Technology

Windows of transparent armor


Goodyear Aerospace

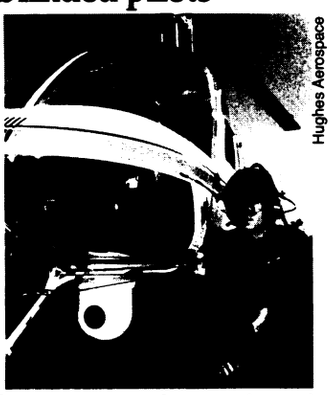
Ever wonder how tank drivers see? Several years ago armored-vehicle designers did away with "vision blocks"—the tank equivalent of windows—when it became clear these spans of transparent armor were too vulnerable to antitank weapons. That restricted battlefield viewing to what little could be seen through a periscope. But advances in lamination may soon give tank troops back their windows.

New vision blocks being developed for the Army at Goodyear Aerospace Corp. in Litchfield Park, Ariz., are now able to provide protection that in some cases actually matches that of surrounding metal armor. Experimental test versions are from 4-inches to 8-inches thick, weigh 16 to 23 pounds, and provide a 12-inch by 4-inch viewing window.

Because glass of optimal thickness is not available, Goodyear laminates three or more layers of 1.25-inch borosilicate glass and then bonds them to a quarter-inch backing of polycarbonate plastic. Explains Richard Huyett, who heads Goodyear's transparent-armor engineering, the glass-and-plastic combo not only renders true color and transmits light well, but it also "performs much better ballistically than either of the two materials did when tested separately." The hard glass "helps absorb the initial impact energy and tends to break up the hard, penetrating core in an armor-piercing projectile," he says. Tough and ductile, the plastic absorbs the remaining energy and keeps spall (glass or shrapnel coming off the back of the glass) out of viewers' eyes.

What makes these new windows possible is Goodyear's yet-undisclosed laminant. Because glass and plastic have such different thermal-expansion rates, a bonding material had to be found that would absorb the plastic's expansion without transmitting so much stress to the glass that it cracked.

IR restores vision to blinded pilots


Hughes Aerospace

Military helicopter pilots can't afford to be grounded by smoke, fog or the dark. Yet the current generation of light-intensifying night-vision systems leave a pilot blinded in dense smoke or when clouds obscure starlight. To "fly by instruments," pilots would have to attain elevations that would make them visible to enemy radar. So Hughes Aerospace Co. in El Segundo, Calif., has harnessed infrared (IR) scanners to record thermal radiation emitted by landscape objects. Immune to weather, smoke and the dark, this system projects a black-and-white IR-generated view of the landscape onto the visor of a pilot's helmet. Images appear where those same objects would have been if viewed directly by visible light.

Because the helmet is plugged in like a joystick to the scanner's guidance system, every change in the pilot's head position triggers a corresponding change in where the IR-receiver (located under the nose of the helicopter) scans. Though cockpit panels are visible through the visor, their data can also be projected onto the visor. Says program manager Eli Reuben, "This system is a candidate for every military helicopter."

Biomedicine

Streptokinase: The saga continues

Many heart attacks are accompanied by a blood clot in an artery feeding the heart muscle. Whether the clot is a cause or effect has not yet been determined, but heart specialists have reasoned that removing it may keep part of the heart muscle from dying. A few years ago, William Ganz of the University of California at Los Angeles introduced a procedure to blow out the clot by threading a catheter into the blocked coronary artery within a few hours of the heart attack and directly injecting streptokinase, a clot dissolver (SN: 11/29/80, p. 341). Since then, researchers have been evaluating the procedure.

In the Dec. 15 NEW ENGLAND JOURNAL OF MEDICINE, J. Ward Kennedy and colleagues at the University of Washington in Seattle, reporting results from the Western Washington Randomized Trial, give streptokinase a good grade. After the presence of coronary blood clots was established in 250 heart attack victims, 134 of them were given intracoronary streptokinase. The researchers found a nearly three-fold reduction in mortality after one month in the group that received streptokinase. After six months, 14.7 percent of the patients in the untreated group and only 3.7 percent of the treated group had died.

At last month's American Heart Association meeting, the procedure got mixed reviews. Researchers from Thomas Jefferson University Hospital in Philadelphia noted that some vessels closed up again soon after treatment. And Stanford University studies indicated that the intracoronary route may not be worth the bother. The studies indicated that intravenous streptokinase injection—a procedure that does not necessitate the availability of a 24-hour cardiac catheterization laboratory, as does intracoronary infusion — had a similar rate of success and side effects, though it took longer to break up the clot.

Herpes on the rise in newborns

A herpes infection for most adults is more nuisance than health threat, but the virus can be deadly in newborns. Though the incidence in infants is still quite small, one report hints that those numbers could be climbing.

From 1966 to 1969, doctors in King County, Wash. recorded 2.6 incidences of neonatal herpes for every 100,000 babies born. That figure had jumped to 11.9 by 1981, paralleling a suspected increase in genital herpes in adults. Although the total number of infants born with the disease still is small, the increase underscores the need for a fast, accurate method of diagnosing herpes in pregnant women, write John Sullivan-Bolyai and Seattle colleagues at the University of Washington in the Dec. 9 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

One-third of the newborns afflicted with equally dangerous Herpes I or Herpes II virus die from the illness, and another one-fourth suffer brain damage. The vast majority acquire the disease at birth as they pass through an infected mother's birth canal. Most women with herpes deliver healthy babies through vaginal delivery; only an active herpes episode within the few days preceding delivery could be dangerous for the infant. At least 85 percent of these episodes are accompanied by easily detected lesions, and an obstetrician alerted to the danger can deliver the baby by cesarean section if the need arises. But occasionally the episodes are not accompanied by obvious symptoms, and are probably the source for most cases of neonatal herpes, the scientists say.

A new diagnostic test for herpes, developed at the National Institutes of Health in Bethesda, Md., and described in the same journal, may further curtail such cases. Unlike conventional tests that require a week, the NIH test can produce results in 24 hours. The new test is "the fastest method available that is as accurate as tissue cultures," says John L. Sever of NIH. Still, the search for a faster test continues. "We need one we can get back in five minutes," he says.