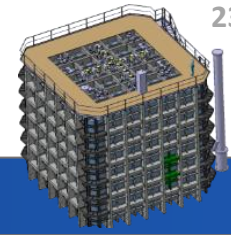
The text 'WA105' is rendered in a large, black, serif font. A thin horizontal line passes through the middle of the characters. To the right of the '5', a pair of tweezers is positioned as if it has just finished pinning the text to the line.

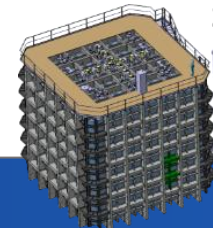
Racks, monitoring, power distribution and cabling



OUTLINE

- Lessons learnt from 311
- Insulation principle & racks location
- Power distribution
- Existing racks
- DAQ Racks
- Monitoring

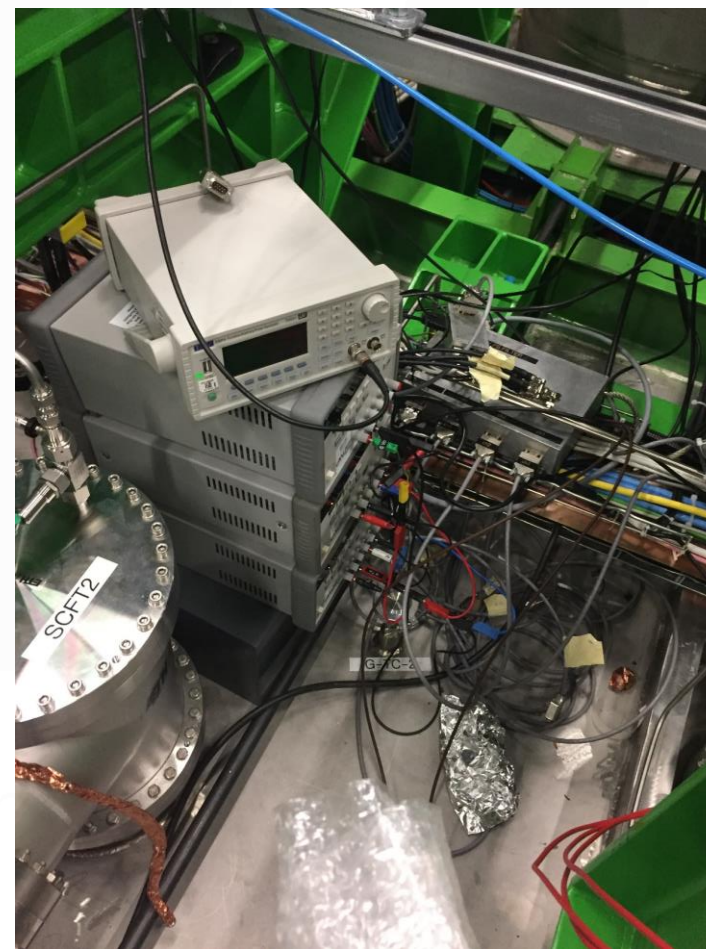
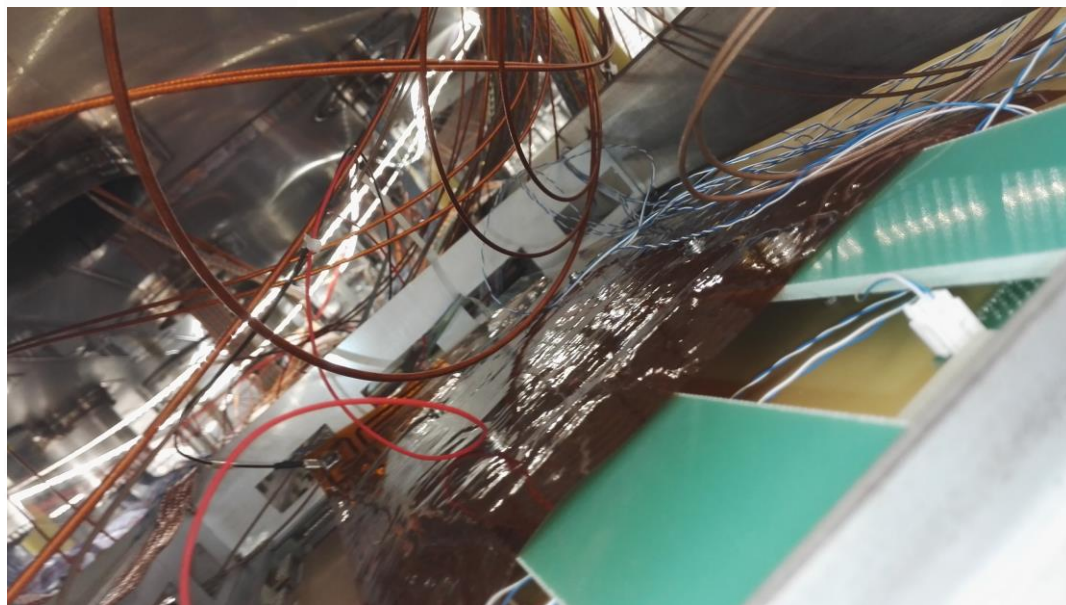
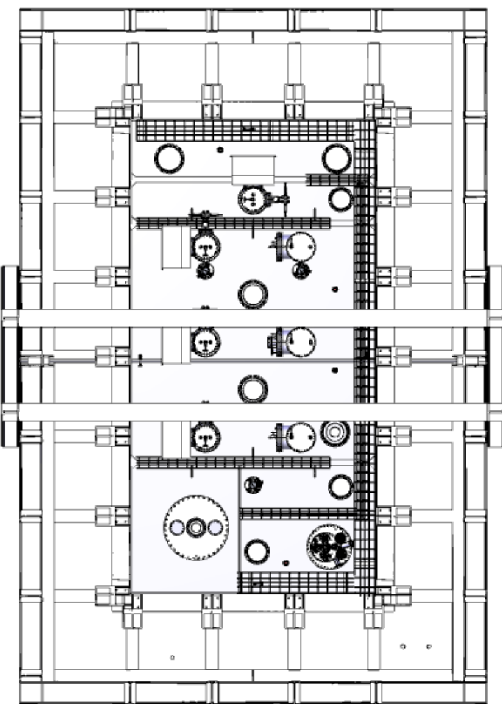


