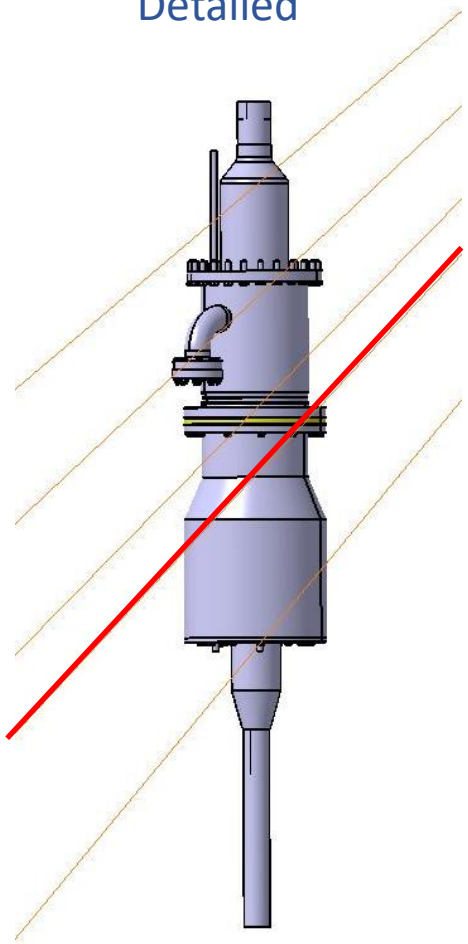
GeoModel



Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

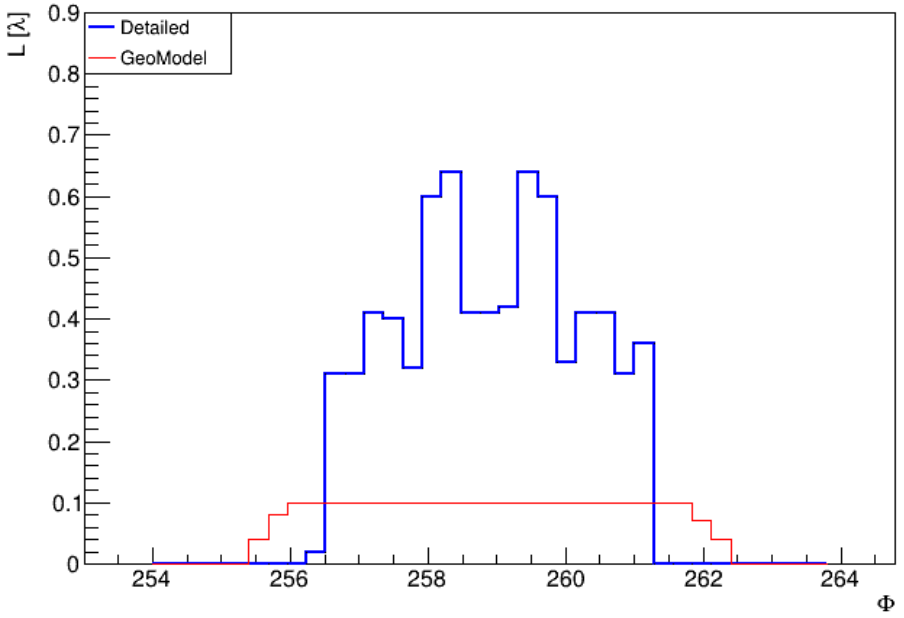
1st Quarter – January-February–March | Compare Analyses – Absorption Length (λI) – Line 4

Detailed



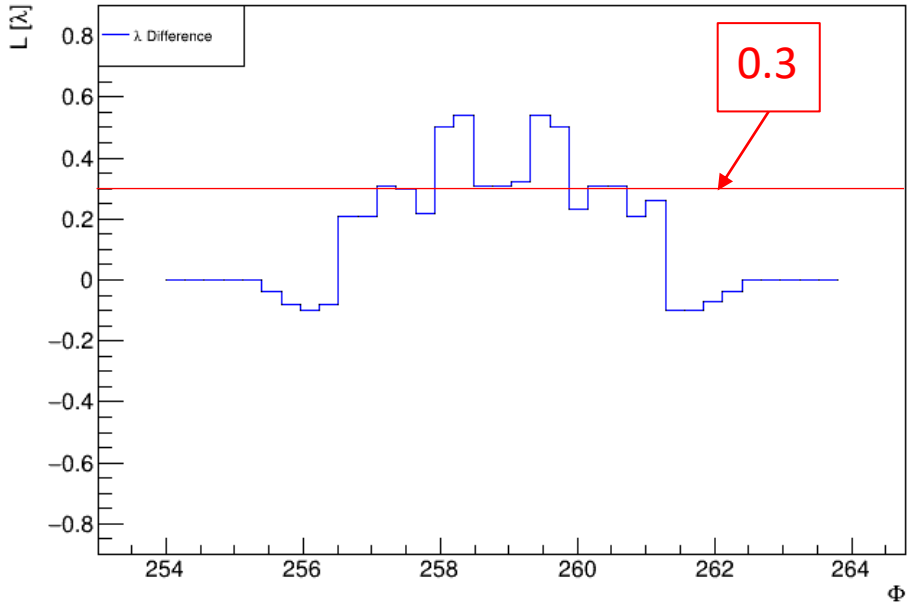
Detailed vs GeoModel

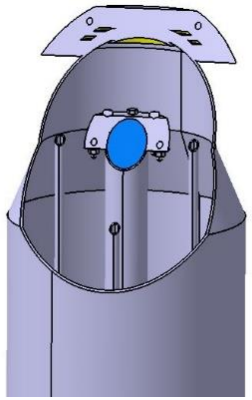
η =-0.84



Difference

η =-0.84





Project overall parameters	
Started	2 April, 2021
Involved manpower	2FTE
Number of task executed	17
Working days spent	39

2nd Quarter – April - May - June

Expected Deadlines

Project #03: **Bypass Tube** (2.7)

