Tracker SSD Ladder Preproduction Review
Actions and Changes Since Last Week

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Alessandro Brez

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

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

Requested Items

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

Requested Items

Complete fabrication, test, and assembly procedures	LAT-PS-635
Complete analyses of production tooling and test equipment	The tooling and equipment are all at G&A and have been tested.
Certification of all flight hardware, production tooling and test equipment	Vendor certifications are listed in LAT-PS-635. Marsh and Virmani have visited G&A and Mipot. Marsh will inspect after first 10 ladders are assembled.
Control methods for all safety hazards	No unusual hazards known. Vendor is responsible for its workforce and has EH&S certification.

Requested Items

Interface Control requirements	Not relevant to ladder assembly
Materials	See LAT-PS-635 and LAT-SS-172
Equipment identification and certification	Equipment is identified in LAT-PS-635.
Personnel identification and certification	Vendor responsibility
Leadership	Alessandro Brez
Contingency Plans	Nothing is written
Risk Assessment, mitigation, and recovery plans	Nothing is written