CTG Engineering tools
PAC review

Charge to the CTG :
" Specifies engineering tools, common with tools of the GDE when appropriate, for designing detectors."

Catherine Clerc

on behalf of the CTG members
K.Krempetz, M.Oriunno,H.Yamaoka

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" Specifies engineering tools, common with tools of the GDE when appropriate, for designing detectors."

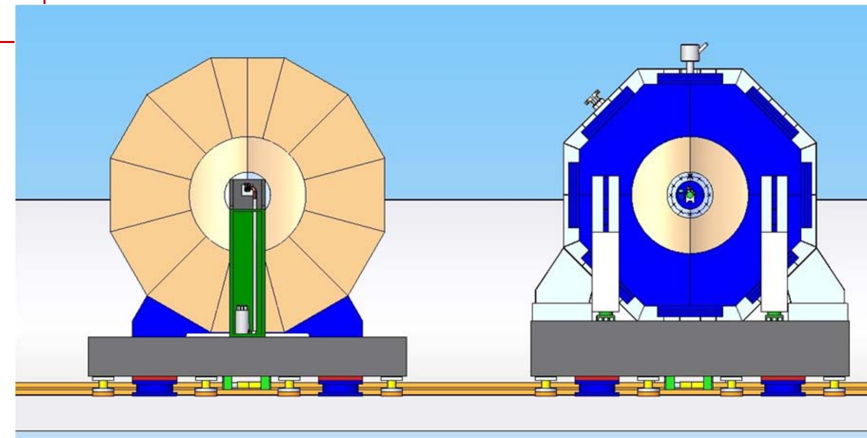
Immediate needs:

- Common tools inside each concepts : ease the work of integration and interconnection between subdetector groups .

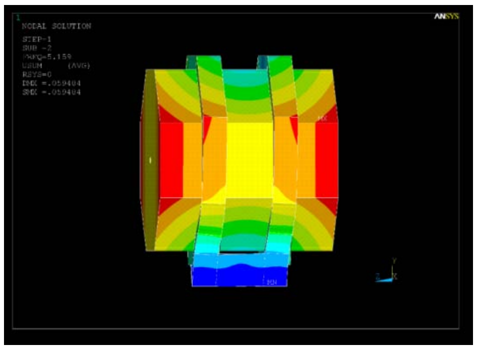
- Studies for the push-pull and experimental Hall :
Work done jointly by both detectors, BDS and Civil engineering groups .

Since it is not possible to overlook the potential interferences in operation between the two detectors, it is mandatory to ensure that everyone is using the same datas and may exchange relevant engineering documents

Some detectors design tools



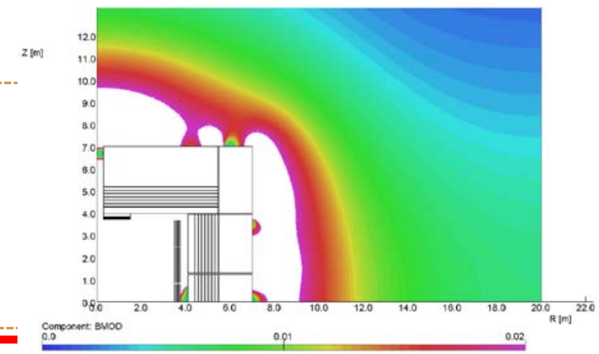
CAD software in use :
ILD : Autodesk inventor, Ideas, Solid edge, Solidworks, Catia
SID: Autodesk inventor, Ideas, Solid edge, Solidworks, Autocad Catia



Mechanical analysis (FEM : Finite Element Models)
ILD : ANSYS, IDEAS, OPERA, SAMCEF, COSMOS
SID: ANSYS, IDEAS, SAP 2000, SAMCEF, COSMOS

Stray Field and magnetic Forces

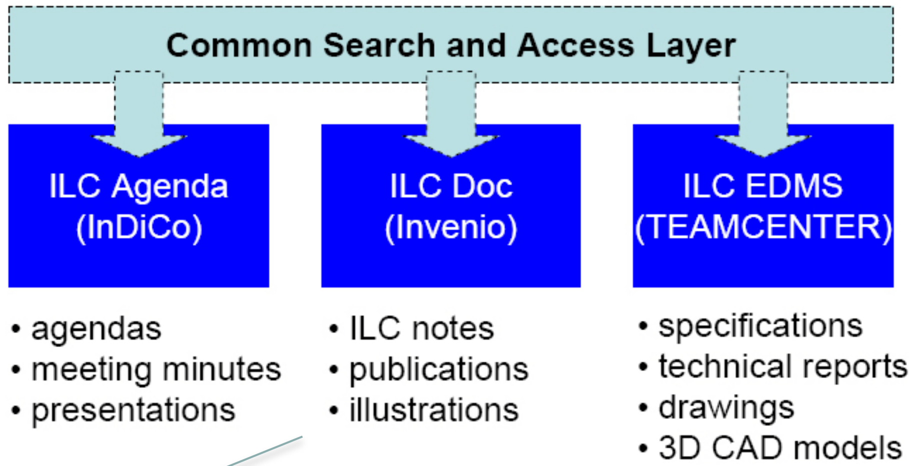
ILD : OPERA, Cast 3M, ANSYS, COMSOL, CST EMStudio
SID: ANSYS



But also electronics design, analysis tools (vibration studies) .....