Manpower: 2FTE

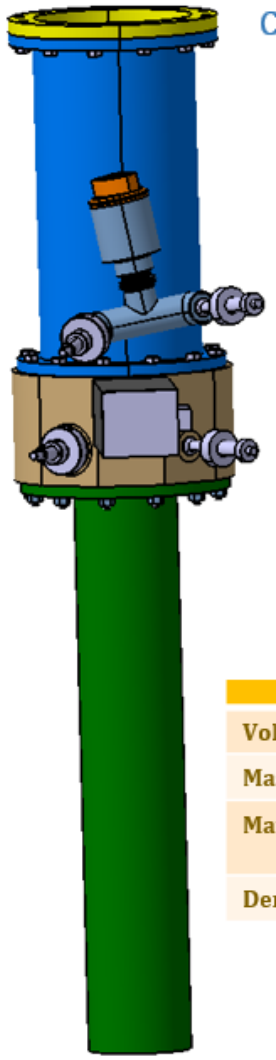
Step 2: 3 Weeks

Steps 1-3-4-5-6-7-8-9-10: 3 Weeks

Total: 6 Weeks

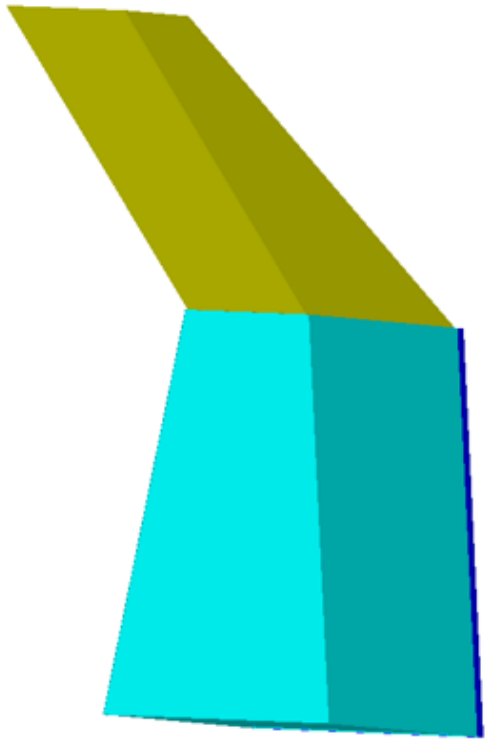
Output: 10 documents

CATIA Model



Volume (m^3)	0.0466
Mass (kg)	104
Material	Polycarbonate / Stainless Steel / Plastic / Aluminum / Liquid Argon
Density (kg/m^3)	1000 / 7870 / 1000/ 2700/ 1396

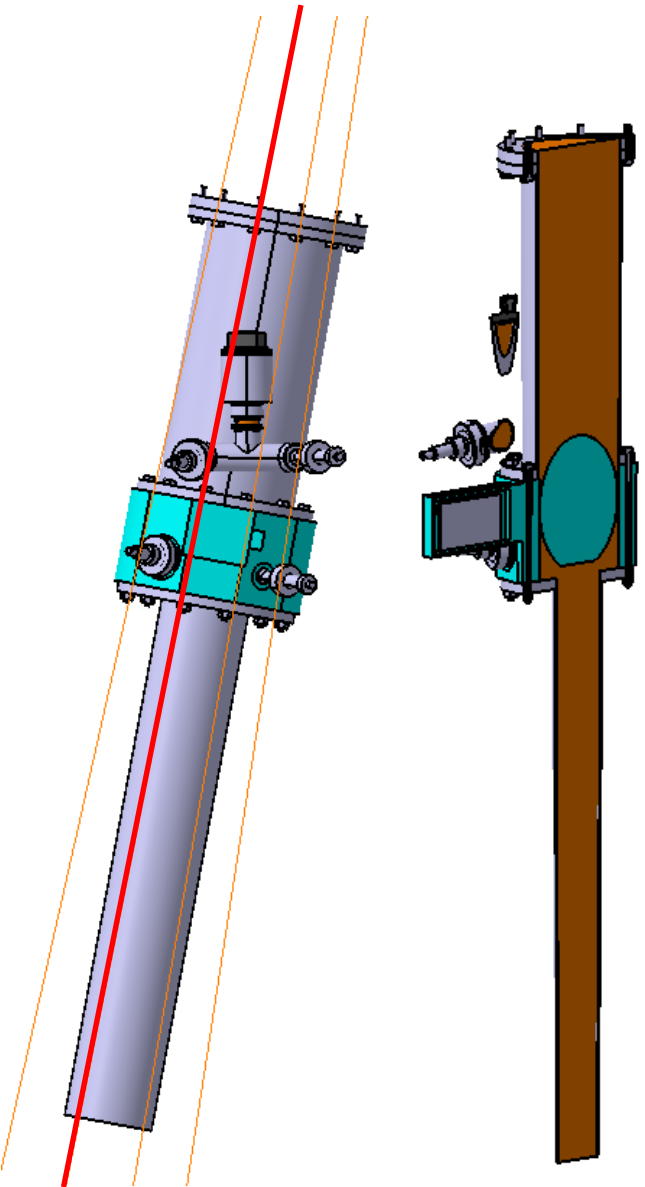
GeoModel



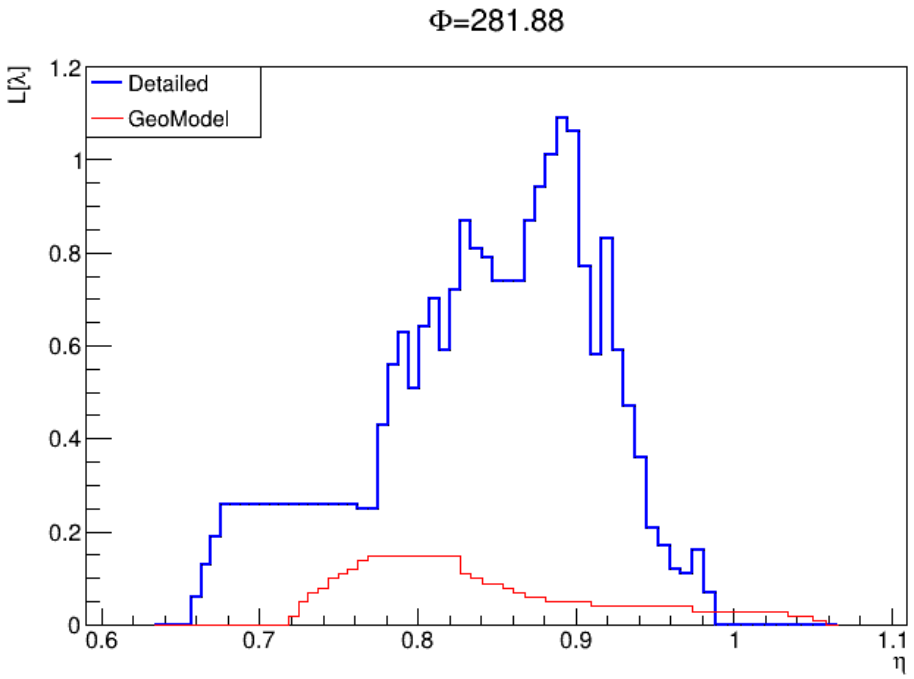
Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

2nd Quarter – April - May – June | Compare Analyses – Absorption Length (λI) – Line 3

