

Status of Civil Facilities Discussions



Karsten Buesser
DESY

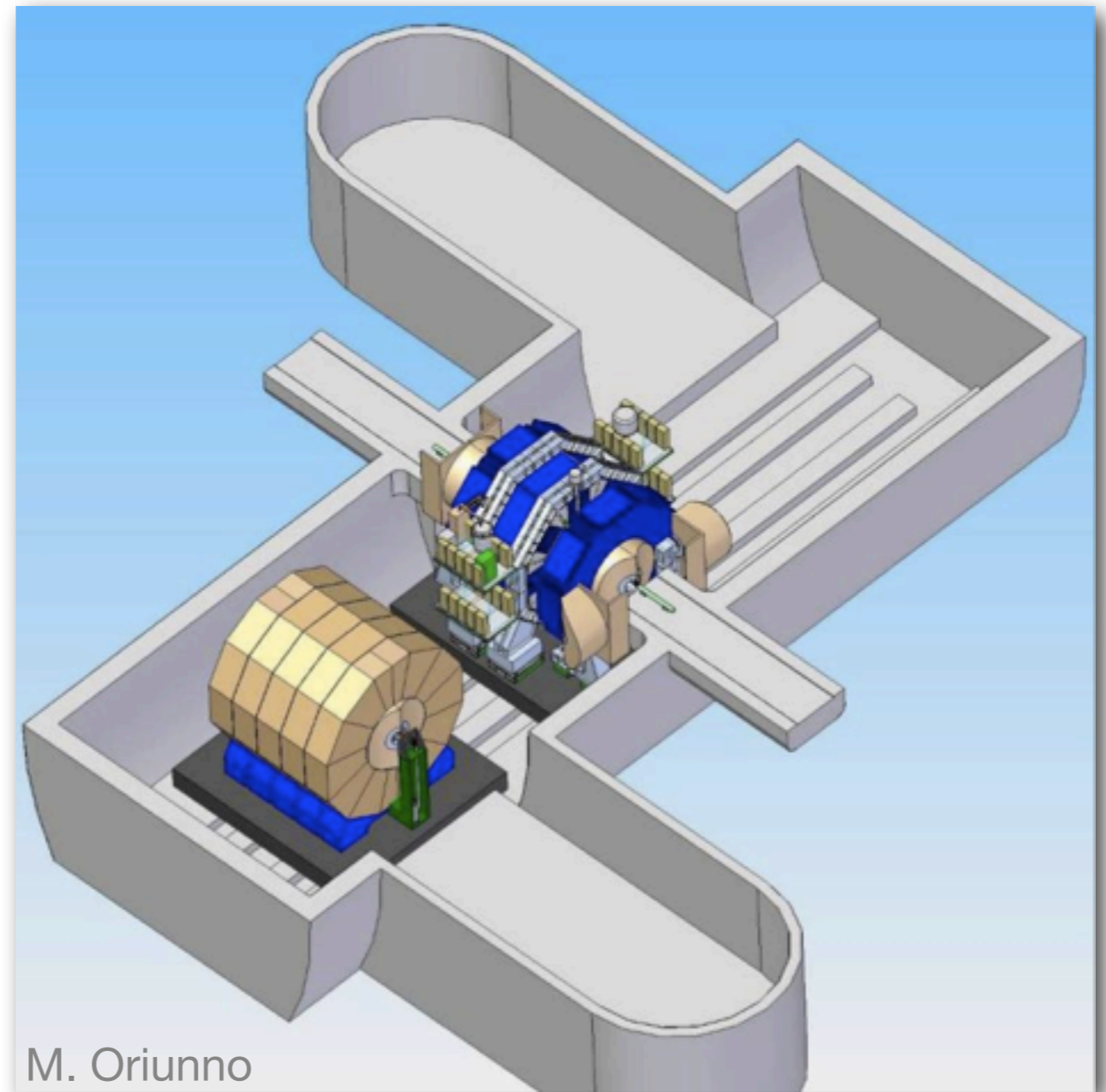
ILD MDI/Integration Webex Meeting
17th November 2011

Global MDI

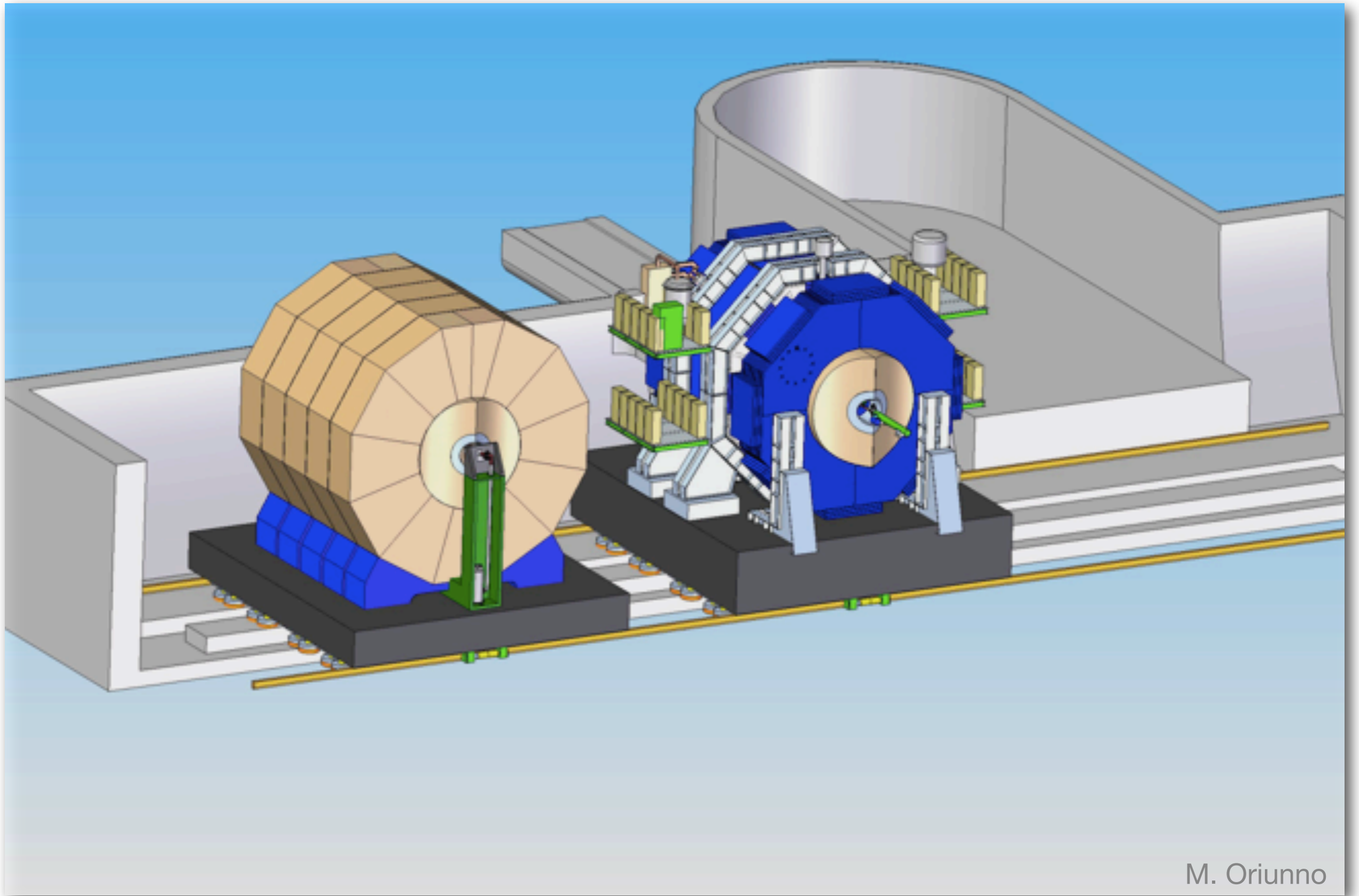
Main Topics



- Resources are limited
- Concentrate on topics that are of most relevance for the TDR/DBD
- Concentrate on cost drivers
 - Civil facilities at the IR:
 - underground areas
 - surface buildings
 - Push-pull system
 - Detector services



M. Oriunno



M. Oriunno

Platform-based detector motion system

Engineering Specifications




- Ongoing work within the MDI Common Task Group
 - Compiled by T. Tauchi
 - ILC-EDMS ID 967835
- Will be main supporting specification for TDR/DBD
- Takes into account modifications for mountainous sites

