Cryomodule Assembly: Sequence et al.

M. Garlaschè on behalf of MME
Cryostating overview on current Master Schedule

In red, major interactions with entities other than MME.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Duration</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>Assembly (pt.0) with tuners and cryolines</td>
<td>9 days</td>
<td>Mon 31/07/17</td>
<td>Fri 10/11/17</td>
</tr>
<tr>
<td>271</td>
<td>Mounting tuner frame</td>
<td>3 days</td>
<td>Mon 31/07/17</td>
<td>Wed 02/08/17</td>
</tr>
<tr>
<td>270</td>
<td>Mounting cryomodule</td>
<td>3 days</td>
<td>Mon 03/08/17</td>
<td>Fri 07/08/17</td>
</tr>
<tr>
<td>269</td>
<td>Leak test</td>
<td>3 days</td>
<td>Mon 08/08/17</td>
<td>Fri 10/08/17</td>
</tr>
<tr>
<td>268</td>
<td>X-rays</td>
<td>0 days</td>
<td>Sat 10/08/17</td>
<td>Sat 10/08/17</td>
</tr>
<tr>
<td>147</td>
<td>Transport activity</td>
<td>0 days</td>
<td>Wed 10/08/17</td>
<td>Wed 10/08/17</td>
</tr>
<tr>
<td>68</td>
<td>Assembly (pt. 1) of systems under top plate until removal of string trolley</td>
<td>15 days</td>
<td>Fri 11/08/17</td>
<td>Thu 24/08/17</td>
</tr>
<tr>
<td>328</td>
<td>Assembly Cryomodule pt.1</td>
<td>11 days</td>
<td>Fri 11/08/17</td>
<td>Fri 25/08/17</td>
</tr>
<tr>
<td>327</td>
<td>RF frequency</td>
<td>1 day</td>
<td>Tue 29/08/17</td>
<td>Tue 29/08/17</td>
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<tr>
<td>330</td>
<td>Alignment survey</td>
<td>2 days</td>
<td>Wed 30/08/17</td>
<td>Fri 01/09/17</td>
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<tr>
<td>329</td>
<td>Pre-tuning</td>
<td>1 day</td>
<td>Fri 01/09/17</td>
<td>Fri 01/09/17</td>
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<tr>
<td>148</td>
<td>Transport activity</td>
<td>0 days</td>
<td>Wed 08/09/17</td>
<td>Fri 11/09/17</td>
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<tr>
<td>78</td>
<td>Assembly (pt. 2) – first leak check</td>
<td>19 days</td>
<td>Fri 01/09/17</td>
<td>Fri 20/09/17</td>
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<tr>
<td>333</td>
<td>Assembly Cryomodule pt.2</td>
<td>19 days</td>
<td>Fri 01/09/17</td>
<td>Fri 20/09/17</td>
</tr>
<tr>
<td>332</td>
<td>Leak test</td>
<td>0 days</td>
<td>Fri 20/09/17</td>
<td>Fri 20/09/17</td>
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<tr>
<td>331</td>
<td>X-rays</td>
<td>0 days</td>
<td>Fri 21/09/17</td>
<td>Fri 21/09/17</td>
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<td>149</td>
<td>Transport activity</td>
<td>0 days</td>
<td>Fri 22/09/17</td>
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<tr>
<td>84</td>
<td>Assembly (pt. 3) – second leak check</td>
<td>17 days</td>
<td>Fri 29/09/17</td>
<td>Fri 17/10/17</td>
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<td>334</td>
<td>Assembly Cryomodule pt.3</td>
<td>17 days</td>
<td>Fri 29/09/17</td>
<td>Fri 17/10/17</td>
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<tr>
<td>336</td>
<td>Leak test</td>
<td>0 days</td>
<td>Fri 17/10/17</td>
<td>Fri 17/10/17</td>
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<tr>
<td>335</td>
<td>X-rays</td>
<td>0 days</td>
<td>Fri 18/10/17</td>
<td>Fri 18/10/17</td>
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<tr>
<td>150</td>
<td>Transport activity</td>
<td>0 days</td>
<td>Fri 19/10/17</td>
<td>Fri 19/10/17</td>
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<tr>
<td>92</td>
<td>Assembly (pt. 4) and closure of cryomodule</td>
<td>14 days</td>
<td>Tue 24/10/17</td>
<td>Fri 10/11/17</td>
</tr>
<tr>
<td>339</td>
<td>Assembly Cryomodule pt.4</td>
<td>14 days</td>
<td>Tue 24/10/17</td>
<td>Fri 10/11/17</td>
</tr>
<tr>
<td>340</td>
<td>Systems check for cryomodule closure</td>
<td>0 days</td>
<td>Sun 04/12/17</td>
<td>Sun 04/12/17</td>
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<tr>
<td>338</td>
<td>Cryomodule closure</td>
<td>0 days</td>
<td>Fri 10/11/17</td>
<td>Fri 10/11/17</td>
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<tr>
<td>337</td>
<td>Leak tests</td>
<td>0 days</td>
<td>Fri 10/11/17</td>
<td>Fri 10/11/17</td>
</tr>
<tr>
<td>151</td>
<td>Transport activity</td>
<td>0 days</td>
<td>Fri 10/11/17</td>
<td>Fri 10/11/17</td>
</tr>
<tr>
<td>101</td>
<td>Alignment validation of closed cryomodule</td>
<td>16 days</td>
<td>Mon 13/11/17</td>
<td>Fri 02/12/17</td>
</tr>
</tbody>
</table>
Cryostating NOW
Current Total number of Assembly actions ~ 90x