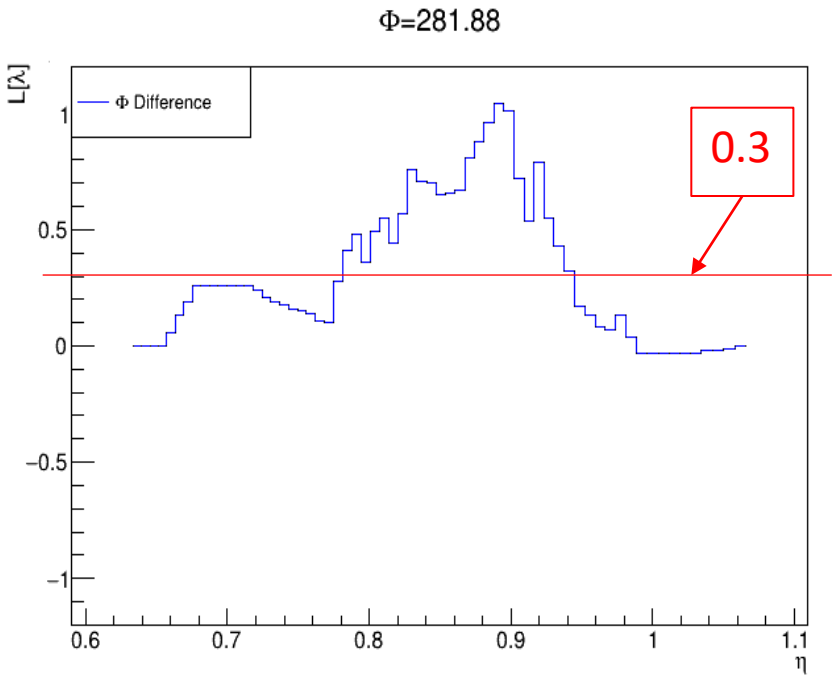
Detailed



Detailed vs GeoModel



Difference



Project overall parameters	
Started	28 June, 2021
Involved manpower	2FTE
Number of task executed	12
Working days spent	28

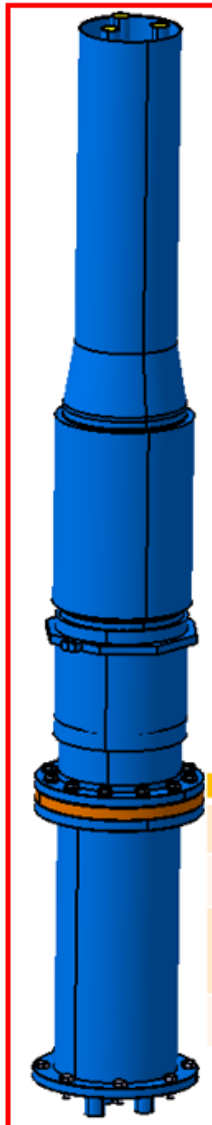
3rd Quarter – July - August - September

Expected Deadlines

Project #05: **Inlet NL2** (2.2)
Manpower: 2FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

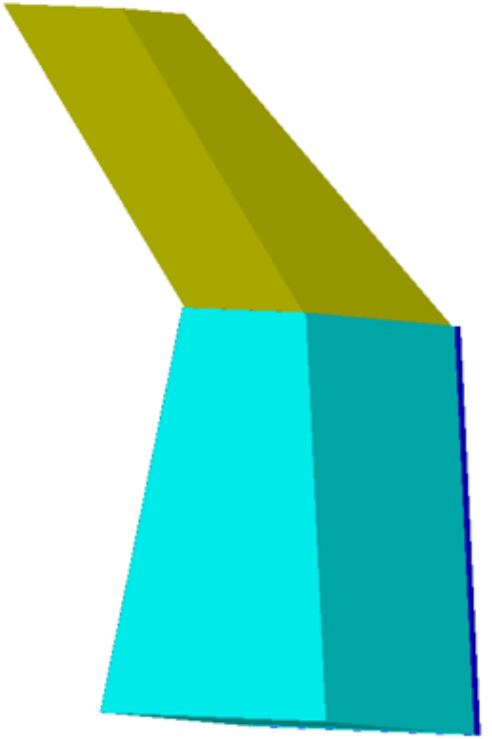
Project #06: **Outlet GN2** (2.3)
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

CATIA Model



Volume (m^3)	0.0067
Mass (kg)	34.5
Material	Stainless Steel / Epoxy / Liquid nitrogen
Density (kg/m^3)	7870 / 1000 / 807

GeoModel

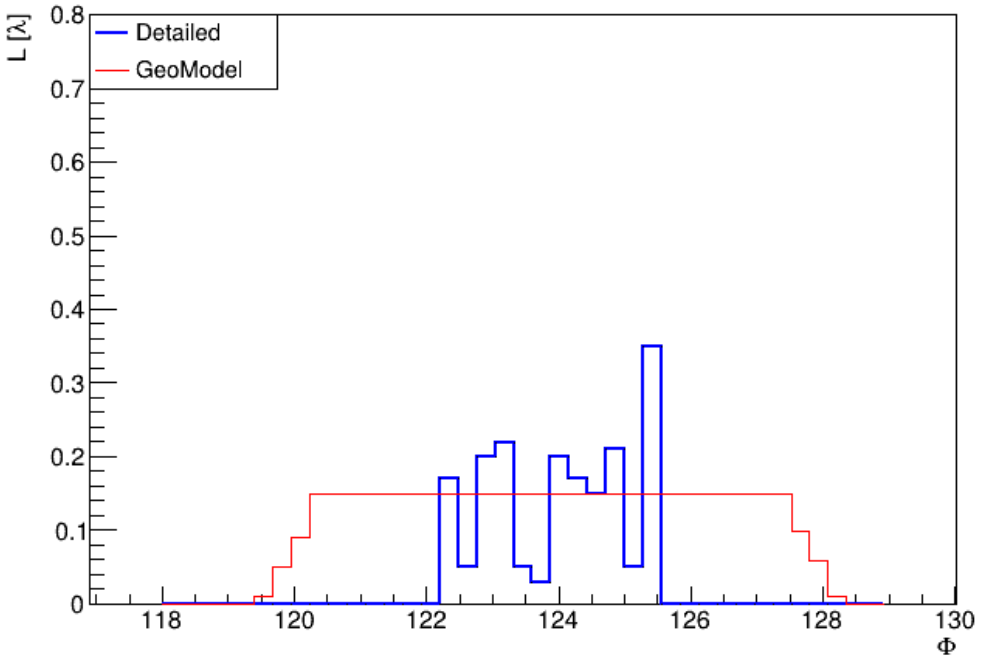


Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

3rd Quarter – July - August – September | Compare Analyses – Absorption Length (λI) – Line 4