9 November, 2011

Engineering Specifications (2) : Experimentnal Hall	RDR	SiD	SiD in Mtn. site	ILD	ILD in Mtn. site
<i>Parameters that define the underground hall volume</i>					
IR Hall Area(m) ; (W x L)	25x120		25x110		25x110
Beam height above IR hall floor (m)	8,6		9(7.5)	8(9)	9
IR Hall Crane Maximum Hook Height Needed(m)	20,5	5m above top of detector	5m above top of detector	20,5	20,5
Largest Item to Lift in IR Hall (weight and dimensions)	400t	380t(HCAL)	380t(HCAL)	55t, 3x3x1.5m	400t
IR Hall Crane	400t+2*20t	400t(200tx2)/10t	400t(200tx2)/10t	80t(40tx2)	(200t+20t)x2
IR Hall Crane Clearance Above Hook to the roof (m)	14.5(includes arch)			6	12,5
Survive caverns(m) ; (W x L xH)	none			15x25x11	15x25x11
Resulted total size of the collider hall (W x L x H)	25x120x39	20.2x90x30	25x110x33	29x100x30	25x110x33
Area at garage position		19x 55.5	with side cavern	with side cavern	with side cavern
<i>Parameters that define dimensions of the IR hall shaft and the shaft crane</i>					
Largest Item; Heaviest item to Lower Through IR Shaft (weight and dimensions)	9x16m, 2000t	2500t	-	3500t, 15.7x7.81m	-
IR Shaft Size : diameter(m)	16	18	-	18	-
IR shaft fixed surface gantry crane. If rented, duration	1.5 years	1.5 years	-	1.5 years	-
Surface hall crane should serve IR shaft	Yes	Yes	-	Yes	-
Other shafts near IR hall for access	No	Yes	-	No	-
Elevator and stairs in collider hall shaft	Yes	?	-	Yes	-
Size of access tunnel at Mtn. site (W x H, m)	-	-	11x11, 10.2x8.0	-	11x11, 10.2x8.0
Inclination of access tunnel at Mtn. site (%)	-	-	< 7	-	< 7
Length of access tunnel at Mtn. site (km)	-	-	1,5	-	1,5
<i>Parameters that define dimensions of the surface assembly building and its crane</i>					
Surface Assembly Building Area ((W x L , m)	25 x 100 / detector			30x60	27x100 / detector
Largest Item to Lift in SurfAsm. Bldg. (weight and dimensions)	400t	380t(HCAL)	(solenoid)	180t	400t, 8.6φx8 (solenoid)
Surface Assembly Crane	400t+2*20t	400t(200tx2)/10t	400t(200tx2)/10t	2x80t	(200t+20t)x2
SurfAsm. Crane Maximum Hook Height Needed(m)	18	20	20	19	20,5
SurfAsm. Crane Clearance Above Hook to the roof (m)	7			5m to ceiling	6,5
Resulted volume of surface assembly building (W x L x H, m)	25 x 100 x 25			30x60x24	27x200x27
<i>Parameters that define crane access area and clearance around detector</i>					
SurfAsm. crane accessible area (needed) / available (W x L, m)	20 x 102			28x56	
IR hall crane accessible area (needed) / available (W x L, m)	22 x 98		18x98	28x41	18x98
Maximum Detector Height(m)		16,15	16,15	15,74	15,74
Detector Width (m)		18.53(14.334)	18.53(14.334)	15,665	15,665
Minimum Detector Clearance (W x L x H, m)				15.67x13.26x15.74	15.67x13.26x15.74
<i>FILL IN OTHER IMPORTANT PARAMETERS WHICH ARE MISSING</i>					
Maximum AC power (MW)	-				
Temperature control (°C)	-				
Humidity control (%)	-				
Sump Pump Control System (ground water)	-				
Cryogenics system : 4K He liquefier and large dewar	-	same level as the coil	same level as the coil	service cavern	service cavern
Dump register	-	on the detector	on the detector	service cavern	service cavern

MDI Technical Baseline Review

Europe/Berlin English Login

ILC Source/RTML/BDS+MDI Technical Baseline Review

24-27 October 2011 *Universe*
Europe/Berlin timezone

 Search

- Overview
- Scientific Programme**
- Timetable
- Registration
 - Registration Form
- List of registrants
- Video Services
- Accommodation
- How to get there

This workshop represents the second comprehensive **Baseline Technical Review**, following on from the Damping Ring BTR held in INFN Frascati in July. The main goal of the BTRs is to formally establish a consensus baseline for the ILC TDR. The workshop will cover four Accelerator Systems:

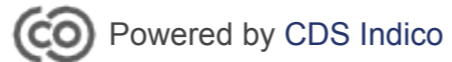
1. Electron source
2. Positron source
3. RTML (including bunch compressor)
4. BDS and MDI (including detector hall)

The review will in general focus on the following themes:

- Parameters, lattice and layout
- Technical systems (magnets, power supplies, RF, vacuum etc.)
- Key technologies (R&D, with a view to down-select if required)
- CFS requirements and specifications
- Cost.

In addition to these general themes, key issues specific to individual accelerator systems will be addressed. A particular emphasis will be placed on formal documentation, ready for inclusion in EDMS.

<http://ilcagenda.linearcollider.org/event/5222>
Last modified: 27 October 2011 17:54



MDI Technical Baseline Review

Navigation icons: Home, Previous, Next, More, Edit

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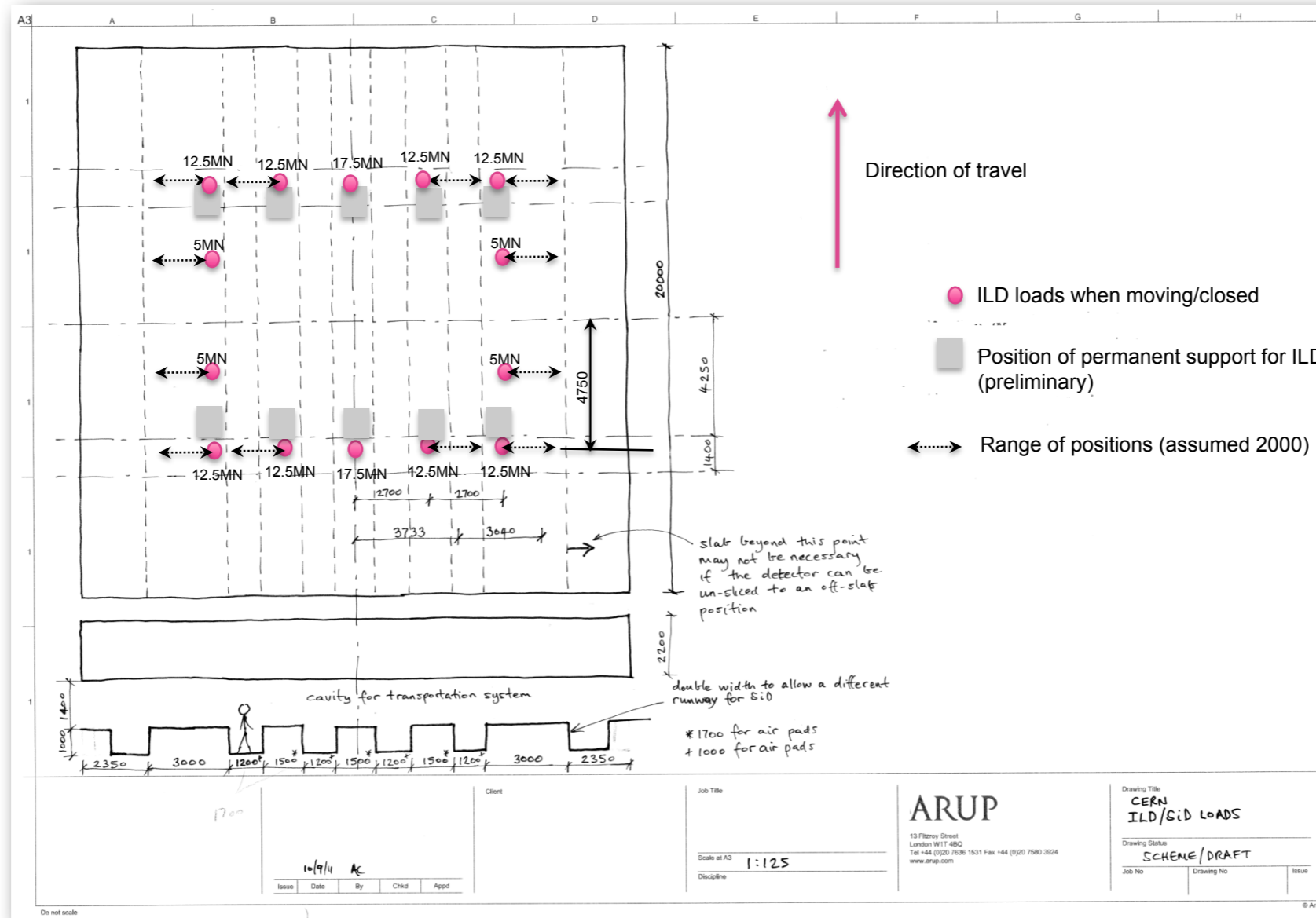
Last mod...

