The Benefits of Modern Goggle Technology

By Peter French

Military people are outfitted with some of the most advanced personal protective equipment in the world. But standard PPE ensembles still include some items that are obsolete by commercial-market standards.

One such element is the sun, wind and dust (SWD) goggle, which was designed in the 1940s. Eye-protection designs and technologies have made significant steps forward in the last few decades, but the SWD goggle has seen little refinement in the past half-century. Now that some new goggles and more flexible procurement systems are available, units are able to exercise their ability to choose the safety, comfort and performance advantages of contemporary eye-protection systems. This new up-to-date eyewear should replace goggles created in the 1940s.

An example of a more liberal procurement system is found in technologically advanced, non-developmental items (NDIs) being approved for shipboard use faster than traditional product-development cycles would allow. A good example of an NDI success story is the recent approval of the ESS flight-deck goggle as an upgrade from the SWD goggle.

New designs and technologies often are found in the commercial sector. This broad marketplace traditionally has been a fertile source of new products that benefit the military, but advancements in goggle technologies developed slowly. When designed in World War II, the SWD goggle was better than many of the eye protection systems of the day. It now stands out as a technological relic. Profound changes have taken place in eye protection, particularly in the high-adrenaline arena of the sports-goggle market. Here are five meaningful advancements:

- Anti-fog lens coatings: Anyone who has worn a goggle during strenuous activity will testify that fog resistance is one of the most important qualities in this product category. Minimizing condensation requires the goggle lens to have an effective chemical anti-fog coating. Several types of coatings are available in the commercial market—some more effective than others. An uncoated lens is far more susceptible to fogging, which seriously can impair the wearer's vision. A simple test can tell you if a lens is anti-fog treated: Just exhale on the lens—if it fogs up, the lens probably does not have an anti-fog coating.
- Large, filtered ventilation ports: Sports-goggle experts long have recognized that another key design element in the battle against fog is adequate ventilation. High airflow can dissipate humidity that otherwise would condense as fog on the lens. The most fog-resistant modern goggles have large ventilation zones, and larger air volumes inside the frames maximize airflow and minimize condensation. It is important that vents are filtered fully to keep eye-irritating particles outside the frame and away from the eyes.
- Comfortable anatomical fit and rapid strap-adjustment systems: A key feature in goggle performance is a sealed, comfortable fit. Goggles that are uncomfortable due to gaps, pressure points, or improperly adjusted straps will not protect the eyes against blowing dust and smoke. In this case, Sailors or Marines may not use the goggles—even in hazardous places. High-quality goggles use a combination of anatomical modeling and malleable face padding to

provide a sealed fit that is comfortable to wear for long periods. High-memory elastic straps with convenient length adjusters ensure a proper fit.

- Wide field of view with ample fit over eyeglasses: Modern goggles provide unobstructed peripheral vision and a wider field of view. The SWD goggle has a relatively narrow field of view and a small interior volume that affords minimal room for eyeglass frames. Goggle frames now are available that fit over eyeglasses comfortably or accommodate the use of a prescription-lens insert.
- ANSI Z87.1 certification & OSHA compliant materials: The ANSI standard sets the requirements to design, construct, test, and use eye-protection devices, including standards to prevent injuries from items that might hit or penetrate the lens. The ANSI Z87.1 standard also is the minimum requirement for safety glasses, goggles, and face shields used by employees under OSHA jurisdiction. The SWD goggle fails to meet flammability-resistance requirements of this standard. Most modern goggles made for industrial- or public-safety personnel are certified to meet all ANSI Z87.1 standards and will help to reduce injuries to Sailors who face a higher fire-exposure risk.

The Navy Office of Safety and Survivability determined that sensory stress to vision contributes significantly to operator fatigue and diminishes performance. Military personnel can work more efficiently when they have proper protective equipment for their eyes. Just as the modern hearing-protection system in a cranial helmet allows personnel to be more attentive to duties, effective goggles will improve safety and performance. These modern goggles are designed with six direct advantages: reduced fogging, increased comfort on a wide variety of face types (and over eyeglasses), fully sealed protection for reduced eye irritation from airborne projectiles and particles, improved and wider field of view, guaranteed compliance with current safety standards, and increased use because of customer satisfaction.

Photo by PHAN Bo J. Flannigan

The ESS flight-deck goggles successfully have completed two years of evaluative Navy testing. They initially became available to military customers in 1999 and rapidly have spread throughout the Navy.

This new flight-deck goggle has received Navy approval as a substitute for the SWD goggle, and President George Bush wore one when he walked the deck of the USS *Abraham Lincoln* and met with Sailors on May 1, 2003.

These goggles are certified to meet ANSI Z87.1 and, in fact, go far beyond ANSI Z87.1 impact standards to the level of the .22-caliber military test (MIL-V-43511C). They will stop a shotgun blast from 30 feet away and have been assigned a national stock number (4210 01-492-5720), which includes clear and tinted lenses. High-performance modern goggles like these are available through DLA, allowing commands to order and to upgrade the quality of their eye-protection systems.

Users include flight-deck and hangar-bay crews on many ships, including USS *Constellation* [before decommissioning—Ed.], USS *Abraham Lincoln*, USS *Harry S. Truman*, USS *Enterprise*, and USS *George Washington*. Several Navy and Marine Corps squadrons also have ordered and use these advanced goggles. **GW**

Mr. French works for Eye Safety Systems, Inc and wrote this story at the editor's request.

The Naval Safety Center does not endorse any specific equipment, but I asked a fleet customer to comment on the ESS goggles—his comments follow. Depending on quantity ordered, these goggles can be imprinted with the command logo or name free of charge.—Ed.

LT Ron Rancourt served on board USS *George Washington* as the air bos'n for nearly four years, completing two work-up cycles and two deployments. He had this comment about these new goggles, "I was on the flight deck from the beginning of flight operations until the last aircraft landed—around 12 to 14 hours a day. I was sold on the comfort alone." But comfort wasn't his only benefit, adding, "I immediately noticed that I no longer got headaches like I did with the standard-issue goggles." About safety aspects, he said, "These goggles provide a larger field of view, which is critical when moving one aircraft near others. I was able to see more of what was going on around the flight deck and did not have to move my head as much—especially at night where a split-second decision could save a life."

LT Rancourt's job required him to enforce flight-deck safety rules. He said, "The biggest infraction on the flight deck is Sailors not having their goggles down. When wearing this new ESS product, people kept them down over their eyes more than people with the standard set. I know this is because the goggles are more comfortable. I am willing to bet that eye injuries on the flight deck will be reduced because of the new ESS goggles. Simply put, these goggles are more comfortable, better and safer!"

LT Rancourt now is the training officer for the airman-apprenticeship program at NATTC Pensacola, Fla.