

# ProtoDUNE-DP Construction and Installation schedule

- Main dates
- Detailed planning for each item
- Table of urgent tasks and timescale

Detector installation schedule revised to take into account new inputs from the different elements of last months

19/01/2018

## Hypothesis for CRP:

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=> G10 and Invar frames are received by 1<sup>st</sup> week of February as expected from companies

⇒ 36 LEMs with CFR-35 available by Feb 26<sup>th</sup>

⇒ 36 anodes by mid Feb.

⇒ Additional 36 LEMs are ordered by Beginning of February depending on tests of CFR-36 design

⇒ LEMs for CRP 3 and 4 can follow the same decision if we decide to go on for 4 CRPs

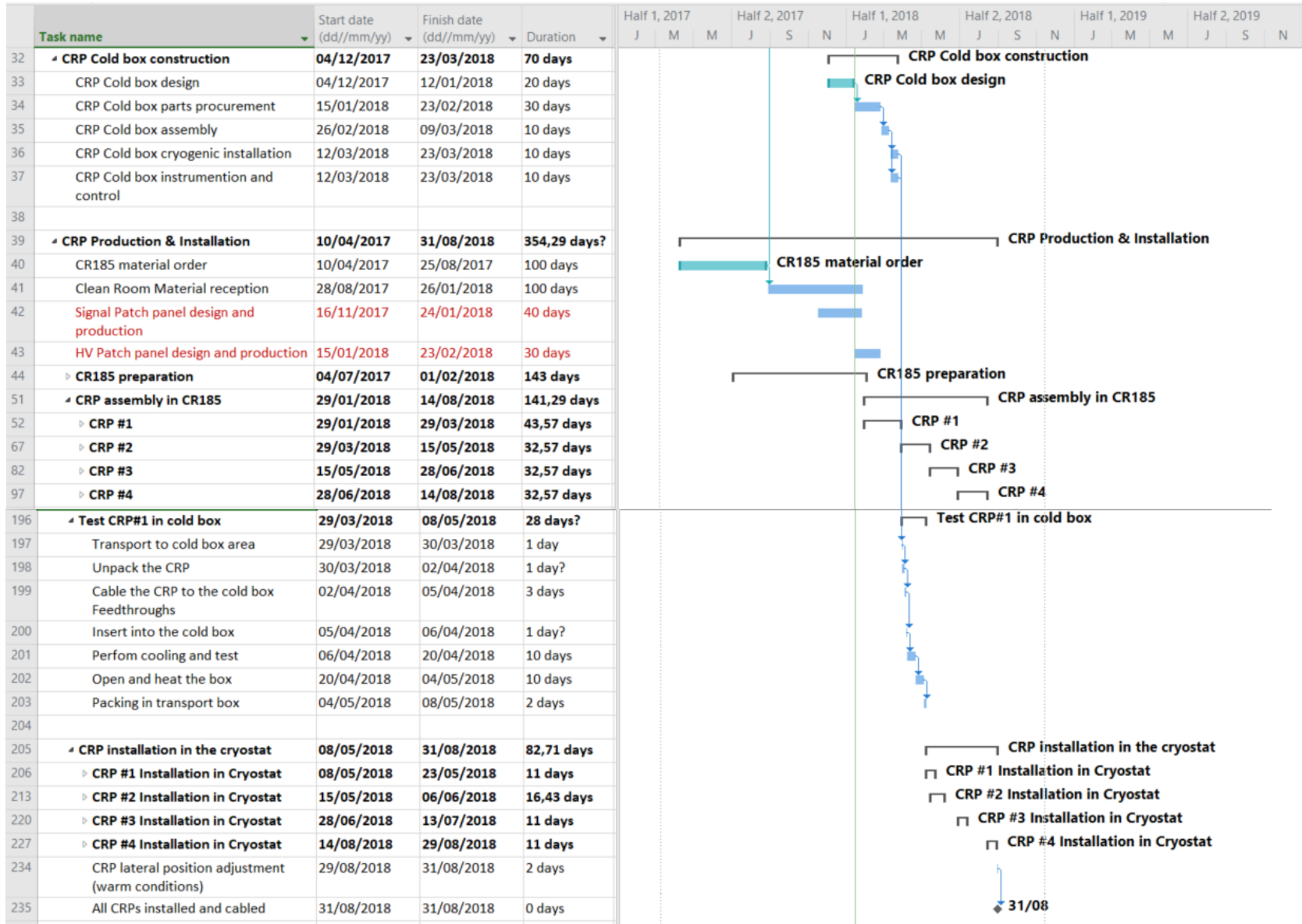
## Critical paths:

