

Cryostat LN2/GN2 Line

Simplification of geometry

Release 13 “Cryostat LN2/GN2 Line”

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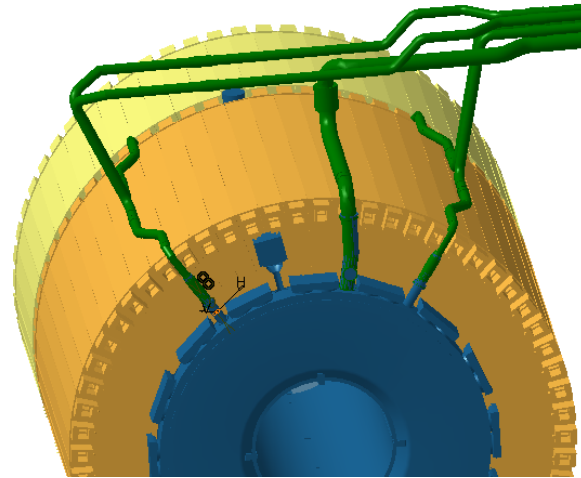
Archil Surmava

Besik Kekelia

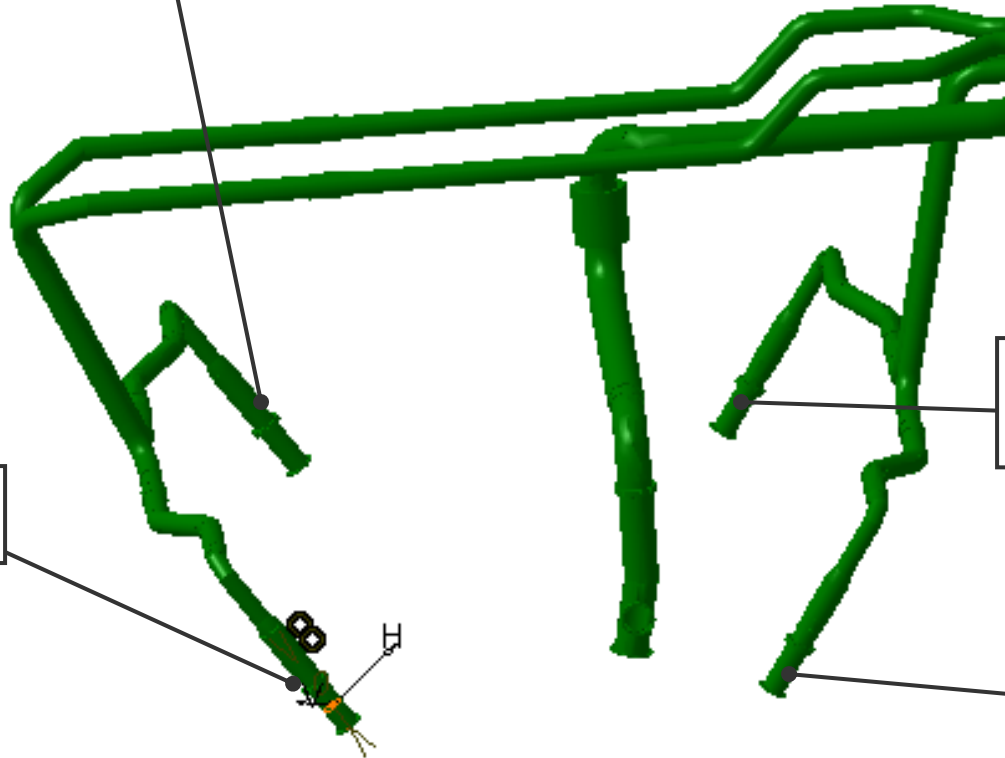
GCCEC www.cadcam.ge

Cryostat LN2/GN2 Line

Overview



Outlet GN2
(side A)