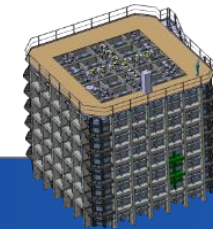


LESSONS LEARNT FROM 3m x 1m x 1m

With the construction of the **3m x 1m x 1m**, we had now a huge experience of “How to construct a neutrino detector?”.

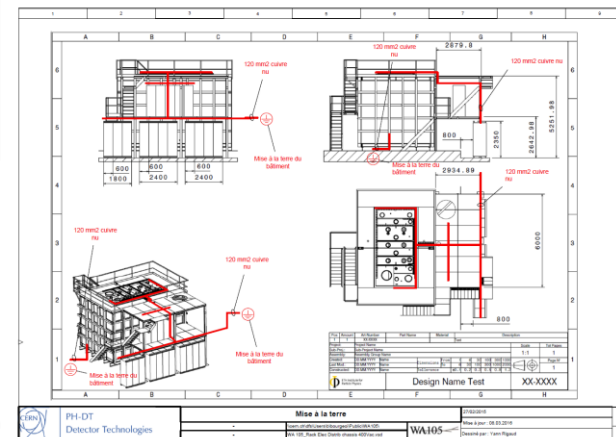
We know also how to improve our design.

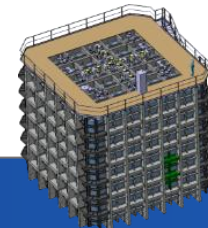




LESSONS LEARNT FROM 3m x 1m x 1m

We learnt also more about noise requirement, for example to minimize the noise we had installed copper plates for GND and use some shielded cables to improve the system.





LESSONS LEARNT FROM 3m x 1m x 1m

Others things...



galvanic insulator

sensors position

Cabling convention

flanges connector

standardization

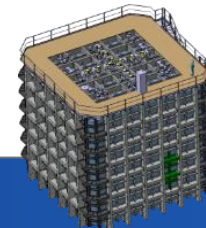
sensors choice

precision

sensors type

...

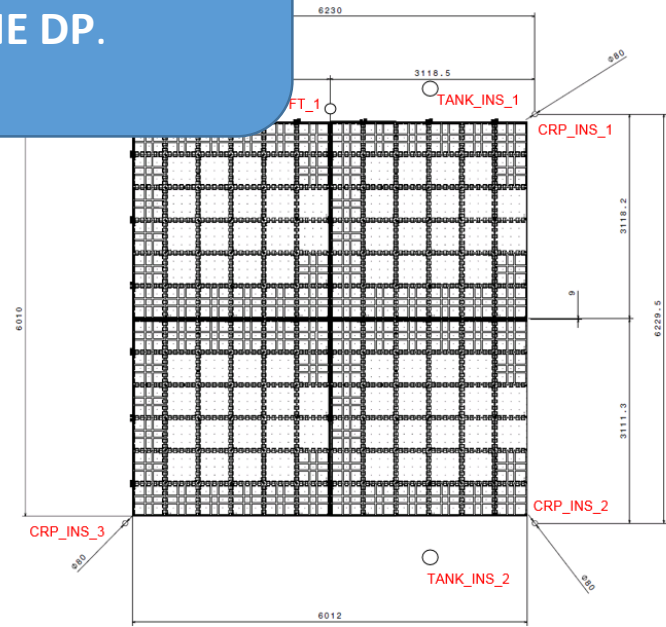
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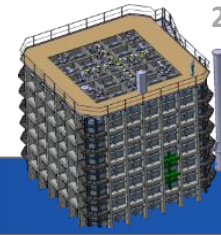