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⇒ the Patch panels of the CRP which are on a critical path: design not ready for HV patch panel and tests of design to be done before ordering  
=> this can affect the end of first CRP construction and then shifts all the schedule

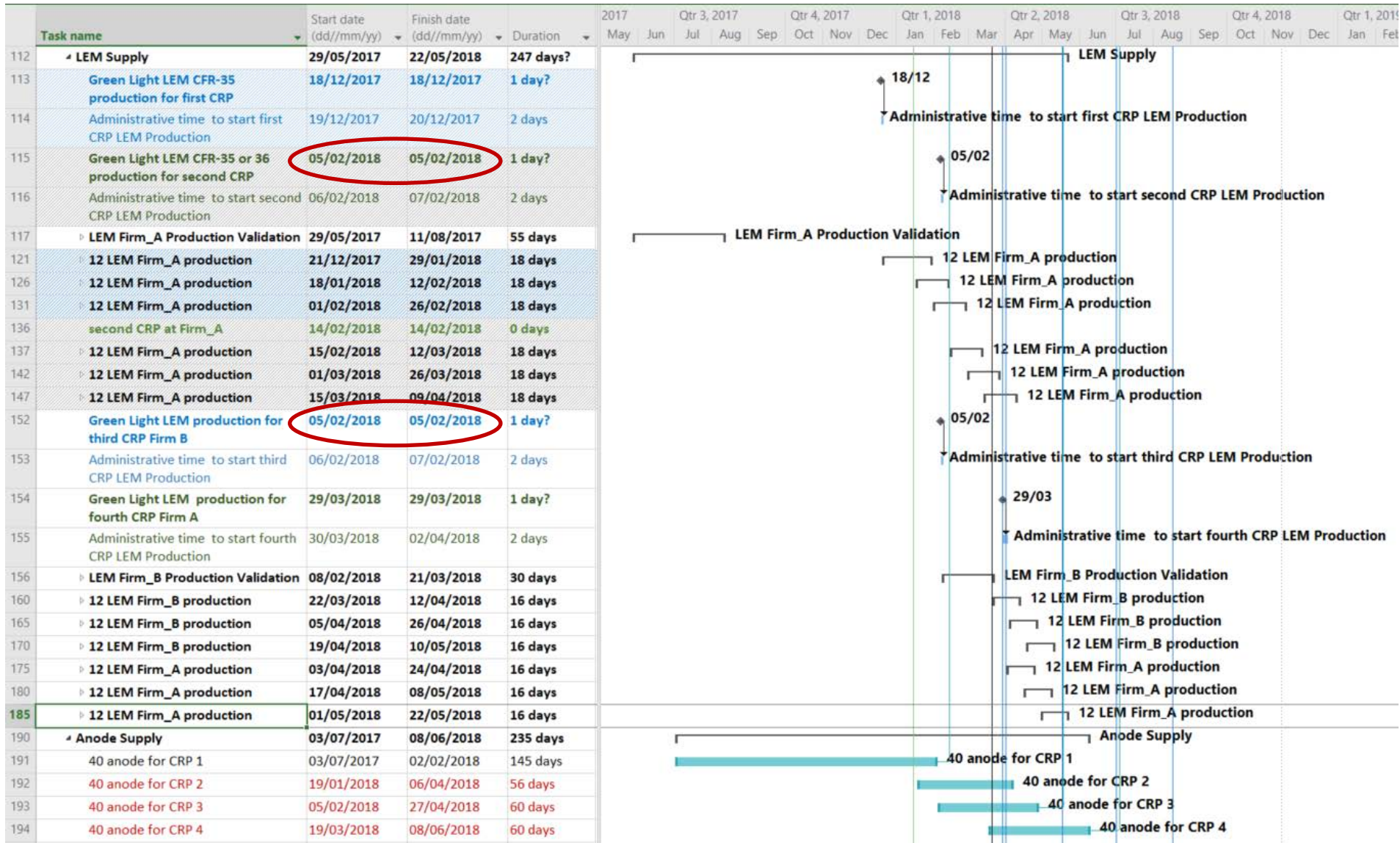
=> SGFT details (from IWG meeting of 16/06) are added but lot of uncertainties on the real tasks schedule: we should not change the design which is adapted and we should go on with the tendering and production.

