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Date of the meeting : 30 September 2021

WP6a Technical follow-up : Meeting Minutes #6

Project/Activity: HL-LHC – Cold Powering (WP6a)

Participants : F.Di Ciocchis (FdC), Y.Leclercq (YL), F.Pillon (FP), R.Betemps (RB), D.Ochoa (DO), A.Jacquemod (AJ), M.R.Curylo (MRC), P.Schneider (PS), J.Fletier (JF)

Agenda:

Indico event <https://indico.cern.ch/event/1055245/>

1. Action list follow-up
2. DFHX blank assembly progress
3. Planning of new activities
4. AOB

Discussion & comments:

1. Action list follow-up

WP6a Integration & Transport & Logistic

- Action #1: Validation of storage areas for WP6a (PC, YL)
Validation of the storage areas reserved by CH for the WP6a.
- Action #2: Transport sequence for WP6a devices (MRC)

DFH

- Action #1: Follow-up weld qualification campaign (FdC, YL, RB)
Qualification plan on-going - few remaining points to be addressed in the next dedicated meeting. Thibaut from the AP engaged a dedicated person for designing the samples for the burst tests. They will start with the DFHX main shuffling box. **Yann underlined that we still have an open point concerning the 4mm lip weld of the DFX. FdC has assessed all the pressure-retaining lip welds of the DFX considering a weld penetration of 2mm (which seems to be the current limit for this type of weld at CERN). The plan is to not ask SOTON to reach the nominal penetration indicated on the drawing.**
- Action #2: Finalize feet design ensuring compatibility with installation sequence (RB)
Activity on-hold.
Tunnel floor unevenness has been measured. Results presented by Stephane Maridor, available [here](#).
- Action #6: flexible's tests follow-up (YL)



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Performing flexible's tests based on what Jerome Fleiter intends to assess before approving the dedicated reports. YL has proposed to postpone this activity until we get the parts for the test. There has been a long discussion between YL and Jerome JF concerning the test of the CL flexibles. The plan is to insert the 18kA CL flexible in the central vacuum chamber. As a first step we will try to insert the 18kA CL without the cables (only with the flexibles) and then after this first test we will add the copper cables. RB pointed out that we need a dedicated part to insert the cables that is currently on his desk. It is important to install this part before inserting the cables. **RB recalled he has a 3D printed part on his desk designed for the insertion of the cables. RB also underlined the need of including the part in the dossier of the series production.**

- **YL to contact Jerome Fleiter to set up the flexible's tests.**

▪ Action #7: IFS flange design validation (YL, RB, FP)

PC reminded that the IFS flange of the DFHX is not included in the current manufacturing dossier. YL mentioned that the finalization of the IFS flange would have been taken over by AG but it still needs to be confirmed. YL confirmed the design is converging. YL stated that the design is progressing although is not fully finalized. We will wait for JF feedback about the final electric layout.

- **FP to share information about the design, JF to check the design from the electrical point of view, JB to prepare a mock up, follow-up the procurement and assess assemblability.**

▪ Action #8: Blank assembly follow-up (YL, FdC, MRC, AJ)

Completed "*Sleeve support assembly – LHCDFHX_0112*", some remarks concerning the shafts interconnection. The helium sleeves have been inserted into the G10 collars, everything fitted properly. Partially assembled "*Assembly rear part cryogenic box2 – LHCDFHX_0199*" – we got stuck in assembling the shafts (the same issue came up in the *LHCDFHX_0112*). Found scratches on "*Stopped Shaft – LHCDFHX_0111*" – they do not affect the functionality. Placed one cradle on the rail – it does not seem to work properly, difficult to slide it without losing the alignment with the rail. Some pictures available [here](#).

AG underling the importance of representing the real assembling conditions also during the blank assembly tests. Specifically, he suggested to install the spacer around the CL helium flexible. **YL suggested to prepare the blank assembly for each cryostat of the series. This will make sure that all the parts have been properly machined as well as facilitate the alignment process.**

DFM

▪ Action #1: Follow-up DSHM-DFM installation study in the LHC tunnel (YL, PS)

PS showed the main plan and status of the study. The study is progressing. Some feedback to be shared with Amalia. PS will model PC's proposal about the routing and check if it improves the design.

DFX



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- Action #1: Production follow-up (YL)

Production on-going. Found issues with the helium bellows – they have been delivered with damages and, therefore, we need to reorder them. The order has not been placed yet. We don't expect to receive the new bellows before end of October (three months delay). YL commented the bellow's order is done and there is a fatigue strength qualification campaign on-going. He expects to receive the bellows by end of November/ beginning of December.

DSH (SC Link)

- Action #2: Reel procurement follow-up (MC)

Contract signed. MC is following-up the procurement. Delivery expected by November 2021 and test to be done by Q1 2022.

MC commented that in about two weeks we should know the exact delivery date of the ordered reel.

