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Date of the meeting : 09 December 2021

WP6a Technical follow-up : Meeting Minutes #12

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

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

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 #2: Transport sequence for WP6a devices (MRC)
MRC presented a first proposal for the installation sequence of WP6a devices. He is in contact with the transport group and they are having regular meeting to progress on this activity. Presentation available [here](#). MRC commented they will get next Monday input from the transport team. MRC commented that the transport team proposed a new tooling for handling the SCLink – a conveyor system. MRC is preparing a draft of the transport sequence that he will send to YL and AG for validation before sharing it with Michele Modena and the transport group. There is also a proposal from the transport group to weld the DFX interface to the DCM before transporting it down in the tunnel.

DFH

- Action #1: Follow-up weld qualification campaign (FdC, YL, RB)
Qualification plan on-going.
AG remarked about the temperature we would reach while performing the lip weld of the DFX's top flange since there is the concrete risk of damaging the cables. He suggested to think about a dedicated mock-up to measure the temperature reached during the welding at this location. The temperature should be less than 100 C (reference value based on the Kapton insulation that from specs may accept up to 100 C before deteriorating its properties).
→ **RB to follow-up the test to measure the temperature reached while performing the lip welds. The AP doesn't have yet the input to proceed with**



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the manufacturing of the equipment.

- 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 #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. Mechanical design validation on-hold, waiting for JF feedback for the final electric layout before going any further. YL confirmed that we received all the info and that the design validation is now in JB's hands. **YL stated that this action is still on-hold.**
- Action #8: Blank assembly follow-up (YL, FdC, MRC, AJ)
Some pictures available [here](#).
YL underlined that the DFHX's drawings have been reviewed to relax the tolerances and the proposed modifications have been circulated – still need to received feedback before officially proceed in modifying them. **AG underlined as it is important to avoid having a deviation of the CL with respect to the central axis of the cryostat. YL mentioned a proposal from Jean-Baptiste Deschamps which consists in installing a reference bar extending parallel to the rail that the survey team can employ to measure how far the various parts are being positioned from the perfect alignment.**

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. PS commented that no further progresses since last time. There are some discussions on-going for modifying the degrees-of-freedom of the SCLink handling tool (reducing the number of DOF). PS will prepare a presentation (in view of the DFM's DDR) with some pictures showing the procedure step-by-step. **PS stated that the study is progressing and the status will be presented in the upcoming DDR.**

DFX

- 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. YL stated that the loading test performed on the ribs of the main chamber wasn't successful. **It's**



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not a design issue but most probably something related with the manufacturing or with the test set-up. YL stated that the parts should be delivered at CERN by end of January.

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. They solved all the technical points, the supplier will deliver the parts in November. PC confirmed we received the new reel - it is stored in the flex building.~~

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

PC, MC and Erik Richards agreed to perform a test on the existing spool. 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 operation.

Dedicated presentation from Erik Richards about the SC Link transport operations, available [here](#). PC commented that the actual design seems too weak - MC is making an upgrade to stiff and strengthen the design by welding some reinforcements. PC stated that the unspooling test should be performed next week.

DFLH (Current Leads)

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

PC stated that all the CL are foreseen to be manufactured by the end of the year.

They found some errors on the O-ring dimensions. RB and JF commented there have been technical issue with the O-ring, they don't have leak tightness on the warm flange (the CL's head). The groove seems to be too deep compared to the diameter of the O-ring. PC will try to give some help from the vacuum group. JF underlined that everything can be ready by the end of the year except for what concerns the readiness of the HTS cables. JF commented that this point is still under investigation. It seems that the leak was caused by the vacuum grease which was very old. They tried putting a new vacuum grease and the connection was leak tight. PC pointed out that all the composite parts should be tested individually before getting integrated in the assembly. In the 18kA they found a crack in a composite part that may have been the cause of the leak. RB will revisit the drawings for correcting some inconsistency on the tolerance found on the various drawings.

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

RB confirmed that the design of the frame has been finalized. The drawings are completed, and they would need to double check them before closing this point.

AG underlined that the fabrication/order of this frame is urgent now. RB commented that the design & drawings are completed – the order is not out yet. AG stated that he has not received any feedback the order is therefor still pending.



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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. Drawing for the DFX are done and signed. Les plans de moule for the DFX are also done. They have also worked on the insulation housing for the DFX. They had a meeting for the validation of the insulation design but there is still some to be addressed. The next step would be making the same for the DFHX. FP commented - he has now started working on the DFHX splices.

▪ 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. **PC suggested to postpone it once we have done the spooling test.**

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 commented this document is in the final check.
- PC asked about the detailed assembling sequence of the DFX. RB will ask DO to work on this point.

Next Meeting: 27th of January 2022

Prepared by: F.Di Ciocchis

Date: 14-12-2021



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List of actions:

N.	Action	Owner	Due date	Status
WP6a Integration & Transport & Logistic				
2	Transport sequence for WP6a devices	MRC		Ongoing
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		On-hold
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