Remove clean room equipment…

…Positioning and welding and control of upper cryoline…

…Assembly and positioning of tuning frame…

5x people foreseen for logistics & assembly

Current slot: tight & no contingency
Current image not exhaustive
Agenda for Assembly Updates

- On WK(n-1) involved actors + reference people shall expect:
  - granular Planning of WK(n)
  - Assembly doc for concerned steps
- Major upcoming events shall be notified with more advance if possible
- ‘Current’ Assembly step to be updated on eLogbook
  (https://espace.cern.ch/HiLumi/WP4/default.aspx)
### Status of Preparation

#### Step 1
1. Remove beam transport equipment.
3. Renew PIP para protection.
4. Renew PIP para protection.
5. Renew supports (MM/EM).
6. Clean PIP para.
7. Set up PIP para high assembly.
8. Renew internal support.

#### Step 2
1. Weld the cryo extension and stopper (PN 2040-2 + MSH 2040-2).
2. Weld stopper (PN 2040-2 + MSH 1040-2).
3. Replace the welding of upper cryostat.
4. Install the cryostat with the support.
5. Install the outer frame to the cryostat.
6. Assemble and weld the inner frame.
7. Weld the inner frame to the cryostat.
8. Weld top part to the cryostat.

#### Step 3
1. See assembly drawing (LNKH-A450B).
2. See assembly drawing (LNKH-A450B).
3. See assembly drawing (LNKH-A450B).
4. See assembly drawing (LNKH-A450B).
5. See assembly drawing (LNKH-A450B).
6. See assembly drawing (LNKH-A450B).
7. See assembly drawing (LNKH-A450B).
8. See assembly drawing (LNKH-A450B).

#### Step 4
1. Insert the cryostat to the inner frame.
2. Assemble back support frame to the inner frame.
3. Assemble the cryostat to the support frame.
4. Assemble back support frame to the cryostat.
5. Assemble back support frame to the cryostat.
6. Assemble back support frame to the cryostat.
7. Assemble back support frame to the cryostat.
8. Assemble back support frame to the cryostat.

#### Step 5
1. Weld the cryostat to the inner frame.
2. Weld the cryostat to the inner frame.
3. Weld the cryostat to the inner frame.
4. Weld the cryostat to the inner frame.
5. Weld the cryostat to the inner frame.
6. Weld the cryostat to the inner frame.
7. Weld the cryostat to the inner frame.
8. Weld the cryostat to the inner frame.

#### Step 6
1. Assemble back support frame to the inner frame.
2. Assemble back support frame to the inner frame.
3. Assemble back support frame to the inner frame.
4. Assemble back support frame to the inner frame.
5. Assemble back support frame to the inner frame.
6. Assemble back support frame to the inner frame.
7. Assemble back support frame to the inner frame.
8. Assemble back support frame to the inner frame.

#### Step 7
1. Assemble back support frame to the inner frame.
2. Assemble back support frame to the inner frame.
3. Assemble back support frame to the inner frame.
4. Assemble back support frame to the inner frame.
5. Assemble back support frame to the inner frame.
6. Assemble back support frame to the inner frame.
7. Assemble back support frame to the inner frame.
8. Assemble back support frame to the inner frame.

#### A. Assy drawings + BOM + Info + Doc
- **Top Cryo rdy this week**
- Remachining Tuner Tube
- Welding Tuner bellows end of this week
- Machining Blades by beg this week
- Thermal shield degreasing

#### B. Components
- **Done**
- **Partly Missing**