Powered by CDS Indico

CFS Interaction Region Studies

- Launched study with contractor ARUP on two tasks:
 - Task 1: Design concept for detector movement platform
 - Task 2: Layout of CLIC complex based on CERN geology
- Joint ILC/CLIC CFS initiative

ARUP Task 1: Platform Design



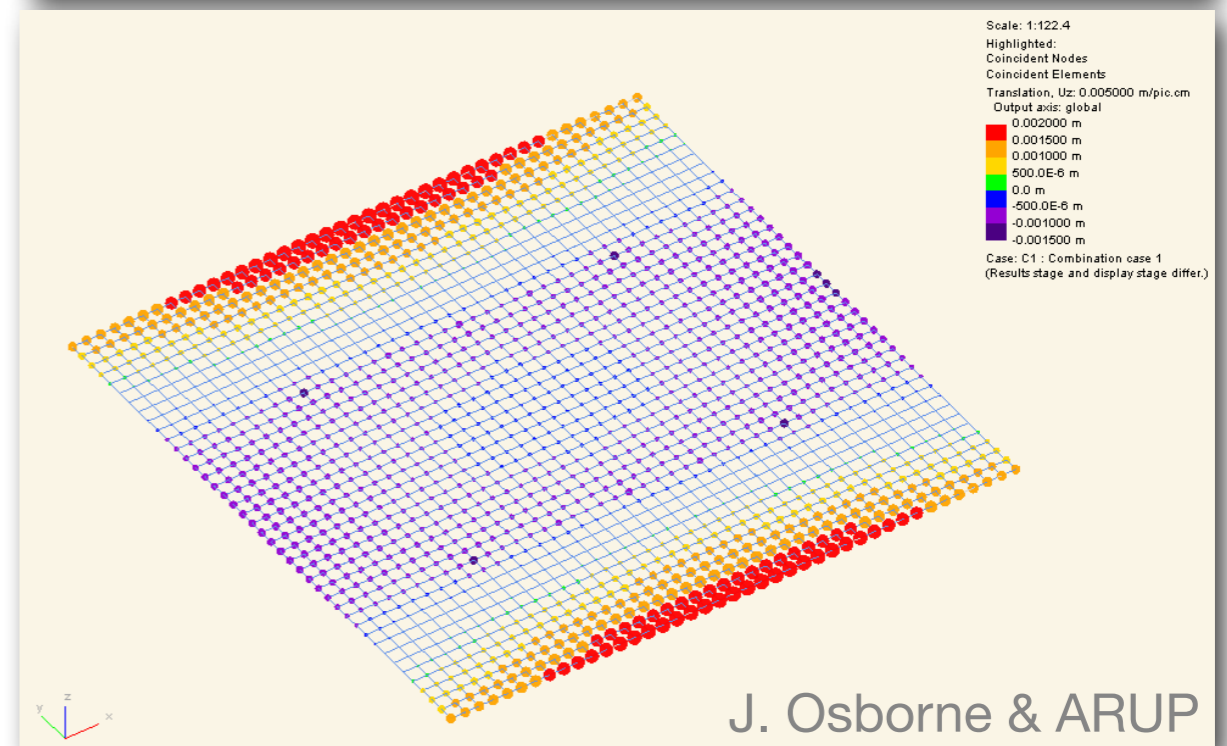
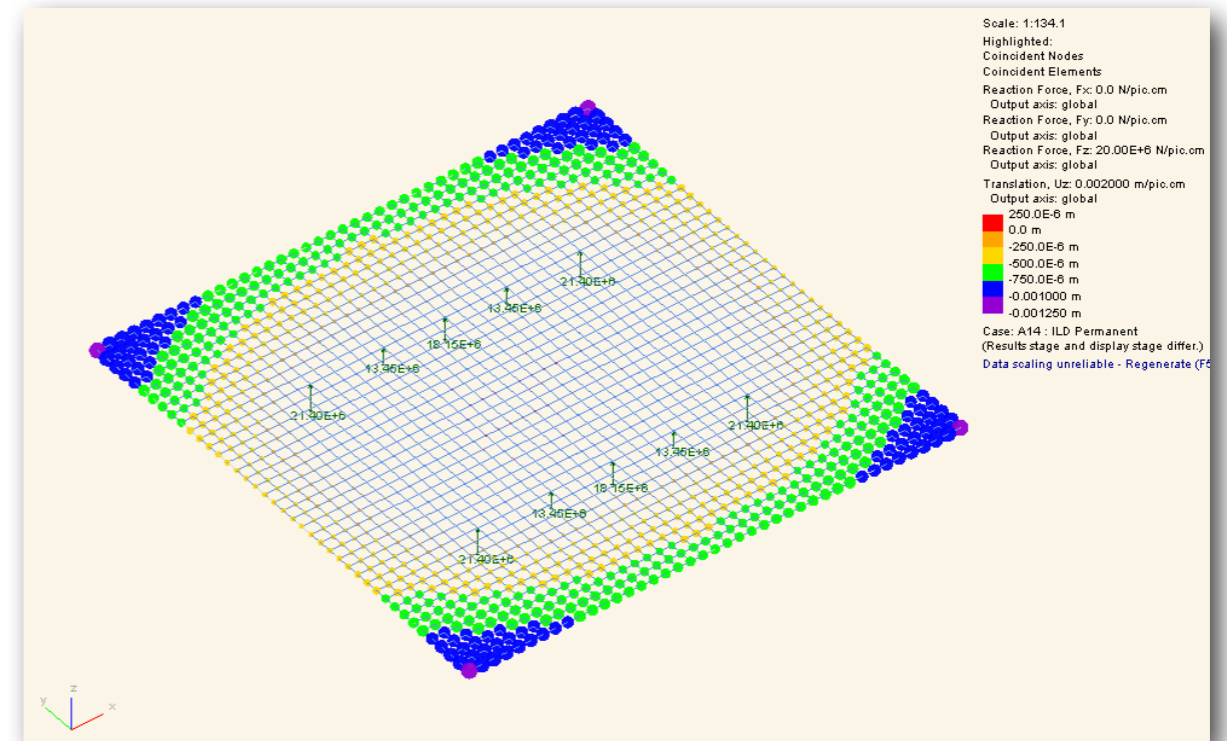
J. Osborne & ARUP

- ILD is the bigger challenge: heavier and larger than SID:
 - Thinner platform at same beam height
 - Larger loads on platform

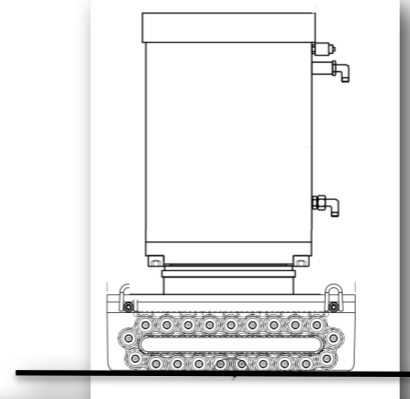
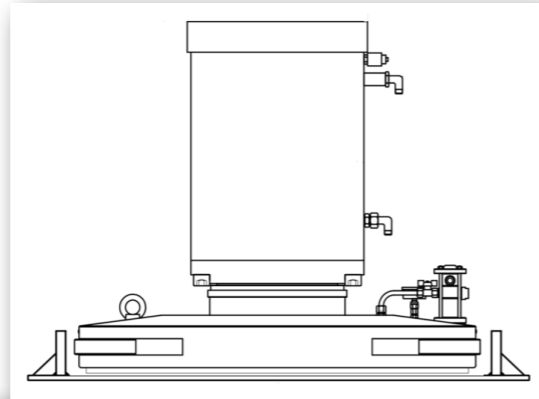
ARUP Task 1: Platform flexures



- Unloaded platform:
 - Flexure: +0.25mm; -1.25mm
- Loaded platform jacking onto transport system:
 - Flexure: +1.9mm; -1.0mm



ARUP Task 1: Detector Movement System



Pads	Rollers
Min 60 required (for ILD, no redundancy)	Min 18 required (for ILD)
No hardened track->can accommodate minor steps	Specialist hardened and flattened track
Design for 1% friction	Design for 3% friction
Pressure infrastructure	Larger propulsion infrastructure
Run-away	Higher friction ->less run-away

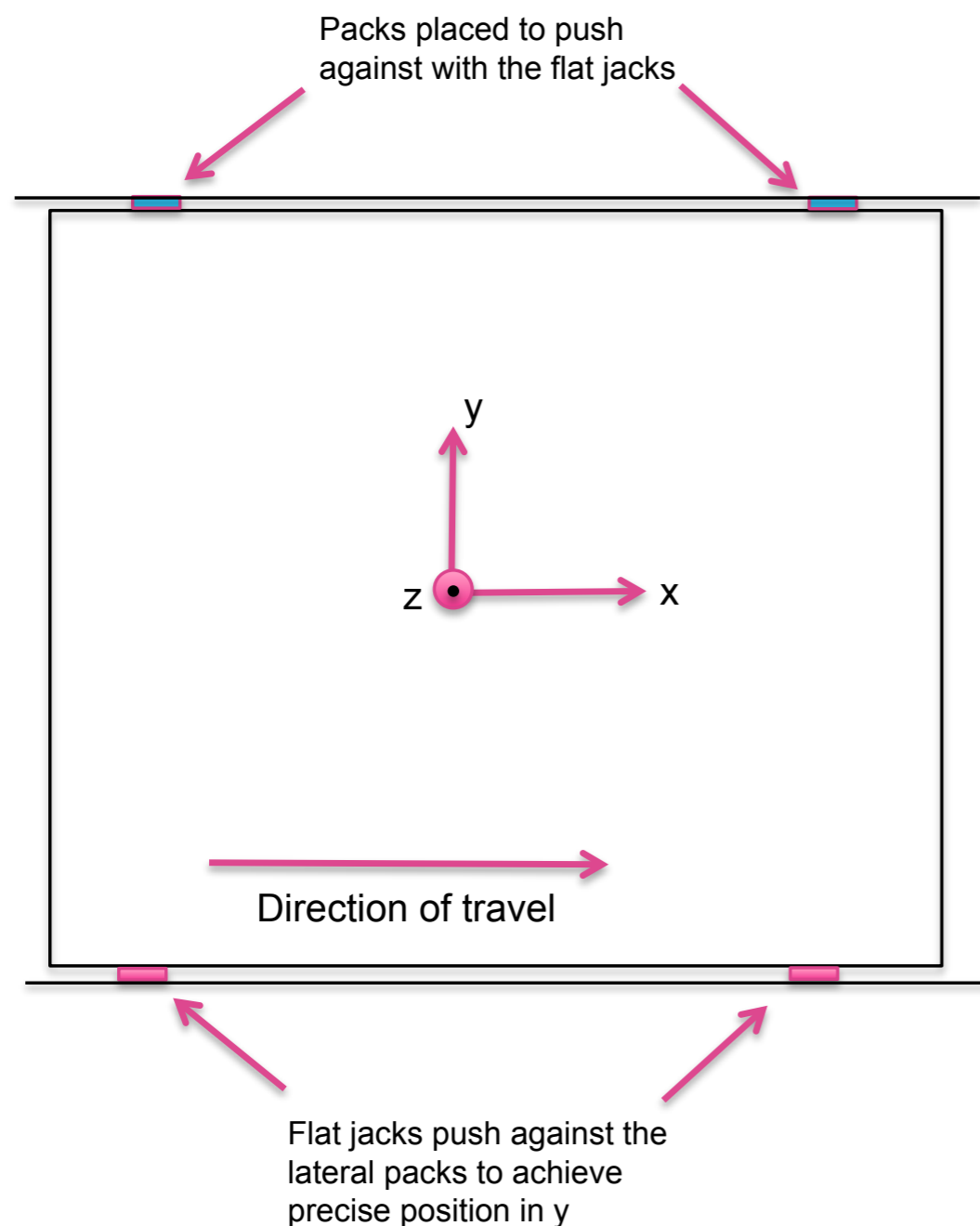
- Two solutions under study:
 - Air pads
 - Hilman rollers

