Tracker SSD Ladder Preproduction Review
Actions and Changes Since Last Week
September 16, 2002

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Robert Johnson
Disclaimer

• R. Johnson prepared this presentation over the weekend and is responsible for all possible errors within.
• A. Brez may need to clarify or correct some of the points during the course of the presentation.
Plan for New Encapsulant

• G&A has ordered the new materials:
  – Nusil CV-1142 for dam
  – Nusil CV-2500 for fill
• These materials are approved and on the LAT list.
• We expect that these materials will be sufficiently cured after 12 hours for handling, even though the full cure requires 7 days at room temperature.
• G&A will build 10 ladders and encapsulate their wire bonds with these materials.
• INFN will carry out the full suite of electrical tests before and after the encapsulation.
• USCS will put these materials onto detectors in the long-term testing setup.
• INFN will carry out environmental tests on a ladder encapsulated with these materials.
• We will review the results on these 10 ladders before proceeding with flight production.
Clarification of Database and Traveler

• The ladder database and input masks are being modified according to the new draft of LAT-TD-914.

• This database will not serve as the “traveler” during production. All items that are redundant with the “in process” traveler being used by G&A are being removed from the database masks.

• The database serves only as a means to record the information that INFN requires in order to monitor the process, evaluate the quality of each ladder, and archive the condition of each ladder:
  – Alignment errors
  – All electrical measurements
  – Missing wires
Clarification of Traveler & Procedure

• G&A has a detailed “in process” procedure and traveler accessed at a computer terminal at each workstation.
• The G&A documents are not public and do not belong to the LAT, but they can be reviewed by us on site.
• LAT-PS-635 lists detailed procedure steps for those processes that INFN developed in collaboration with G&A, such as SSD edge bonding. These and the working-stage definitions are consistent with the in-house G&A document.
• LAT-PS-635 also details those processes developed and carried out by INFN personnel, such as the electrical testing.
• LAT docs 635, 914, and 891 apply equally to G&A and Mipot.
• We are editing LAT-PS-635 and LAT-TD-914 to clarify what they are and reduce the confusion.
Clarification of NCR

- LAT-PS-891 has been renamed—it is not a NCR procedure but rather a set of criteria to use in acceptance testing of individual ladders.
- Nonconformance reporting by G&A will be carried out using their internal procedures.
- We are working to agree upon defining major nonconformances that, upon their occurrence, will require a halt to production and immediate notification of A. Brez and R. Johnson.
- For example, Johnson proposes (TBR):
  - Rejection of >4 ladders out of a run of 40.
  - Accidents resulting in destruction of >2 ladders out of a run of 40.
Plan for Independent Source Inspection

• As stated already, INFN personnel have worked closely with G&A on the G&A site to develop the procedures.
• Sandro has reviewed all G&A procedures and their “in-process” documents.
• INFN personnel will continue to be on site monitoring the production at all times, mainly by way of the electrical testing.
• Darren March and Nick Virmani visited G&A and Mipot last November to inspect their facilities.
• Darren Marsh will travel to G&A to perform an inspection when the first 10 ladders are reviewed.
• An equivalent process will be implemented for the start of production at Mipot.
Clarification of WS-5

• Pulling a couple of ladders per day out of the production line at WS-5 for special electrical testing adds too much complexity to the production flow, which is not justified by the results seen so far.

• Of primary importance is to ensure that a large lot of ladders (such as a week’s production) is not carried out before beginning electrical testing.

• For example, if G&A wishes to wire bond one week and encapsulate the next, the WS-5 electrical testing would be required.

• Johnson proposes to specify that no more than 20 ladders (TBR) may be wire bonded before electrical testing begins on the lot.
Response to Nick Virmani’s Comments

• We reviewed Nick’s written comments and drafted a response to him. Some are being incorporated into the documentation, while others were arguably not necessary.
• Johnson has not yet been able to discuss the response with Nick.
• Most of Nick’s concerns should be satisfied by Darren’s review of the in-house G&A (and later, Mipot) documents. Adding much of the detail to LAT-PS-635 that Nick requests is not possible and would anyway not be relevant, since G&A works from their in-house procedures, not directly from LAT-PS-635.
Tooling Drawings

• The tooling was developed by collaboration between INFN and G&A.
• G&A machines all of the tooling (even the tools to be used by Mipot).
• G&A controls the drawings in its internal system.
• Do we want to enter the drawings into the LAT system for archival purposes?
# Requested Items

<table>
<thead>
<tr>
<th>Production plan and flow diagram</th>
<th>LAT-PS-635</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualification/Environmental Test Plans and Test Flow</td>
<td>See LAT-TD-879 and LAT-TD-880 for completed testing of ladders.</td>
</tr>
<tr>
<td>Production Quality Control Plan</td>
<td>LAT-PS-635</td>
</tr>
<tr>
<td>Inspection and measurement documentation plan</td>
<td>LAT-DS-635 and LAT-DS-914.</td>
</tr>
<tr>
<td>Plans for handling, shipping containers, environmental control and mode of transportation, identification, and storage</td>
<td>LAT-PS-527 and LAT-PS-635. Ladders are never shipped until after mounting on trays.</td>
</tr>
</tbody>
</table>
## Requested Items

<table>
<thead>
<tr>
<th>Traceability Plan for all flight hardware</th>
<th>Tracker database: LAT-TD-384 and LAT-TD-914.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Schedule</td>
<td>LAT P3 schedule.</td>
</tr>
<tr>
<td>Closure of Actions from the Previous Reviews</td>
<td>None</td>
</tr>
<tr>
<td>Complete drawing package approved for production</td>
<td>LAT-DS-26 and LAT-DS-594 are the flight articles. The assembly fixture drawings are only in Italy.</td>
</tr>
<tr>
<td>Subsystem Specification Complete &amp; Under CM</td>
<td>Level-3 spect is under CM. Level-4, LAT-SS-134 and LAT-SS-152 release in progress.</td>
</tr>
</tbody>
</table>
## Requested Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete fabrication, test, and assembly procedures</td>
<td>LAT-PS-635</td>
</tr>
<tr>
<td>Complete analyses of production tooling and test equipment</td>
<td>The tooling and equipment are all at G&amp;A and have been tested.</td>
</tr>
<tr>
<td>Certification of all flight hardware, production tooling and test equipment</td>
<td>Vendor certifications are listed in LAT-PS-635. Marsh and Virmani have visited G&amp;A and Mipot. Marsh will inspect after first 10 ladders are assembled.</td>
</tr>
<tr>
<td>Control methods for all safety hazards</td>
<td>No unusual hazards known. Vendor is responsible for its workforce and has EH&amp;S certification.</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>requested item</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Control requirements</td>
<td>Not relevant to ladder assembly</td>
</tr>
<tr>
<td>Materials</td>
<td>See LAT-PS-635 and LAT-SS-172</td>
</tr>
<tr>
<td>Equipment identification and certification</td>
<td>Equipment is identified in LAT-PS-635.</td>
</tr>
<tr>
<td>Personnel identification and certification</td>
<td>Vendor responsibility</td>
</tr>
<tr>
<td>Leadership</td>
<td>Alessandro Brez</td>
</tr>
<tr>
<td>Contingency Plans</td>
<td>Nothing is written</td>
</tr>
<tr>
<td>Risk Assessment, mitigation, and recovery plans</td>
<td>Nothing is written</td>
</tr>
</tbody>
</table>