# CRP Production and installation



Cold bath done only for CRP#1 => in parallel produce the CRP#2

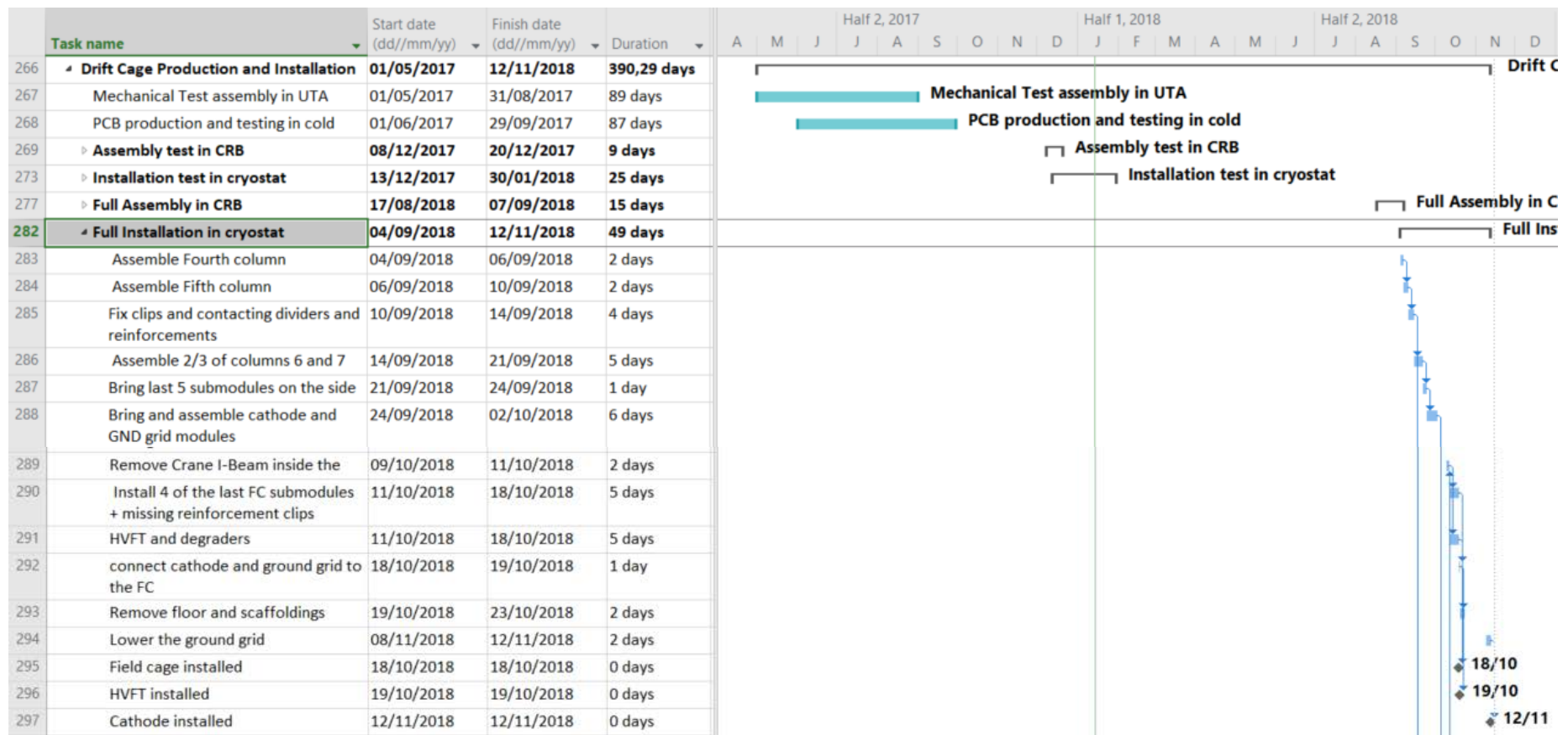
# LEM and Anode production



Anodes orders should be placed sequentially at a rate of 40/month