We have to ensure of their interoperability, compatibility of inputs , i.e make the definition and enable the exchange of mandatory documents as requirements, drawing standards, technical specifications....

GDE Recommandations



ILCDoc : “will mostly contain documents with textual or graphic information such as technical notes, communication, schedules, presentations, publications etc “

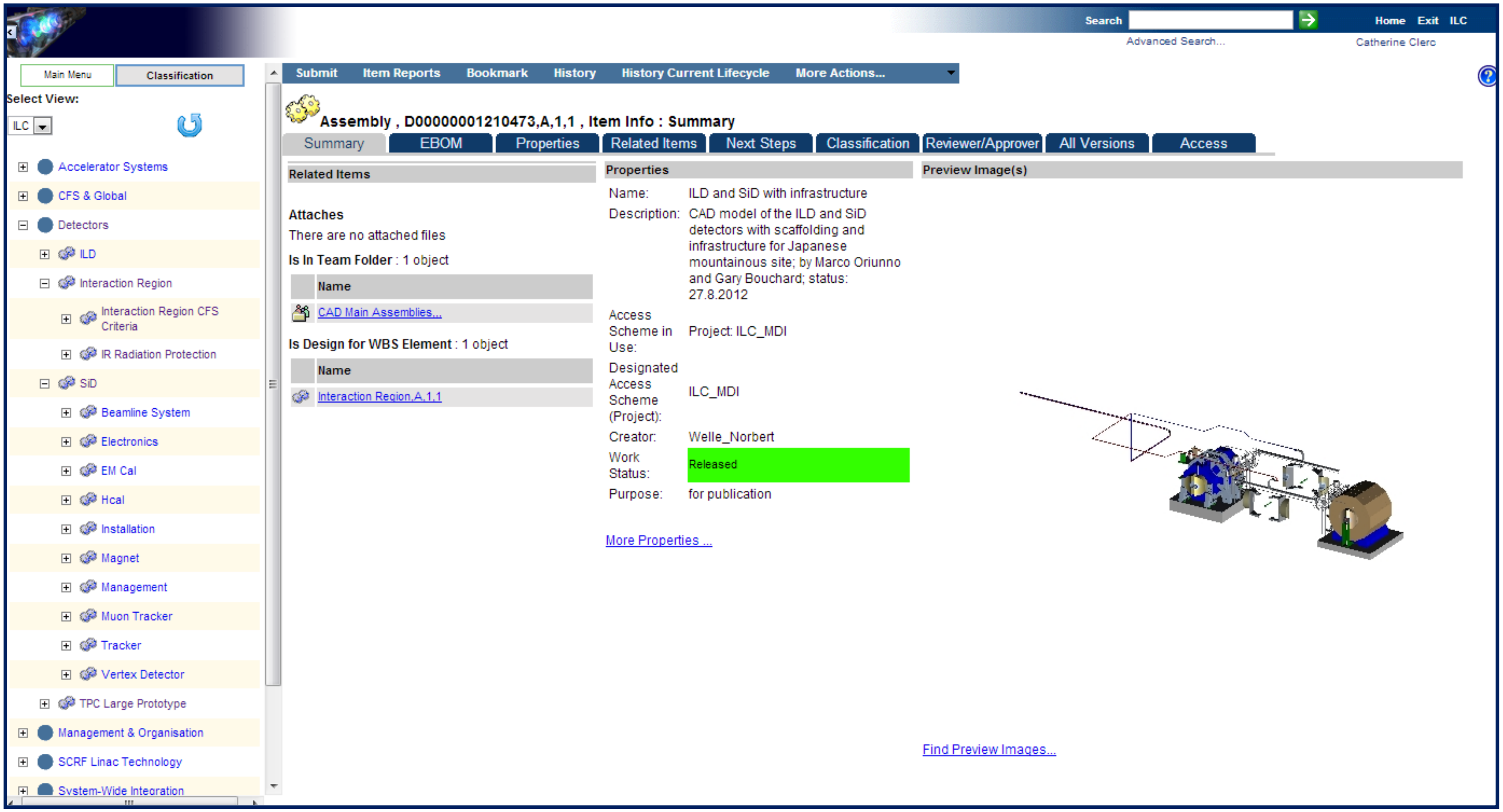
ILC-EDMS : “Documents containing engineering data such as drawings, technical specifications and cost estimates “

