Detector movements and experimental area

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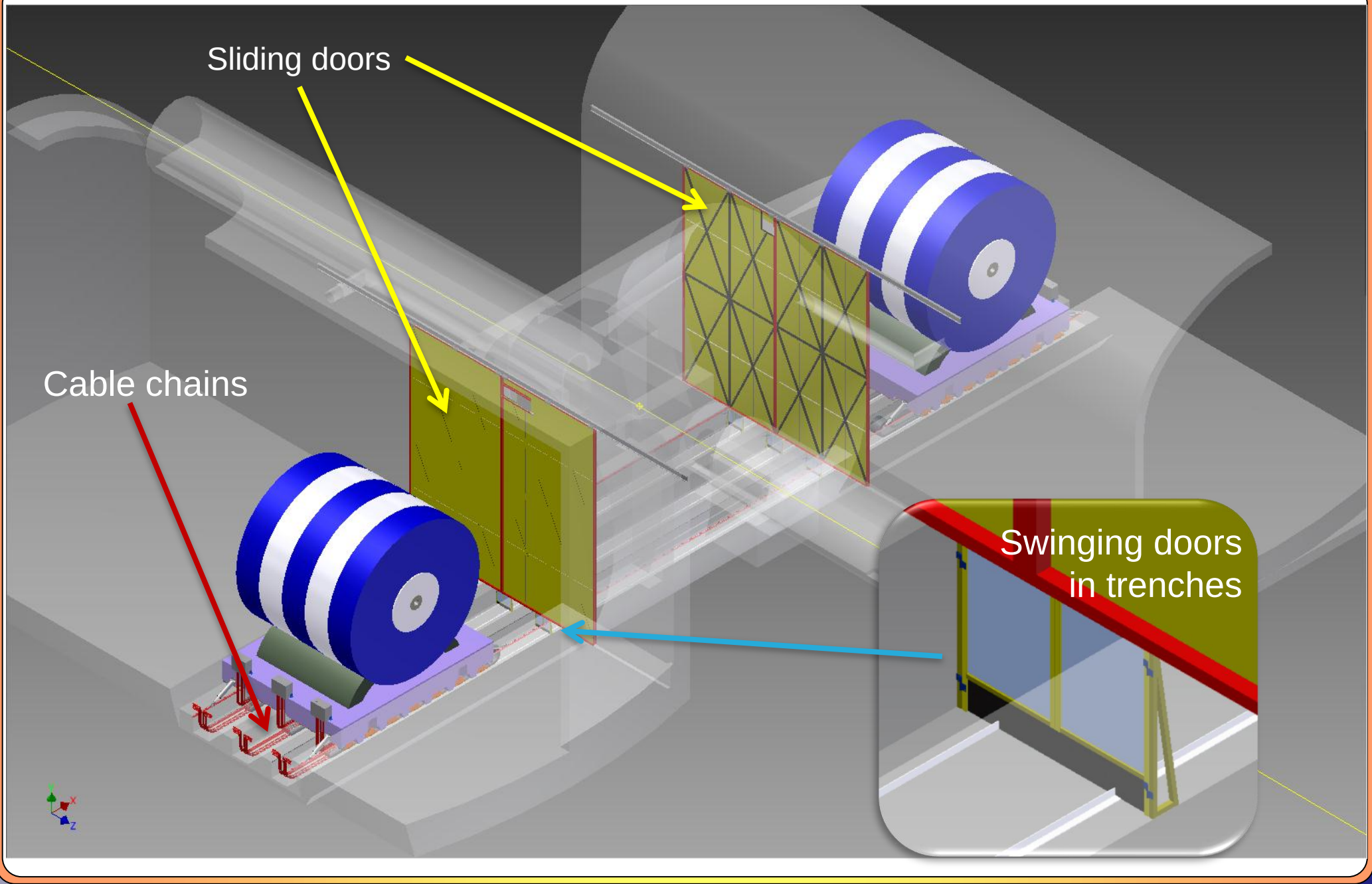
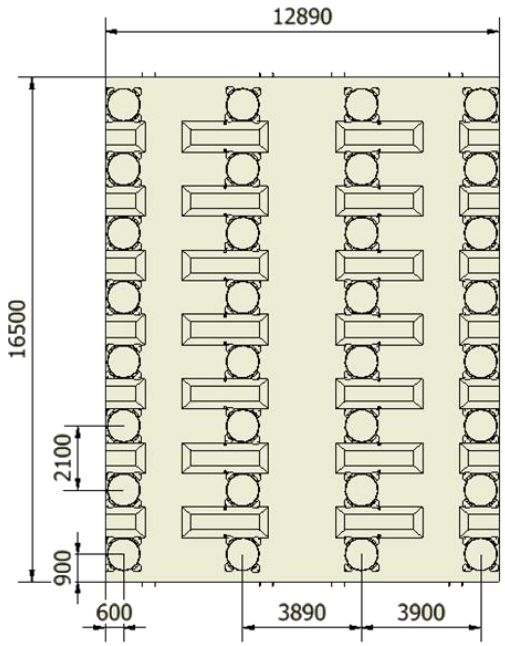
Outline

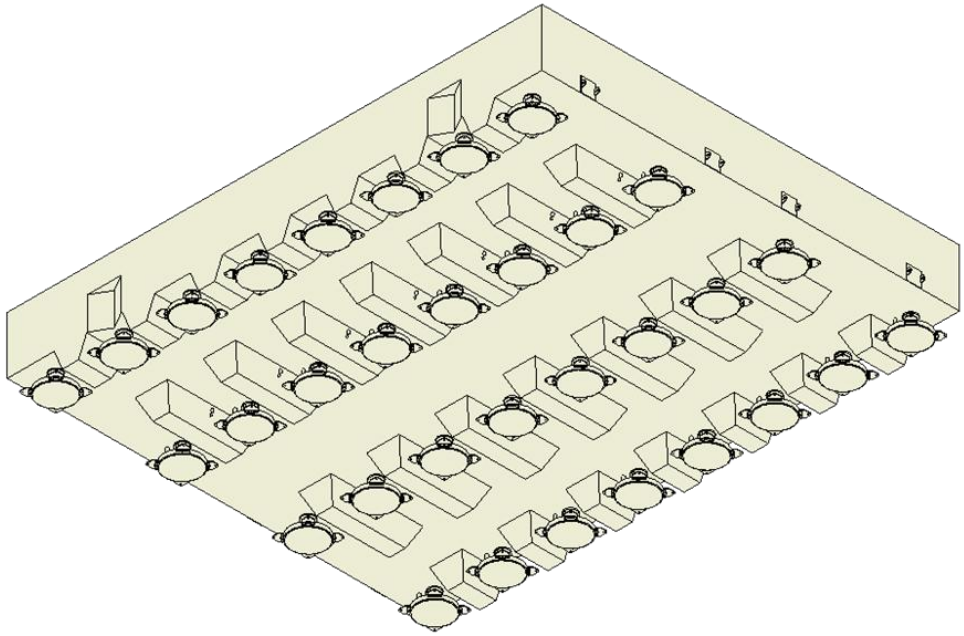
- Push-pull scenario
  - Platform
  - Cable chains
  - Movement scenario step by step
- Cavern door considerations
  - Sliding
  - Swinging
- Surface hall w.r.t. Cavern

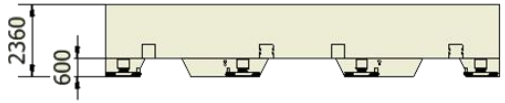
Detector movements and experimental area



Previous array of airpads







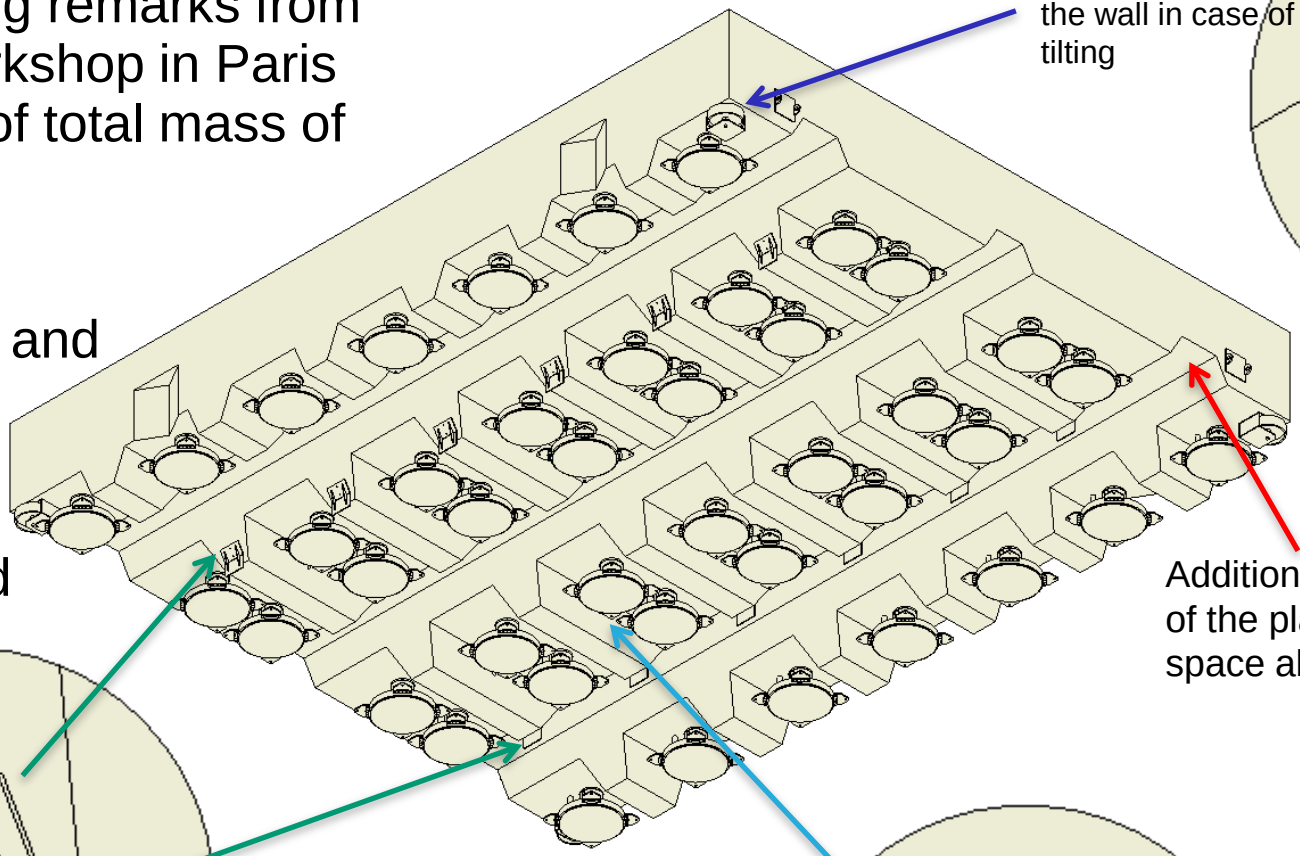
Total weight of platform with detector	12000[t]
Airpad weight capacity	400[t]
Number of needed airpads	30