Detailed vs GeoModel

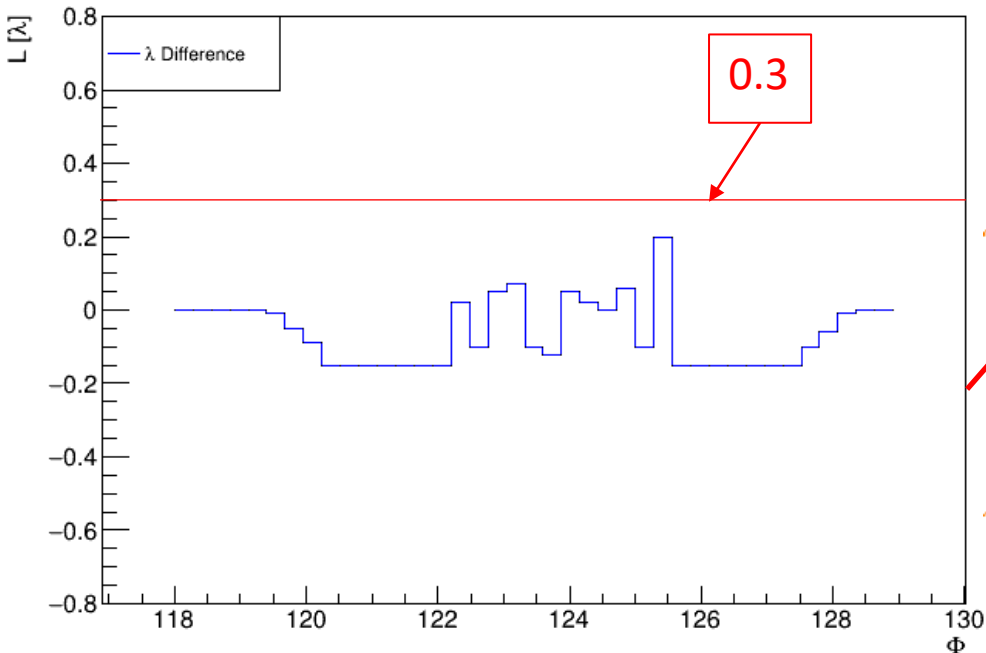
η = -0.786

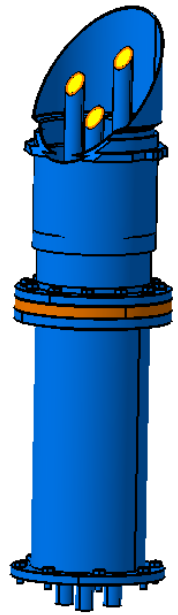


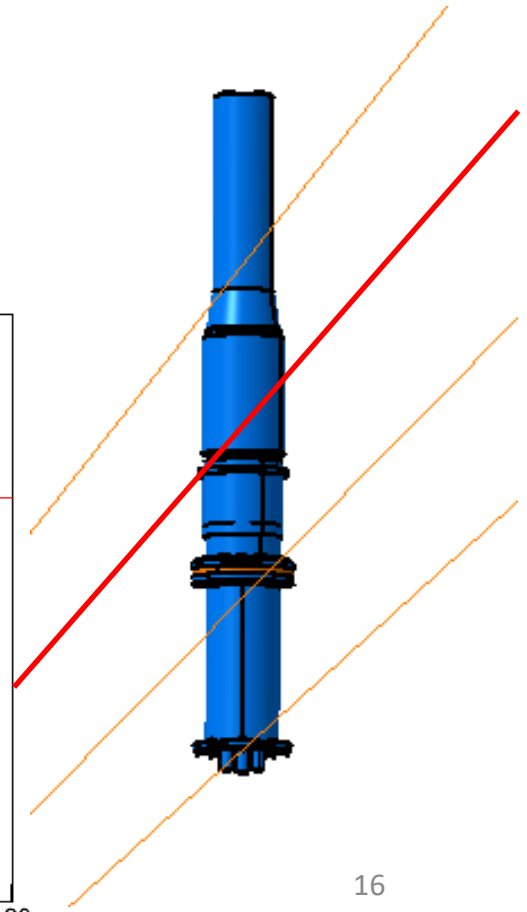
Project overall parameters	
Started	16 September, 2021
Involved manpower	2FTE
Number of task executed	5
Working days spent	11

Difference

η =-0.786







3rd Quarter – July - August - September

Expected Deadlines

Project #07: **Safety Line / Side C** (2.4)

Manpower: 3FTE

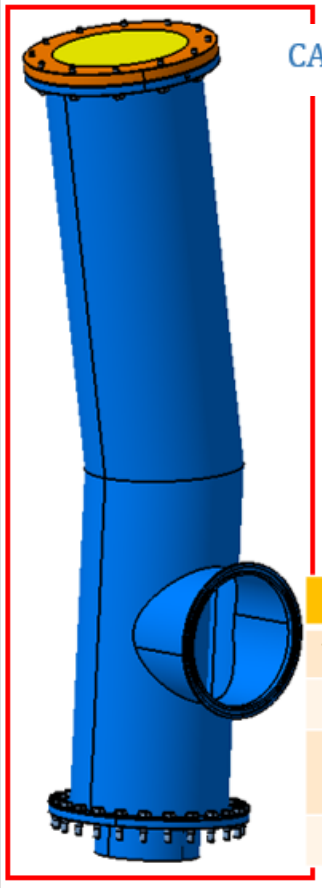
Step 2: 2 Weeks

Steps 1-3-4-5-6-7-8-9-10: 2 Weeks

Total: 4 Weeks

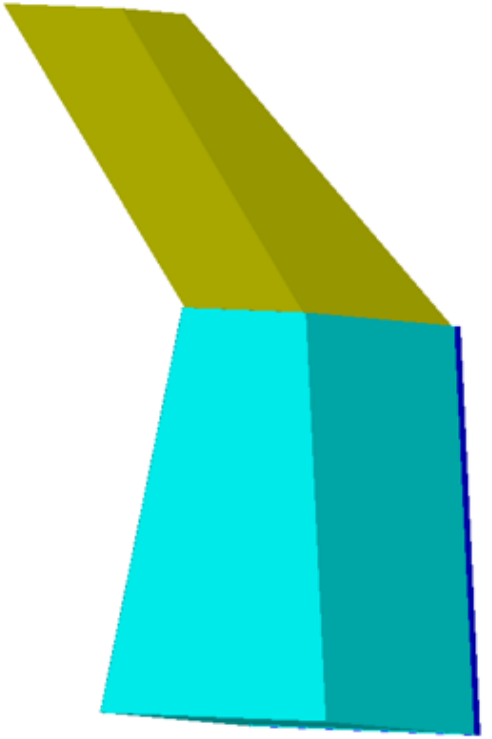
Output: 10 documents

CATIA Model



Volume (m^3)	0.04145
Mass (kg)	88
Material	Stainless Steel / Epoxy / Liquid Argon
Density (kg/m^3)	7870 / 1000 / 1396

GeoModel

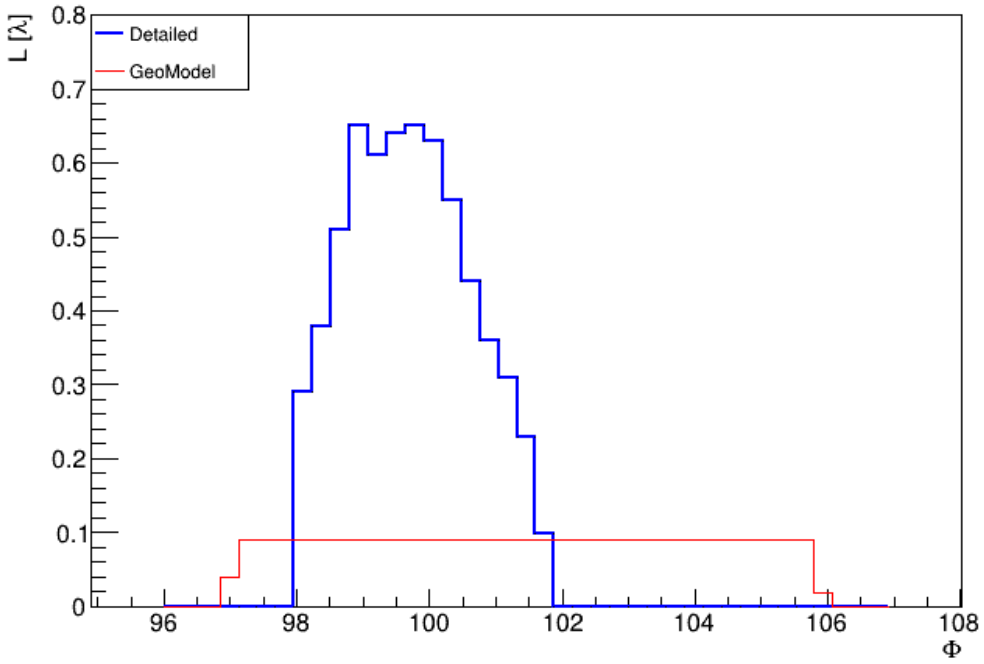


Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

3rd Quarter – July - August – September | Compare Analyses – Absorption Length (λI) – Line 1

