HYTEC Monthly Progress Report – Submitted to SLAC

January, 2000

1. Monthly Management Review

Progress Report

Monthly progress report submitted February 5, 2001 for work performed by HYTEC during the month of January.

HYTEC Funding

HYTEC funding issues were resolved during the month of January. Funding has been secured through FY'01 (September, 2001).

2. Tracker Tower Design

Tracker Tower Design Requirements

HYTEC is not responsible for the system level design of Tracker components, and therefore requires a specific set of design requirements to complete design and analysis. Tracker design components will be designed with the assumption that each tower is an independent unit with fixed-base boundary conditions at the tower-to-grid interface. The mounting flexures are part of the TKR tower components and will be evaluated with the tower analysis. Using this assumption, a set of design requirements will be defined during the month of February that satisfy the needs of the Tracker tower components. Once available, these design requirements will be made available for review and will require formal release and signatures from key management, in order to meet schedule requirements.

3. Tracker Tower Level Modeling

Tracker/Instrument Modeling

Work has begun to finalize the Tracker tower FE modeling. Modifications to the design are being incorporated which include resizing the trays to be 368.5mm on a side. In addition, material properties are being updated to reflect the most recent information as determined by material testing and research data. The final report will be delivered with a simplified model for inclusion into the instrument model at SLAC. This update is not expected until the end of March.

Tracker Tower-to-Grid Interface Modeling

The tracker tower-to-grid interface modeling has been on hold at HYTEC. We were awaiting information from SLAC regarding reaction forces from the grid, into the tower flexures. Reaction force information was received from SLAC and will be evaluated during the month of February.

4. Tracker Documentation

Drawing Package

We have begun releasing drawings. We have released both the face sheet drawing and the assembly tooling drawing package. Assembly tooling and closeout drawings will be released in early February.

We are still having troubles with the SLAC Document Control Center. We are able to retrieve a LAT document number, but are unable to properly complete the release process through SLAC. We are working the bugs out and hope to have this resolved in early February.

The drawing package is available on the HYTEC/GLAST web site and will be updated as drawings are released.

5. Tracker Tray Closeout Development

Particulate Pollution Issues

Carbon contamination issues have been under investigation during the month of January. Tests have been planned to investigate the bond strength of a paralyne coated surface. Test coupons have been sent out for coating and are expected mid-February. Baseline testing of uncoated carbon-carbon material is currently being tested to quantify the bond strength of carbon-carbon to a selected P75 face sheet material. Testing is expected to be completed mid to end of February.

Carbon-Carbon Material Procurement

The first lot of carbon-carbon material has been received. This delivery included 3 panels 0.5" thick and 4 panels 0.3" thick, in addition to several other odds and ends. The panels were machined flat to correct for the warping that was discussed in the December progress report. This warping is evident on several of the thinner panels. There will be some loss to both strength and conductivity. The magnitude of degradation is unknown at this time, however it is believed to be minimal because continuous fiber layers are maintained through the thickness. The material quality is high enough to continue tray prototype testing.

The manufacturing processes are being corrected to ensure future shipments of carbon-carbon materials are not warped.

The final lot of carbon-carbon material is expected at the end of February. The recent California blackout has caused some of the unexpected delays.

Closeout Frame Development

The closeout frame design is continuing to progress. Modifications have been made to include alignment features for assembly of the trays, as well as modifications to reflect changes to the MCM (per SLAC drawings). A corner joint concept has been included in the closeout frame design and will be tested next month.

6. Face Sheet Material Selection

Face Sheet Material Purchase

The face sheet material for the standard and SuperGLAST trays has been processed. Layup is complete and machining is expected early in February. Delivery of the face sheet prototypes is expected in the middle of February.

7. Tracker Tray Sidewall Design

Material Property Testing

Mechanical property results have been included in a summary report of the sidewall material testing. The report will be released after all sidewall testing is completed.

The pullout testing has been completed. Several tests were performed to verify the load carrying capability of the two sidewall materials with and without inserts. The results will be published with other testing results.

The shearout tests are currently in progress. Shearout tests were performed with and without inserts at varying distances from the edge of the coupon to understand edge effects. Testing is expected to be completed in early February.

8. Contact Resistance between Sidewall and Closeout

We have been discussing the possibility that there may be more contact resistance between the sidewall and closeout if YS-90A GFRP is used instead of P30 G-C, or vice versa. As a first order check, we have had some surface roughness tests performed to quantify the surface roughness of the sidewall material candidates. We will use this information in the final selection of the sidewall material.

We have also been investigating the contact resistance through a measure of the pressure along the thermal boss. Pressure sensitive tape will be used to measure the pressure along the length of the thermal boss and will be compared to published data. These are simple tests that will help assess the heat transfer from the closeout frame to the sidewalls.

9. Tower Clearance & Alignment and Silicon-to-Tray Alignment

A report was drafted, but not released, that reported the alignment of the closeout trays and towers. This report used incorrect values for the tower stay-out zone. In a recent meeting, it was noted that the stay-out zone for the TKR tower is 300 μm total (150 μm each side). This will need to be corrected in the tower alignment.

10. Top Tray Design

The top tray design concept has been updated to include additional features to accommodate cable termination resistors as well as a TKR tower lifting fixture. The overall thickness of the tray has been increased by ~6 mm and the core has been reduced to ¾ of the standard tray thickness. The tray can accommodate this core reduction because the tray only carry's half the payload.

This tray configuration needs to be reviewed with UCSC to verify the features accommodate the cables as designed.

11. Bottom Tray Attachment to Grid

Progress on the bottom tray attachment has been minimal this month. Weekly telecon's with SLAC have advanced the design slightly. A great deal of analysis on the SLAC side will provide reaction forces at the tray-to-grid interface, which will be included in HYTEC tower models.

12. Tray Assembly Tooling

The TKR tower tray sandwich structure assembly tooling concept has undergone an extensive evaluation before the tooling is fabricated. The design has been scrubbed and will be released for RFQ on the first of February. The assembly tooling will be fabricated during the month of February so that evaluations can take place in March.

The assembly tooling concept pre-bonds all inserts in the closeout frame, bonds the four closeout walls and completes the tray bonding with the face sheets and core. The four corner post holes will be post machined to provide the accuracy necessary. A drilling template is being considered to improve repeatability.

13. Tracker Meetings and Tracker Technical Discussions

Weekly Tracker Meetings

HYTEC participated in all weekly tracker technical meetings with SLAC and UCSC, during the month of January.

Weekly Instrument Meetings

HYTEC has participated in all the weekly instrument integration meetings with SLAC to discuss Tracker to Grid integration issues.

Engineering Meetings

An engineering meeting with SLAC and INFN was scheduled for the end of January, however the meeting was moved to February 1st & 2nd.