4 rows of 8 airpads are sufficient

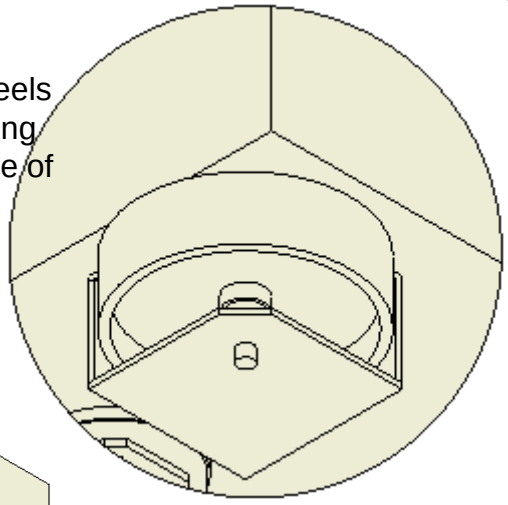
Canges in design of the platform

- Following remarks from ILD Workshop in Paris update of total mass of detector

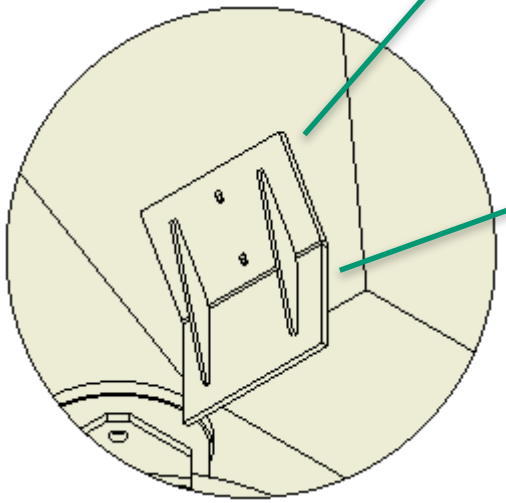
- Number and location of airpads changed



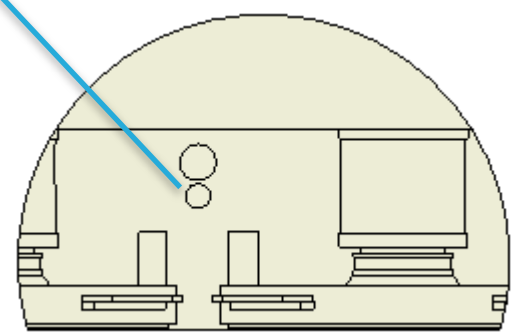
Horizontal wheels to prevent hitting the wall in case of tilting



Additional cut in bottom of the platform to make the service space above cable chains higher

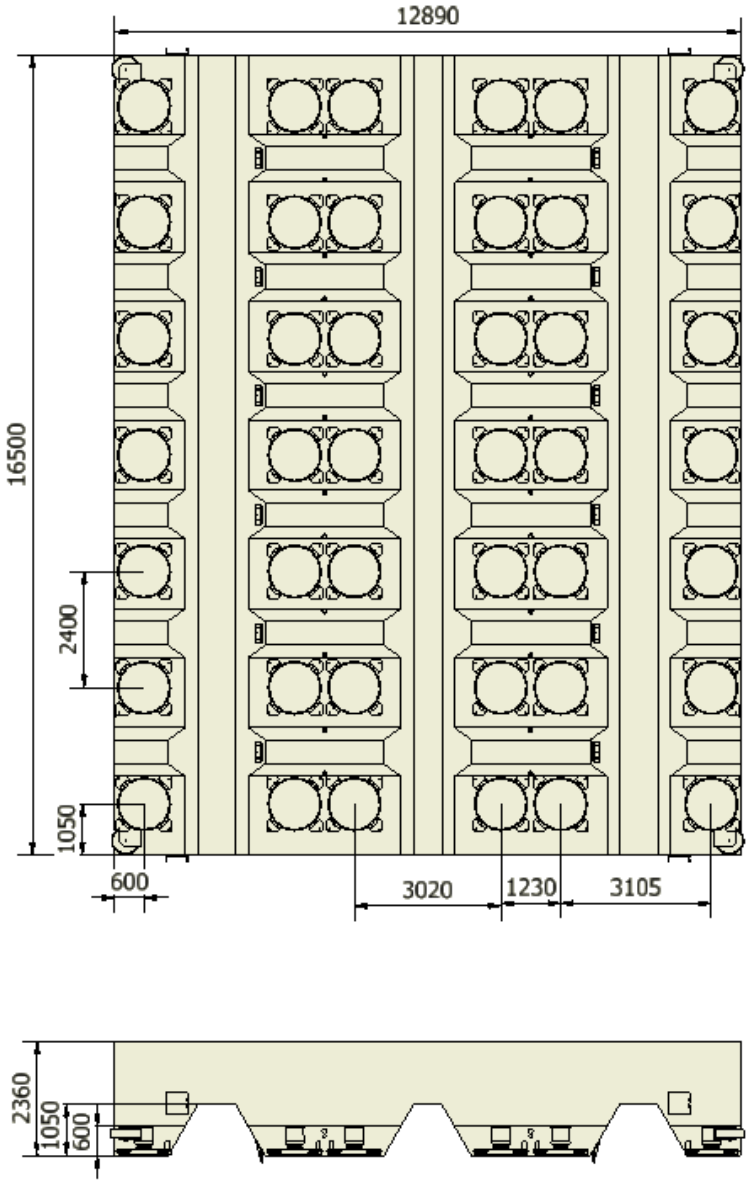


Two rows of plates on sides of platform legs for guiding during push-pull move



Holes in legs for airpad air and oil piping

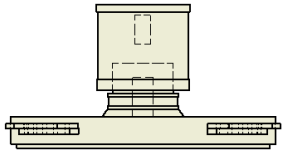
Change in Airpads layout

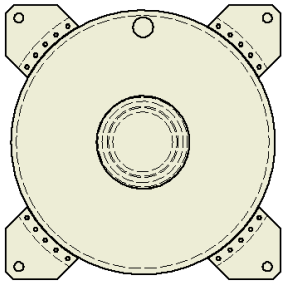


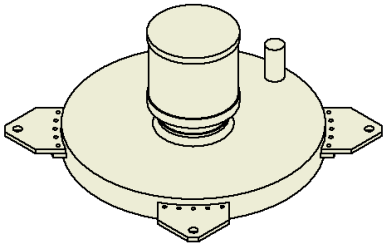
One type of platform for all detectors.
Weight of a detector up to 14 000 [t]

Total weight of platform with detector	16 000[t]
1 Airpad weight capacity	400[t]
Number of needed airpads	40

6 rows with 7 airpads in each row
better load distribution
Somewhat more safety margin

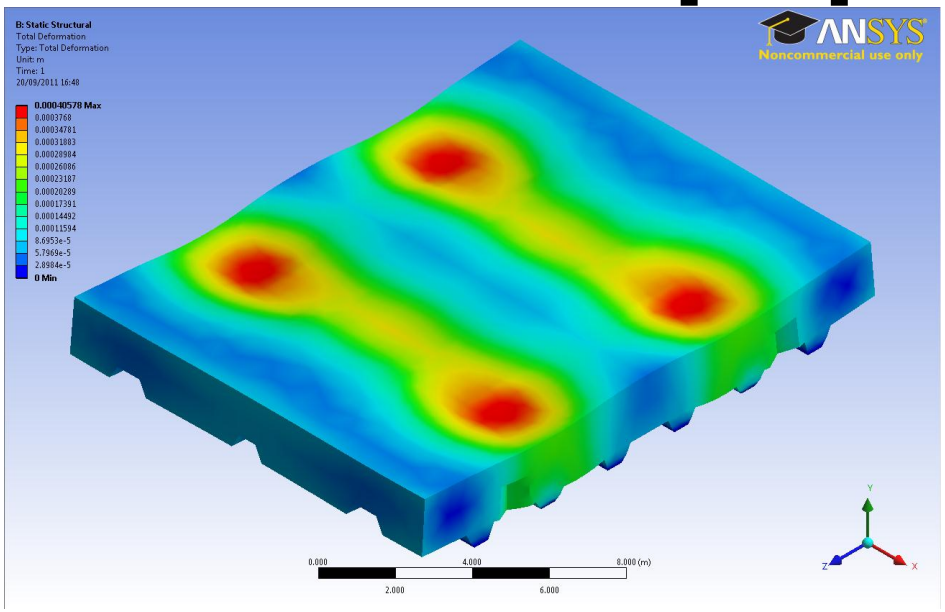




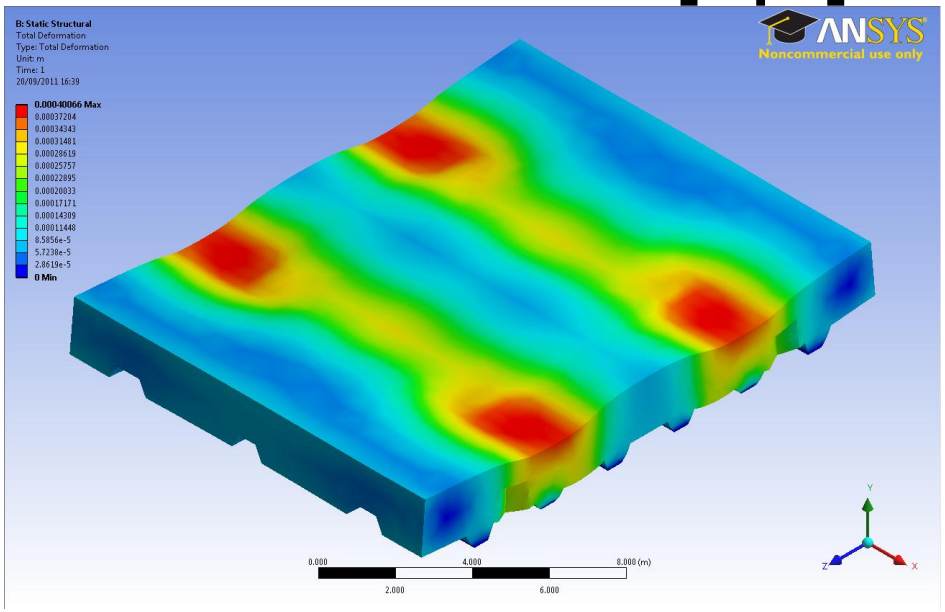


Platform deformation under detector in two configurations

Detector closed		
Deformation	0.41	[mm]
Stress	14.2	[MPa]



