

Innovation

SBIR Topic Number:
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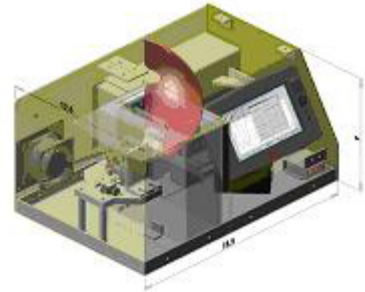
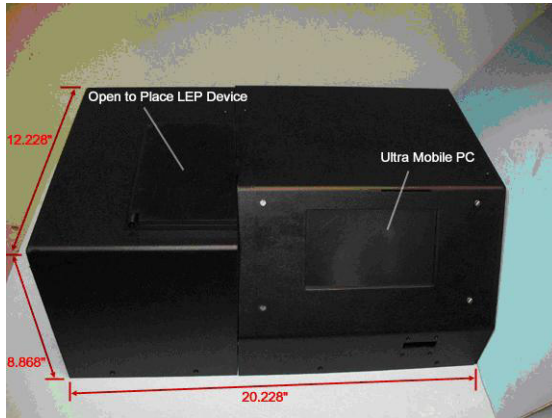
SBIR Title:
Laser Eye Protection
Field Evaluation Device

Contract Number:
FA8650-07-C-6743

SBIR Company Name:
Physical Optics
Corporation, Torrance, CA

Technical Project Office:
AFRL Human Effectiveness
Directorate, Wright-
Patterson AFB, OH (AFRL
711 HPW/RHDO, Brooks
City-Base, TX)

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Dual Optical Ultrawide Band Laser Eyewear Transmission (DOUBLET) Device

- The Air Force needs a user-friendly, self-contained, compact, and moderately priced device that provides the capability to evaluate the protection levels of Laser Eye Protection (LEP) eyewear in deployed field conditions
- Physical Optics Corporation developed the DOUBLET engineering prototype, which is a research quality spectrometer that allows operational units to measure protection levels in laser-protective eyewear
- A user-friendly graphical user interface provides step-by-step instructions for making an optical density measurement on spectacles, goggles, or visors
- Advantages of the DOUBLET device include its simplified interface, high sensitivity, high accuracy, fast analysis, encrypted protection of sensitive information, ruggedness, and portability

AFRL/RH OPSEC 155

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Air Force Requirement

Advances in laser component technologies have lowered the cost and increased the capability of lasers by military forces. The use of lasers for precisely guiding smart bombs, illuminating targets, range finding, aircraft self-protection, laser weapons, and secure communications is extensive and expanding.

The Air Force needs a user-friendly, self-contained, compact, and moderately priced device that provides the capability to evaluate the protection levels of laser eye protection (LEP) eyewear in deployed field conditions.

SBIR Technology

Under a Phase II SBIR project, Physical Optics Corporation (POC) developed the Dual Optical Ultrawide Band Laser Eyewear Transmission (DOUBLET) device. This LEP field evaluation device is a research quality spectrometer that was designed and developed to allow operational units to measure protection levels in laser-protective eyewear. AFRL 711 HPW/RHDO took delivery and received a demonstration of the DOUBLET prototype device in April 2009.

The DOUBLET device uses a rugged non-scanning technology to measure the optical density (OD) of LEP eyewear from 0 to 5 OD with a precision of +/-0.1 OD across the VIS-NIR spectral range (400-1400 nm). A rugged and powerful ultra-mobile personal computer (PC) is used to safely store sensitive information, control the system, perform signal processing, and provide a facile touch-screen user interface.

No laser is used; the light sources are a tungsten-halogen lamp and a violet diode. A novel measurement method allows collection of the complete laser-protection spectrum in as little as three seconds. A user-friendly graphical user interface (GUI) provides step-by-step instructions for making an OD measurement on spectacles, goggles, or visors. DOUBLET compares the test item spectrum against its design spectrum and determines whether or not it meets specifications. Following the test, the user can receive a simple pass or fail signal of his or her choosing. However, the software is also capable of storing and downloading test spectra for future failure analysis, if desired.

DOUBLET is small (1.27 cubic feet), weighs less than 40 pounds, and is ruggedized. The only moving parts are the light shutter and cooling fan.

Potential Air Force Application

Advantages of the DOUBLET device include its simple user-friendly interface, high sensitivity, high accuracy, fast analysis, encrypted protection of sensitive information, ruggedness, and portability. The DOUBLET technology has potential utility in government and commercial applications that require rigorous safety controls on LEP eyewear such as visors, spectacles, and side shields.

Also, there is the potential for substantial cost savings to the Air Force. Fielded LEP devices using other technologies are expensive and are currently replaced at either the first sign of imperfection by visual inspection or according to a Mean Time Between Failure regime, even though their protective capabilities may not be compromised. Moreover, LEP devices are stored in the Life Support Equipment Shops in Air Force operational units. If a Life Support Equipment Technician could actually measure the protection provided by LEP devices on a regular basis and replace these devices only when they fail to meet their specifications, considerable cost savings could accrue to the Air Force. At the same time, increased aircrew confidence could be cultivated in the performance of their LEP eyewear.

Company Impact

This SBIR project provided POC the opportunity to expand its corporate expertise in state-of-the-art laser eye protection R&D. Further, the DOUBLET technology carries the promising prospect of transition within the defense and commercial marketplaces.

Since its inception in 1985, POC has emerged as a small systems integrator of advanced technologies in the areas of Applied Technology, Information Technology, Photonic Systems, Electro-optics and Holography.



SBIR/STTR

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