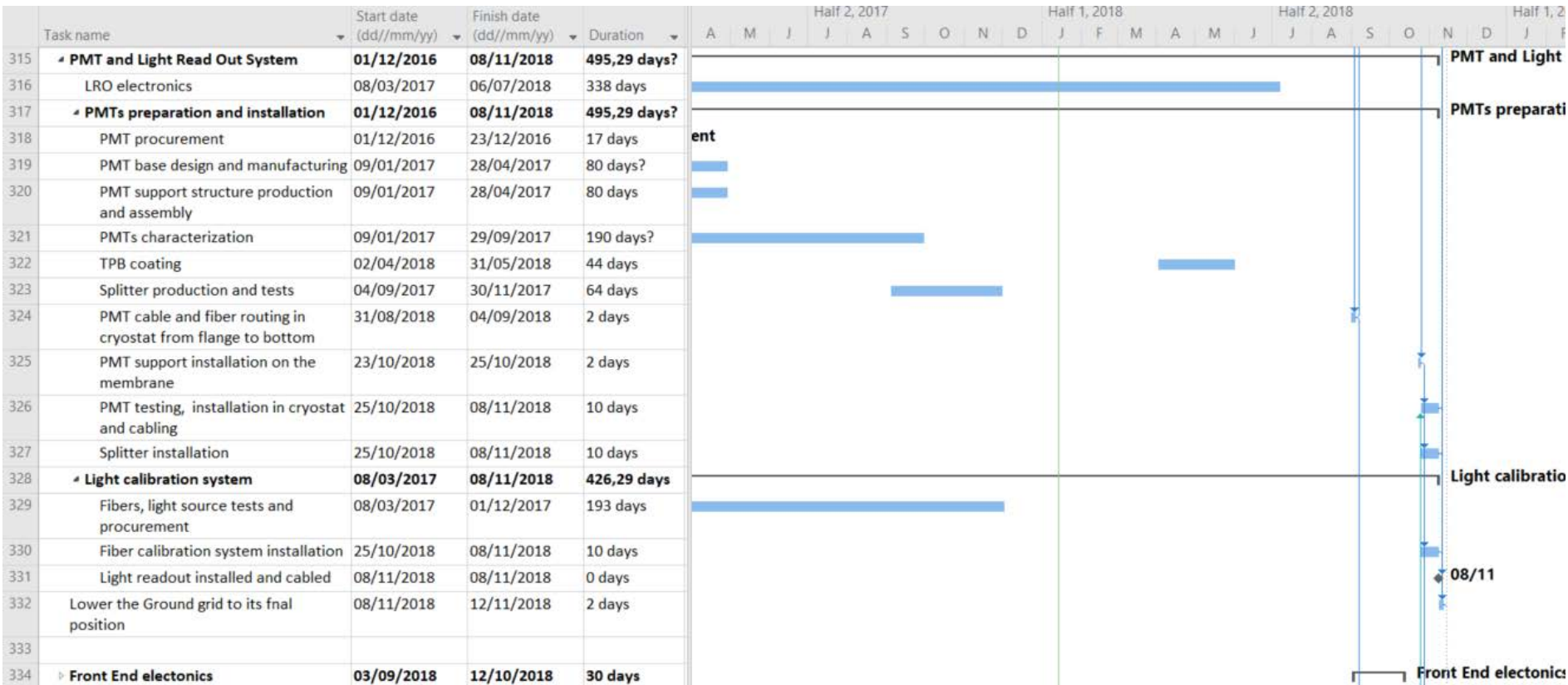
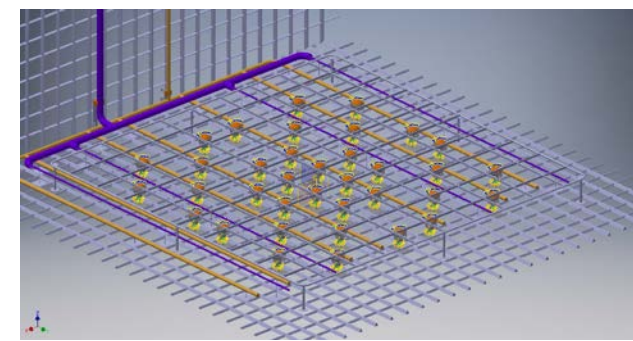
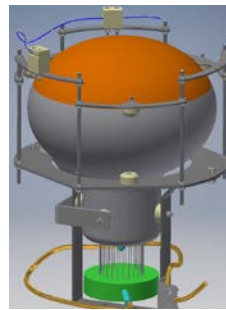
# Field Cage Installation

- The assembly procedure in the cryostat takes into account the test of 4 submodules which was done end of 2017