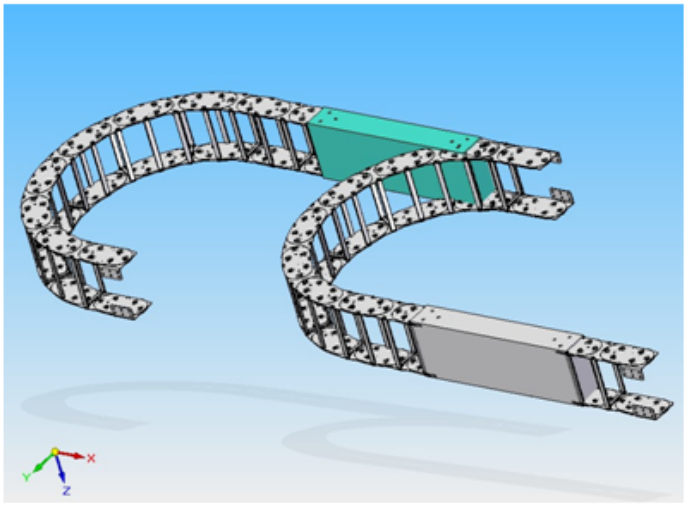
Endcaps started opening		
Deformation	0.40	[mm]
Max stress	15.5	[Mpa]



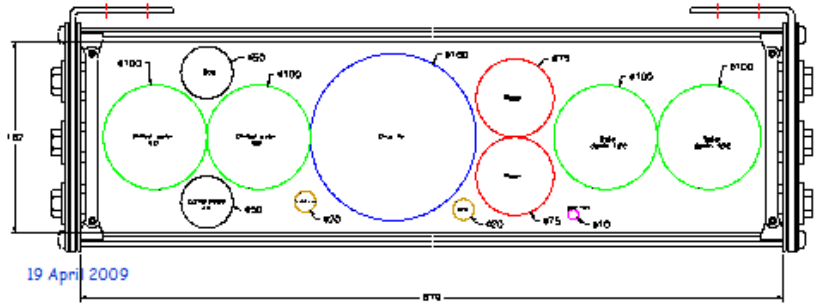
Cable chains

- Utilities needed to be carried in cable chains. The past is :

Utilities in Cable Chain



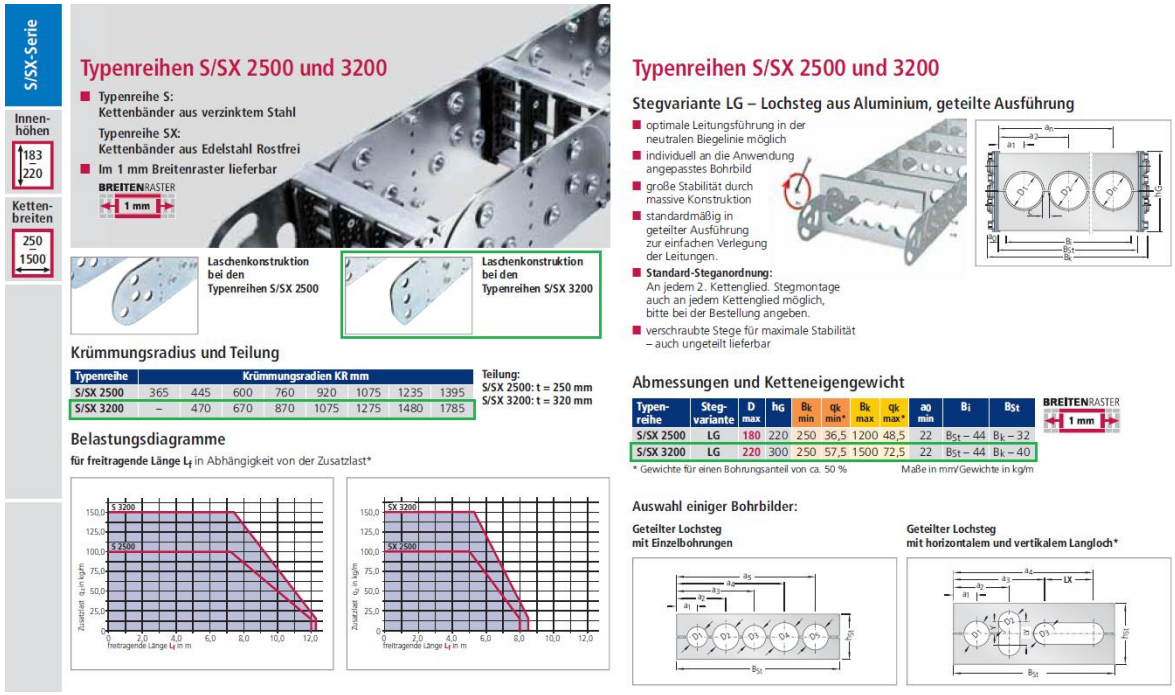
	Qty	OD mm
Cryogenics	1	160
Demin. Water 16°C	2	100
Chilled Water 5°C	2	100
Power	2	75
Gas Mix	2	50
Compressed Air	1	50
Twisted Pairs	1	20
Ground	1	20
Optical fiber	1	10



Cable chain of section area 180x680 seems to be large enough.

Possible cable chains

- Some companies have in their offer cable chains of almost the same type and parameters. Example of suitable type:



S/SX-Serie

Innenhöhen: 183 – 220

Kettenbreiten: 250 – 1500

Typenreihen S/SX 2500 und 3200

- Typenreihe S: Kettenbänder aus verzinktem Stahl
- Typenreihe SX: Kettenbänder aus Edelstahl Rostfrei
- Im 1 mm Breitenraster lieferbar

BREITENRASTER 1 mm

Laschenkonstruktion bei den Typenreihen S/SX 2500

Laschenkonstruktion bei den Typenreihen S/SX 3200

Krümmungsradius und Teilung

Typenreihe	Krümmungsradien KR mm							
S/SX 2500	365	445	600	760	920	1075	1235	1395
S/SX 3200	–	470	670	870	1075	1275	1480	1785

Teilung: S/SX 2500: t = 250 mm; S/SX 3200: t = 320 mm

Belastungsdiagramme

für freitragende Länge L_f in Abhängigkeit von der Zusatzlast*

Typenreihen S/SX 2500 und 3200

Stegvariante LG – Lochsteg aus Aluminium, geteilte Ausführung

- optimale Leitungsführung in der neutralen Biegelinie möglich
- individuell an die Anwendung angepasstes Bohrbild
- große Stabilität durch massive Konstruktion
- standardmäßig in geteilter Ausführung zur einfachen Verlegung der Leitungen.
- **Standard-Steganordnung:** An jedem 2. Kettenglied. Stegmontage auch an jedem Kettenglied möglich, bitte bei der Bestellung angeben.
- verschraubte Stege für maximale Stabilität – auch ungeteilt lieferbar

Abmessungen und Kettengewicht

Typenreihe	Stegvariante	D max	h_G	B_K min	q_K min*	B_K max	q_K max*	a_0 min	B_i	B_{St}
S/SX 2500	LG	180	220	250	36,5	1200	48,5	22	B_{St} – 44	B_K – 32
S/SX 3200	LG	220	300	250	57,5	1500	72,5	22	B_{St} – 44	B_K – 40

BREITENRASTER 1 mm

* Gewichte für einen Bohrungsanteil von ca. 50 %

Maße in mm/Gewichte in kg/m

Auswahl einiger Bohrbilder:

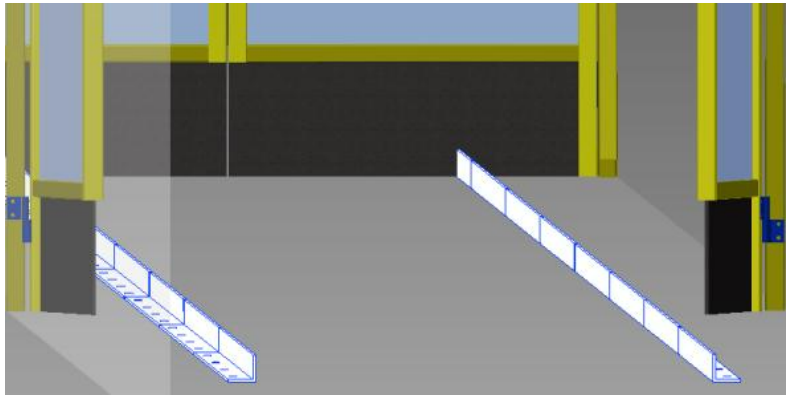
Geteilter Lochsteg mit Einzelbohrungen

Geteilter Lochsteg mit horizontalem und vertikalem Langloch*

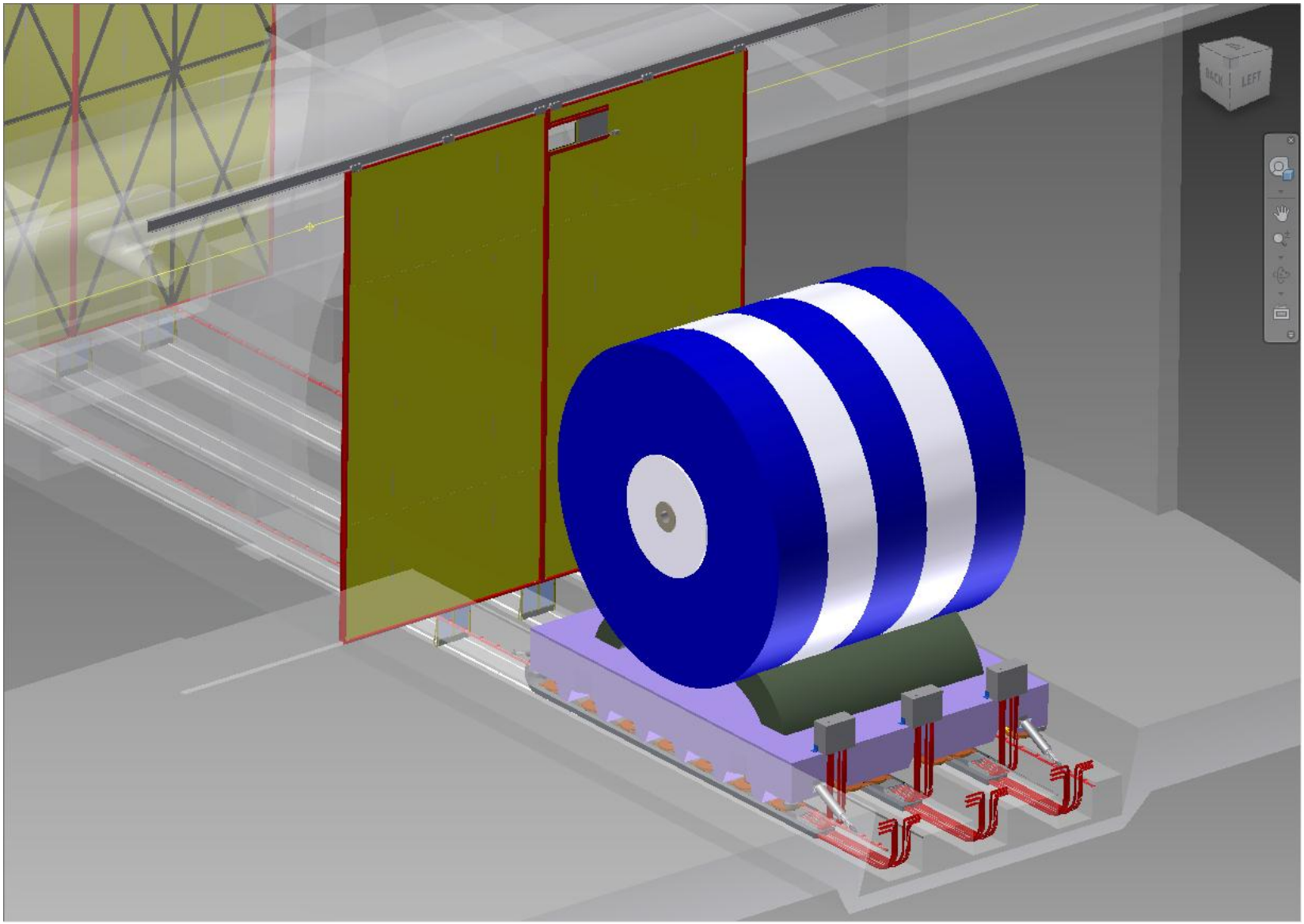
Inner section: 220x1000

If needed can be increased

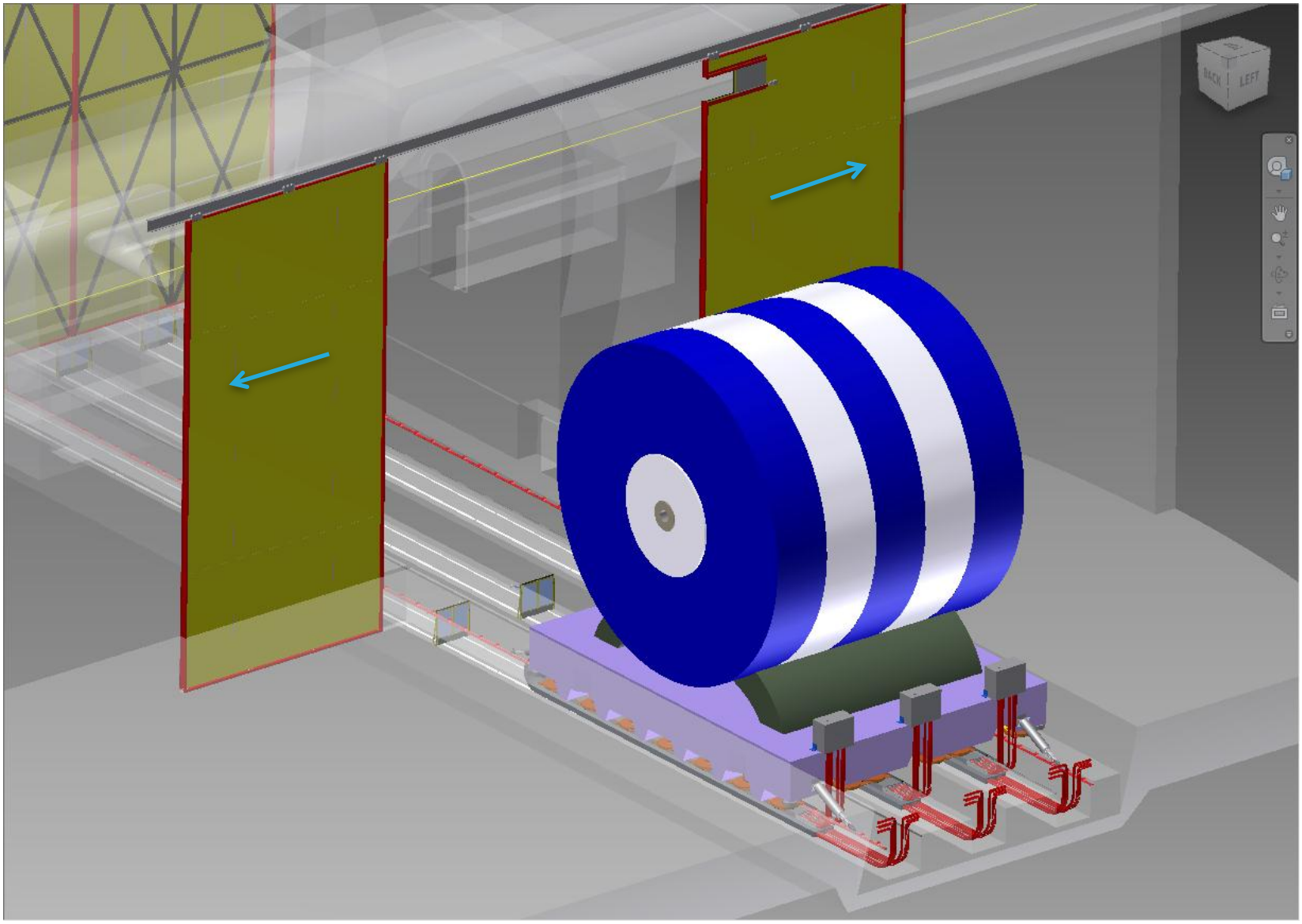
Cable chains will be guided by L-profile bars on the bottom of trenches



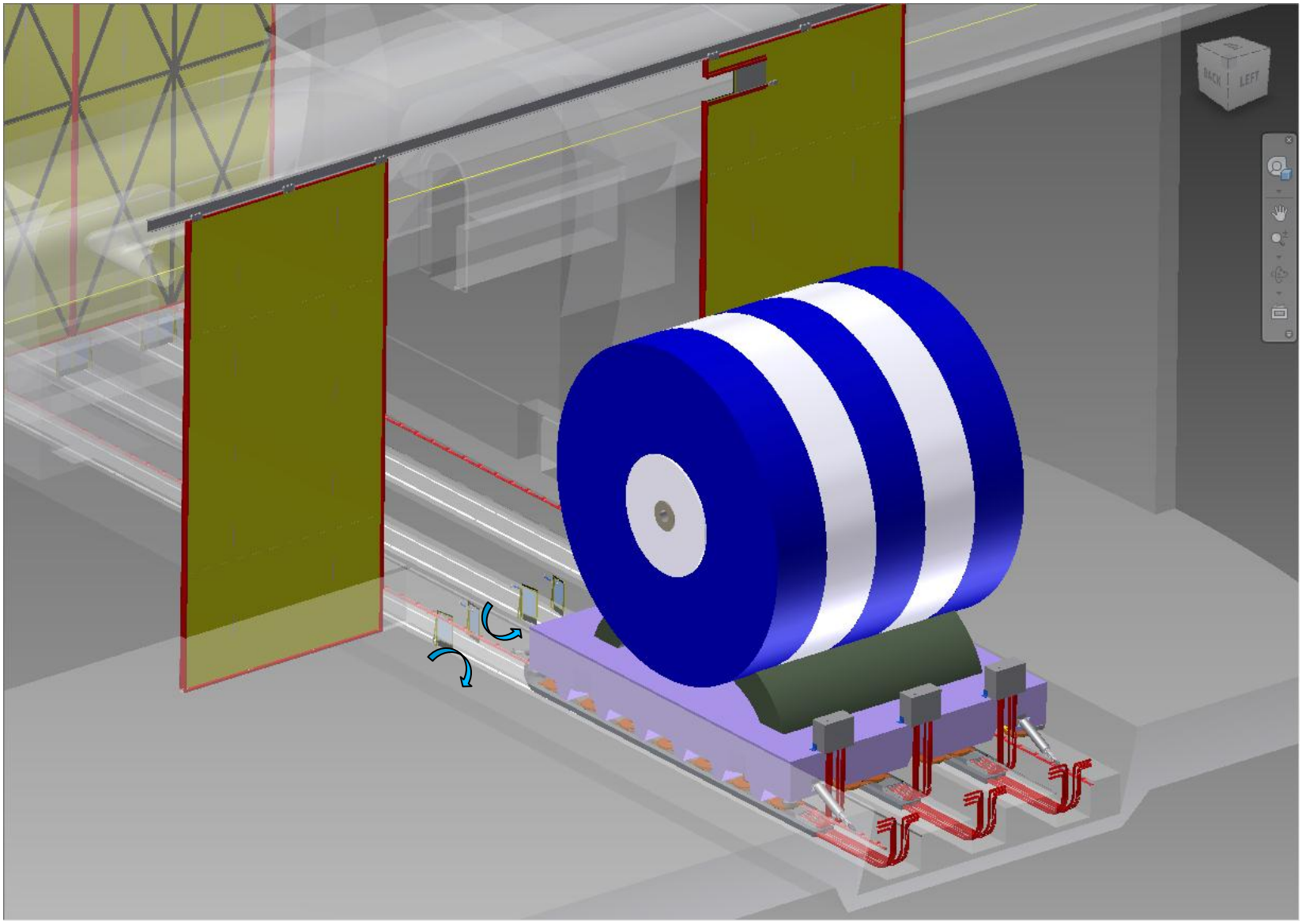
Scenario of opening doors and moving detector
Starting from cavern position