Some ILC EDMS Objectives

- provide central collaboration and lifecycle mgmt. platform for the Global Design Effort of the ILC
  - enable members of the ILC collaboration to access and contribute project information independent of location
  - enable engineers at the different laboratories to collaboratively design components using 3D CAD
  - enable scientists to participate in design processes from the very beginning by viewing the evolving CAD models
  - provide teams, committees, boards etc. with workspaces for work-in-progress document management
  - support change control of the ILC baseline during the EDR phase
  - protect confidential information and intellectual property against unauthorized access

ILC-EDMS System breakdown structure:

- include a level devoted to detectors, with one level per detector,
- plus a specific workspace « interaction region « for cooperative work between detectors / BDS/CFS(push-pull studies, dimensioning of hall and services….)



Team workspace definition ; ex of MDI TEAM

Main Menu | Classification

Lists
- Work Lists
- My Lists
- My Teams

Create
- Part
- Documents
- Others ...

Preferences
- My Preferences
- Change Password
- Change User Data

Logs

In Service

Help
- EDMS Help
- EDMS-FAQ
- EDMS-Info
- Downloads
- DESY Imprint

Copyright 2007

Check Out From Team | Put to WIP Vault | Make Available To Team | Submit | Route | More Actions...

My Teams: ILC_MDI_Team: Experimental Hall

You are here: ILC_MDI_Team: Experimental Hall

Export Table As ◉ CSV ○ HTML ○ XML

EDMS-ID	Name	Description	Work Status	Access Scheme in Use
D00000000970815,A,1,1	CASE 8-wSND Experimental Hall	Experimental hall design for Japanese mountain site	Working	Team: ILC_MDI_Team
D00000000970895,A,1,1	CASE 8-wSND Experimental Hall STEP FILE	STEP File of the CASE 8-wSND Experimental Hall design for the Japanese mountain site	Working	Team: ILC_MDI_Team
D00000000967835,B,1,1	Engineering Specifications for the ILC Experimental Hall	Engineering Specifications for the ILC Experimental Hall; status Apr 26, 2012 (KILC12)	Released	Project: ILC_MDI
D00000000970865,A,1,1	Experimental hall design in mountain site	Experimental hall design in mountain site	Working	Team: ILC_MDI_Team
D00000000967715,A,1,1	ILC Experimental Area Layout, Single Central Shaft	Drawing of the ILC Experimental Area Layout, Single Central Shaft	Released	Project: ILC_MDI
D00000000967795,A,1,1	ILC Experimental Area Layout, Two Side Shafts	Drawing of the ILC Experimental Area Layout, Two Side Shafts	Released	Project: ILC_MDI
D00000000967755,A,1,1	ILC Experimental Area Layout, Two Side Shafts + Access	Drawing of the ILC Experimental Area Layout, Two Side Shafts + Access	Released	Project: ILC_MDI
D00000001001665,A,1,1	IR hall dose rate estimates with detector concepts	Dose rates in IR hall are estimated with several kinds of designs of detector, shielding walls and pacmans. The obtained dose rates are evaluated in comparison with	Released	Project: ILC_MDI

Related Items

Attaches

Export Table As ◉ CSV ○ HTML ○ XML

File Name
CASE8-wSND.jpg
CASE8-wSND_stamp.pdf
CASE8-wSND.pdf

Is In Team Folder : 1 object

Name
Experimental Hall...

Is Related From Documents : 1 object

Name
Experimental hall design in mountain site,A,1,1

Relates To Documents : 1 object

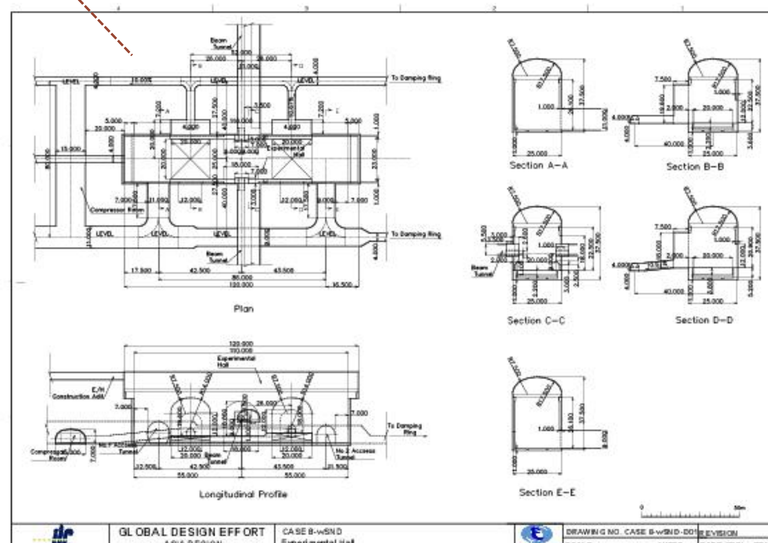
Name
CASE 8-wSND Experimental Hall STEP FILE,A,1,1

