The BLT Prediction Tool ("BLT" signifies "Boundary Layer Transition") is provided as part of the Damage Assessment Team analysis package, which is utilized for analyzing local aerothermodynamics environments of damaged or repaired space-shuttle thermal protection tiles. Such analyses are helpful in deciding whether to repair launch-induced damage before re-entering the terrestrial atmosphere. Given inputs that include re-entry trajectory and attitude parameters, air density, air temperature, and details of each damage or repair site, the BLT Prediction Tool calculates expected times of laminar-to-turbulent transition onset of the boundary-layer flow during re-entry. (These times help to define the proper aerothermodynamic environment to use in subsequent thermal and stress analyses of local structural components.)

The BLT Prediction Tool includes a database of computed boundary-layer parameters that cover a range of nominal re-entry trajectories and uses an interpolation program for estimating local boundary-layer properties during flight.
Flight-deck display software was designed and developed at NASA Langley Research Center to provide two-dimensional (2D) and three-dimensional (3D) terrain, obstacle, and flight-path perspectives on a single navigation display. The objective was to optimize the presentation of synthetic vision (SV) system technology that permits pilots to view multiple perspectives of flight-deck display symbology and 3D terrain information. Research was conducted to evaluate the efficacy of the concept. The concept has numerous unique implementation features that would permit enhanced operational concepts and efficiencies in both current and future aircraft.

One innovative feature, shown in the figure, was the ability of the flight crew to select among several modes that present a dynamic 3D perspective of aircraft within the flight environment. The study focus was to uncover the developments and benefits of using the 2D and 3D exocentric SV information with regard to primary flight displays (PFDs) and navigational displays (NDs) for reducing accidents and damage for commercial aircraft. The investigated technologies aim toward eliminating low visibility conditions as a causal factor in civil aircraft accidents, while replicating the operational benefits of clear-day flight operations, regardless of actual outside visibility conditions. The concepts also form the basis of revolutionary electronic flight bag applications that utilize these technological enhancements.

The results showed that SV on the PFD was pivotal for pilot use in terrain avoidance and situation awareness, while SV terrain on the 2D co-planar navigational display was not found to provide much benefit. However, pilots noted that the 3D exocentric display of synthetic terrain, with key implementation features, added significantly to flight-crew situation awareness and substantially enhanced the pilot’s ability to detect and avoid controlled-flight-into-terrain situations.

Conclusions reached indicate that SV depicted on PFD is essential for terrain