

Crab Cavities Technical Coordination XXXIII



Location:	376/1-020
Date:	18th December 2017, week 51
Time:	10h30
Scope:	coordination and alignment of tasks involved in the preparation of the cryomodule test, follow up of master plan.
Attendees:	Alick Macpherson, Ofelia Capatina, Eduardo Cano, Frank Gerigk, Krzysztof Brodzinski, Simon Barriere, Olivier Pirotte, Aurelio Berjillos, Mateusz Sosin, Teddy Cappelli, Marco Garlaschè, Vivien Rude
Master schedule:	EDMS 1747466
Logbook:	http://elogbook.cern.ch/eLogbook/eLogbook.jsp?lgbk=387
Indico:	https://indico.cern.ch/event/688308/

Master schedule:

Aurelio presents the last version of the Master Schedule. Today, 18th of December, we are in a buffer time day. He presents only a minor change between the previous version of the schedule and the present one. This change corresponds to a switch between the cutting line and the final alignment steps. The cutting line will commence the 9th of January, whereas the 8th of January is reserved for the final alignment steps.

Concerning alignment, Mateusz comments that the cavity alignment results are very good. He reports on a conversation with Ofelia and Rama in which they agreed that, as the alignment is sufficiently good, there is no need on performing extra alignment operations and leave those operations until the installation of the cryomodule in SPS, if necessary. Ofelia mentions that it would be important to keep trace on the alignment evolution during the subsequent steps.

Alick asks if there is any activity foreseen during the Christmas break, as the schedule shows none. He mentions that, nevertheless, electricity and water will be provided during the Christmas break. Frank answers that if conditioning can be done during Christmas it will be done as foreseen by Eric's team. If for some reason it cannot take place then the present planning for January will not be changed.

Aurelio continues presenting the master schedule. He points out that, once the "cutting jumper lines" task is completed, there are 7 days of buffer time in which the CM will be in M7 waiting for its transportation to SPS. In this regard, Krzysztof mentions that they will need one of these buffer days for tests on the pressure gauges. The planning states that the cryomodule will be received at SPS the 19th of January. Nevertheless, if Giovanna is able to receive the CM earlier, Giovanna would organize the transport of the cryomodule on an earlier date. For that, Alick and Giovanna have to coordinate to prepare the transport.

Tomorrow (19th of December), the warmup of the cryomodule will start. This operation lasts 3 days and it is planned to finish on the 21st of December. In this regard, Alick and Giovanna have to coordinate in terms of transport preparation.

Cooldown process update:

Krzysztof presents the temperature curves for the first and second cooldown, which took place after the replacement of the rupture disk. According to the results presented, about 43 hours (2 days) are needed to get liquid Helium on the cavity. He also comments that using a temperature gradient restriction of 50 K did not put much stress on the equipment.

Abrupt changes are observed in the curves during the second cooldown, which are attributed to a problem during the night regulation of the SM18 infrastructure. The curves also include the level regulation tuning. It can be observed in the curve that the right regulation parameters were found, which provided a stable thermalized operation of the cryomodule. With an inlet temperature of the screen of 50 K and an outlet temperature of 75 K the module is fully thermalized.

Krzysztof reports on two points to be improved for the next cooldown. Firstly, the value of the pressure gauge is shifted around 20 mbar from the real value. This gauge is presenting a smooth behavior but this offset has to be corrected for operation in SPS. Thus, a recalibration of the pressure gauge is needed. For that, Krzysztof asked Aurelio if he could make use of one of the buffer time days previously mentioned, at which Aurelio answers positively. The second point to be improved in the future is the placement of the temperature sensors. In the current cryomodule, the thermometers were screwed outside the helium vessels and provide a value slightly shifted by 0.3-0.5 K as they are not in the liquid, in addition to the contact resistance between the thermometer and the vessel. It is suggested to drill holes into the helium tank so that the temperature can be measured directly in the helium.

Krzysztof continues presenting the slides and the main conclusions extracted from the cooldown process, which include the two previously mentioned "lessons learnt." These conclusions are summarized in the slides.

Krzysztof informs that the cryomodule is planned to be at 300 K by the 22nd of December. To this fact, Alick comments that it is good to have in mind that, if there are activities during the Christmas break, they will take place with the cryomodule at warm, which will pose less safety issues.

Lastly, Krzysztof makes a request to Ofelia: when they will lower the level of liquid helium, they need an estimation of the amount of helium that they would be evaporating in order to reevaluate the heat loads. Ofelia agrees on provide him these estimations.

As a concluding remark, Frank says that any activity related with SM18 has to be coordinated with Alick, whereas activities related with the transport of the cryomodule to SPS have to be coordinated with Giovanna.