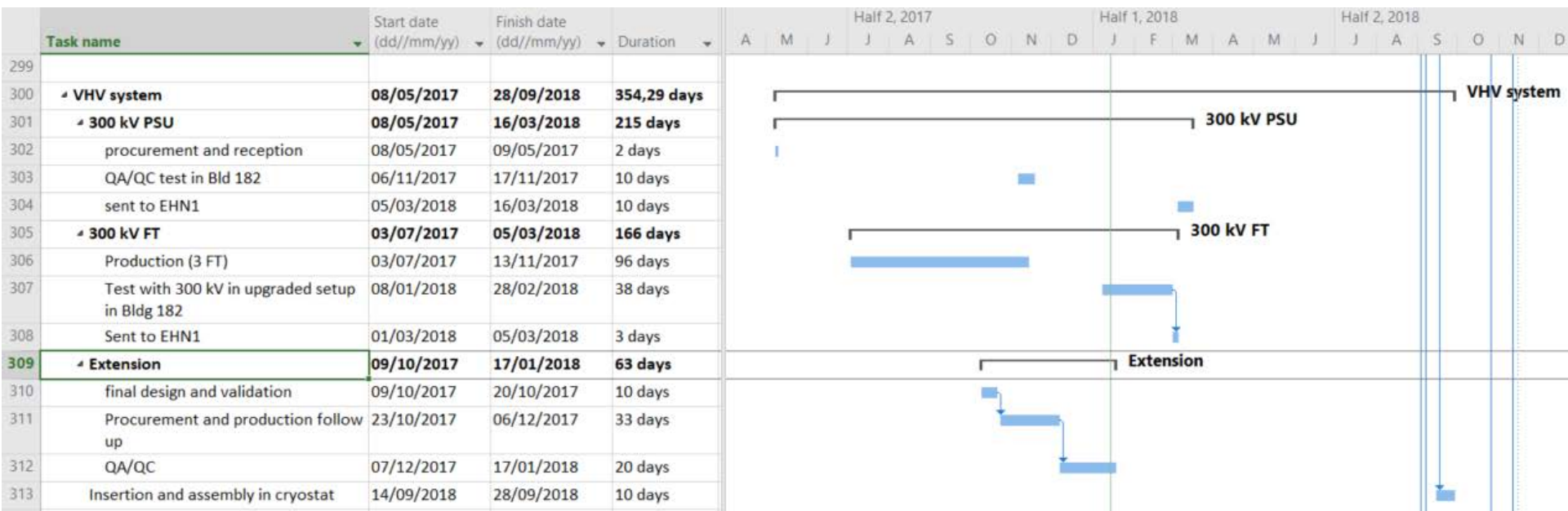
The other modules will be installed after CRP4 in Sept-Oct 2018  
 But this could be optimised and done before with a specific assembly sequence allowing a safe CRP installation and cabling in cryostat