LESSONS LEARNT FROM 3m x 1m x 1m

Measurement location	Picture	HW (on rack) (on board)			Cables							Hardware	Connector on HW side	Cables							Hardware	Remarks	Comments
		Qty	Price (unit)	Total Price	Category	SKU	Picture	Number of cables	Length	Price (unit)	Total Price			Category	Connector on HW side	Category	SKU	Picture	Number of cables	Length			
x4 TOP, MIDDLE, BOTTOM, CRP (on the CRP)	Temperature for PCB components by 6 Pin 12 on the CRP	6	200	1200	CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm	DL21.22.462A		3	7	21	63.5mm	SUBD 50 pins	Patch Panel 1	SUBD 50 pins	CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm	DL21.22.462A		3	7	0	63.5mm	SUBD 50 pins	
	Temperature for heaters (Pin 12 for regulator loop with heaters)	4	20	80	CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm	DL21.22.438.0		1	7	7	21mm	SUBD 50 pins		SUBD 50 pins	CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm	DL21.22.438.0		1	7	0	21mm	SUBD 50 pins	
	Capacitive level meters	4		0	CABLE COAXIAL SO CHAF - PAIRIE PARRS - TYPE C-50-23-E	DL61.11.368.A		8	5	40	4.2mm	SMA		SMA	CABLE COAXIAL SO CHAF - PAIRIE PARRS - TYPE C-50-23-E	DL61.11.368.A		8	5	0	4.2mm	SMA	
	Distance meters	3		0	CABLE COAXIAL SO CHAF - PAIRIE PARRS - TYPE C-50-23-E										CABLE COAXIAL SO					0	4.2mm	SMA	
	Heaters (heater will allow air to avoid liquid on CRP) - 6Pin	4	350	1400	PL DE CABLES ET TORNADES POUR DC - PAE L27 mm															0	1.5mm	AMPHEMOL MDC 10 pins	
	HV LHM	72	0	0																0	2.1mm	SHV	
	Extractor 0m/1m	4	0	0																0	3.2mm	BNC	
x2 TANK_INS_1, TANK_INS_2	Class of Pin 12 (component by 12 Pin)	24	800	800	CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm																		
	Part Monitor	1																					
	PMs	18			Capton Instru KAP7500ch																		
	Heaters on the bottom		400		PL DE CABLES ET TORNADES POUR DC - PAE L27 mm	DL01.81.900.1						1.5mm	AMPHEMOL MDC 10 pins	Number of heaters on bottom need to be define									
	Temperature for heaters (Pin 12 for regulator loop with heaters)		20		CABLE PLATS PARRS TORNADES POUR DC - PAE L27 mm	DL21.22.438.0						7	SUBD 50 pins	Depend on heaters number									
	120v - 127V Volt according ambient temperature	3	40		PL DE CABLES ET TORNADES POUR DC - PAE L27 mm	DL01.81.900.1		6	4			1.5	AMPHEMOL MDC 10 pins	Maybe some additional on the bottom									
	Camera				Capton Instru KAP7500ch	NO							SUBD 50 pins	Number and position need to be define									
Cloud Level meters	1						1				??												
Pressure	1																						
HW_1	HV cathode	1			NO	NO	NO	NO	NO	NO	NO	Dedicated	Defatal										