Detailed vs GeoModel

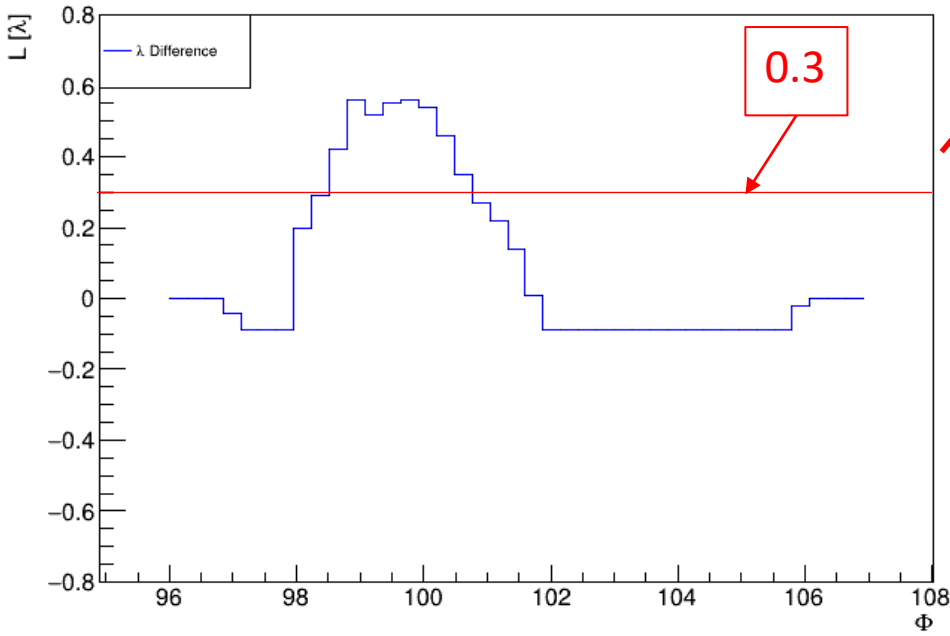
η = 0.74

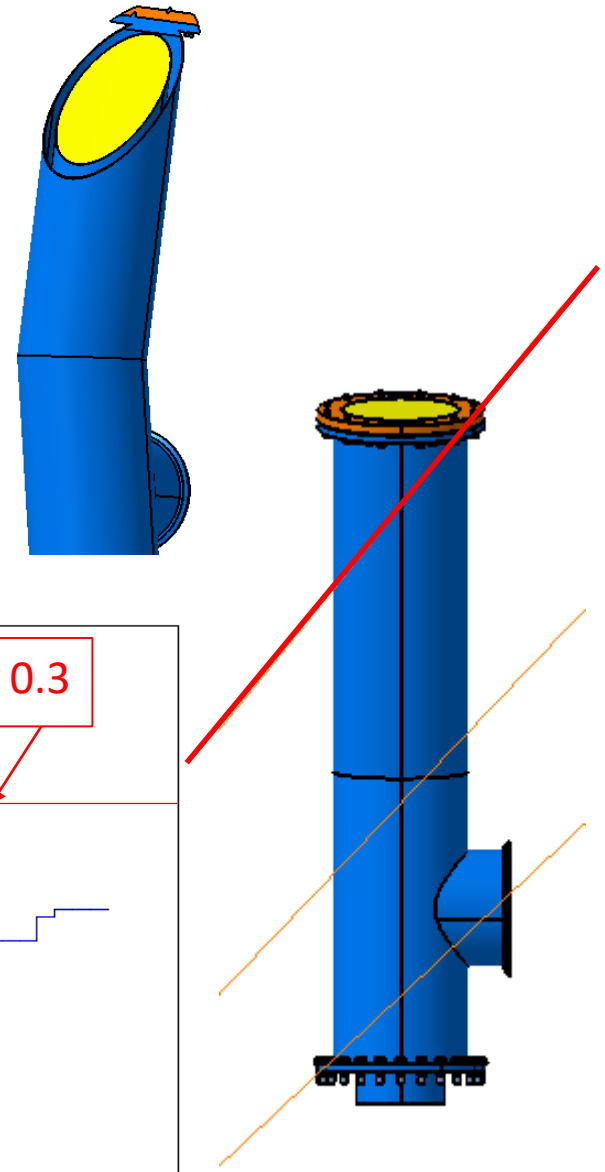


Project overall parameters	
Started	5 October, 2021
Involved manpower	2FTE
Number of task executed	10
Working days spent	17

Difference

η = 0.74





4th Quarter – October - November - December

Expected Deadlines

Project #04: **The Unit** (2.5)