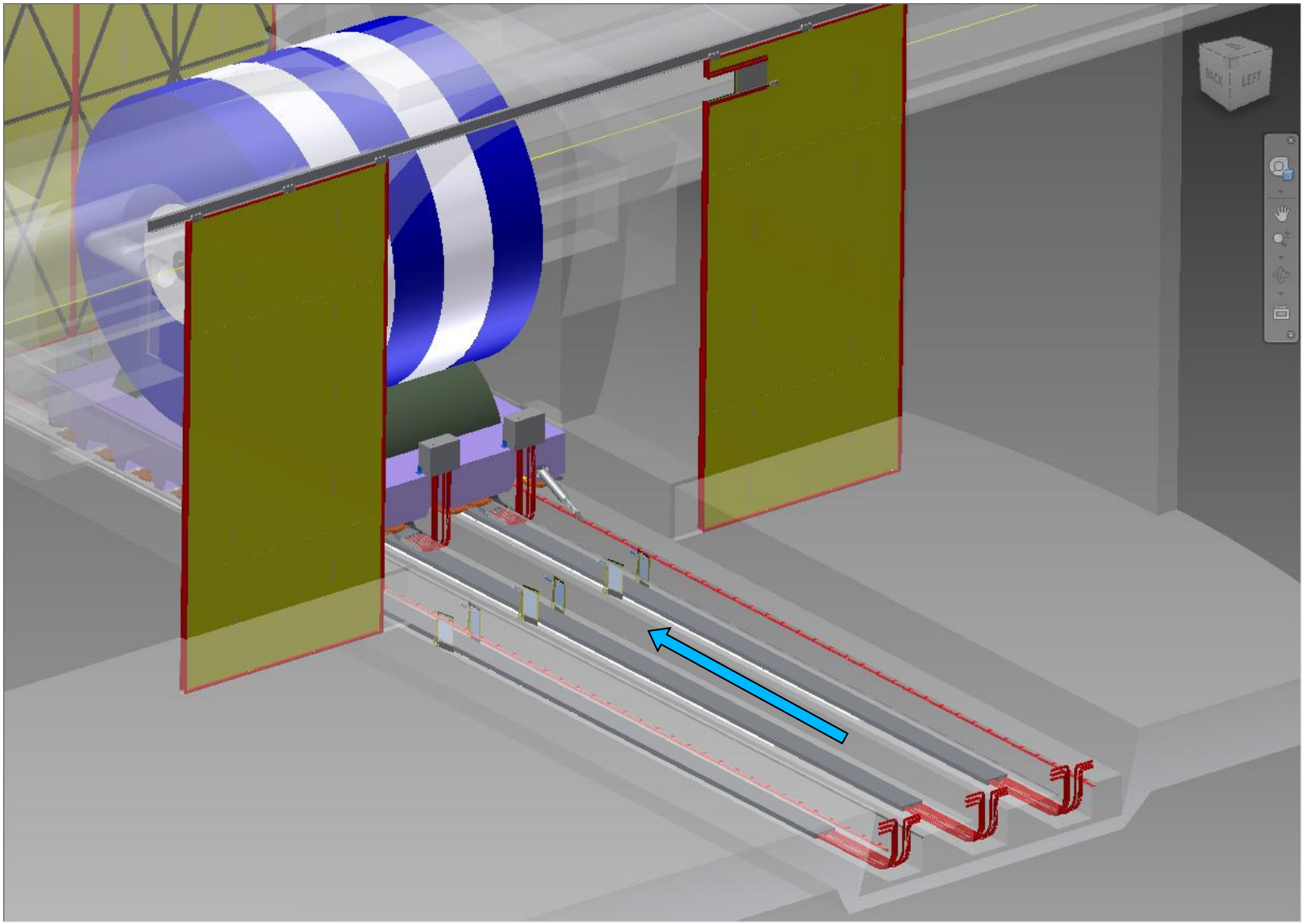
1. Opening of sliding doors



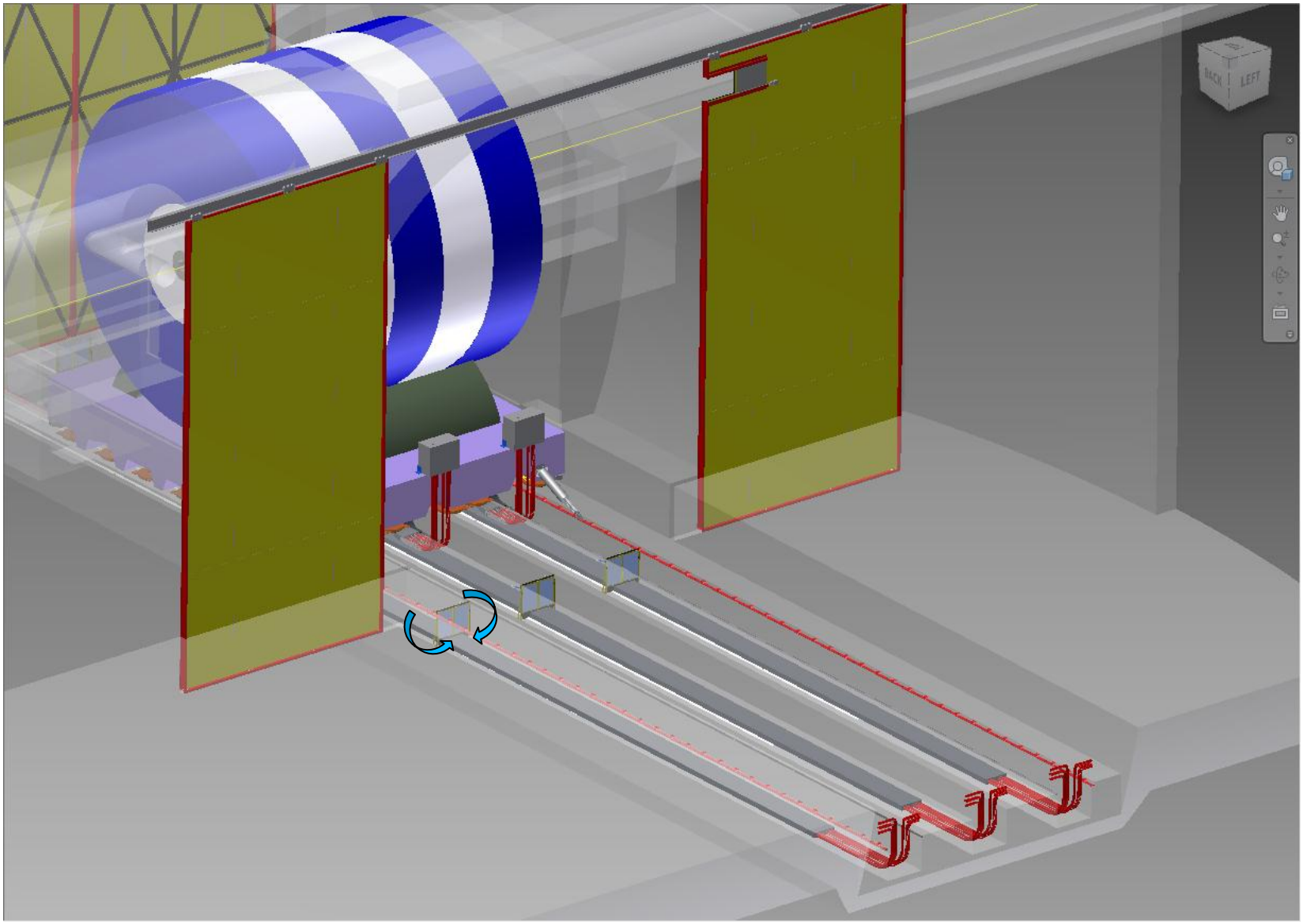
2. Opening of swinging doors (in trenches)