Properties

ILC Document Type:	Technical Drawing
Name:	CASE 8-wSND Experimental Hall
Description:	Experimental hall design for Japanese mountain site
Access Scheme in Use:	Team: ILC_MDI_Team
Designated Access Scheme (Project):	ILC_MDI
Creator:	List_Benno
Work Status:	Working
Purpose:	

More Properties ...

Preview Image(s)



Documentation for MDI Studies : specifications

ILC Document , D00000000967835,B,1,1 , Item Info : Summary

Summary | Properties | Related Items | Files | Next Steps | Classification | Reviewer/Approver

This object is worldwide visible.

Native files of this object are worldwide visible.

Related Items

Attaches

Export Table As ◉ CSV ○ HTML ○ XML

	File Name
	engineering-specifications-updates.xlsx
	engineering-specifications-updates.pdf
	engineering-specifications-updates.jpg
	engineering-specifications-updates_stamp.pdf

Is In Team Folder : 1 object

	Name
	Experimental Hall...

Is Description for : 2 objects

	Name

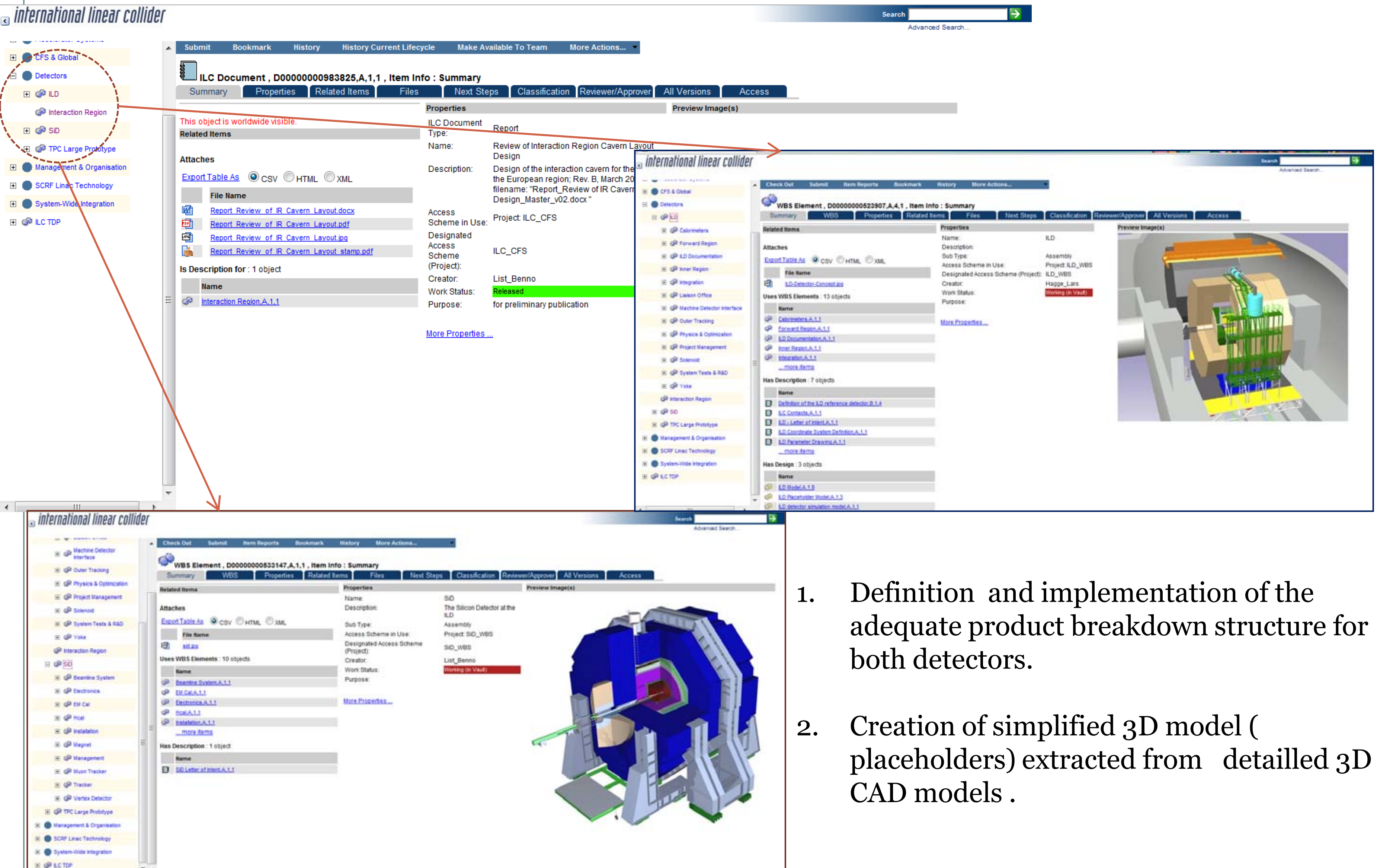
Properties

ILC Document Type:	Specification
Name:	Engineering Specifications for the ILC Experimental Hall
Description:	Engineering Specifications for the ILC Experimental Hall; status Apr 26, 2012 (KILC12)
Access Scheme in Use:	Project: ILC_MDI
Designated Access Scheme	ILC_MDI

26 April, 2012

Engineering Specifications (2) : Experimetnal Hall	RDR	SiD	SiD in Mtn. site	ILD	ILD in Mtn. site	Comments or notes
Parameters that define the underground hall volume						
IR Hall Area(m) ; (W x L)	25x120		25x142		25x142	Z-shape in EU and American sites, I-shape in Mtn. site
Beam height above IR hall floor (m)	8,6	9(7.5)	9(7.5)	9(8)	9	from top of the platform
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	(215t+30t)x2	80t(40tx2)	(250t+30t)x2	
IR Hall Crane Clearance Above Hook to the roof (m)	14.5(includes arch)		15,8	6	15,8	
Utility caverns(m) ; (W x L xH)	40x15		77.5x15x13.5		77.5x15x13.5	
Resulted total size of the collider hall (W x L x H)	25x120x39	20.2x90x30	25x142x42	29x100x30	25x142x42	
Area at garage position		19x 55.5	25x50	with side cavern	25x50	
Parameters that define dimensions of the IR hall shaft and the shaft crane						