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ARUP Task 1: Positioning System



The final positioning system

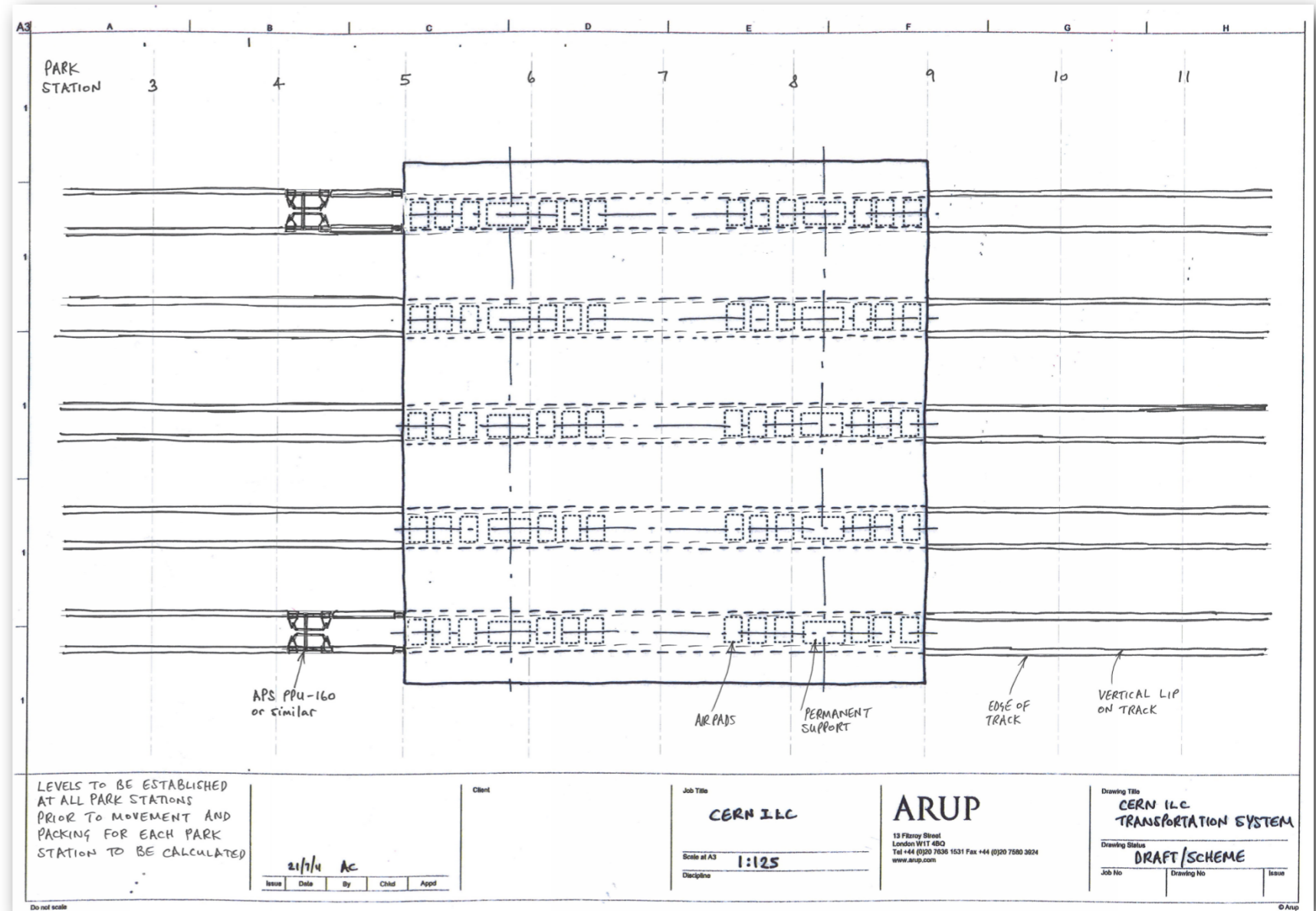
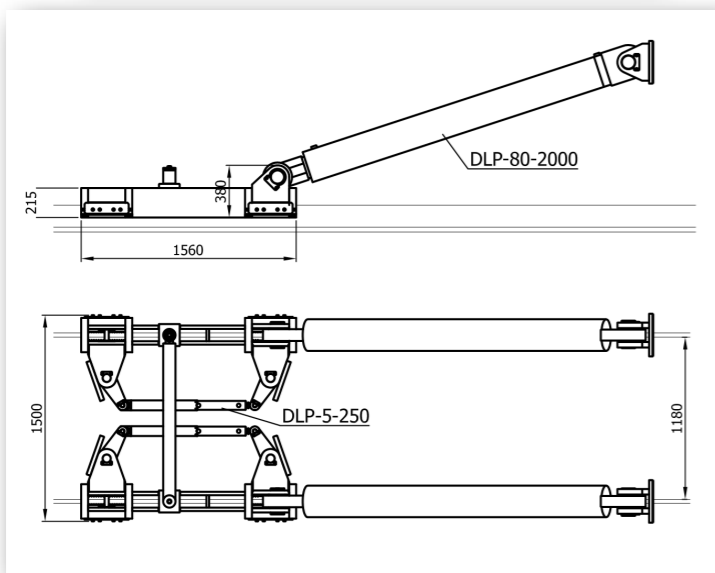


Degree of freedom	Methodology
x, R _{zz}	Push pull system
z, R _{xx} , R _{yy}	Pack adjustment under slab
y (air-pads) <i>illustrated</i>	Lateral push with flat jacks whilst air pads are active
y (rollers) <i>illustrated</i>	Lateral push with flat jacks whilst the lateral slider (on the roller) is un-locked