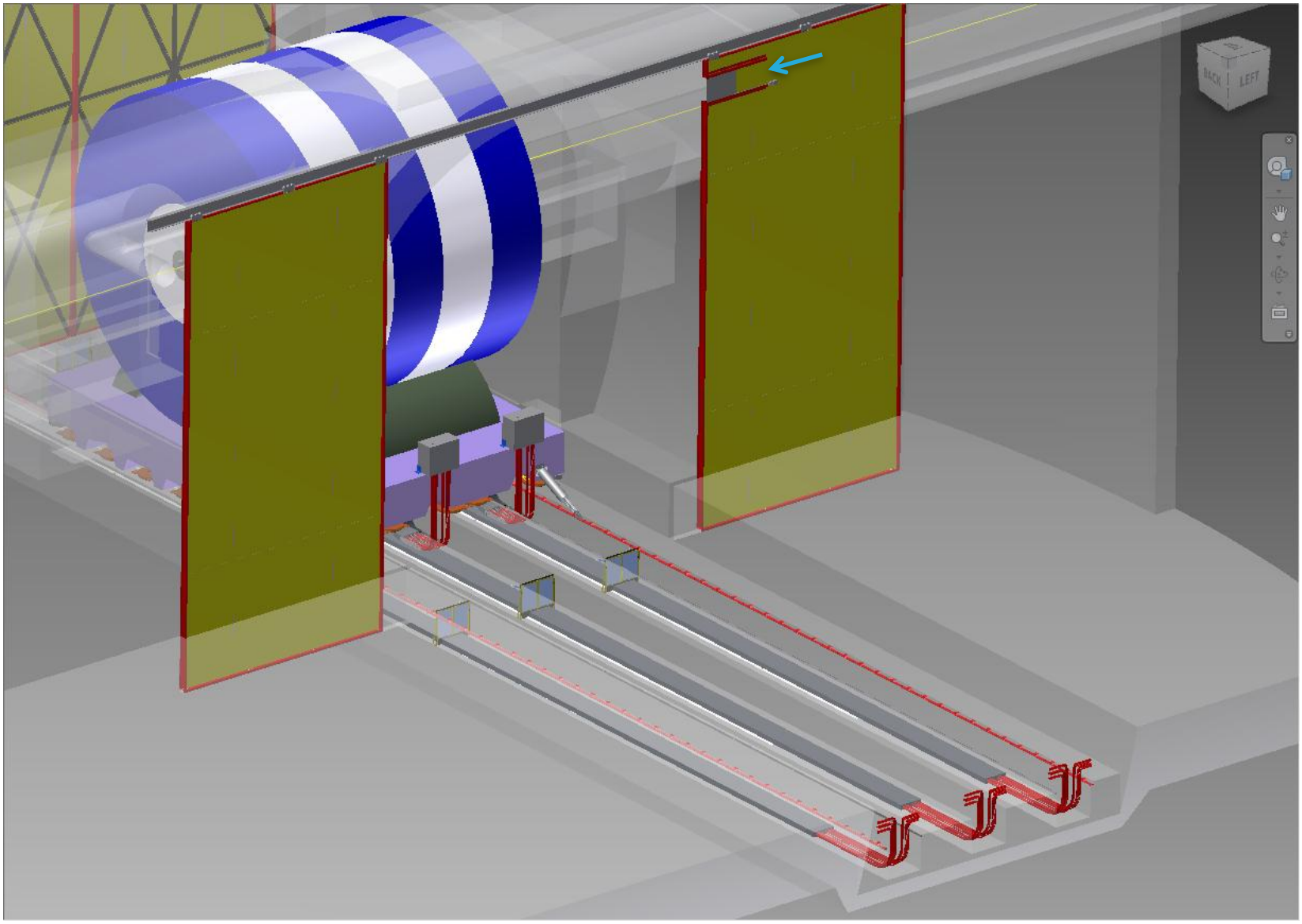
3. Moving the platform



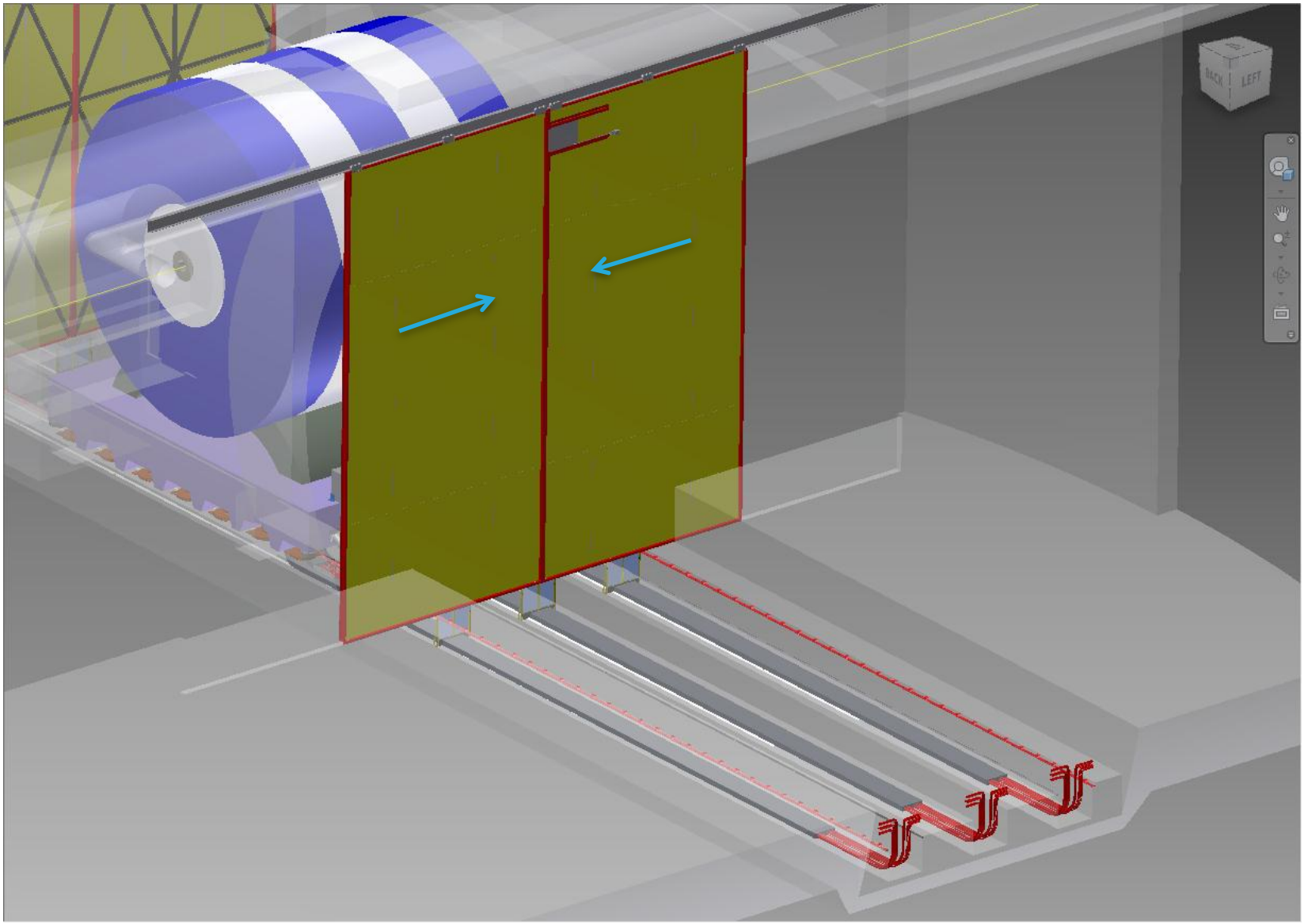
4. Closing swinging doors



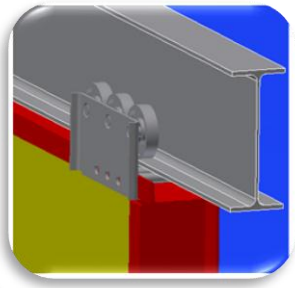
5. Closing upper gap for magnet power supply



6. Closing sliding doors

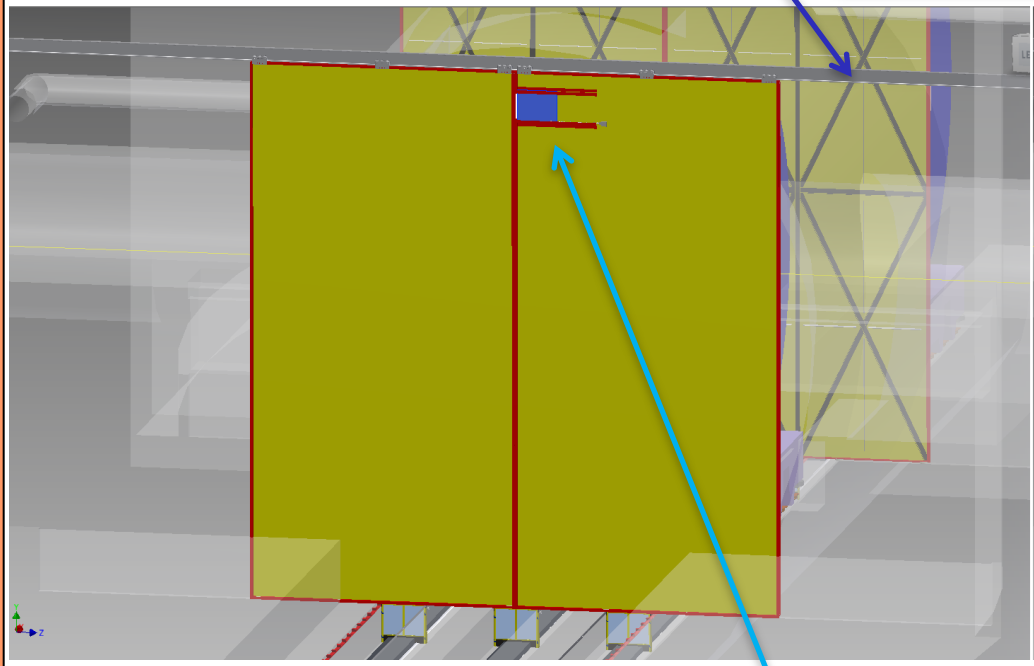


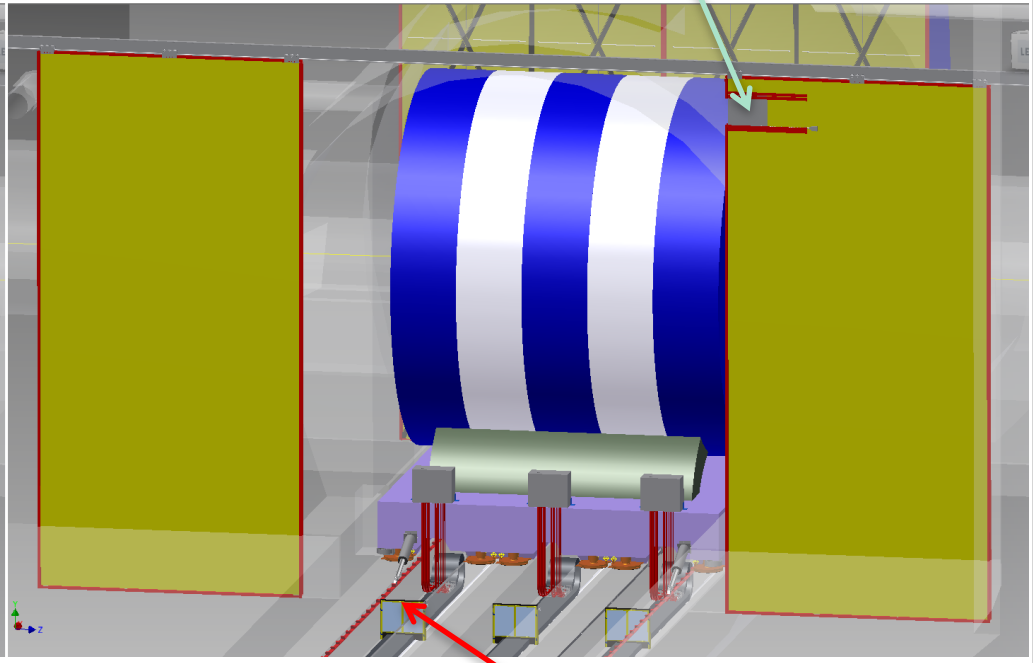
Sliding doors



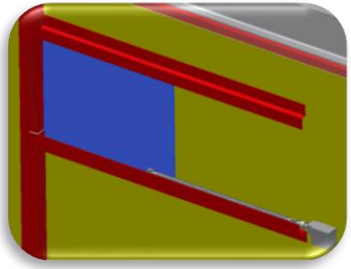
Both halves slide on I shape profile
Three pairs of trolleys per each half

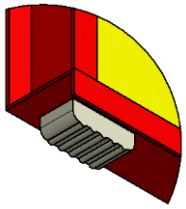
Magnet power supply permanently connected





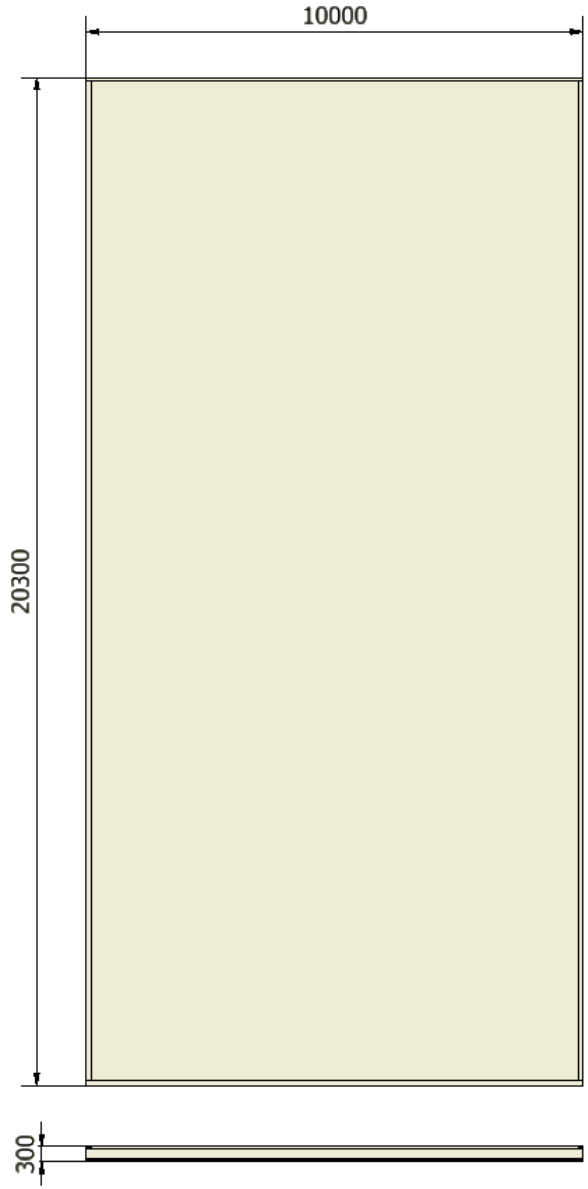
Whole gap for magnet power supply was moved to one of halves to enable easier closing it