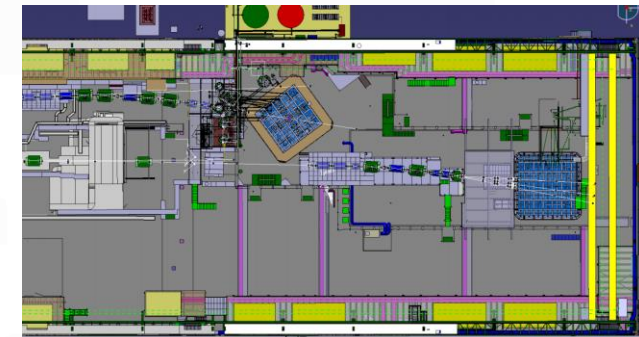
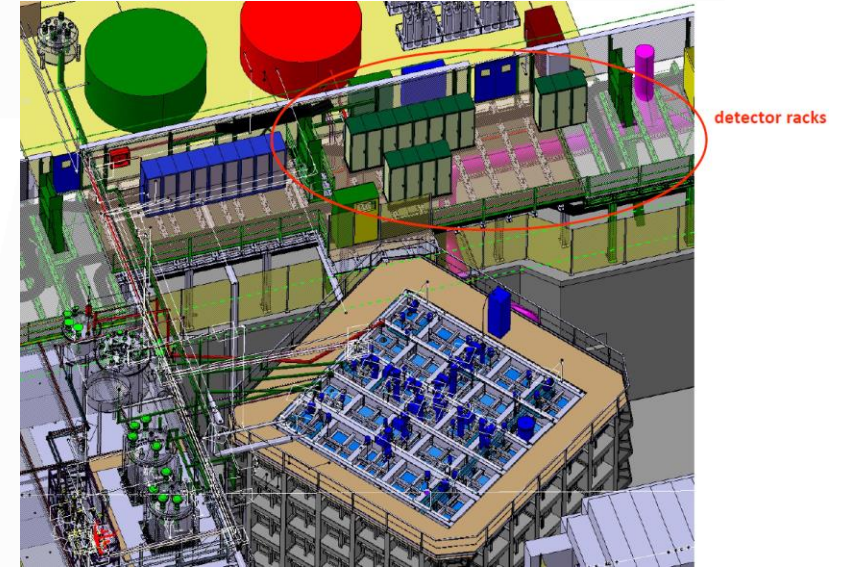
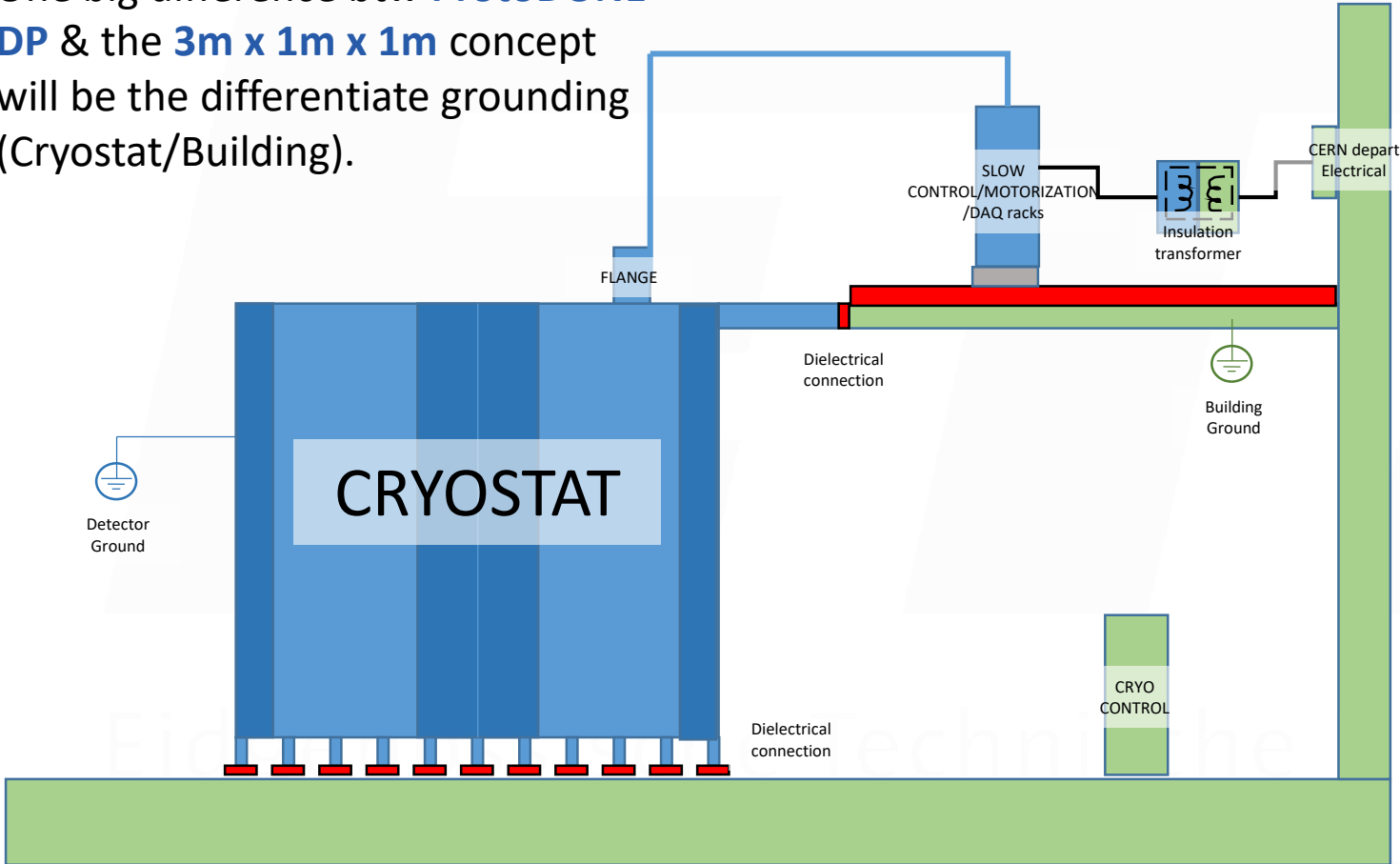
We have also a better understanding of which sensors we need and where to place them. So with this informations we have started to build the instrumentation list for ProtoDUNE DP. See Cosimo talk