Note, R_{xx} is rotation about the x-axis, etc

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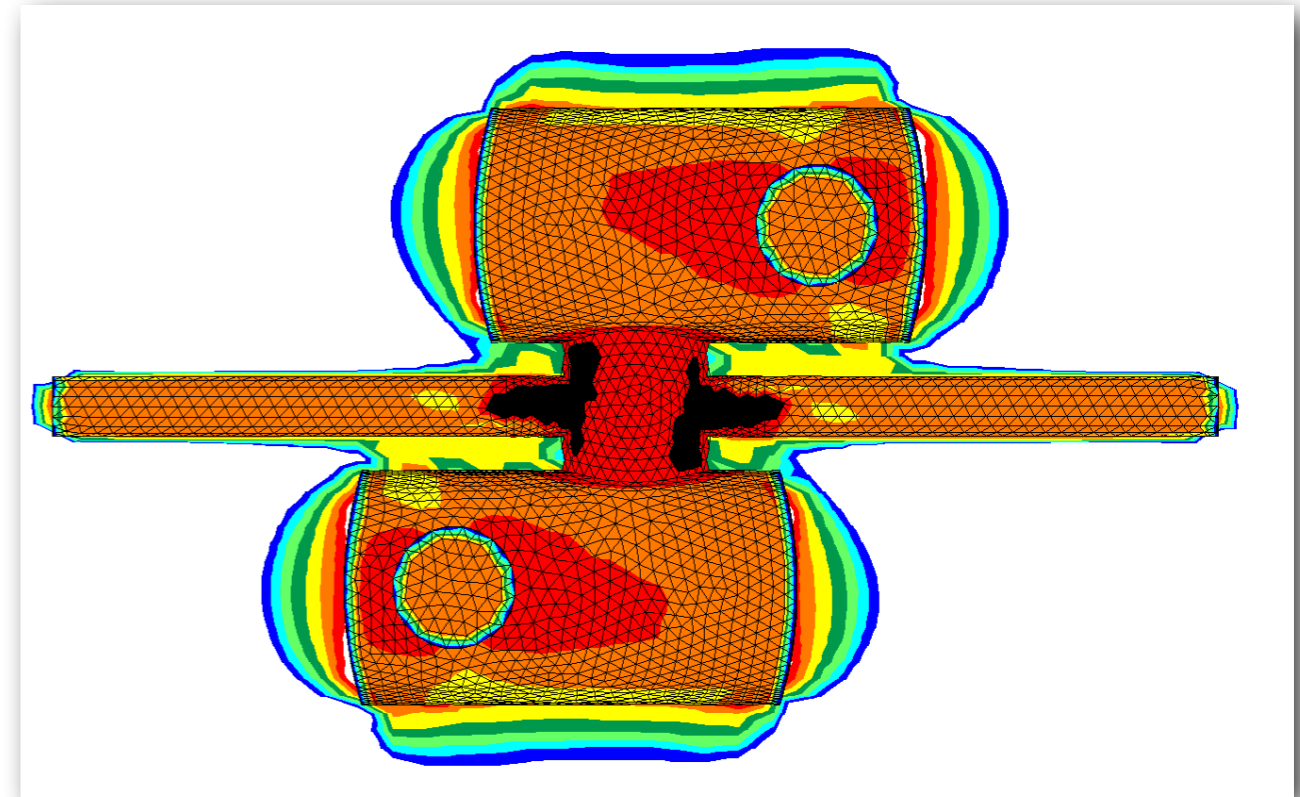
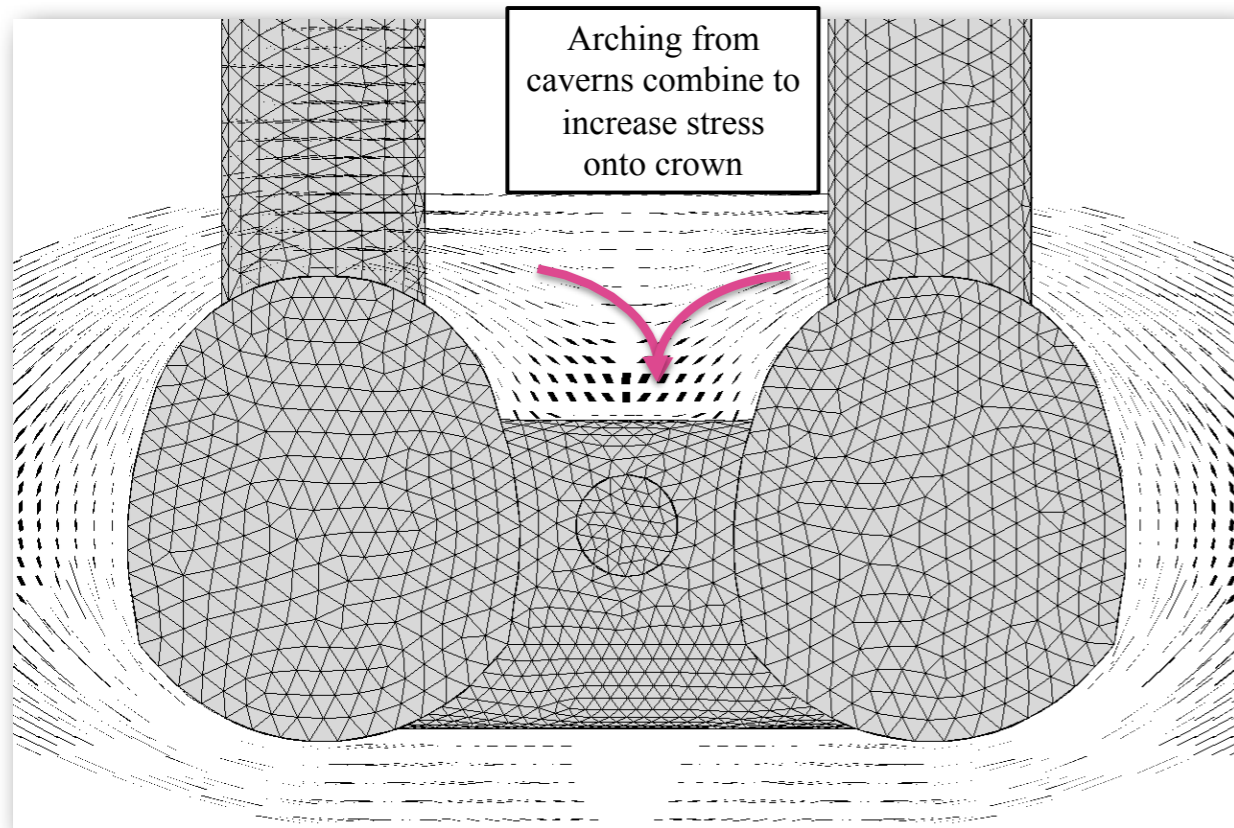
ARUP Task 1: Drive System



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- Air pad drive system using grip jacks

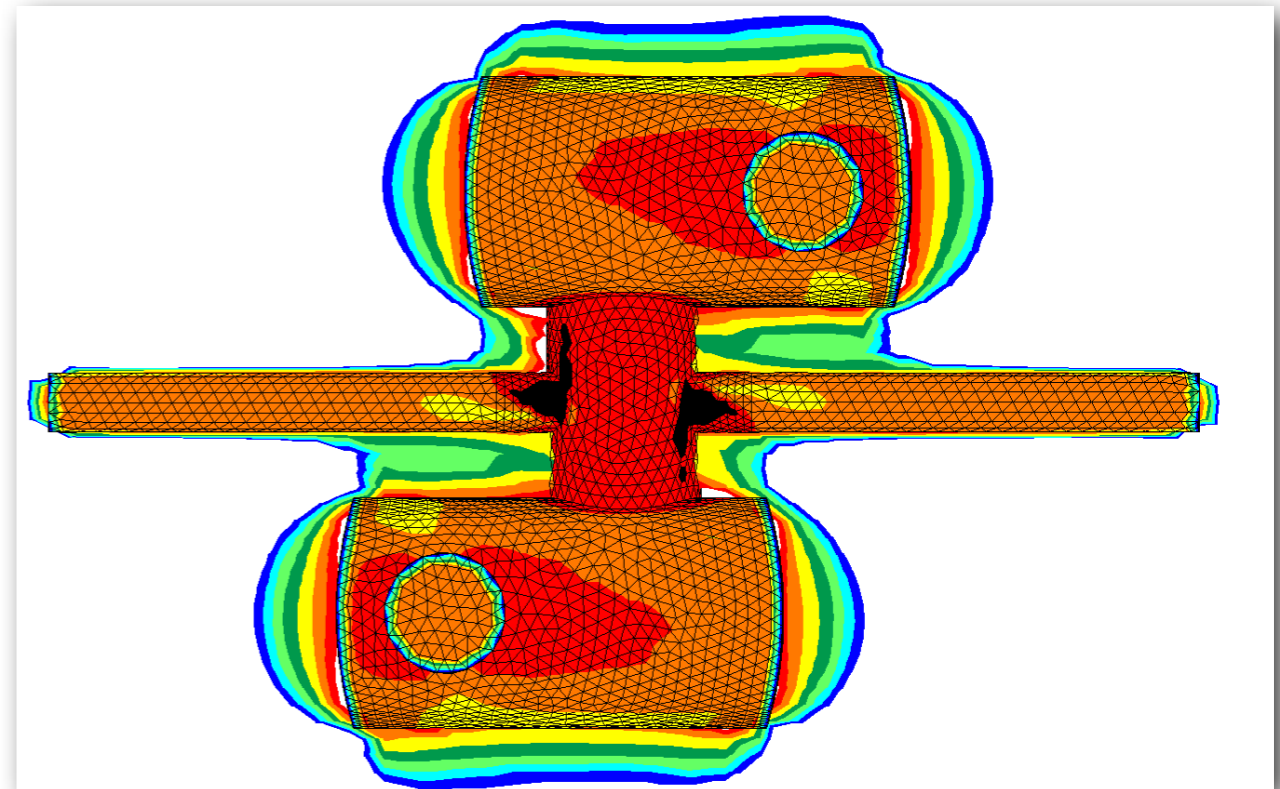
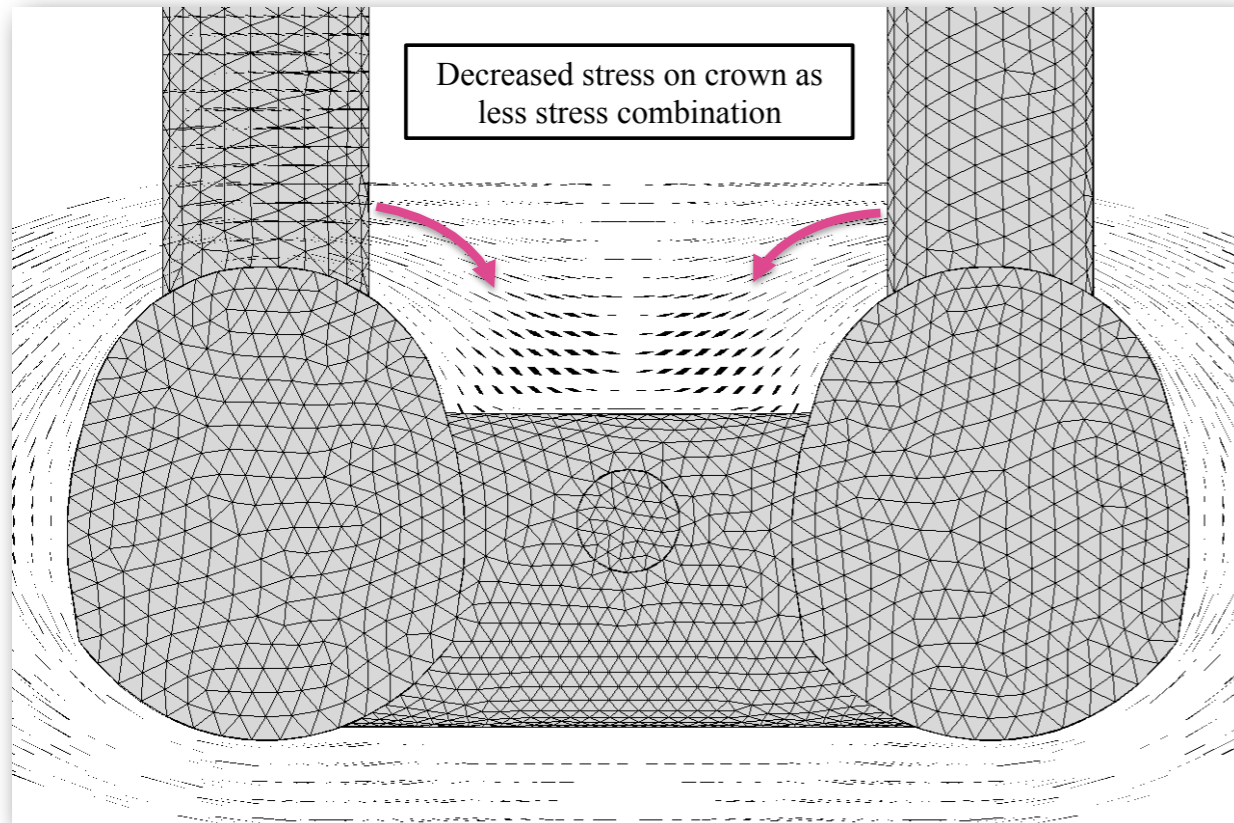
ARUP Task 2: CLIC Underground Hall