- Action #3: Reel design validation (PC, MC)

PC, MC and Erik Richards agreed to perform a test on the existing spool. The test is foreseen to be performed in early September. MC underlined the need of reducing the spool speed and adding a brake to keep constant the cable's tension. The objective is to test how the spool is performing and to see how the cables behave during the operation.

Dedicated presentation from Erik Richards about the SC Link transport operations, available [here](#). MC commented that there are still some parts to be manufactured for performing the test. According to the current schedule the test is foreseen to be performed in two weeks. RB will help MC with the manufacturing of the parts at the AP. **RB reported that the AP will take 8 weeks to manufacture the brake's disc to test the reel. The plan is to ask other machine shops for manufacturing this part trying to negotiate the shortest lead time possible.**

DFLH (Current Leads)

- Action #2: Production follow-up (RB, PC)

PC underlined the need of arranging regular meetings with Pierre Moyret (EN-MME, in charge of the CL production planning) to identify any potential stopper/issue in the manufacturing in order to ensure on-time delivery. PC underlined that as baseline they will arrange regular meeting to follow up the progress. PC mentioned that at a certain point would be useful to invite Pierre Moyret to come to SMI2. PC stated that all the CL are foreseen to be manufactured by the end of the year.

- Action #4: Review models and integration of CL's transformers boxes (RB, AG)

Transformer's boxes have been modelled and integrated in SM18/Tunnel. RB confirmed that the concept is done and the space is defined. They need to design also the dedicated supporting frame. RB and AG will have a dedicated discussion before starting the detailed drawings. RB pointed out that the design responsibility is still to be defined. RB underlined there are still some points from integration to be addressed.

RB mentioned that for him is not clear the final arrangement in the machine. AG confirmed that for the machine this point is still under discussion. AG underlined that we can proceed with the design activities for cluster F. He also stressed the urgency of the frame design.



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PC suggested to have a dedicated meeting with RB and AG in front of the models to converge on the remaining points. **RB confirmed the design of the frame has been completed.**

Cables & Splices

▪ Action #1: Splices & tooling design (RB, FP, PS)

FP confirmed that the design activities are still on-hold. FP and RB are waiting for Jerome Fleiter/Julien Hurte feedbacks before finalizing the design. FP confirmed the design activities have been re-started and he is progressing on the DFX. FP stated that the DFX splices have been designed. They are now working on the insulation. They will then move on the DFHX splices. **FP mentioned the design for the DFX is in a good shape. They plan to test the current design before triggering the series production.**

▪ Action #2: Design splices anti-pulling system (PC, RB, FP)

A first meeting was held to initiate the discussion. During the meeting Julien Hurte raised uncertainties concerning the actual flexibility of HTS. PC underlined the need of arranging dedicated recurrent meetings to follow-up these activities. As a starting point, a summary table of the HTS cable's requirements is needed. This action is currently on-hold because PC underlined the need of Jerome Fleiter (on holiday) to progress. PC suggested to conceptualize the system by taking advantage of the DFHX blank assembly.

2. AOB

- PC mentioned they are working on a document – “TE-VSC Contribution to WP6a” – concerning the vacuum instrumentation configurations in WP6a, which will also underline the impact of the vacuum barriers on the vacuum instrumentation. PC underlined that the document has been updated so as to include all the related costs. Concerning the vacuum barrier AB wants to keep the VB until the test to decide then if we can modify or not the function of the VB.
- PC asked about the leak test configuration in AP. PC underlined that we would need to ask to AP formal leak test reports.

Next Meeting: 30th of September 2021

Prepared by: F.Di Ciochis

Date: 07-10-2021



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List of actions:

N.	Action	Owner	Due date	Status
WP6a Integration & Transport & Logistic				
1	Validation of storage areas for WP6a	PC, YL		New
2	Transport sequence for WP6a devices	MRC		New
DFH				
1	Follow-up weld qualification campaign	FdC, YL, RB		Ongoing
2	Finalize feet design ensuring compatibility with installation sequence	RB		On-hold
6	Flexible's tests follow-up	YL		Ongoing
7	IFS flange design validation	YL		Ongoing
8	Blank assembly follow-up	FdC, YL, MRC, AJ		Ongoing
DFM				
1	Follow-up DSHM-DFM installation study in the LHC tunnel	PS, YL		Ongoing
DFX				
1	Production follow-up	YL		Ongoing
DSH (SC Link)				
2	Reel procurement follow-up	MC		Ongoing
3	Reel design validation	PC, RB, MC		Ongoing
DFLHA/ DFLHB/ DFLHD (Current Leads)				
2	CL production follow-up	PC, RB		Ongoing
4	Review models and integration of CL's transformers boxes	RB, AG		Ongoing
Cables & Splices				
1	Finalize splices & tooling design	RB, FP, PS		Ongoing
2	Design splices anti-pulling system	PC, RB, FP		On-hold