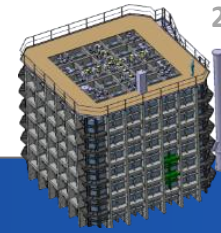




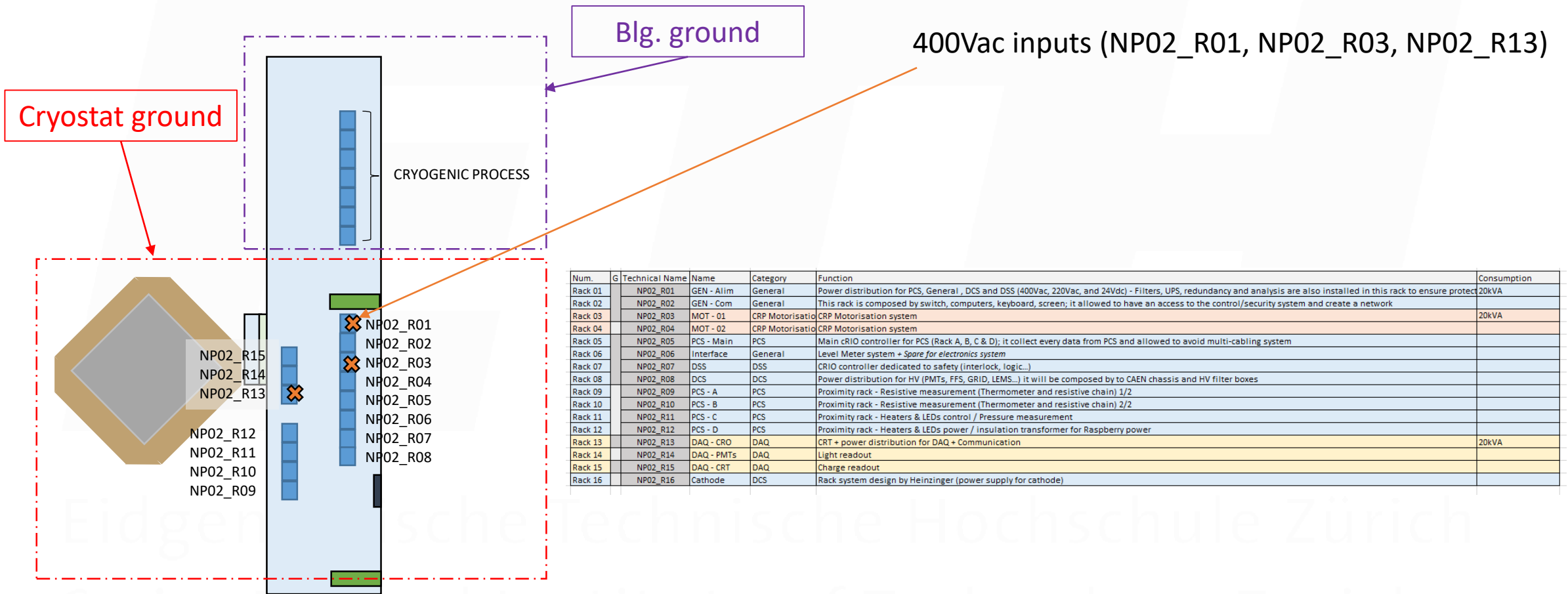
INSULATION PRINCIPLE / RACK LOCATION

One big difference btw **ProtoDUNE DP** & the **3m x 1m x 1m** concept will be the differentiate grounding (Cryostat/Building).