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- Layout of CLIC underground hall in CERN geology
- Higher stresses mean more complicated lining and rock support and higher risk of rock yield

ARUP Task 2: CLIC Underground Hall

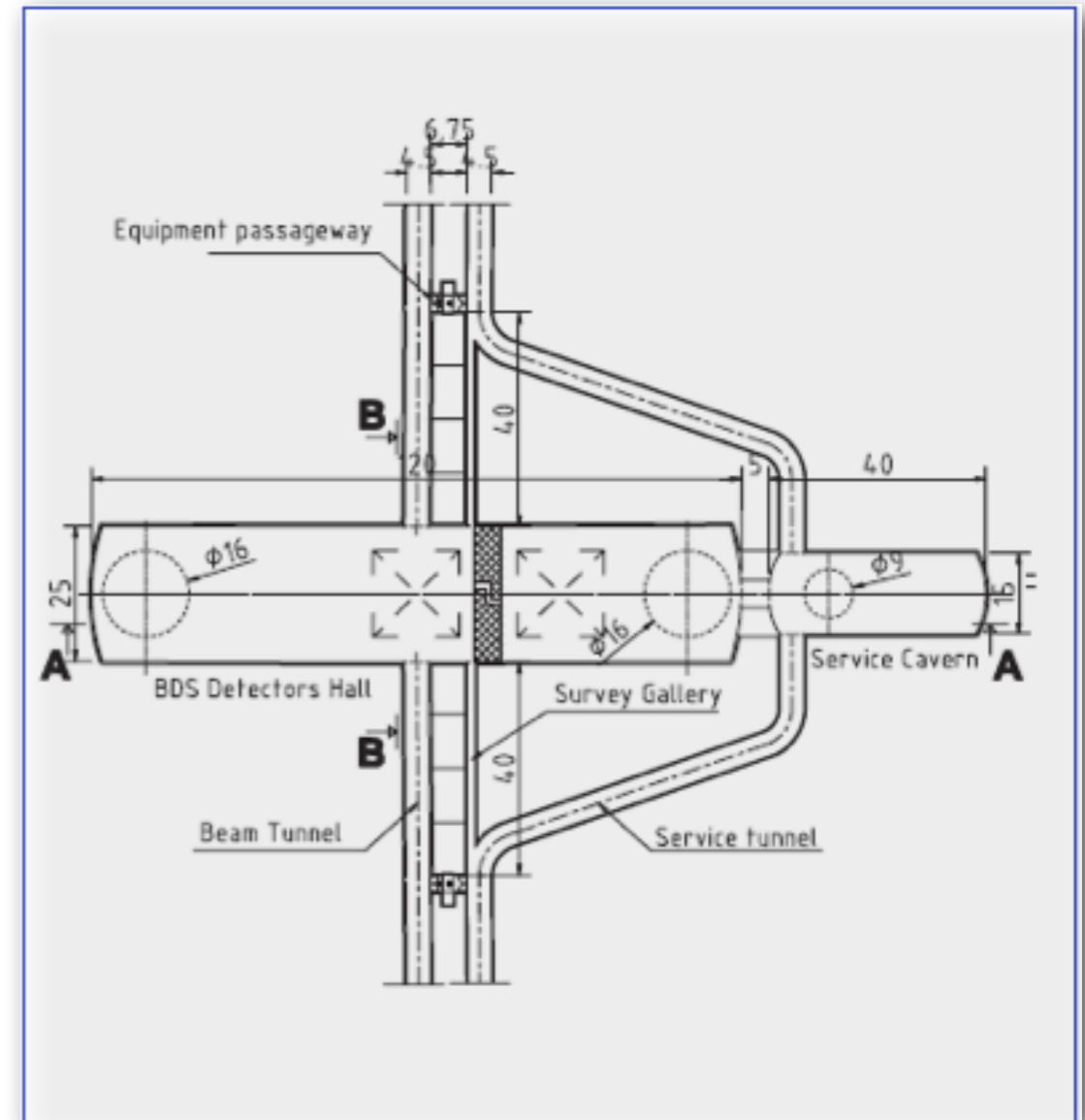


J. Osborne & ARUP

- Modification to the layout could reduce stresses
- Results can help to evaluate also other geologies

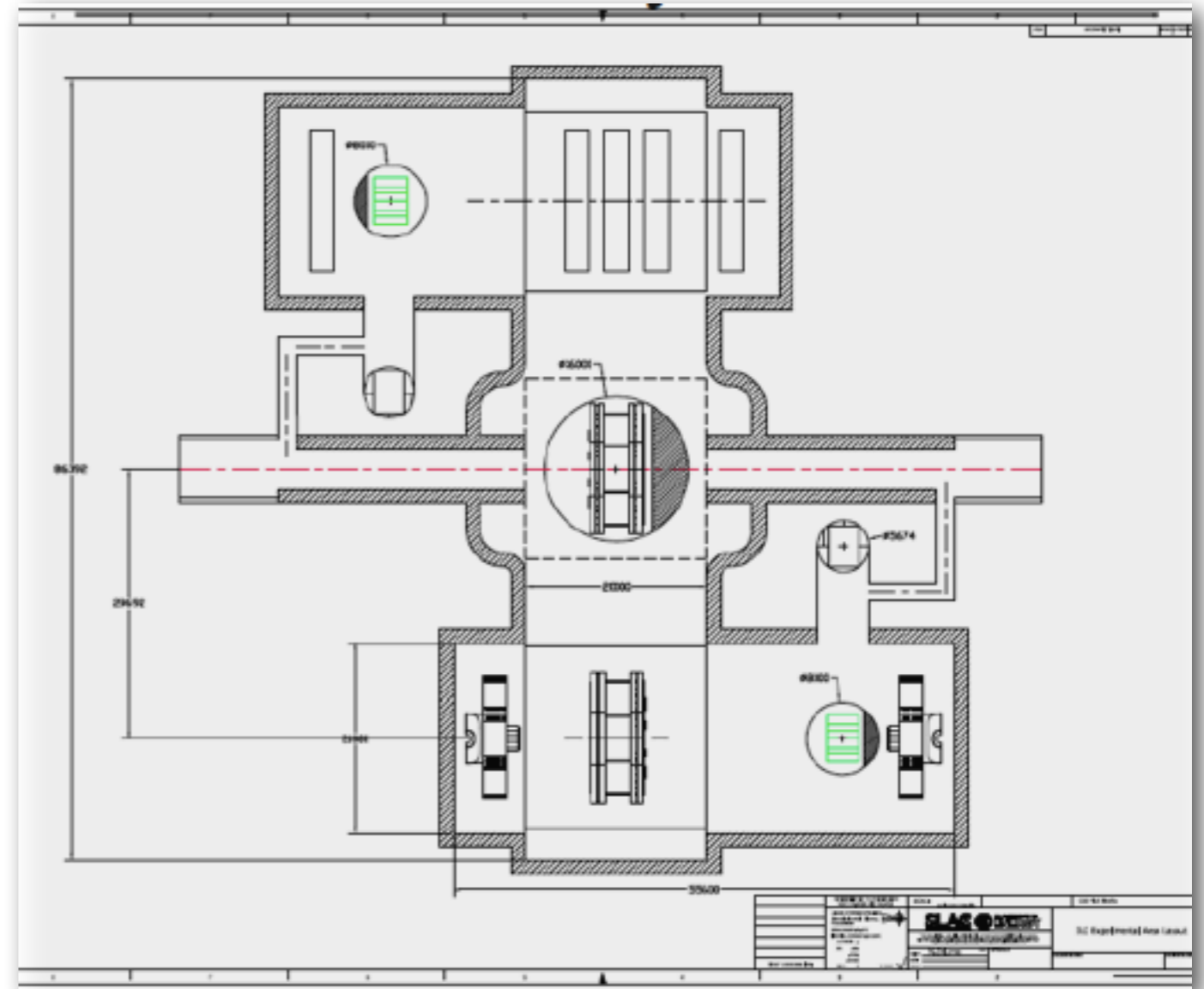
RDR IR Hall Layout

- Large (120m long)
- Shafts above experiments
- Not enough space in garage positions
- No space for services
- Not optimised for push-pull operations