# Light Readout System



Installation and cabling in cryostat Sept-Oct. 2018

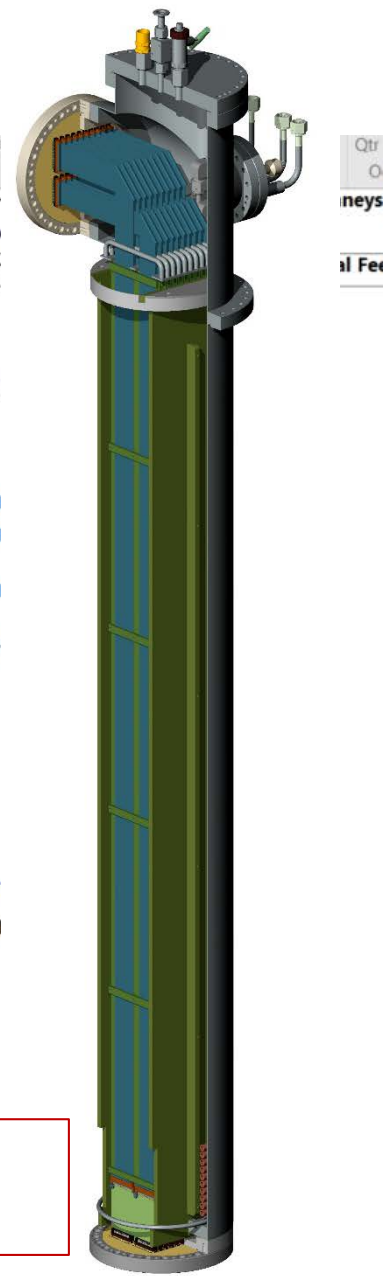
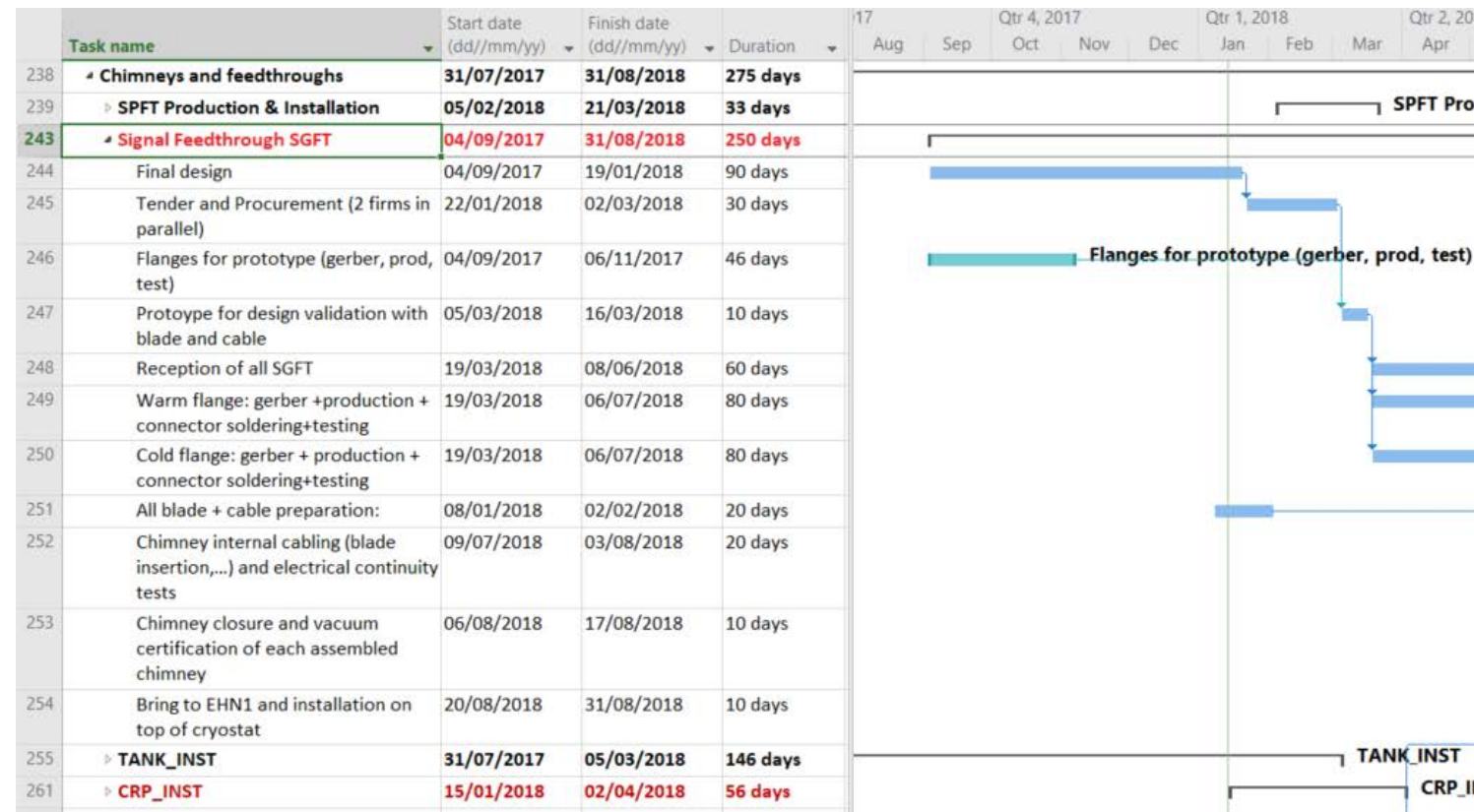
# Very High Voltage system



Was discussed in September - Need confirmation and some updates

# Chimneys and Feedthroughs

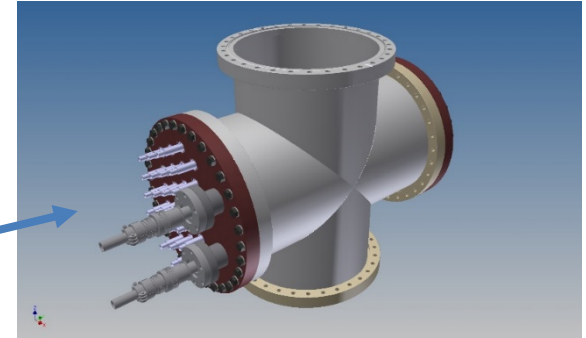
## SGFT: Signal Feedthroughs => 12 elements



It is expected to complete the tender file by Jan 19th 2018 with the actual known design