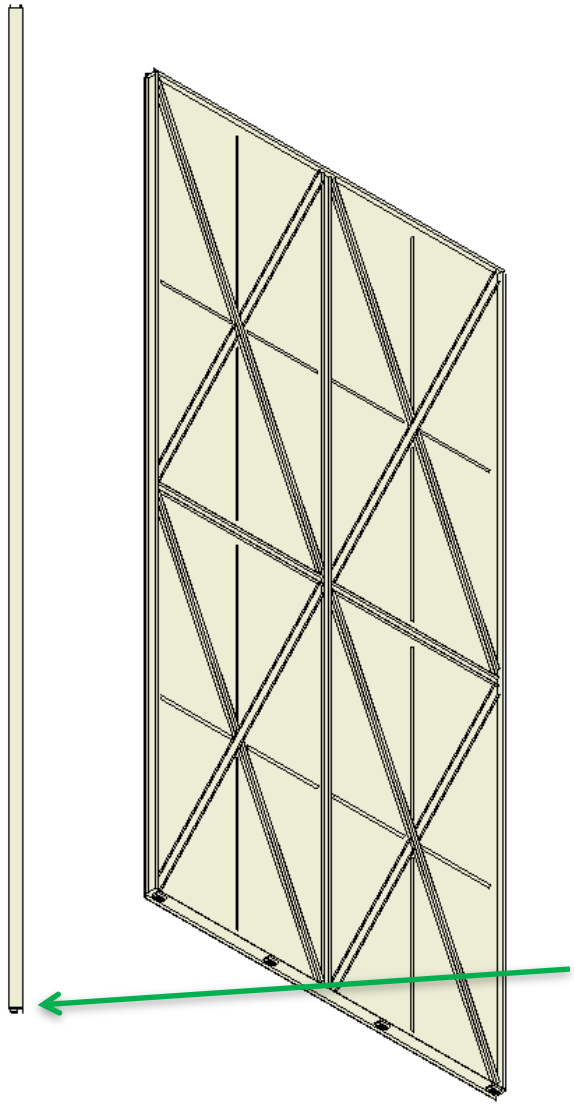


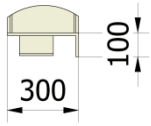


Sliding over the trench gap
Additional rollers ensure the movement

Cavern door layout







Main frame of C300 profile truss made of C200 profile

We assume the detectors are self-shielding

Thickness of 300[mm] if needed can be increased

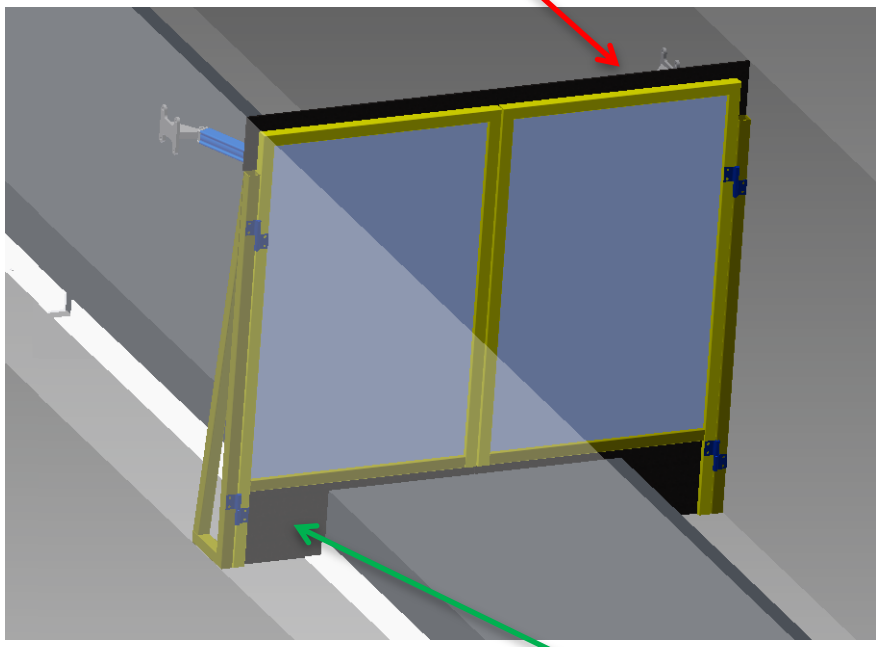
Sliding doors of approximately 13,3[t] each half

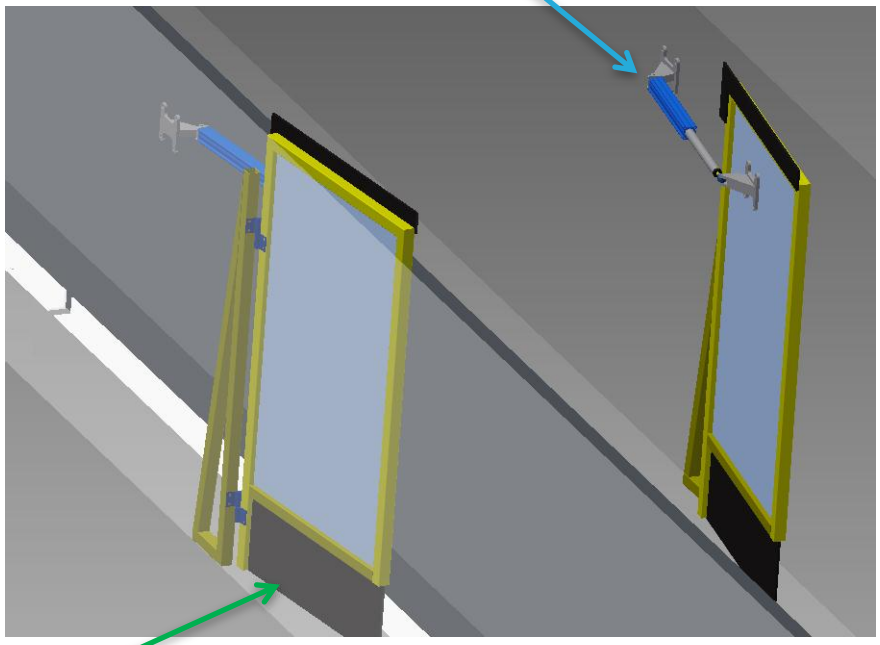
L shape profile at the bottom side to make door system more hermetic

Swinging doors – closing the trench area

Rubber part works as a gasket and seals area between swinging and sliding doors

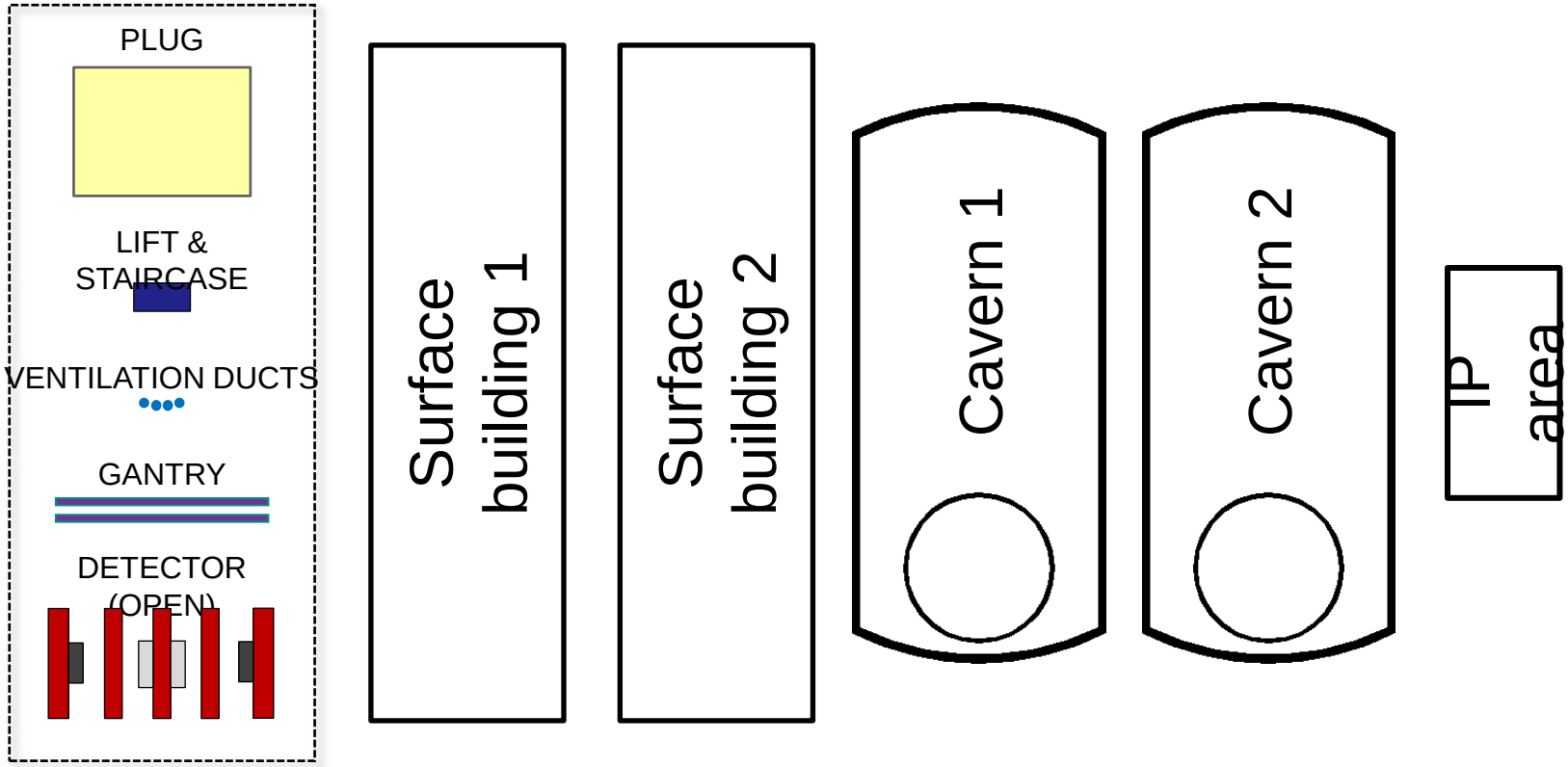
Pneumatic jacks open and close swinging doors



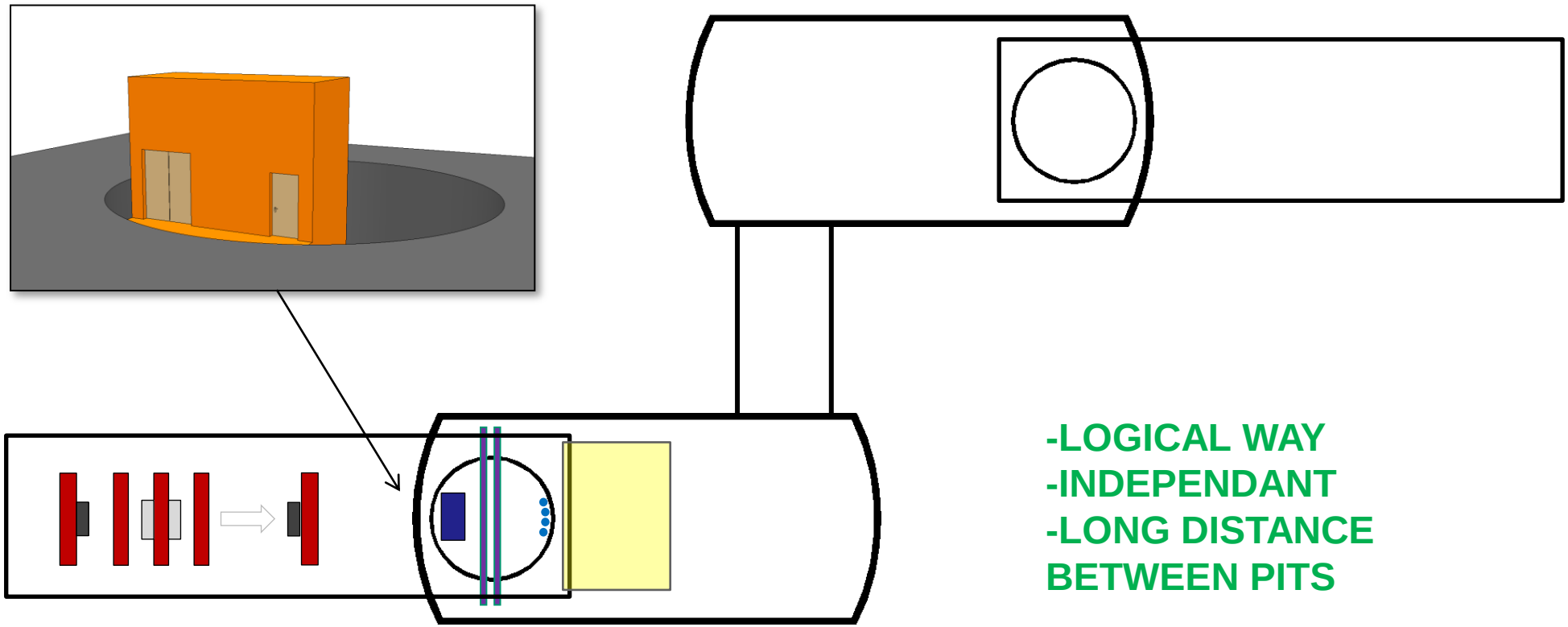


Rubber lower part gives flexibility to close the
- when cable chains lay on the bottom of the trench
- when cable chains are removed with platform to cavern