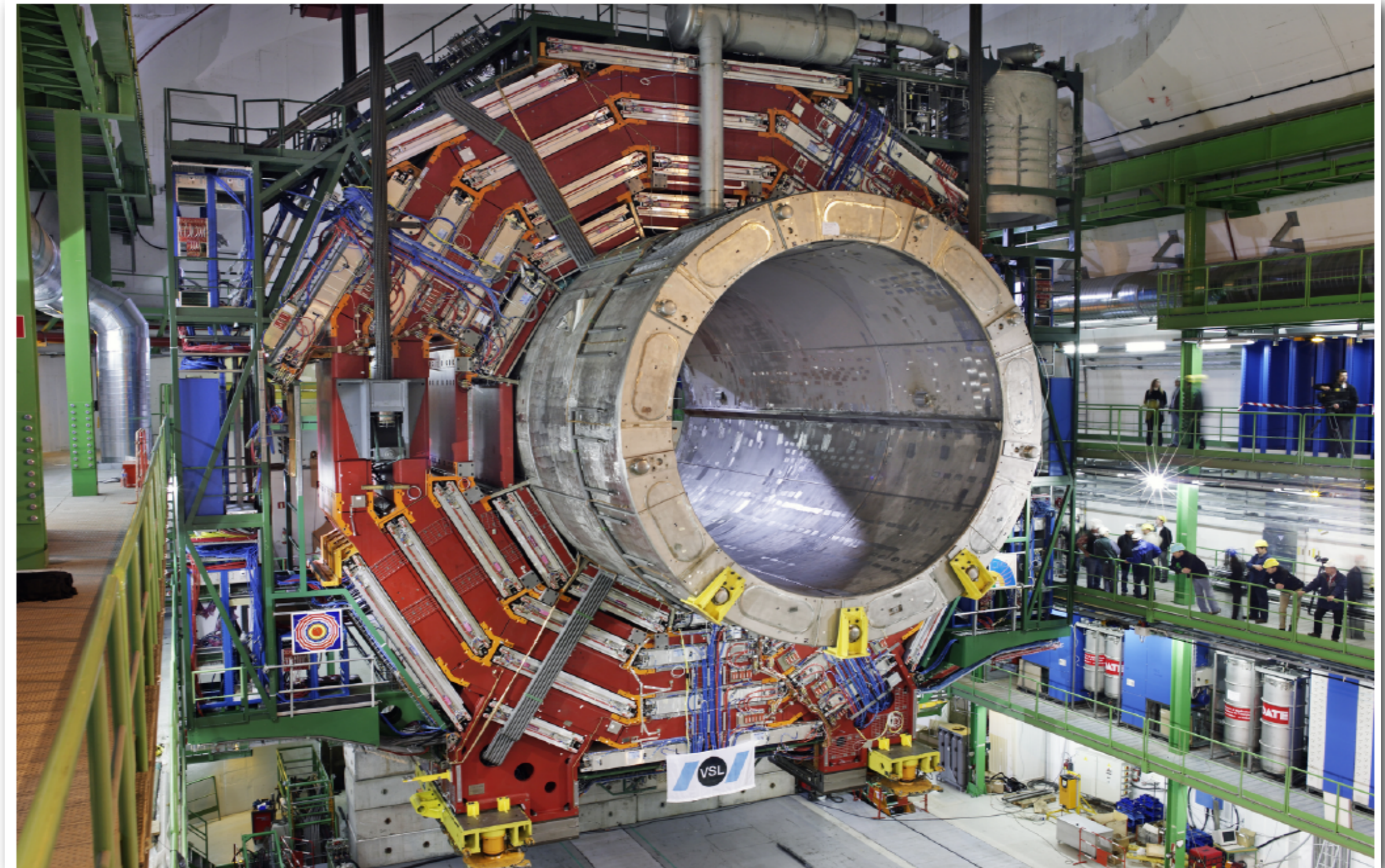


Latest IR Hall Layout

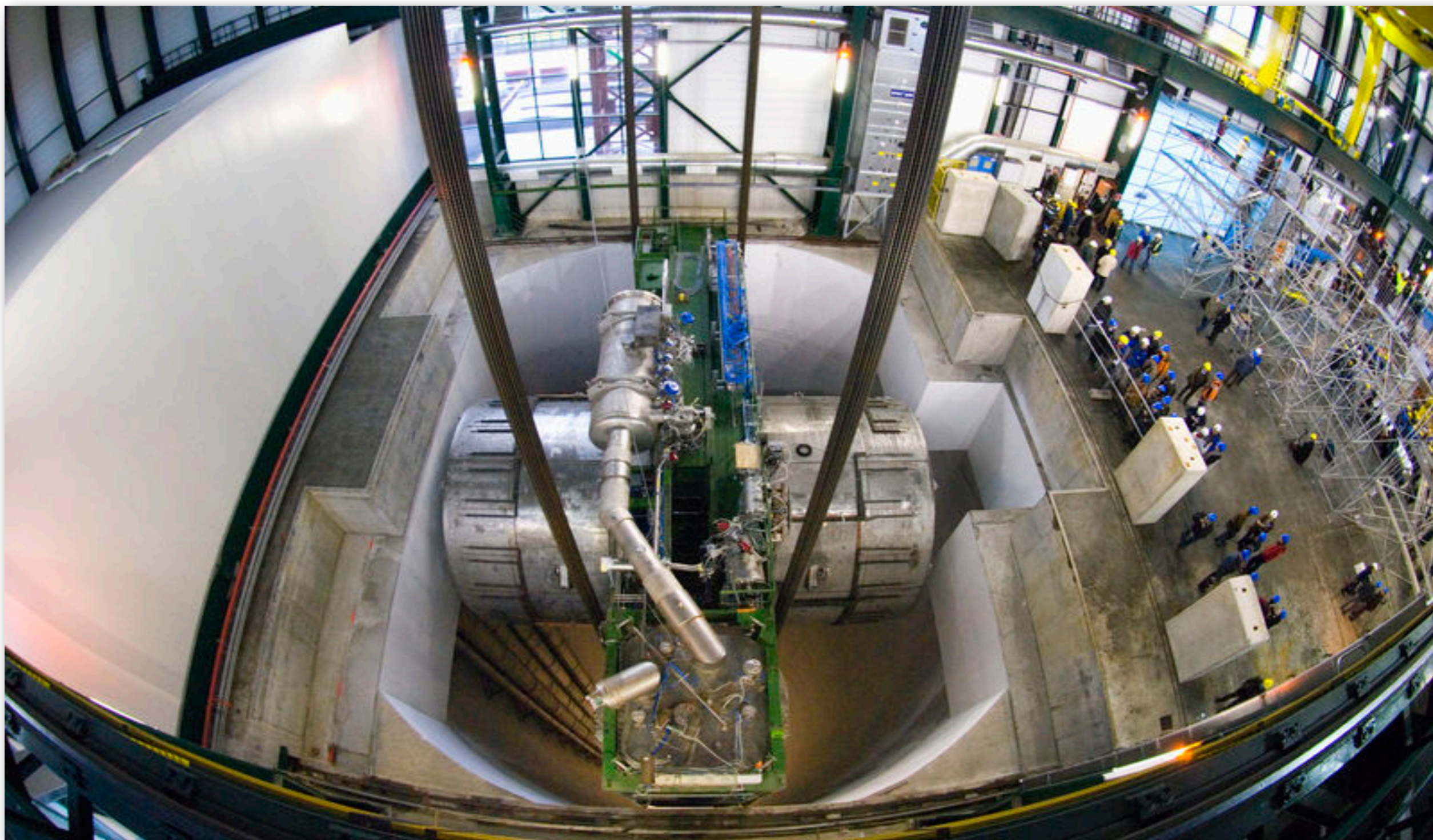
- Z-Shape
- Garage positions allow detector maintenance
- Only one large (~18m) shaft
 - used only in installation phase
- Maintenance shafts (~9m) in garage positions
- Small shafts for elevators (safety issues)
- Work in progress