# Chimneys and Feedthroughs



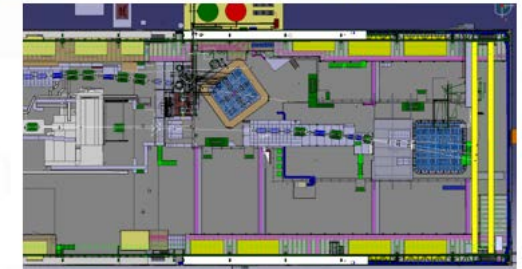
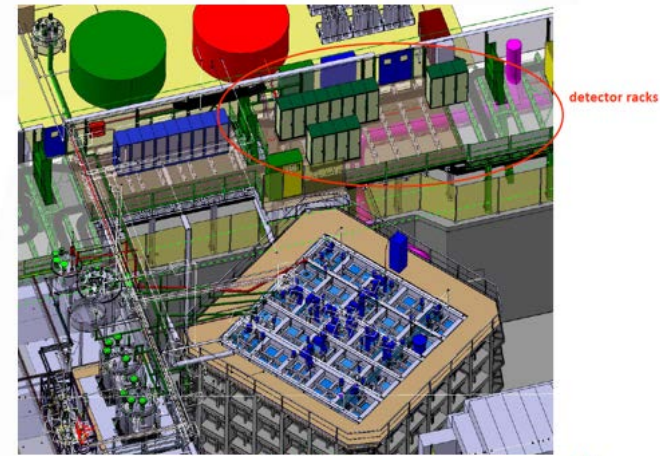
**TANK\_INST: PMTs HV+optical fibers + slow control => 2 elements**

Task name	Start date (dd/mm/yy)	Finish date (dd/mm/yy)	Duration	Qtr 3, 2017			Qtr 4, 2017			Qtr 1, 2018		
				Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
255 TANK_INST	31/07/2017	05/03/2018	146 days	[Gantt bar spanning from Jul 2017 to Mar 2018]								
256 Final design	31/07/2017	06/09/2017	28 days	[Gantt bar in Aug 2017]								
257 Procurement, fabrication and QA/QC	07/09/2017	24/01/2018	90 days	[Gantt bar from Sep 2017 to Jan 2018]								
258 Fabrication of chimney separator	25/01/2018	14/02/2018	15 days	[Gantt bar in Jan 2018]								
259 ship to CERN	15/02/2018	19/02/2018	3 days	[Gantt bar in Feb 2018]								
260 Installation on top of cryostat	01/03/2018	05/03/2018	3 days	[Gantt bar in Mar 2018]								
261 CRP_INST	15/01/2018	02/04/2018	56 days	[Gantt bar from Jan 2018 to Mar 2018]								
262 Design	15/01/2018	09/02/2018	20 days	[Gantt bar in Jan 2018]								
263 Procurement and fabrication	12/02/2018	19/03/2018	26 days	[Gantt bar from Feb to Mar 2018]								
264 Test and validation	20/03/2018	02/04/2018	10 days	[Gantt bar in Mar 2018]								

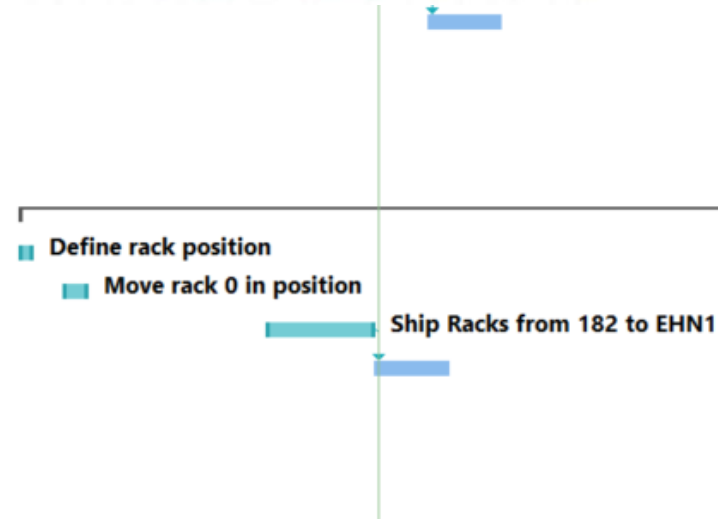
**CRP\_INST: not yet designed  
Should be started now with a milestone to be ready for end of March**