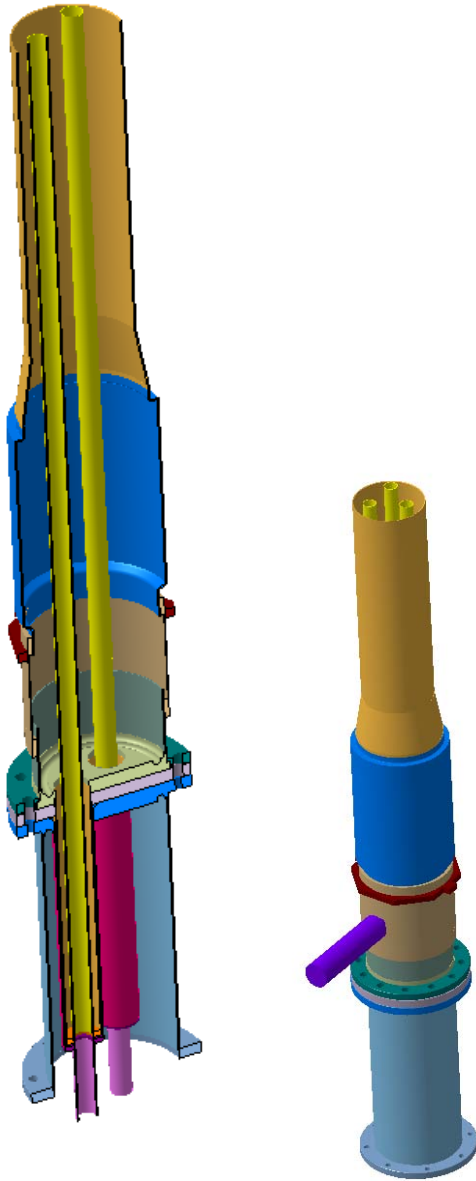


Outlet GN2
(side C)

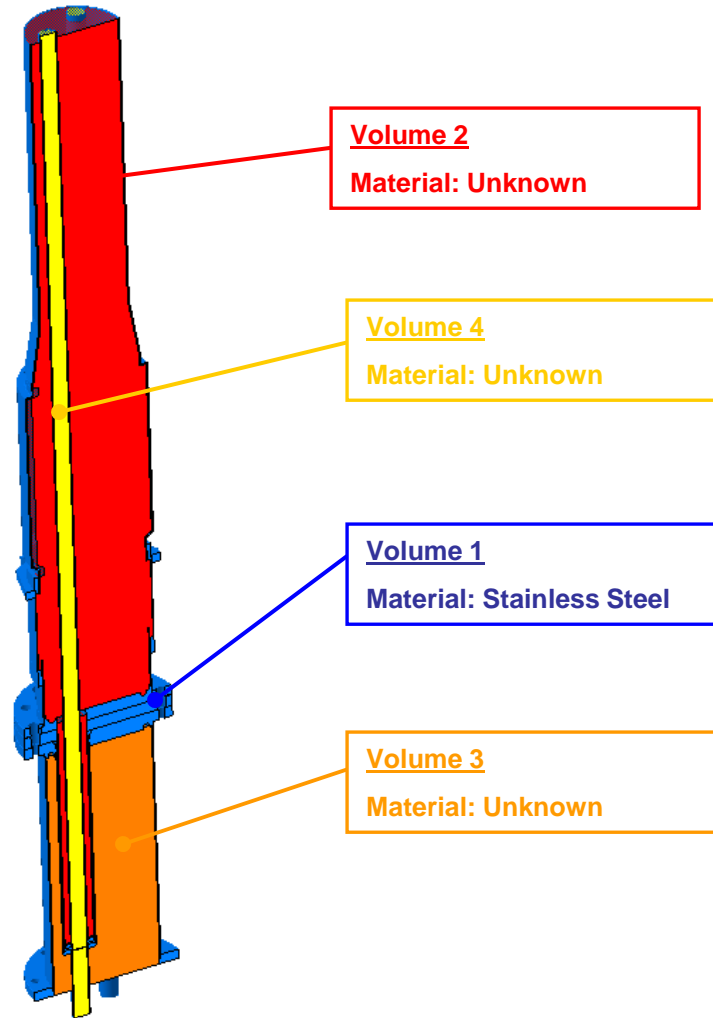
Inlet LN2 / Liquid
Nitrogen Line
(side A)