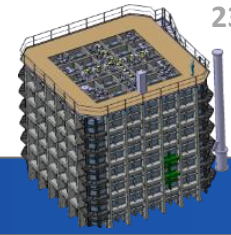




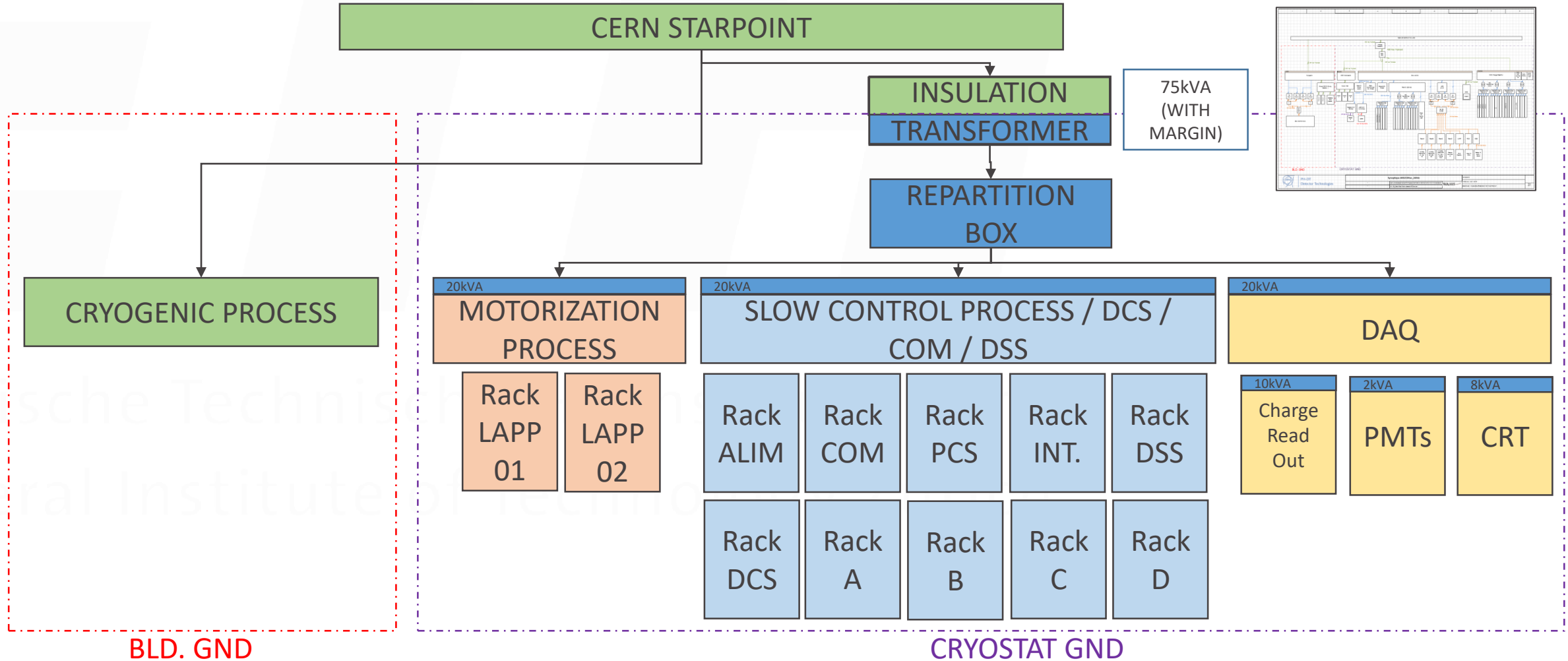
RACKS LOCATION

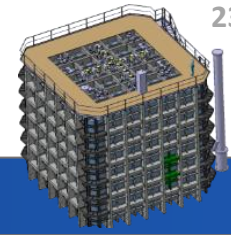


Num.	G	Technical Name	Name	Category	Function	Consumption
Rack 01		NP02_R01	GEN - Allim	General	Power distribution for PCS, General, DCS and DSS (400Vac, 220Vac, and 24Vdc) - Filters, UPS, redundancy and analysis are also installed in this rack to ensure protect	20kVA
Rack 02		NP02_R02	GEN - Com	General	This rack is composed by switch, computers, keyboard, screen; it allowed to have an access to the control/security system and create a network	
Rack 03		NP02_R03	MOT - 01	CRP Motorisatio	CRP Motorisation system	20kVA
Rack 04		NP02_R04	MOT - 02	CRP Motorisatio	CRP Motorisation system	
Rack 05		NP02_R05	PCS - Main	PCS	Main cRIO controller for PCS (Rack A, B, C & D); it collect every data from PCS and allowed to avoid multi-cabling system	
Rack 06		NP02_R06	Interface	General	Level Meter system + Spare for electronics system	
Rack 07		NP02_R07	DSS	DSS	cRIO controller dedicated to safety (interlock, logic...)	
Rack 08		NP02_R08	DCS	DCS	Power distribution for HV (PMTs, FFS, GRID, LEMS...) it will be composed by to CAEN chassis and HV filter boxes	
Rack 09		NP02_R09	PCS - A	PCS	Proximity rack - Resistive measurement (Thermometer and resistive chain) 1/2	
Rack 10		NP02_R10	PCS - B	PCS	Proximity rack - Resistive measurement (Thermometer and resistive chain) 2/2	
Rack 11		NP02_R11	PCS - C	PCS	Proximity rack - Heaters & LEDs control / Pressure measurement	
Rack 12		NP02_R12	PCS - D	PCS	Proximity rack - Heaters & LEDs power / insulation transformer for Raspberry power	
Rack 13		NP02_R13	DAQ - CRO	DAQ	CRT + power distribution for DAQ + Communication	20kVA
Rack 14		NP02_R14	DAQ - PMTs	DAQ	Light readout	
Rack 15		NP02_R15	DAQ - CRT	DAQ	Charge readout	
Rack 16		NP02_R16	Cathode	DCS	Rack system design by Heinzinger (power supply for cathode)	



POWER DISTRIBUTION (SIMPLE VERSION)



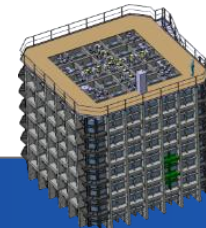


EXISTING RACKS



A large part of these rack are already built and functional. They are currently used for the **3m x 1m x 1m** since September 2016 and they will be moved when they will be available.

Only some minor modification to add more sensors and to improve the system are needed.



EXISTING RACKS

We had conceived these racks to be standard and like these they are easy to reproduce, to transport and to adapt.

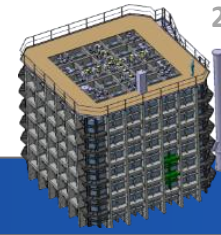
PH-DT Detector Technologies			Distant Rack		Dessiné le : 20.01.2015 Vu le jour : 07.12.2015 Dessiné par : N. BOURGEOIS / Y. RIGAUT	Page 2/3 Imprimé le : 18.06.2015
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Distant Racks