Largest Item; Heaviest item to Lower Through IR Shaft (weight and dimensions)	9x16m, 2000t	3287t (Barrel Iron)	-	3500t, 15.7x7.81m	-	
IR Shaft Size : diameter(m)	16	18, 8	-	18, 10	-	
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 stares in collider hall shaft	Yes	?	-	Yes	-	
Size of access tunnel at Mtn. site (W x H, m)	-	-	11x9	-	11x11	cable racks in the access tunnel, e.g. Air duct,
Inclination of access tunnel at Mtn. site (%)	-	-	< 7	-	< 7	
Length of access tunnel at Mtn. site (km)	-	-	1,5	-	1,5	
Parameters that define dimensions of the surface assembly building and its crane						
Surface Assembly Building Area ((W x L , m)	25 x 100 / detector	200x200		30x60	27x100 / detector	
Largest Item to Lift in SurfAsm. Bldg. (weight and dimensions)	400t	380t(HCAL)	(125+α)t, 6.79 ϕ x6.066	180t	400t, 8.6ϕx8 (solenoid)	
Surface Assembly Crane	400t+2*20t	400t(200tx2)/10t	400t(200tx2)/10t	2x80t	(200t+20t)x2	same as in the hall
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	area is the main parameter
Parameters that define crane access area and clearance around detector						
SurfAsm. crane accessible area (needed) / available (W x L, m)	20 x 102	200 x 200	200 x 200	28x56		SID's very preliminary
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)		12.4x11.2x12.4	12.4x11.2x12.4	15.67x13.26x15.74	15.67x13.26x15.74	from LoI
FILL IN OTHER IMPORTANT PARAMETERS WHICH ARE MISSING						
Maximum AC power (MW)	-					540KW/exp
Temerature 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	the liqufier will be mounted at the same level as the top of the solenoid.
Dump registor	-	on the detector	on the detector	service cavern	service cavern	damp resister can be als0 at the side wall

The Two detectors : System breakdown description



1. Definition and implementation of the adequate product breakdown structure for both detectors.

2. Creation of simplified 3D model (placeholders) extracted from detailled 3D CAD models .

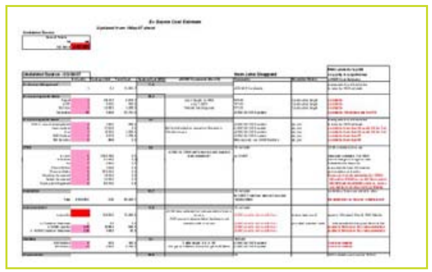
TDD, TDR and ILC-EDMS

Technical Design Report (TDR) <u>summarizes</u> TDD for publication

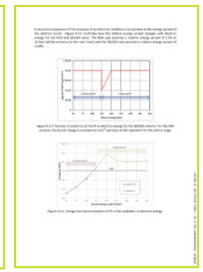
Technical Design Documentation (TDD) captures entire design efforts, results & rationale