Inlet LN2 / Liquid
Nitrogen Line
(side C)

Cryostat LN2 / Liquid Nitrogen Line



Grouped Volumes according to materials



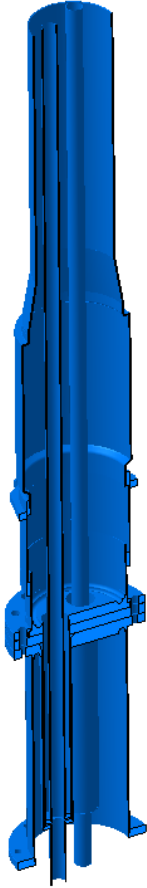
Note: The materials are grouped according to our view, but may requires further checking

Volume 1

Material: Stainless Steel

Detailed

Volume: ~4998cm³



Simplified

Volume: ~5004cm³

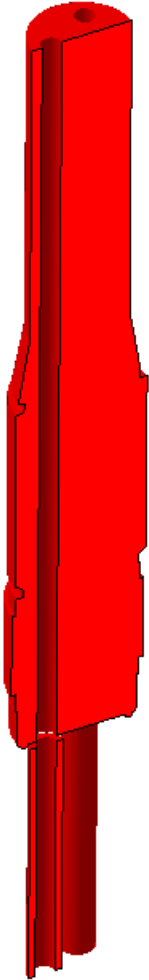


Volume 2

Material: Unknown

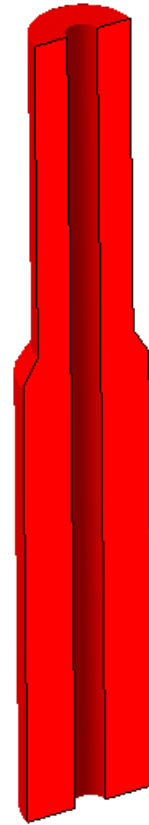
Detailed

Volume: ~19772cm³



Simplified

Volume: ~19823cm³

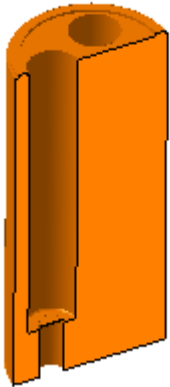


Volume 3

Material: Unknown

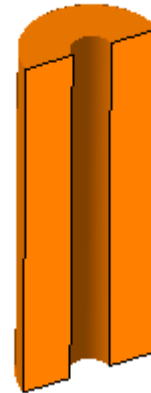
Detailed

Volume: $\sim 5742\text{cm}^3$



Simplified

Volume: $\sim 5742\text{cm}^3$



Volume 4

Material: Unknown

Detailed

Volume: ~2031cm³



Simplified

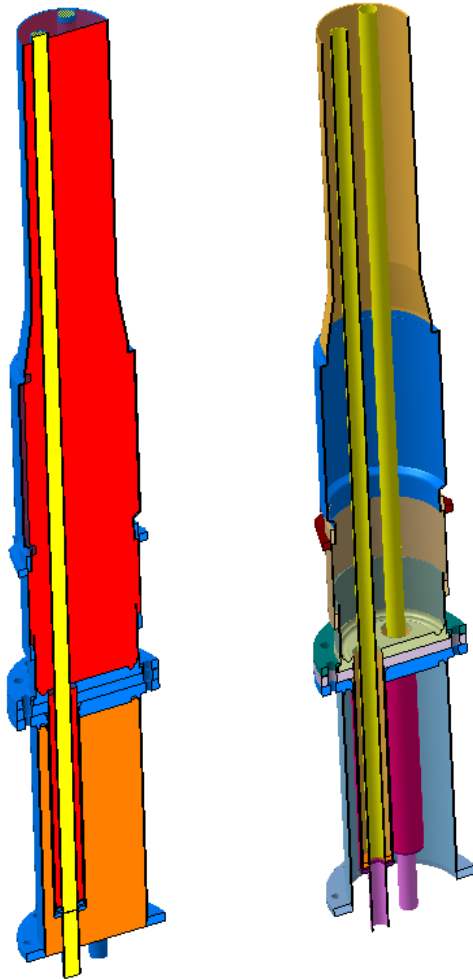
Volume: ~2030cm³



Cryostat LN2 / Liquid Nitrogen Line

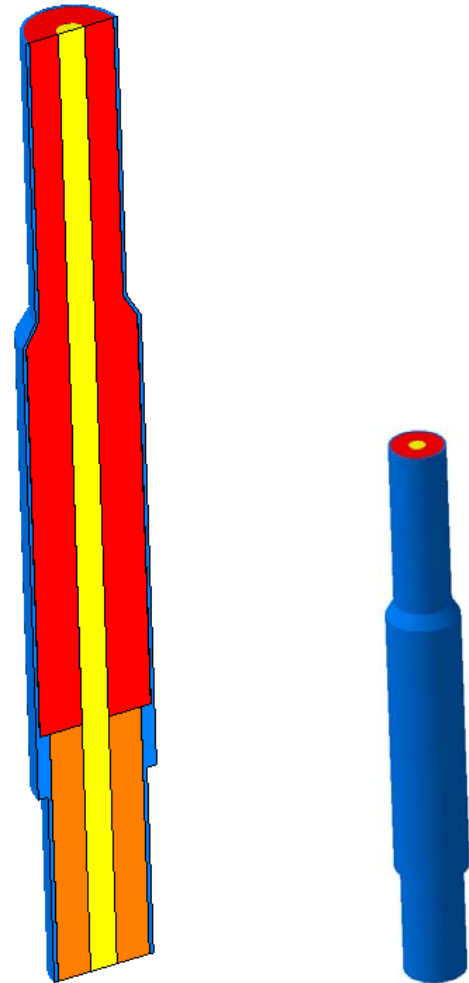
Detailed – All Volumes

Volume: $\sim 32546\text{cm}^3$



Simplified – All Volumes

Volume: $\sim 32601\text{cm}^3$



Geant4 code

```
//////////////////////////////////// R13 - Criostat-NL2 //////////////////////////////////////
G4double r_inner;
G4double r_outer;
G4double z_half;
G4double phi0 = 0.;
G4double dphi = 360.*deg;
G4RotationMatrix* RotObjG11 = new G4RotationMatrix(G4ThreeVector( 0.870484*mm, -0.485699*mm, 0.0797838*mm), -1.57721);