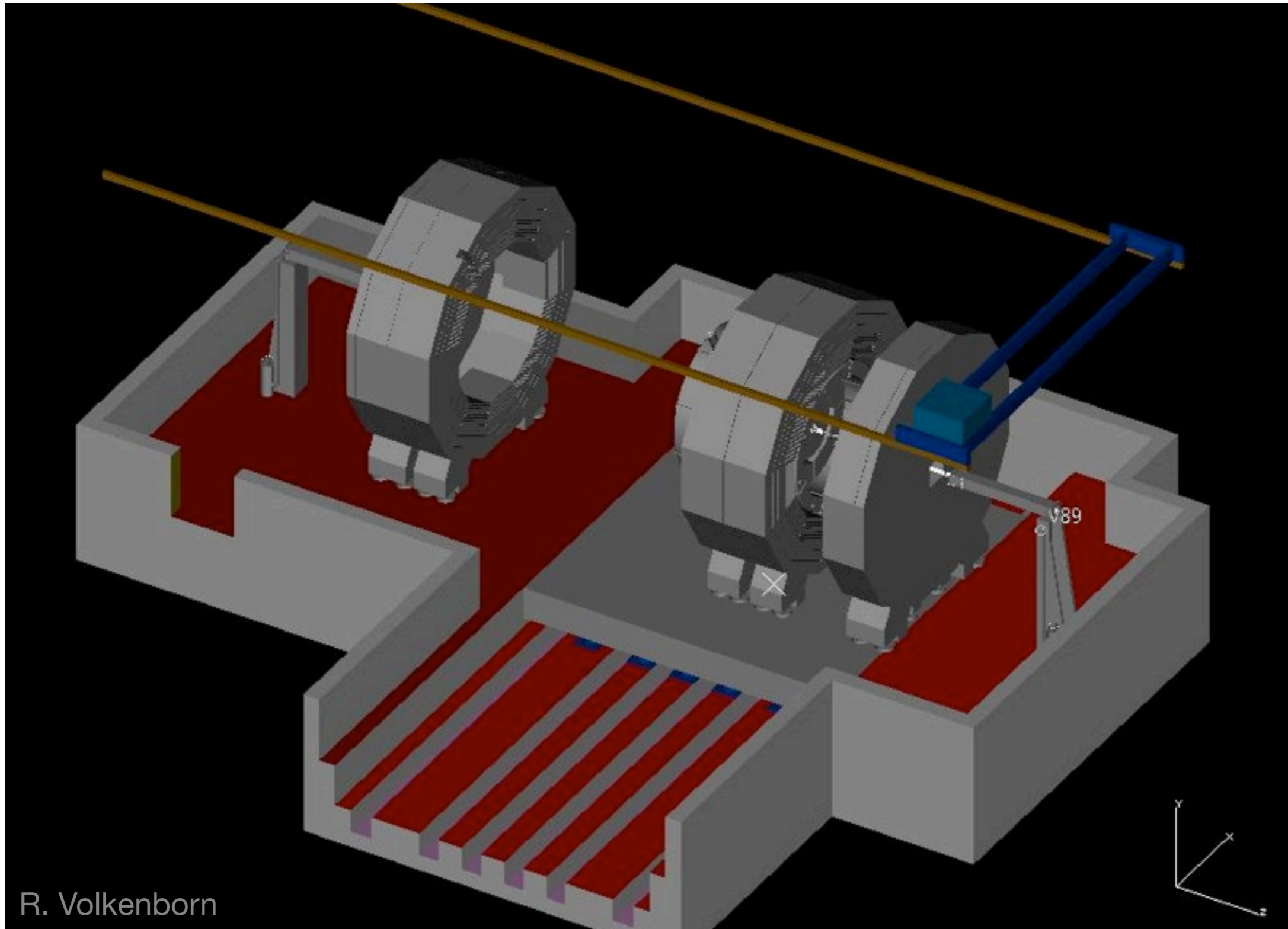
CMS Assembly



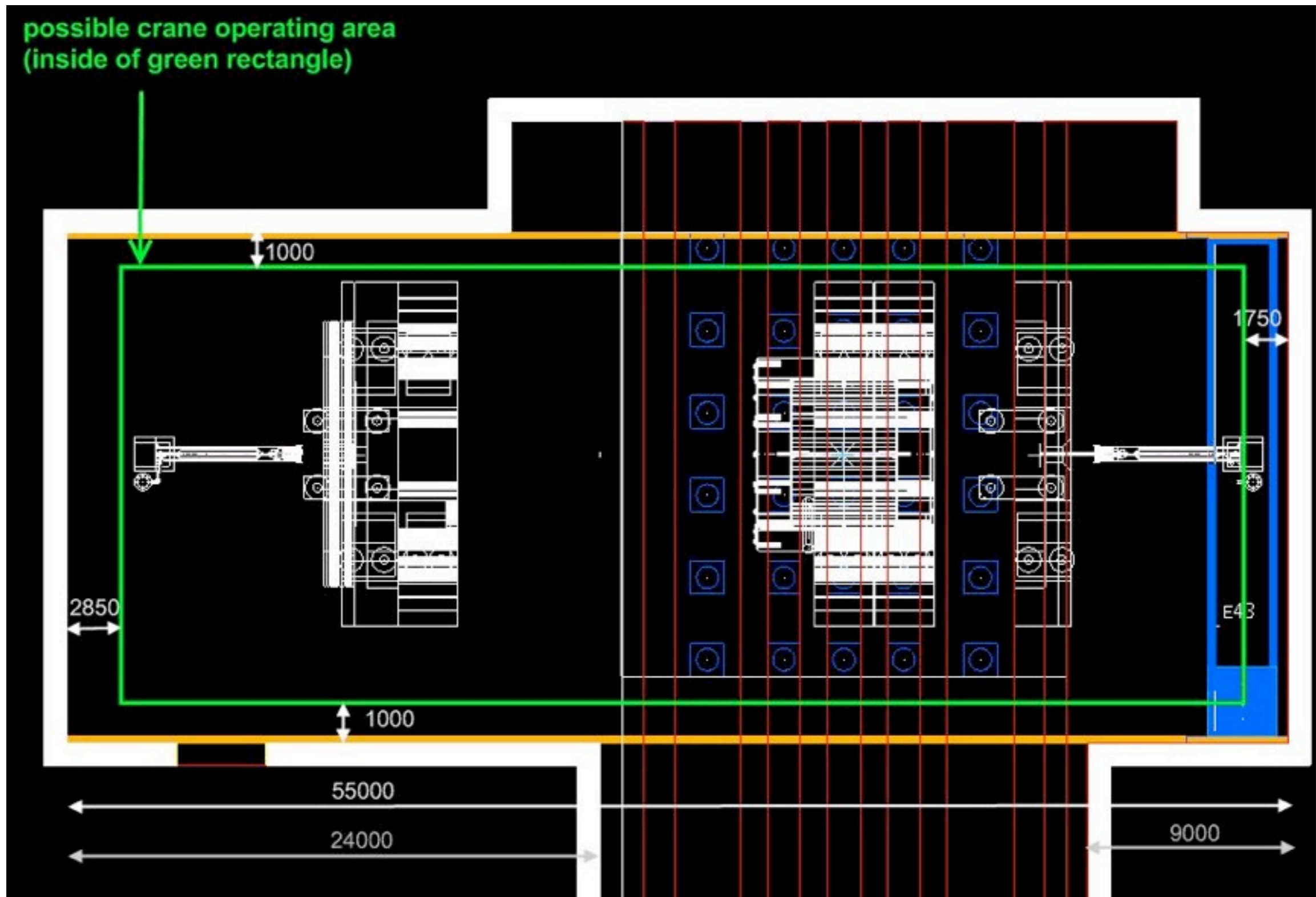
CMS Assembly



Hall Optimisation Study for ILD



Define Final Hall Dimensions for ILD



Next Milestone

- Common ILD/SiD/ILC-CFS Workshop on engineering and civil facilities, 12-13 December 2011
- Finalise the layout and dimensions of the IR civil facilities for the „standard“ ILC sites
- Status discussion on mountain site implications
- Finalise work plan towards the TDR/DBD



The screenshot shows a web page titled "SiD/ILD Engineering & Detector Interface Working Meeting". The page includes a navigation bar with "US/Pacific", "English", and "Login" options. The main content area is divided into a sidebar and a main text area. The sidebar contains a table of contents with links to "Overview", "Timetable", "Registration", "Registration Form", "List of registrants", "Accommodations", and "SiD Workshop". The main text area contains several paragraphs of text, including a welcome message, registration information, and meeting details. The meeting details are summarized in a table below.

Dates:	from 12 December 2011 09:00 to 13 December 2011 17:00
Timezone:	US/Pacific
Location:	SLAC A&E Building #41 2575 Sand Hill Road Menlo Park CA 94025 Room: Yosemite Conference Room (#130A)
Chairs:	Oriunno, Marco Markiewicz, Thomas

Timeline

- On-going studies (platform, civil facilities) use parameters of the current ILD model
- Main parameters for underground and surface facilities will be fixed before the end of this year
 - CFS Technical Baseline Review March 2012
 - Cost estimates for CFS for TDR:
 - Americas region: March (prel.), June 2012 (final)
 - Asian region: August 2012 (final)

Comment

- From the detector point of view, it is very beneficial to simplify the ILD solenoid and reduce the size of the yoke:
 - Smaller dimensions, less mass
 - Less cost
 - Less complexity
- The biggest cost impact will not be on the detector, but on the CFS cost!
 - Underground volumes, shaft diameters
- It is already very late to change the relevant parameters for the „DBD“ model of the detector
 - all engineering studies for TDR/DBD assume Lol detector dimensions!
- Last chance to have any impact: December MDI meeting at SLAC...