Crab cavity monitoring system validation and first cool down results:

Vivien presents the results of the cavity alignment and the different alignment systems employed. In summary, he presents the alignment monitoring systems available, the alignment results at ambient conditions, under vacuum, during cooling down and warmup, at 4 K and the comparison between the simulations and the measurements. All the results are clearly shown in the slides.

In particular, during the cooling down of the cavities, they observed that there was a difference between the longitudinal translations (with regard to the center of the cryomodule) of the two cavities. This point is discussed during the meeting and, although different possible explanations to this difference are raised (e.g. the angle of the cavities, a possible explanation through the stress on the FPCs), no conclusion is drawn. Therefore, additional discussion on this difference would be needed.

Mateusz is asked about the precision of realignment. He answers that with the new system they can instantaneously see the feedback of the alignment, so they could go below the 20 microns.

As mentioned previously, Ofelia says that there is no need of readjusting the alignment in SM18, as it is inside the specifications. Also, there exists the possibility of readjusting once the cryomodule is at SPS.

Marco asks Vivien if he can include in the results how much the alignment has changed during assembly. He comments that it will be good to have the effect of the all the previous steps on the alignment, especially those that imply radial position changes.

RF tests and tuning of the cavities:

Ofelia informs about the tuning results. First, the tuning system was checked at 4 K and showed good results. In the present moment, the cavity is at 2 K and in the middle of the frequency range. During the tests, the full range of operation was tested on both cavities and it worked pretty well. The maximum instability found was of 100 Hz. In conclusion, the tuning system allows to precisely tune both cavities.

Additionally, Ofelia informs that Kurt was in Spain during last week checking on the table, which should arrive to CERN before the end of the week.

Alick remarks that, according to the vacuum readings, the cavities are multipacting quite a bit.

SPS CM installation:

Simon presents in the slides the YETS 17/18 sequencing, the present week, and future operations. Today, the vacuum lines start to be dismantled, which is planned to finish today. The heater tank installation by cryogenics has also started today. The second valve box will be also installed today and the connection to the VB will commence on Thursday 21st of December or Monday 8th of January. In this regard, Krzysztof informs that the phase separator has not been delivered yet to CERN and that it will be delivered on January.

Ofelia asks if this kind of VB are tested in the supplying companies prior to delivery to CERN. Krzysztof answers that they are tested in terms of pressure and leak tightness but that they have to be tested at cryogenic conditions after assembly.

Simon continues presenting the planning for the week. A lot of groups will be performing operations in the worksite, but everything is under control in terms of coordination and safety.

Action list:

ID	Action	Who	Opened	Closed	Result, Comment
49	Define detailed test sequence of Cryomodule in SM18	Rama	27.2.2017	16.10.2017	Presented at the CC Review, Rama elaborates the details with all actors. To be presented at TCC, end Sept
56	Bottom-up planning of SPS activities for YETS	Giovanna	8.5.2017	closed	In work, deadline: SPS Coordination Meeting
61	Report on readiness of controls software and hardware	Rama/Frank	30.8.2017	20.11.2017	Concluded that CS section needs to put more manpower on software
62	M7 integration plan and inputs/outputs from/to other groups	Alick	11.9.2017	06.11.2017	CM is installed next week
63	Interlocks definition and strategy	Giovanna	11.9.2017	06.11.2017	Document is released. It will arrive to Rama for final approval.
64	Cryogenic cooldown before/after Xmas break	Giovanna with CRG	11.9.2017	06.11.2017	
67	Operativity of SM18 during Christmas break			06.11.2017	
68	Details and priority of RF tests in SM18 (+SPS)	Rama			
69	Confirmation of the amount of helium to be released		16.10.2017	06.11.2017	120 liters of liquid helium
70	Clarification of the procedure for the jumper lines pressure test	Krzysztof	06.11.2017	20/11/2017	The right procedure has been followed

Documentation:

ID	Action	Who	Opened	Closed	Result, Comment
44	MTF to be updated with actions on RF conditioning. RF test reports to be placed in correct node.	Carlo	30.1.2017	06.11.2017	

Space:

ID	Action	Who	Opened	Closed	Result, Comment
57	Follow-up of space in bldg. 2002	Frank	8.5.2017		B.2002 will be cleared (G. Mcmonagle) before Dec17, for SRF use
65	New storage space urgently required. Verify availability of bldg. 150	Frank	2.10.2017	16.10.2017	No option to store anything
66	Storage space also needed for the DQW toolings	Frank, Rama	2.10.2017	16.10.2017	The temporary solution in 162 continues. The material which is there right now can stay. 2002 will be used to store tooling and material as soon as it becomes available.