G4RotationMatrix* RotObjG22 = new G4RotationMatrix(G4ThreeVector( 0.896088*mm, 0.0719491*mm, -0.438007*mm), -1.81049);
G4ThreeVector GLVect1(1538.83*mm, 2304.22*mm, -3035.52*mm);
G4ThreeVector GLVect12(1538.83*mm, 2304.22*mm, 3035.52*mm);
G4ThreeVector GLVect2(-1539.94*mm, 2303.48*mm, -3035.52*mm);
G4ThreeVector GLVect22(-1539.94*mm, 2303.48*mm, 3035.52*mm);
G4ThreeVector GLVect(0.,0.,0.);
G4ThreeVector DLVect(-114.7*mm, -105.6*mm, 134.5*mm);
G4ThreeVector DLVect1(-165.87*mm, -105*mm, -83.6*mm);
G4ThreeVector DLVect2(-83.3*mm, -77*mm, 139.7*mm);
G4double Zo[]={0*mm,292.58*mm,390*mm,1003.107*mm,1040*mm,1480*mm};
G4double Ro[]={78*mm,92.8*mm,71.5*mm};
G4double Ri[]={71.58*mm,87.3*mm,66*mm};

//----- NL2 Space
G4double Zplan[] = {Zo[0],Zo[0],Zo[1],Zo[1],Zo[3],Zo[4],Zo[5],Zo[5]};
G4double Roacc[] = {Zo[0],Ro[0],Ro[0],Ro[1],Ro[1],Ro[2],Ro[2],Zo[0]};
G4Polycone* SpNL2 = new G4Polycone("SpNL2", 0., 360.*deg, 8, Roacc, Zplan);
G4LogicalVolume* SpNL2_log = new G4LogicalVolume(SpNL2, GCalorMaterials::GetMat("AIR"), "SpNL2_log", 0, 0, 0);
SpNL2_log->SetVisAttributes(airVisAtt);
G4AssemblyVolume* SpNL2_AV = new G4AssemblyVolume(SpNL2_log, GLVect, 0);

//--- NL2 (Stainless Steel)
G4double Zplan1[] = {Zo[0],Zo[1],Zo[1],Zo[2],Zo[2],Zo[3],Zo[4],Zo[5]};
G4double Riacc1[] = {Ri[0],Ri[0],Ri[0],Ri[0],Ri[1],Ri[1],Ri[2],Ri[2]};
G4double Roacc1[] = {Ro[0],Ro[0],Ro[1],Ro[1],Ro[1],Ro[1],Ro[2],Ro[2]};