Parameters

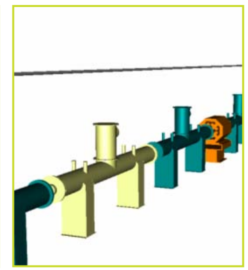
Specifications



Cost Estimation



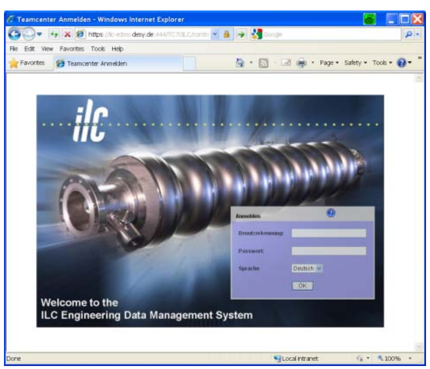
Calculations



CAD Models

Design Summary

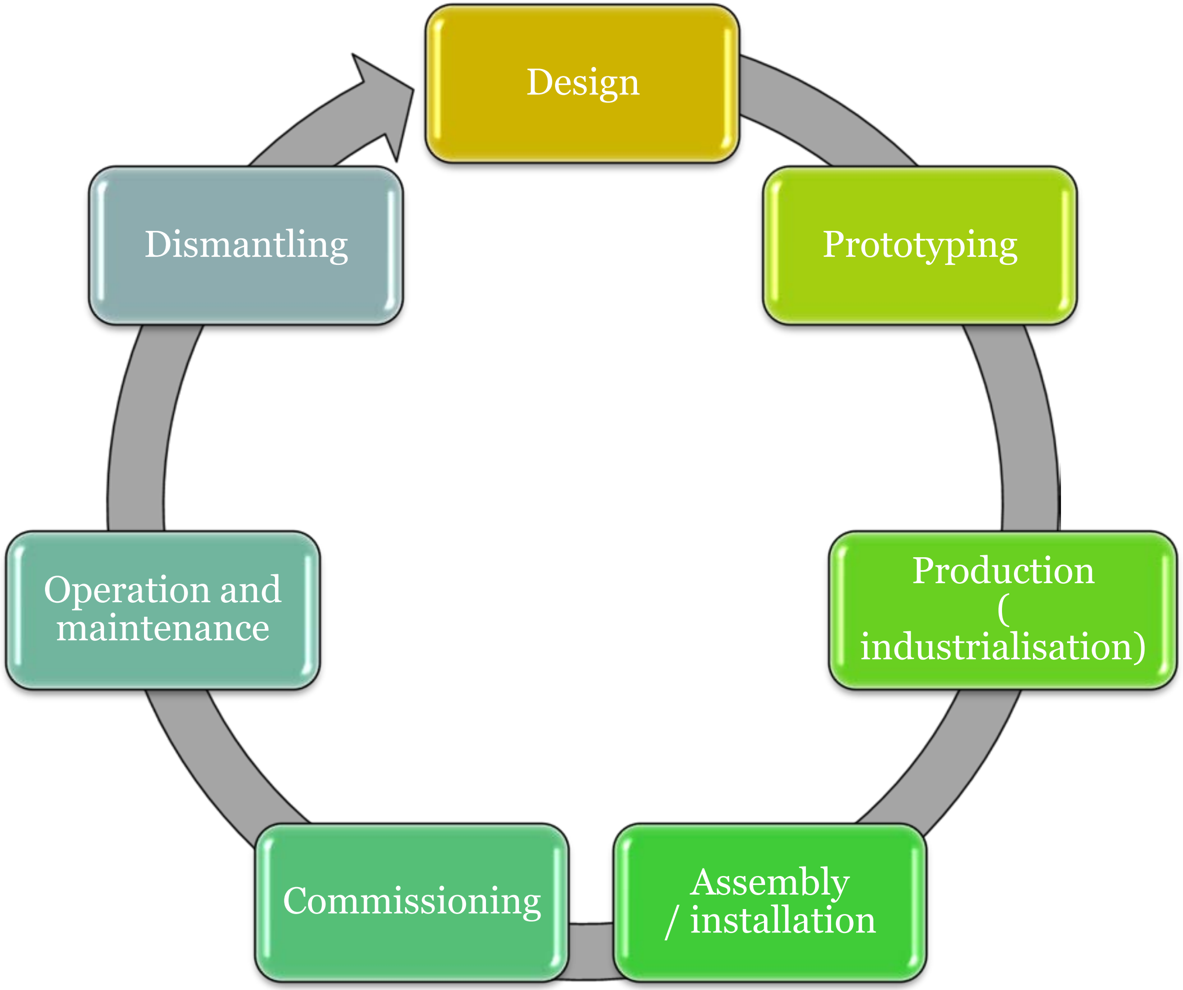
…



ILC-EDMS <u>organizes</u> the Technical Design Documentation, providing **structure**, **traceability**, **version & configuration mgt.**, and **change control**