Manpower: 1.5FTE

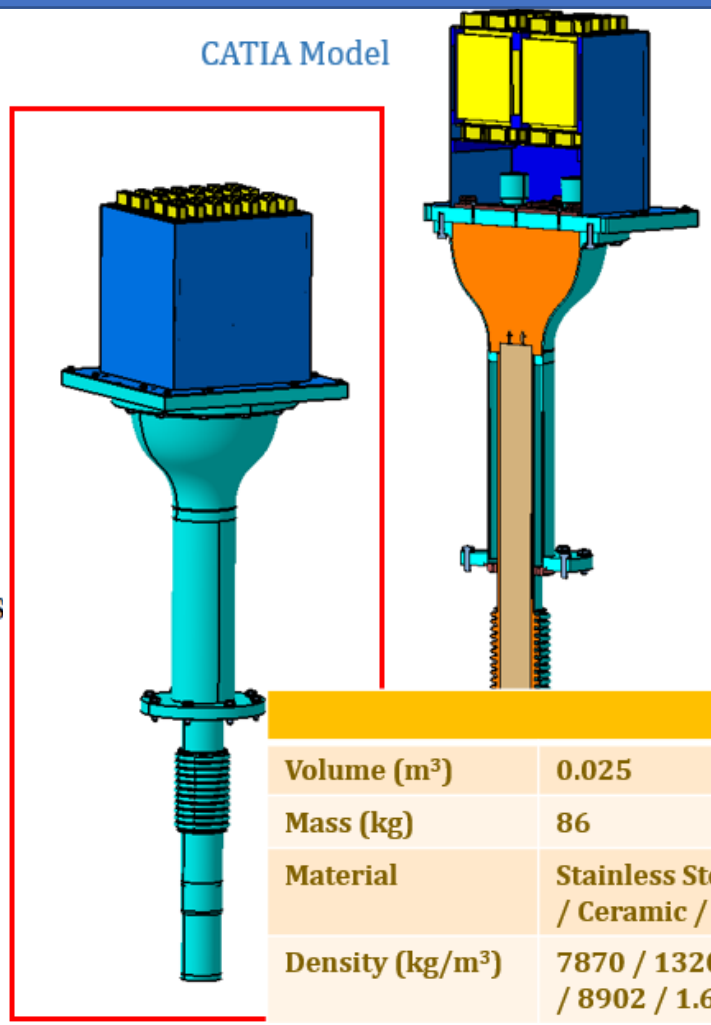
Step 2: 2 Weeks

Steps 1-3-4-5-6-7-8-9-10: 3 Weeks

Total: 5 Weeks

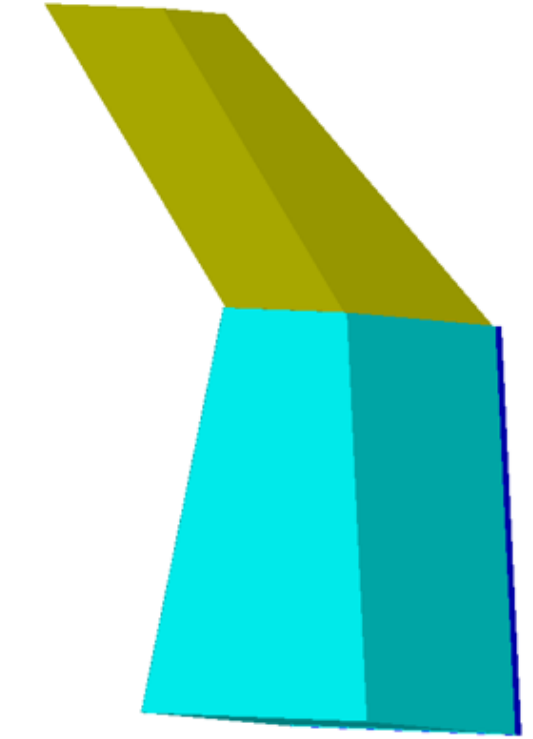
Output: 10 documents

CATIA Model



Volume (m^3)	0.025
Mass (kg)	86
Material	Stainless Steel / PEEK / Aluminum / Fglass / Ceramic / Copper / Nickel / Gas Argon
Density (kg/m^3)	7870 / 1320 / 2700 / 2560 / 3780 / 8960 / 8902 / 1.662

GeoModel



Volume (m^3)	0.0925
Mass (kg)	38.8
Material	LArServices8 / Aluminum
Density (kg/m^3)	350 / 2700

Mails: 4

Participants: Caroline Fabre, Niko Tsutskiridze, Davit Shekiladze

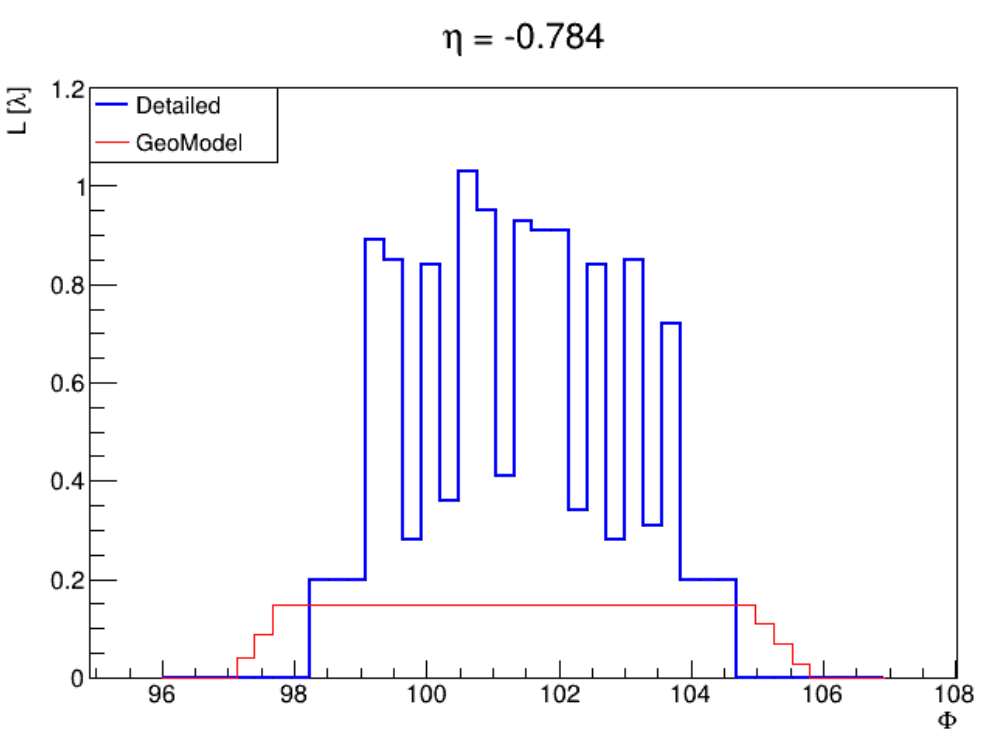
Mails: 17

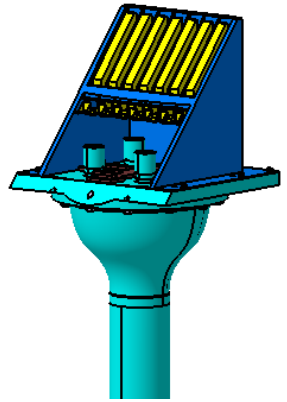
Participants: Oleg Solovyanov, Michael Rijssenbeek, Niko Tsutskiridze, Davit Shekiladze

Time spent: 11 days

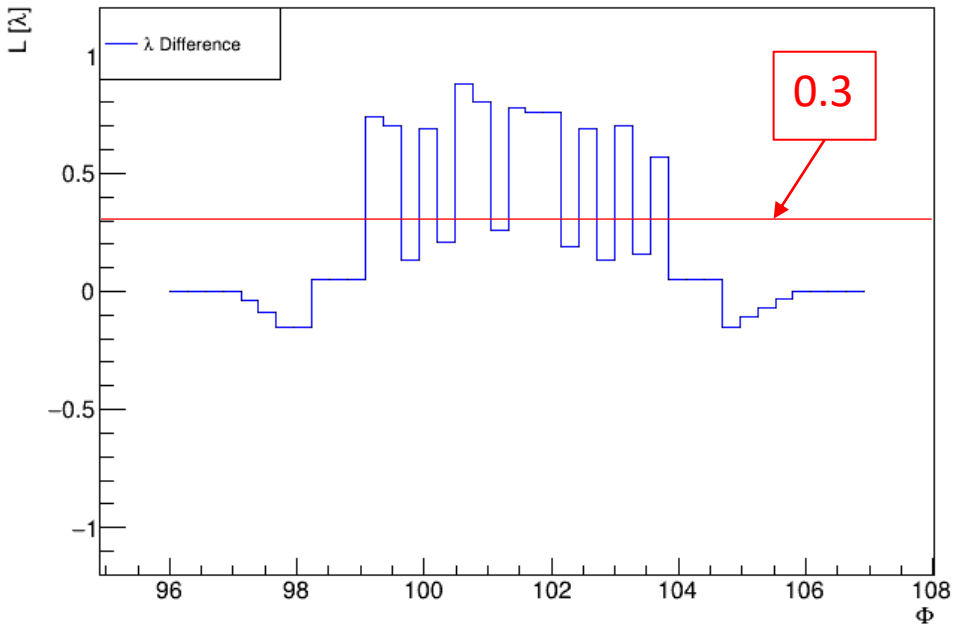
4th Quarter – October - November – December | Compare Analyses – Absorption Length (λI) – Line 1