G4Polycone* MNL2 = new G4Polycone("MNL2", 0., 360.*deg, 8, Zplan1, Riacc1, Roacc1);
G4LogicalVolume* NL2_log = new G4LogicalVolume(MNL2, GCalorMaterials::GetMat("SSTEEL"), "NL2_log", 0, 0, 0);
NL2_log->SetVisAttributes(SSVisAtt);
SpNL2_AV->AddPlacedVolume( NL2_log, GLVect, 0);

//--- VOLUME 1
G4double Zplan2[] = {Zo[2],Zo[2],Zo[3],Zo[4],Zo[5],Zo[5]};
G4double Riacc2[] = {Zo[0],Ri[1],Ri[1],Ri[2],Ri[2],Zo[0]};
G4Polycone* M1_NL2 = new G4Polycone("M1_NL2", 0., 360.*deg, 6, Riacc2, Zplan2);
G4LogicalVolume* M1_NL2_log = new G4LogicalVolume(M1_NL2, GCalorMaterials::GetMat(" "), "M1_NL2_log", 0, 0, 0);
M1_NL2_log->SetVisAttributes(LiqVisAtt);
SpNL2_AV->AddPlacedVolume( M1_NL2_log, GLVect, 0);

//--- VOLUME 2
r_inner = 20.9*mm;
r_outer = 71.58*mm;
z_half = 195*mm;
G4Tubs* M2_NL2 = new G4Tubs("M2_NL2", r_inner, r_outer, z_half, phi0, dphi);
G4LogicalVolume* M2_NL2_log = new G4LogicalVolume(M2_NL2, GCalorMaterials::GetMat(" "), "M2_NL2_log", 0, 0, 0);
M2_NL2_log->SetVisAttributes(VacuVisAtt);
GLVect.setZ(195*mm);
SpNL2_AV->AddPlacedVolume(M2_NL2_log, GLVect, 0);

//--- VOLUME 3
r_inner = 0*mm;
r_outer = 20.9*mm;
z_half = 740*mm;
G4Tubs* M3_NL2 = new G4Tubs("M3_NL2", r_inner, r_outer, z_half, phi0, dphi);
G4LogicalVolume* M3_NL2_log = new G4LogicalVolume(M3_NL2, GCalorMaterials::GetMat(" "), "M3_NL2_log", 0, 0, 0);
M3_NL2_log->SetVisAttributes(PolyVisAtt);
GLVect.setZ(740*mm);
```

To be identified