(From L.Hagge)

Product lifecycle management : ILC is a 25-30 years experiment



Summary:

Ready to operate for detectors :

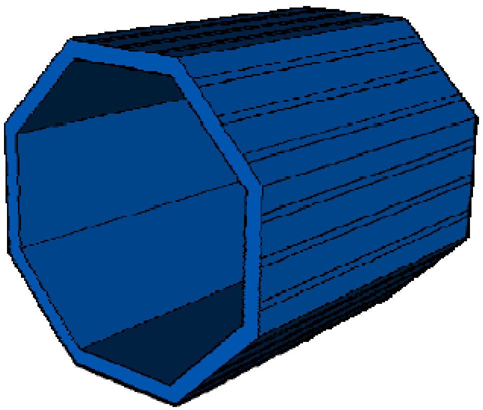
- ➢System breakdown structures describing the main components of the 2 detectors has been created
- ➢ ILC_MDI_Team : already use the system and upload relevant documents for Hall design studies

It is already organised to efficiently follow the two detectors projects among each step of their life
It is to become an important and major tool for the future of the ILC detectors as a collaborative and management tool .
But If the use of this EDMS provides the selection, definition and tracking of the mandatory documentation, the management of this documentation is a major issue and is to be established

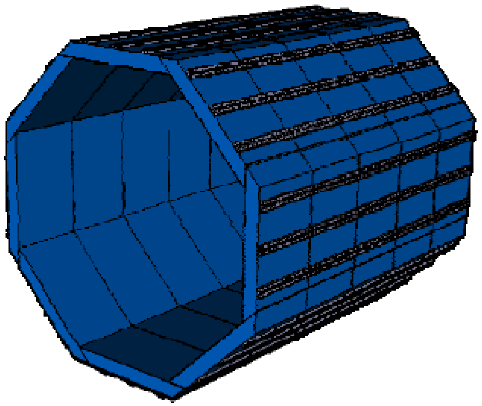
SPARE

Different Models for Different Purposes

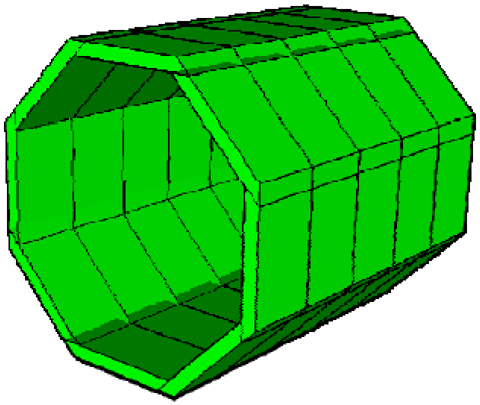
Placeholder



Detailed Design



Physics Simulation



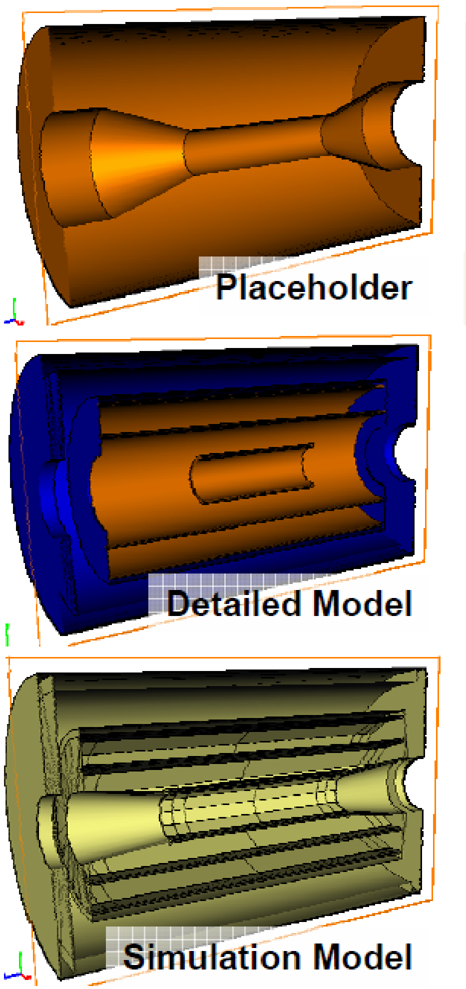
Placeholder model enables integration and checks for collisions and compliance of interfacing components; Contains e.g. reserved space and interface details.

