Coil Fabrication Status and NCRs - BNL

Jesse Schmalzle

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BNL Coil Fabrication Status

- Coils to date = 9 (4 compete (1 quarantined), 2 rejected, 3 underway,):
  - QXFA202 - Complete and shipped (1st coil fabricated at BNL).
  - QXFA203 - Complete and shipped.
  - QXFA204 - Complete and shipped.
  - QXFA205 - Cable damaged during winding – coil rejected.
  - QXFA206 - Complete and shipped – shipping anomalies, impact is under investigation.
  - QXFA207 - Impregnation complete, final prep underway.
  - QXFA208 - Cable damaged during wind/cure – coil rejected.
  - QXFA209 - Reaction underway.
  - QXFA210 - Winding underway.
  - QXFA202 & 204 used in magnet MQXFA03
QXFS04 – Impreg test with QH Swap

- Coil that was set aside after reaction a few years ago – not impregnated.
- Recently used for an impregnation test with fiberglass under trace.
  - 1 layer of fiberglass was installed under the trace.
  - (change from 2x Hexcel over trace to 1x under & 1x over)
- Impregnation quality looks good.
- Heaters / Coil passed standard electrical checks.

<table>
<thead>
<tr>
<th>Powered Component</th>
<th>QXFS04</th>
<th>Grounded / Monitored Component</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Coil</td>
</tr>
<tr>
<td>PHB01</td>
<td>3680 V - OK</td>
<td>2500 V - OK</td>
</tr>
<tr>
<td>PHB02</td>
<td>3680 V - OK</td>
<td>2500 V - OK</td>
</tr>
<tr>
<td>PHB03</td>
<td>3680 V - OK</td>
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</tbody>
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Hipot Checks - leakage < 1 μA
Cable was damaged during winding of inner layer.
- Winding was paused to address oil leaking from a gearbox.
- Cable spool was clamped and control power was turned off.
- Winding was resumed without removing the spool clamp.
- Immediately paused to remove clamp.
- When resume again there was some slack in the cable that went unnoticed, as a result the cable was not fully in contact with the guide pulley.
- When cable tension was applied, the cable was pulled below the guide pulley and got caught against the guide roller bracket.

Coil was unwound, all parts were recovered.

Improvements made to prevent in future:
- Added a guard below the guide pulley to prevent cable from dropping / becoming caught in the event of tension loss.
- Incorporated interlock to prevent start when spool is clamped.
Coil movement on shipping fixture during transport, discrepancies noted upon receipt at LBNL:
- Rub marks on coil from aluminum coil OD clamps.
  - Indications of small axial motion.
- End restraint screws not in contact with coil end.
  - One rubber tip appears to be cracked.

Coil disposition under evaluation.

Improvements for future shipments:
- Add thin rubber between coil and aluminum coil OD clamps.
- Add lock nuts to end restraint screws.
- Replace end restraint screw rubber tips with swivel pads.
Cable was damaged during curing of inner layer.
- Cable was not in correct position in the transition ramp area during curing of layer 1.
- Transition lead was dislodged during prep for curing / Teflon wrapping.
- Lead was thought to have been repositioned correctly prior to curing.
- Damage was discovered after curing layer 1.

Coil was unwound, all parts were recovered.

Improvements made to prevent in future:
- Added clamp on pole to be installed at start of winding, when the lead is initially positioned in the ramp, and to remain in place thru curing.
- Added clamp at end of coil to be installed before moving L2 spool prior to Teflon wrapping.
- Revised procedure for installing LE filler segments & inspecting lead prior to curing.
- Eased sharp edges on filler segments.

Lead clamp bolted to pole
BNL Coil Fabrication

- Thank you
- Questions?