Testing/Simulation

AFRL evaluates laser eye protection with help from Optis

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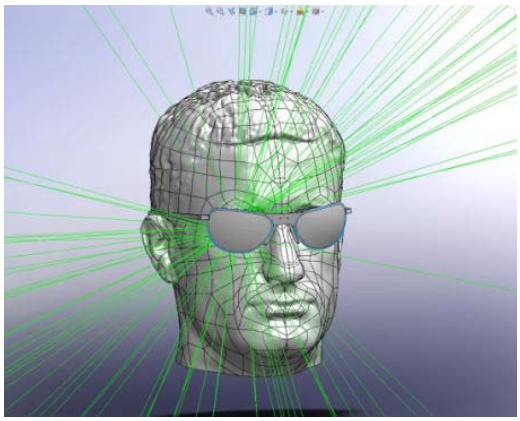

OptisWorks' reverse ray tracing techniques are used to understand the laser vulnerability of laser eye protection.

To maximize combat survivability and crew effectiveness, air crews need an effective means of protecting their eyes from the risk of injury from lasers. Traditional laser eye protection (LEP) gives some degree of physical protection by filtering out the undesirable wavelengths of light while still transmitting visible light. However, the disadvantage of these traditional designs is that the color filters, used to block laser light, can interfere with the air crew's reading of cockpit instrumentation by altering their whole light environment.

The **U.S. Air Force** Research Lab (AFRL), 711th Human Performance Wing, Human Effectiveness Directorate, Directed Energy Bioeffects Division, Optical Radiation Branch (AFRL 711 HPW/RHDO) Brooks City-Base, TX, recently began using **Optis**' OptisWorks light and color simulation software to simulate the performance of various manufacturers' proposed designs of anti-laser eyewear.

The Optis software solution enables AFRL 711 HPW/RHDO to approve or reject a manufacturer's design for use by military aircrew. The software was chosen because it can be integrated with **Dassault Systèmes** SolidWorks 3-D CAD design software and its ability to carry out accurate color simulations.

AFRL 711 HPW/RHDO, with support from optical specialists from **TASC** Inc., employs Optis solutions for testing two aspects of LEP. First, to analyze geometric coverage of the LEP, they use OptisWorks' reverse ray tracing techniques, whereby the eye is considered as a source and each ray emitted around the eyewear is deemed to be a possible entry path for a laser. While this is not a physical reality, it is an effective means to determine the coverage area. The only alternative—to determine the infinite possibilities of where a laser in space could be positioned to bypass the eye protection—would be a practical impossibility.

The second challenge faced by AFRL 711 HPW/RHDO was simulating and analyzing how colors appear when seen through the LEP. Using OptisWorks' advanced colorimetric simulation capabilities and its ability to take into account human vision and a sunglass filter kit, where the special LEP filters are defined, engineers can ascertain the degree of color change that occurs when a specific element of cockpit instrumentation is viewed through LEP. This enables them to determine whether a pilot will be able to correctly interpret avionic information from displays, warnings, and illuminated controls on the cockpit interface. Correct color perception is of critical importance in a flight deck, particularly at high speeds and in stressful combat situations.

"By using OptisWorks software we have cut out months of costly, time-consuming human testing and simultaneously improved the reliability of our findings. When we compared simulation results and real measured results, the difference was almost zero," said Bill Brockmeier, Optical Engineer, Advisory Services (TASC), Brooks Air Force Base, Texas.

Matthew Monaghan

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