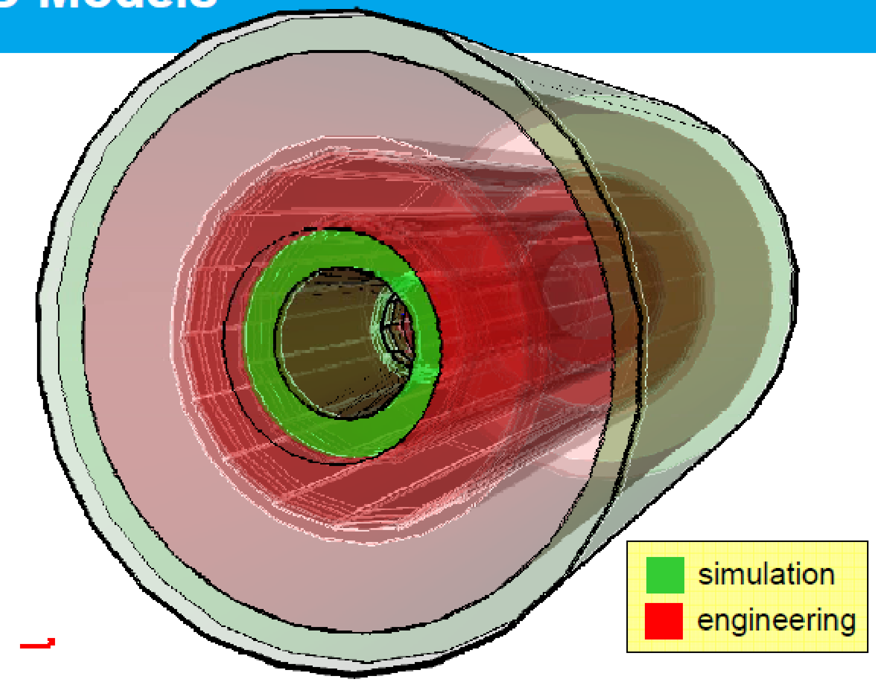
Detailed Design model is basis for construction; Defines how to assemble a component from parts, and provides their exact geometry and material properties

Physics Simulation model enables MC simulation and detector optimization; Describes e.g. segmentation, shape and physics behavior of components

Viewer uses : Different Models comparison.

Comparing Different VXD Models

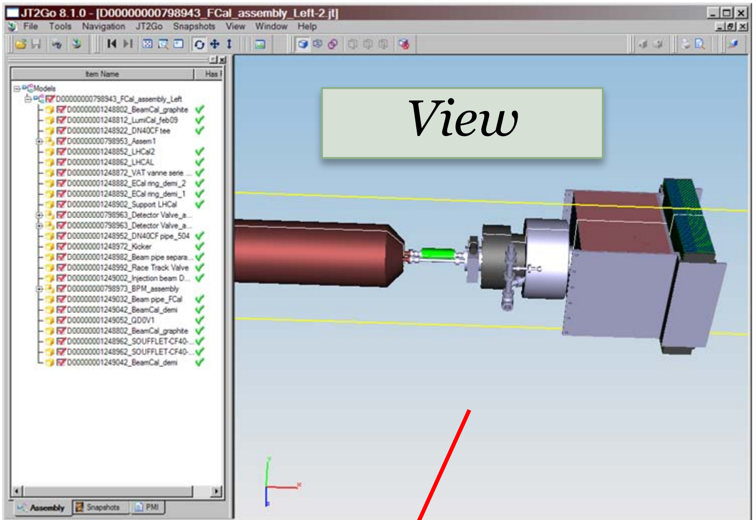


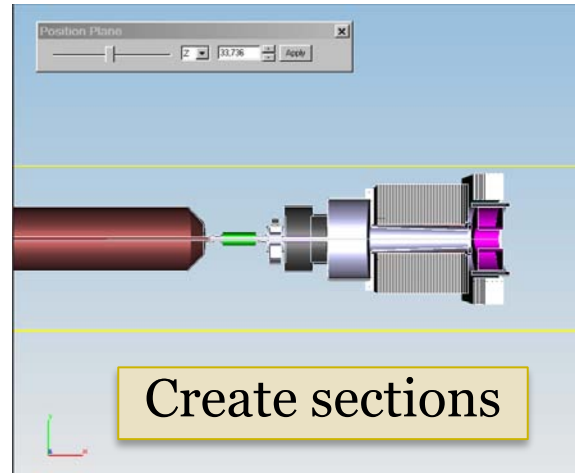


- Engineering and simulation models contain different elements, e.g. housing vs. pads
- Need to identify comparable geometry, and perform collision checks to ensure e.g. active material is confined inside chamber

Lars Hagge | EDMS Demo for ILD | 07.07.2010 | **Seite 14**

Viewer uses : Dimensional compatibility of the design subdetectors .





snapshot
And pictures