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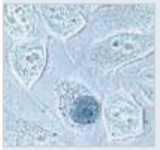

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Apr 22, 2009

Software modelling: the eyes have it

New software that precisely simulates the behaviour of the human eye allows aircraft designers to build a pilot's-eye view of the cockpit.

The SPEOS Visual Ergonomics package from OPTIS, France, is designed to model of range of real-world variables that affect how well aircraft pilots perceive the information on their cockpit displays. The software considers the materials used in interior construction, reflections from screen displays and surfaces, windscreen filters, the performance of the head-up display, landing lights and even the position of the sun and moon.

This method of referring back to the performance of the human eye to model what a pilot would experience is claimed by OPTIS to be unique. "Any changes made to flight deck and lighting design achieved using the OPTIS approach will be based on the physically correct representation of what the pilot actually sees, rather than simple ray-tracing methods which make no reference to the human eye and its complexity," commented Pete Moorhouse of OPTIS.

Using SPEOS can potentially save designers time and money by reducing the need for expensive test flight programs. Without leaving the ground, various combinations of interior design, aircraft location and external lighting conditions can be modelled to improve safety and reduce pilot fatigue.

One particular application for SPEOS is to improve pilot visibility in night vision applications for civil and military aircraft. Bombardier Aerospace, for example, is using the software to simulate what a pilot sees when landing a plane on an aircraft carrier with minimal landing and navigational lights.

"OPTIS is the only solution which enables us to accurately predict glare, reflections, and other real-life factors which could distract or tire the pilot to the point of compromising comfort and ultimately safety," said Richard Heppell, manager of core systems engineering at Bombardier. "By eliminating these negative points early in the virtual design stage, we expect to reduce our design time by 50% and avoid costly prototypes."

SPEOS is integrated into CAD applications including CATIA V5, significantly reducing the learning curve for engineers getting to grips with the new package.

Future developments could see the simulation results from SPEOS being incorporated into immersive virtual reality scenarios, to provide an accurate representation of a pilot's view during an aircraft's landing or take-off phase.

"This is the next phase of physics-based simulation," said Moorhouse. "Integrating our output within a virtual reality solution will provide an experience similar to a flight simulator, but including the optical changes that occur during any change in position or lighting conditions. Manufacturers are also interested in using the software to simulate pilot visibility during mid-air refuelling, to overcome glare problems caused by the sun."