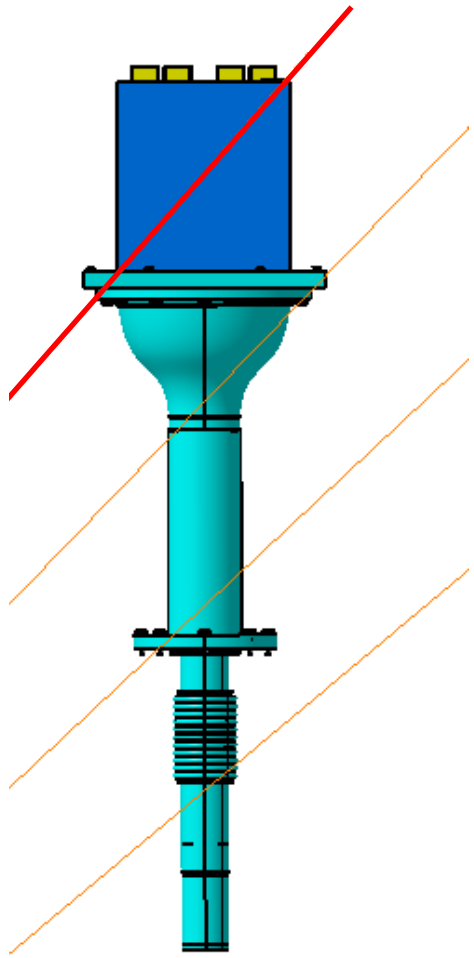
Detailed vs GeoModel





Difference





Project overall parameters	
Started	25 October, 2021
Involved manpower	2FTE
Number of task executed	12
Working days spent	37

4th Quarter – October - November - December

Project #08: SEGMENT#01 ID services in the GAP region – Supprts, Cables, Pipes (1.1, 1.2, 1.3)

Manpower: 3FTE

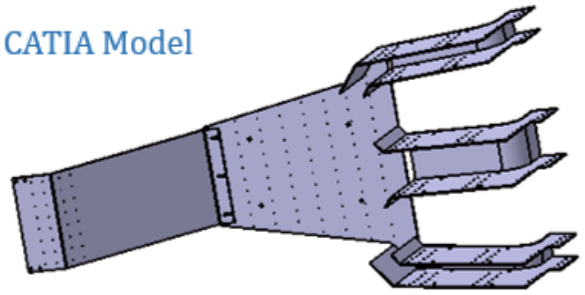
Step 2: 4 Weeks

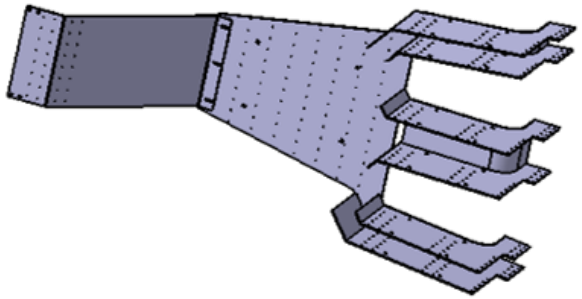
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks

Total: 6 Weeks

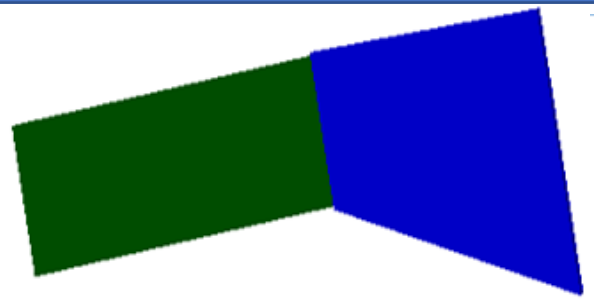
Output: 10 documents

CATIA Model

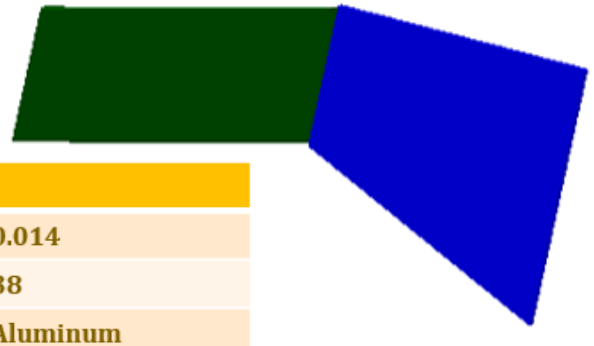




GeoModel



Volume (m³)	0.008
Mass (kg)	22
Material	Aluminum
Density (kg/m³)	2700



Volume (m³)	0.014
Mass (kg)	38
Material	Aluminum
Density (kg/m³)	2700

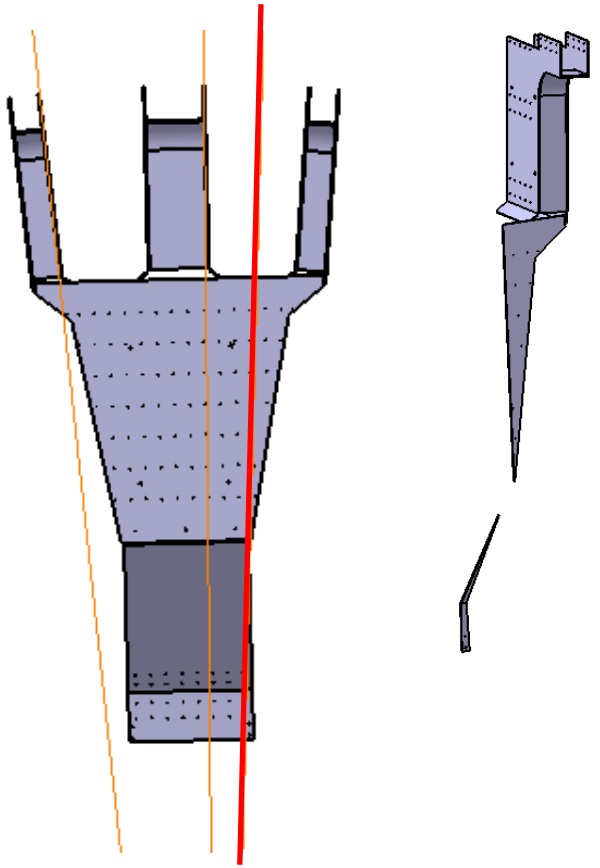
Mails: 18

Participants: Oleg Solovyanov, Marco Ciapetti, Dave Robinson, Kirsty Lynn Veale, Peter Kulka, Niko Tsutskiridze, Davit Shekiladze