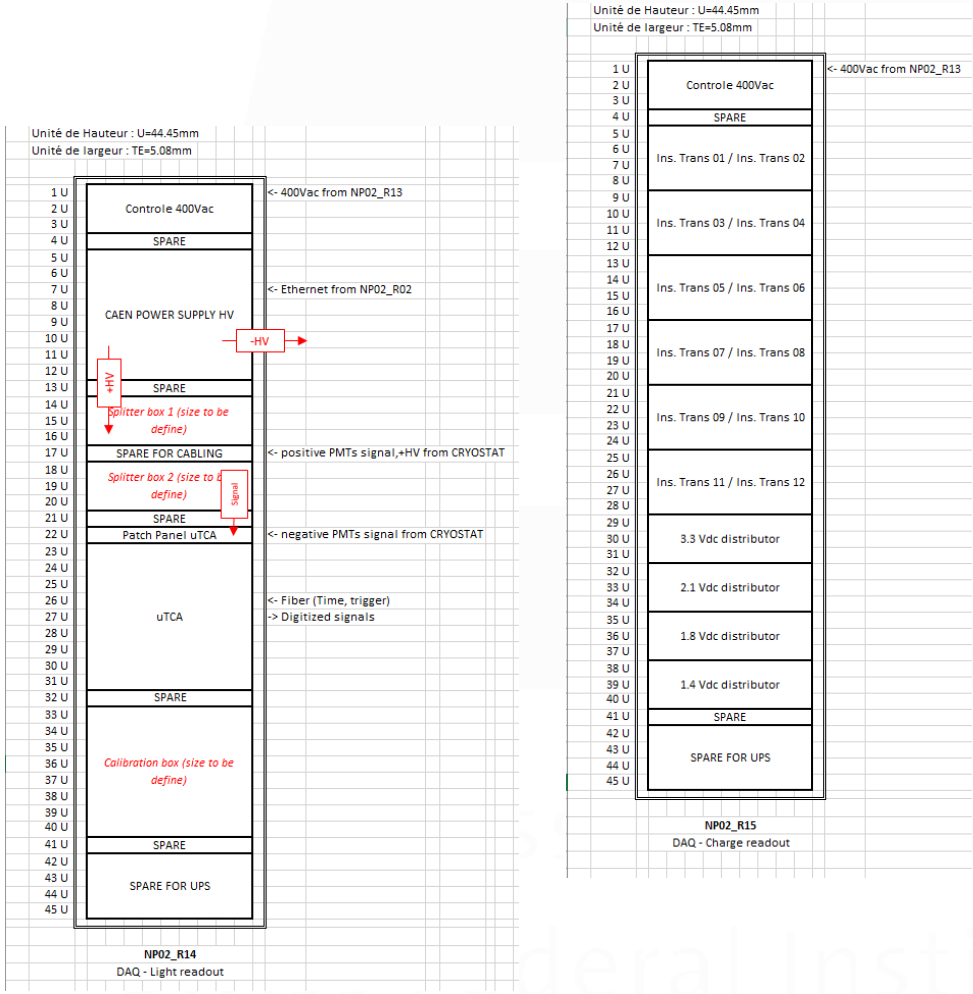
PH-DT Detector Technologies			Remote Rack		Dessiné le : 20.01.2015 Vu le jour : 07.12.2015 Dessiné par : N. BOURGEOIS / Y. RIGAUT	Page 4/5 Imprimé le : 18.06.2015
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Remote Racks

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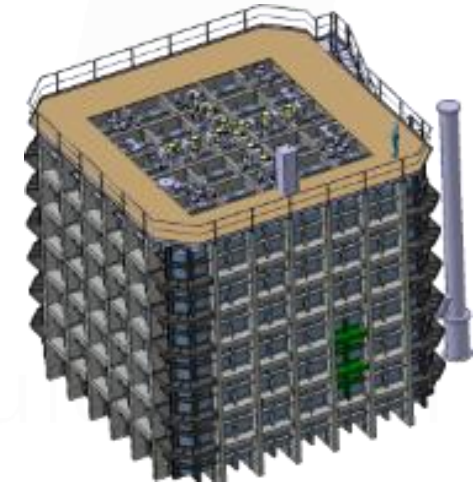
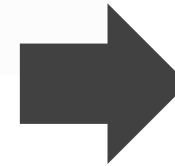
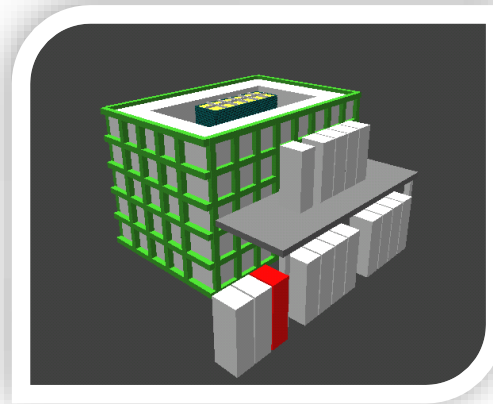


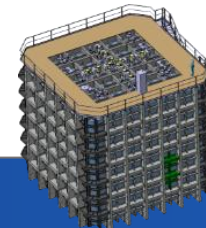
DAQ RACK STANDARDIZED



Work in progress for the design of the 3 DAQ racks.

