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Status of Interface Requirements and how they are put together

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- Requirements Status (top-down requirements)
- Requirements Status (interface requirements)
- Guidelines on writing interface requirements

Status of top-down requirements in DOORS (slide 1 of 2)



- L2 (ACCSYS) requirements essentially unchanged since last TB
- Over 240 L3 (linac sections) Requirements in DOORS
 - Requirements for all sections are considered complete by the Lead Engineers except for A2T and DmpL; these are being finalized
- Over 1070 L4 (disciplines) Requirements in DOORS
 - See next slide

Status of top-down requirements in DOORS (slide 2 of 2)

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ESS Accelerator L4 sets of requirements

Section	L4 BMD	L4 EMR	L4 PBI	L4 RFS	L4 CRYO	L4 ISS	Total
ISRC	O	O	O	O	O	23	23
LEBT	Y	O	21	O	O	O	21
RFQ	O	19	11	19	O	O	49
MEBT	54	18	Y	18	O	O	90
DTL	68	31	Y	19	O	O	118
SPK	66	30	64	15	O	O	175
MBL	66	31	64	15	16	O	192
HBL	66	31	64	15	16	O	192
HEBT	71	O	65	O	O	O	136
DmpL	Y	O	Y	O	O	O	0
A2T	83	O	Y	O	O	O	83
Overall							1079

O	no requirement set needed
Y	requirement set needed
	requirement set exists in DOORS (but may be incomplete)
	requirement set exists in DOORS (considered complete by LE)

- Some of the “missing” requirements do exist, but are not yet in DOORS; e.g. DmpL BMD is ready for upload

Are Interface Requirements Needed?

France's new trains too wide for old stations

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Latest update : 2014-05-21

France's SNCF rail network has ordered 2,000 trains for an expanded regional network that are too wide for hundreds of station platforms, entailing costly repairs, the national operator announced on Tuesday.

21-May-2015

In May 2014 train operator RFF stated that 1300 of 8700 platforms needed work:

- displace equipment
- modify platforms

ACC interface requirements status in DOORS (slide 1 of 2)



Number of requirements for the interface of ACC with

- ICS: 3 (plus 12 draft in spreadsheet)
- SI (CF) : > 190 (about half have mutual agreement)
- TS: 0 (plus 17 draft in spreadsheet)
- NSS: 0 (also 0 in spreadsheet)

Number of L3 ACC internal interface requirements: 62

- Supplied by Lead Engineers and VAC group
- Currently covers L3 sections from ISrc to SPK

ACC interface requirements status in DOORS (slide 2 of 2)

Number of L4/L5 interface requirements within ACC: 41

Interface Controls Tracking (AD perspective)
ACCELERATOR
20-May-2015
ACC-ICS interfaces tracked separately

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Substantial number of draft requirements in spreadsheets for PWRC, WTRC