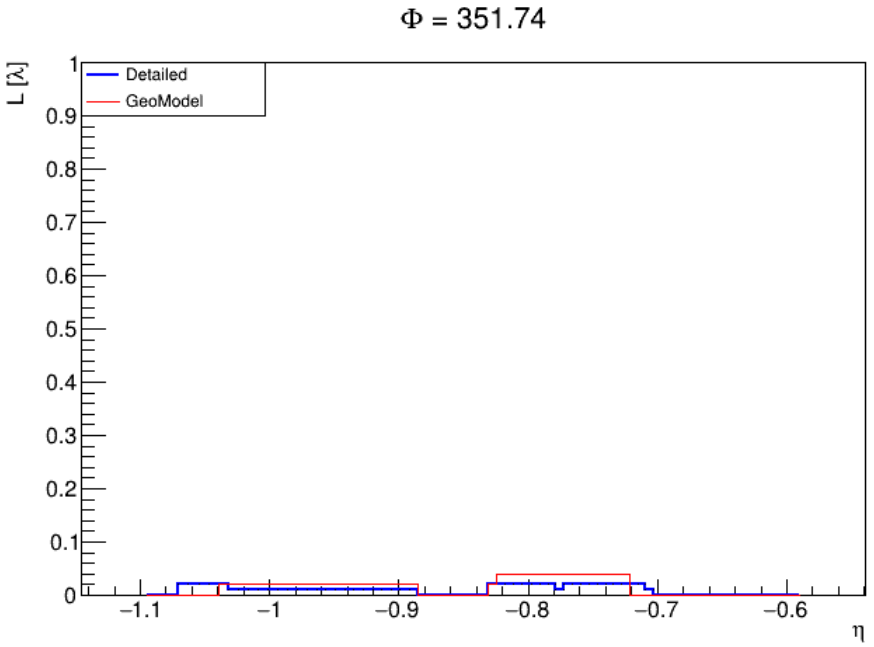
Time spent: 7 days

4th Quarter – October - November – December | Compare Analyses – Absorption Length (λI) – Line 3

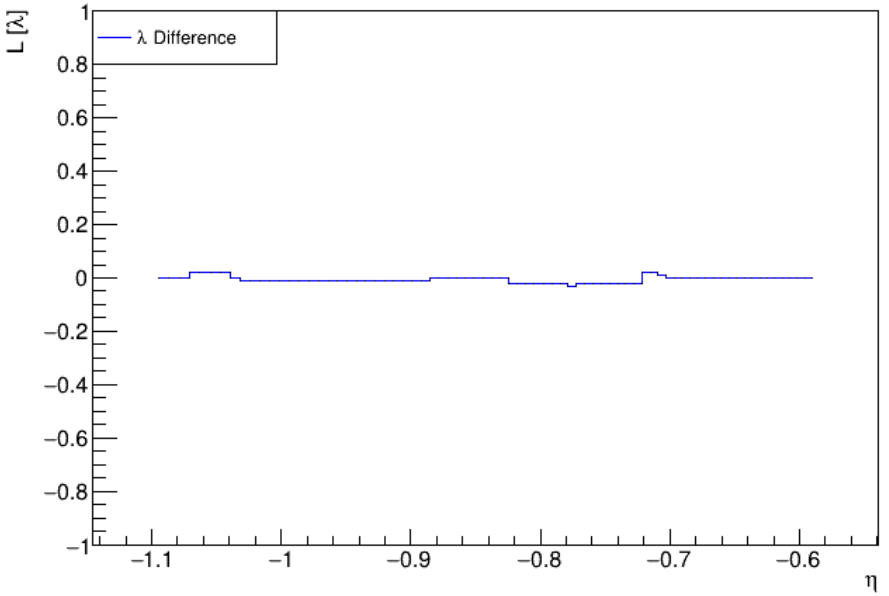
Detailed



Detailed vs GeoModel



Difference



Project overall parameters	
Started	6 December, 2021
Involved manpower	2FTE
Number of task executed	4
Working days spent	9

4th Quarter – **October - November - December**

Expected Deadlines

Project #09: **SEGMENT#02 ID services in the GAP region – Supprts, Cables, Pipes**
(1.1, 1.2, 1.3)
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Project #10: **SEGMENT#03 ID services in the GAP region – Supprts, Cables, Pipes**
Manpower: 3FTE
Step 2: 2 Weeks
Steps 1-3-4-5-6-7-8-9-10: 2 Weeks
Total: 4 Weeks
Output: 10 documents

Result at Gitlab

https://gitlab.cern.ch/asharmaz/atlas-g4-xml/-/tree/2nd-push/Calorimeter

2nd-push | atlas-g4-xml / Calorimeter / + | Lock | History | Find file

Merge branch '2nd-push' of https://gitlab.cern.ch/asharmaz/atlas-g4-xml into 2nd-push
Niko Tsutskiridze authored 2 hours ago

Name	Last commit
..	
ID Services - Sector1	Reports of ID Services - Sector1
Inlet NL2	Calculation of Absorption Length-CATIA Detailed vs. GeoModel
LAr By Pass	Upload New File
LAr Dump Valve Adapter	3D model of new Description
LAr Pump	.wrl file of New LarPump
LAr The Unit	Results of The Unit
Safety Line	Safety Line - Compare Analyses
.gitkeep	ATLAS Calorimeter

Results of The Unit
Niko Tsutskiridze authored 2 months ago

Name	Last commit
..	
1. The Unit -Mass Analyses.pdf	Results of The Unit
2. The Unit - Compare Analyses.pdf	Results of The Unit
3. The Unit -Absorption Length-CATIA Detailed vs. GeoMo...	Results of The Unit
4. The Unit - Simplification.pdf	Results of The Unit
5. The Unit -Absorption Length-CATIA Detailed vs. Simplifi...	Results of The Unit
6. The Unit - Integration Conflicts Checking.pdf	Results of The Unit
7. Modification of Simplified Model According to Conflicts...	Results of The Unit
8. The Unit - Codding, Check for similarity and internal co...	Results of The Unit
TheUnit.wrl	Results of The Unit
TheUnit.xml	Results of The Unit

Conclusion

1. The life cycle included 10 consecutive steps when we defined the deadlines. Then it increased from 10 to 13 Which required additional 1.5 weeks

2. Calculation of Absorption Length was required from Tile Call group. We spent 1.5 months for Research Development tasks. So, we started first project in 24 February instead of January (2 months late)

3. Step 2 (Reproduction of the SmarTeam Model / Calculation Volume da Mass) is the most time consuming. It required to gather information from the different sources (SmarTeam, CDD drawings, EDMS, Catalogues etc.). Also we needed contact with people by mail which took a lot of time consumption

4. According to our agreement from 10 projects, we successfully finished 7, 1 is partially completed and for the rest (2 projects) we could not meet the deadline

Thank you for your attention

მადლობა ყურადღებისათვის

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