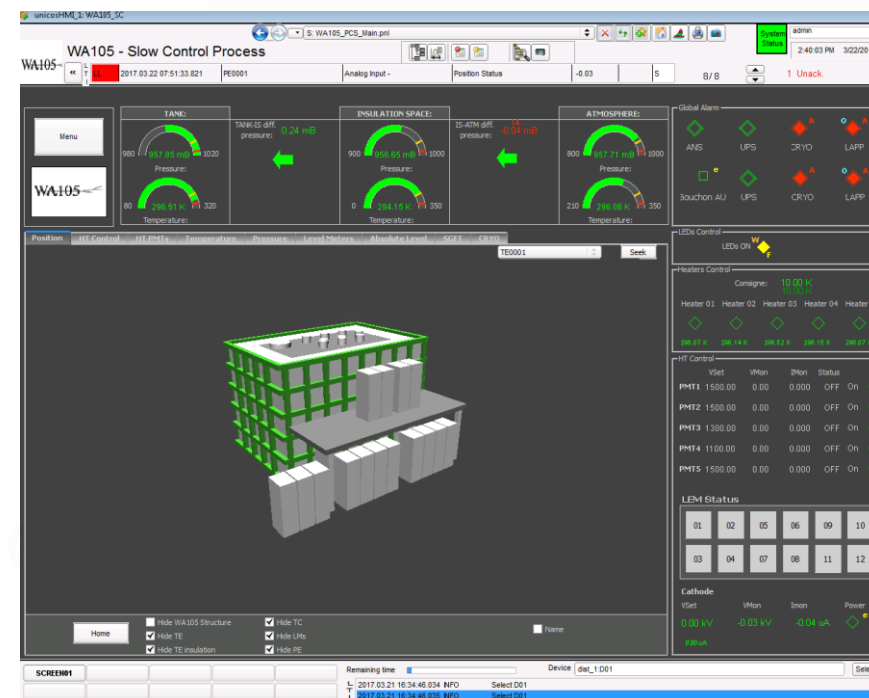
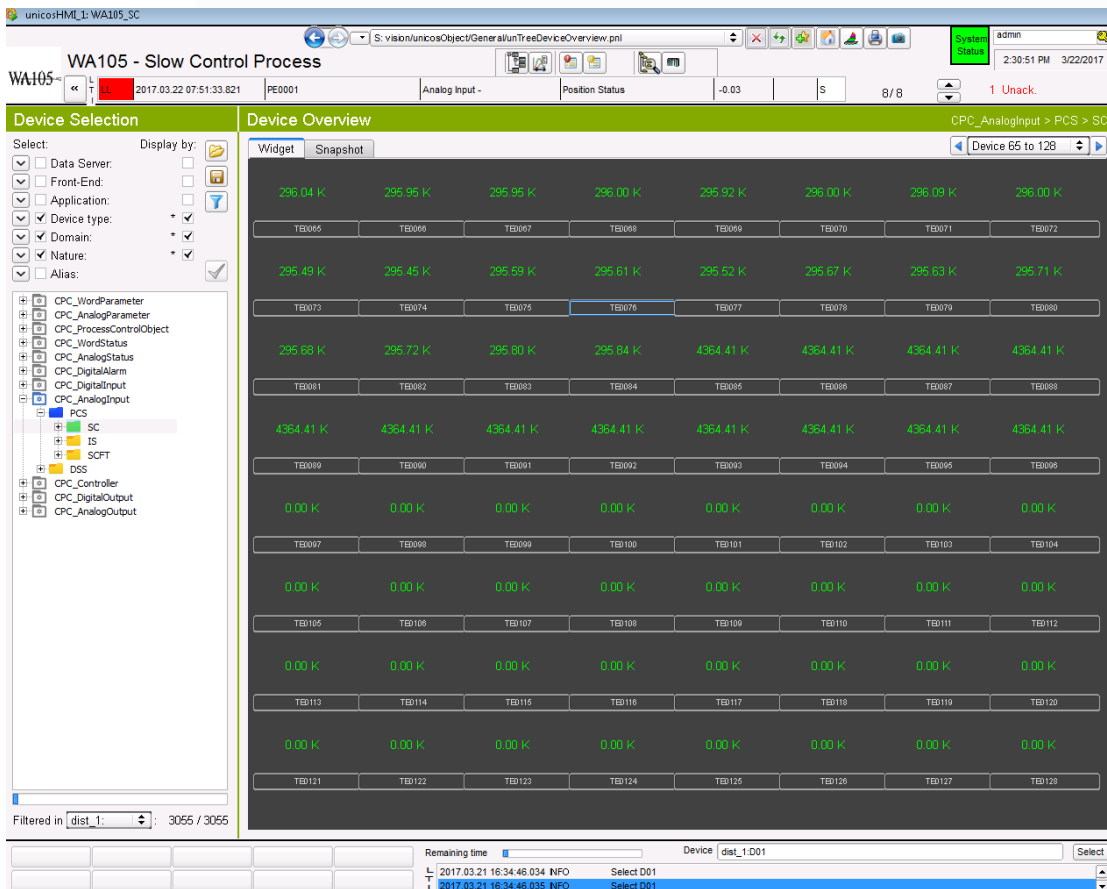
When final design will be established it will be possible to start construction of the structure to be ready when we will move racks to blg. 887 (EHN1).

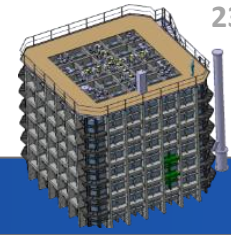




MONITORING

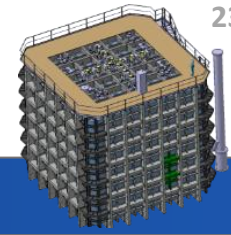
Every (RT+FPGA) parts are ready to display the **ProtoDUNE** version (some minor modifications will be necessary and a SCADA version dedicated for **ProtoDUNE DP**).





Thank you...

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Swiss Federal Institute of Technology Zurich



3m x 1m x 1m network