Contact			AD	Ion Source sp.	Power Supplies	Beam Line Magnets	Survey&Alignment(non-AD)	Water Cooling Systems	Conventional Power	Buncher Cavities	RFQ Cavity	DTL Tanks	SPK Cryomodules	MBL Cryomodules	HBL Cryomodules	Beam Collimators	Beam Dumps	Vacuum Systems	Cryogenic Plant	Cryogenic Distribution	Mechanical Beam Line Support	Target Diagnostics	Current Monitors	Diag: BPMs	Diag: Slits	Diag: Emittance Syst.	Beam Loss Monitors	Bunch Length Measurements	Diag: Profile Monitors (Non-invasive)	Diag: Profile Monitors (invasive)	Diag: Faraday Cups	Diag: Fast Faraday Cups	LPRF: LLRF	LPRF: Reference Line	LPRF: Master Oscillator	LPRF: RF Cell Intck. & Ctrl	HPRF: Amplifiers (<1kW)	HPRF: HP Amplifiers	HPRF: Distribution Systems	HPRF: HV Power Convertors			
W.Wittmer	Ion Source specialties	L4		0	L4																																						
C.Martins	Power Supplies	L4		Y	0	L4																																					
E.Sargsyan	Beam Line Magnets (incl. Deflectors)	L4		0	Y	0																																					
F.Rey	Survey & Alignment (non-AD)			Y	0	Y	0	L4																																			
A.Lundmark	Water Cooling Systems	L4		11	Y	Y	0	0	L4																																		
F.Jensen	Conventional Power	L4		Y	Y	0	0	0	0	L4																																	
W.Wittmer	Buncher Cavities	L4		0	0	0	Y	Y	0																																		
W.Wittmer	RFQ Cavity	L4		0	0	0	Y	15	0	0	0	L4																															
E.Sargsyan	DTL Tanks	L4		0	0	Y	Y	15	0	0	0	0	L4																														
C.Darve	SPK Cryomodules	L4		0	0	0	Y	Y	Y	0	0	0	0	0	L4																												
C.Darve	MBL Cryomodules	L4		0	0	0	Y	Y	Y	0	0	0	0	0	0	L4																											
C.Darve	HBL Cryomodules	L4		0	0	0	Y	Y	Y	0	0	0	0	0	0	0	L5																										
A.Ponton/T.Shea	Beam Collimators (low/high energy)	L5		0	Y	0	Y	Y	0	0	0	0	0	0	0	0	L5																										
A.Jansson	Beam Dumps	L5		0	Y	0	Y	Y	0	0	0	0	0	0	0	0	0	L4																									
P.Ladd	Vacuum Systems	L4		Y	Y	Y	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	L4																								
X.Wang	Accelerator Cryogenic Plant	L4		0	0	0	Y	Y	0	Y	0	0	0	0	0	0	0	0	0	L4																							
J.Fydrych	Cryogenic Distribution	L4		0	0	0	Y	0	Y	0	0	Y	Y	Y	Y	Y	Y	Y	0	0	L5																						
P.Ladd	Mechanical Beam Line Support	L5		Y	0	Y	Y	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	L4																					
T.Shea	Target Diagnostics	L4		0	0	0	Y	Y	Y	0	0	0	0	0	0	0	Y	Y	Y	0	Y	0	L5																				
H.Hassanzadegan	Diagnostics: Current Monitors	L5		Y	0	0	0	Y	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	Y	Y	0	L5																			
H.Hassanzadegan	Diagnostics: Beam Position Monitors	L5		0	0	Y	Y	0	Y	0	0	Y	0	0	0	0	0	0	0	0	Y	Y	0	L5																			
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L5																			
B.Cheymol	Diagnostics: Emittance Systems	L5		0	0	0	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0	Y	Y	0	0	L5																		
I.Kittelmann/T.Shea	Diagnostics: Beam Loss Monitors	L5		0	0	0	0	Y	0	Y	0	0	Y	0	0	0	0	0	0	0	0	0	0	0	L5																		
I.Kittelmann/B.Cheymol	Diagnostics: Bunch Length Measurements	L5		0	0	0	Y	0	Y	0	0	0	Y	0	0	0	0	0	0	0	Y	Y	0	0	L5																		
C.Thomas	Diagnostics: Profile Monitors (Non-Invasive)	L5		0	0	0	Y	0	Y	0	Y	0	0	Y	0	0	0	Y	0	Y	0	0	0	0	L5																		
B.Cheymol	Diagnostics: Profile Monitors (Invasive)	L5		0	0	0	Y	0	Y	0	Y	0	Y	0	Y	0	Y	0	Y	0	Y	0	0	0	L5																		
B.Cheymol	Diagnostics: Faraday Cups	L5		0	0	0	Y	Y	Y	0	0	Y	0	0	Y	0	Y	0	Y	0	Y	0	0	0	L5																		
B.Cheymol	Diagnostics: Fast Faraday Cups	L5		0	0	0	Y	Y	Y	Y	0	0	0	0	0	0	0	Y	0	Y	0	0	0	0	L5																		
A.Johansson, R.Zeng	LPRF: LLRF	L5		0	0	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
R.Zeng	LPRF: Reference Line	L5		0	0	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
A.Johansson, R.Zeng	LPRF: Master Oscillator	L5		0	0	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
R.Montano	LPRF: RF Cell Interlock and Control	L5		0	0	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
M.Jensen	HPRF: Amplifiers (< 1kW)	L5		0	Y	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
M.Jensen	HPRF: HP Amplifiers	L5		0	Y	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
R.Yogi	HPRF: Distribution Systems	L5		0	0	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	0	0	Y	Y	0	L5																		
C.Martins	HPRF: HV Power Convertors	L4		0	0	0	0	Y	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L4																		

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Interface requirement example: magnet cooling water interlock to PS

- The magnet shall be protected from overheating by a clixon mounted on the magnet cooling, whereby the clixon is interlocked with the Magnet Power Supply (PS). The connection on the PS supply serves as interface, with a LEMO 00 chassis connector on the PS side and a LEMO 00 cable connector on the magnet side of this interface
 - Interface itself is defined (interlock)
 - Interface location is defined (on PS)
 - Interface type is defined (LEMO 00 connectors)
 - Cable owner is implicitly defined
- Other interface requirements will be needed here to describe the signal type and the action (switching to off or standby of PS)

Aspects related to Interface Requirements



- Interface requirements need to be looked at in the broader sense of the term, e.g.
 - Space (the Cryo Distribution Systems have an interface with DTL!)
 - Mechanical
 - Electrical
 - (Electrical Safety)
 - (Radiation Safety)
 -
- It is good practice to have interface requirements defined in time for the **Preliminary Design Review**
 - “We discovered the problem a bit late....” said the RFF spokesman in view of the issue with the train platforms
 - Platform repair work had already cost 80 million euros by May 2014



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Thank you for your attention!