Surface & Underground arrangement



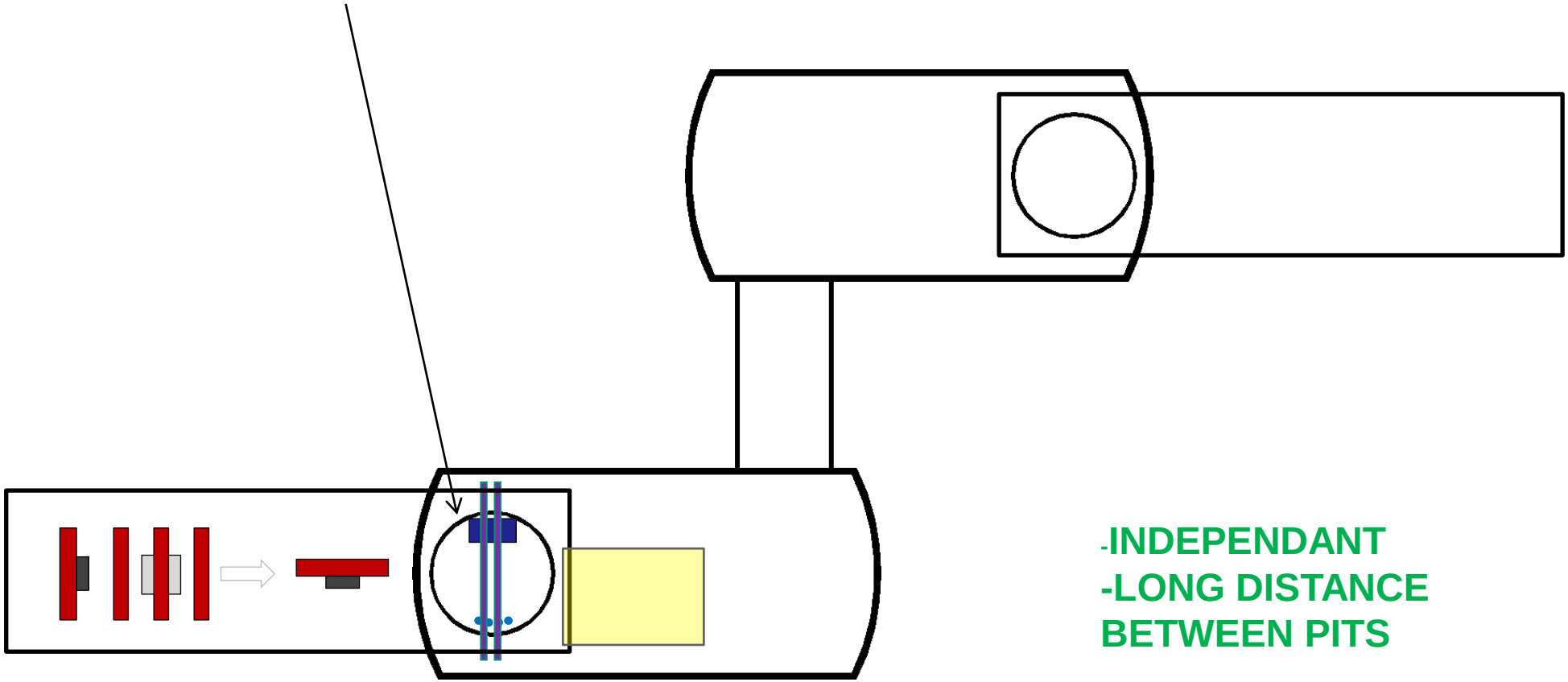
1- Logical sequence like CMS



-LOGICAL WAY
-INDEPENDANT
-LONG DISTANCE BETWEEN PITS

-CLASH BETWEEN DETECTOR & LIFT

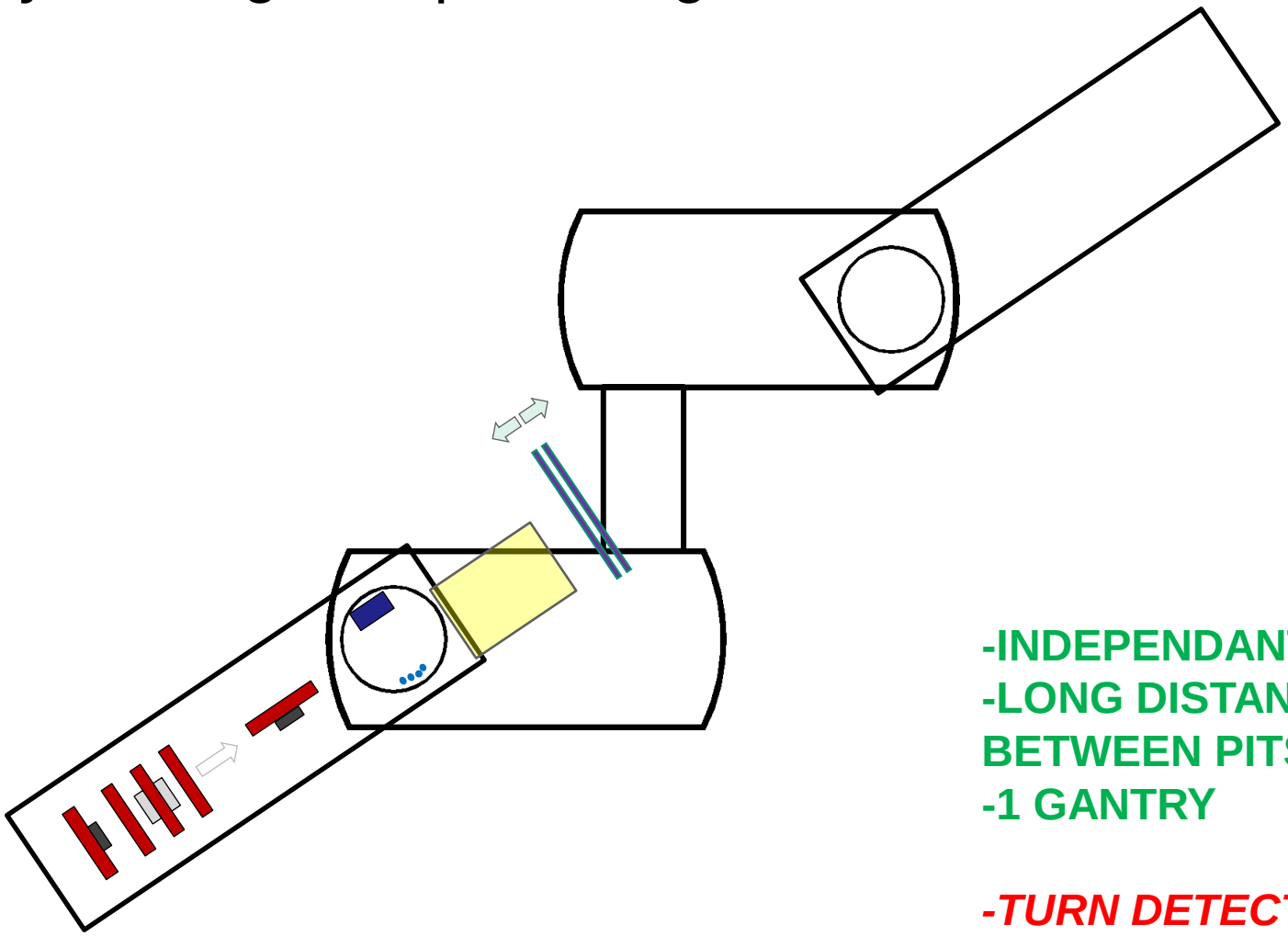
2- Turn 90° lift & ventilation



-INDEPENDANT
-LONG DISTANCE BETWEEN PITS

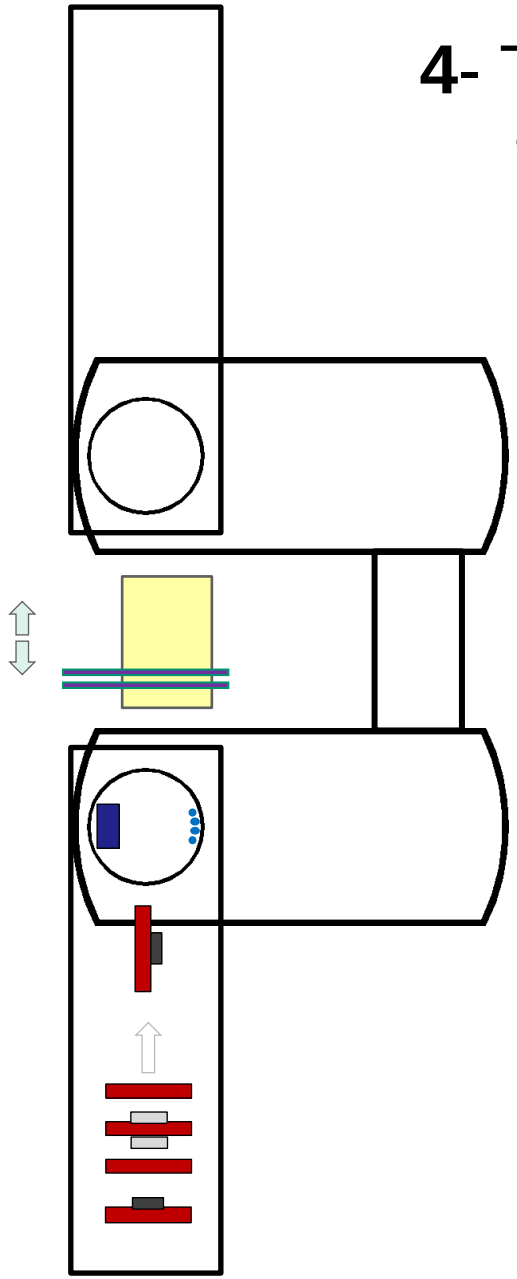
-TURN DETECTOR 2x
-2 GANTRYS & 2 PLUGS

3- Gantry sharing, oblique configuration



-INDEPENDANT
-LONG DISTANCE BETWEEN PITS
-1 GANTRY

-TURN DETECTOR 2x
-2 PLUGS



4- To Enable Gantry & plug sharing turn second cavern 90°

1 DETECTOR Turn
1 GANTRY
1 PLUG

PITS MAYBE TOO CLOSE

Summary

- Door thickness can be adapted to needs
- Airpads pneumatics and hydraulics installation under study
- Missing information of cables to be carried by cable chains
- Orientation of surface building not independent from cavern

Thank you