# External cabling, roof layout and Racks

Some tasks to be confirmed with NP



Task name	Start date (dd//mm//yy)	Finish date (dd//mm//yy)	Duration	Qtr 3, 2017	
				Jul	Aug
343					
344	▷ Large Area Trigger Counters	04/06/2018	13/07/2018	30 days	
348	◀ External cabling, roof layout and Racks	08/03/2017	14/11/2018	431 days	
349	◀ cable trays and roof piping	08/03/2017	04/05/2018	293 days	
350	design and 3D layout	08/03/2017	29/03/2017	16 days	
351	external trays purchase and installation	02/10/2017	24/11/2017	40 days	
352	Warm cryogenic piping installation	09/04/2018	04/05/2018	20 days	
353	◀ External cables and optical fibers	06/11/2017	27/02/2018	72 days	
354	Manufacturing and QA/QC	06/11/2017	31/01/2018	53 days	
355	Installation	01/02/2018	27/02/2018	19 days	
356	◀ Roof crates	15/10/2018	08/11/2018	18,29 days	
357	Low voltage	15/10/2018	17/10/2018	3 days	
358	PMT calibration	25/10/2018	08/11/2018	10 days	
359	Cameras	15/10/2018	17/10/2018	3 days	
360	◀ Racks	04/09/2017	14/11/2018	303 days	
361	Define rack position	04/09/2017	07/09/2017	4 days	
362	Move rack 0 in position	20/09/2017	27/09/2017	6 days	
363	Ship Racks from 182 to EHN1	04/12/2017	11/01/2018	19 days	
364	Rack cabling and connection to external cabling	12/01/2018	08/02/2018	20 days	
365	Install light system HV modules in rack	04/09/2018	11/09/2018	5 days	
366	General slow control testing	18/10/2018	14/11/2018	20 days	



## URGENT Tasks and timescale:

Tasks	Start date
CRP_INST design	Now and to be completed by 9/02/18
CRP_INST procurement	9/02/18 and to be completed by 29/03/18
HV CRP patch panel design and procurement	Now and to be completed by 27/02/18
Signal CRP patch panel design and procurement	Now and to be completed by 27/02/18
LEM ordering and production for CRP#3 and 4	5/02/18; 29/03/18
Anode ordering for CRP#2, 3 and 4	19/01/18; 5/02/18; 19/03/18
SGFT final file for tendering process	22/01/18
SGFT start tendering process	23/01/18

List of some items to cover now in priority:

- URGENT: finalise design and produce the patch panels for the CRPs.
- SGFT tenders to send in January
- CRP\_INST design in January
- CRP\_INST production for end of March
- Cathode and ground grid to conclude the design and start the orders

# ProtoDUNE-DP main schedule

	Task name	Start date (dd/mm/yy)	Finish date (dd/mm/yy)	Duration
4	ProtoDUNE-DP	01/12/2016	14/11/2018	500 days?
5	▸ Cryostat preparation	08/03/2017	07/12/2017	197 days
14	▸ Cryostat internal cables and instrumentation	03/07/2017	23/10/2018	331,29 days?
30				
32	▸ CRP Cold box construction	04/12/2017	23/03/2018	70 days
38				
39	▸ CRP Production & Installation	10/04/2017	31/08/2018	354,29 days?
237				
238	▸ Chimneys and feedthroughs	31/07/2017	31/08/2018	275 days
265				
266	▸ Drift Cage Production and Installation	01/05/2017	12/11/2018	390,29 days
298	Beam plug installation	02/10/2018	09/10/2018	5 days
299				
300	▸ VHV system	08/05/2017	28/09/2018	354,29 days
314				
315	▸ PMT and Light Read Out System	01/12/2016	08/11/2018	495,29 days?
332	Lower the Ground grid to its final position	08/11/2018	12/11/2018	2 days
333				
334	▸ Front End electronics	03/09/2018	12/10/2018	30 days
339				
340	End of installation inside the cryostat	12/11/2018	12/11/2018	0 days
341				
342	Ready to seal TCO & cryostat	12/11/2018	13/11/2018	1 day
343				
344	▸ Large Area Trigger Counters	04/06/2018	13/07/2018	30 days

Full revision done on 15/01/2018

The end of installation is Nov. 15th, 2018

## ProtoDUNE-DP main schedule

To be noted:

- The actual schedule doesn't take into account possible interference with ProtoDUNE-SP between August and end of October where the EHN1 access could be subject to some limitations:
  - Access restrictions (number of persons, safety equipments) during the NP04 filling
  - Access to the pit not allowed when the beam is on