Boeing Completes Safety-Of-Flight Testing of Life-Support System for F-22 Fighter Pilots

Boeing has completed safety-of-flight testing of the life-support system to be worn by pilots during the F-22 fighter flight-test program.

"The F-22 life-support system will deliver superior performance," said Bob Barnes, F-22 vice president-program manager for Boeing. "It embodies a truly innovative, integrated life-support concept that provides F-22 pilots a level of protection that matches the F-22's flight capabilities."

The new life-support garment allows pilots to withstand high accelerations for longer periods of time. It also protects against the dangers of higher altitudes and faster ejection speeds.

The F-22 is the U.S. Air Force's replacement for the F-15. It is an air-superiority fighter designed to take absolute control of the skies above any battlefield. Boeing is teamed with Lockheed Martin to design and build the F-22.

Boeing and its suppliers developed the system with ongoing input from the Air Force customer community.

"This has been a collaborative effort, with the contractor providing experience in technology and design, and the Air Force drawing upon its expertise in operational suitability and performance insight," said Dawn McGarvey-Buchwalder, F-22 life-support system manager for the Air Force F-22 Systems Program Office.

"This integrated ensemble will now move into the engineering and manufacturing development (EMD) flight program as the only Air Force system able to provide the physiological protection necessary for the pilot to fully exploit the capabilities and mission of the F-22."

Maj. Steve Rainey, a test pilot at the Air Force Flight Test Center at Edwards Air Force Base, Calif., has test-flown the life-support system. He lauded the ensemble in a flight report last year.

"Overall, the ensemble is outstanding," Rainey reported. "I was particularly enamored with the helmet. This was one of the lightest, most comfortable helmets I have ever flown with. I have flown the standard Air Force and Navy combinations as well as (other) systems. None compare with the F-22 ensemble. This system is much simpler and will provide significantly less time for fitting."

The garments that comprise the life-support system simultaneously meet pilot-protection requirements established by the Air Force in the areas of high altitude, acceleration, heat distress, cold-water immersion, chemical and biological (C/B) environments, fire, noise and high-speed/high-altitude ejection.

Escape-system tests conducted last year demonstrated that the ensemble will protect pilots when exposed to wind speeds of up to 600 knots. Current life-support systems are designed to provide protection only up to 450 knots.

The head-mounted portions of the life-support system are approximately 30 percent lighter than existing systems, thereby improving mobility and endurance for pilots. With its advanced design, the HGU-86/P helmet reduces the stresses on a pilot's neck by 20 percent during high-speed ejection compared to current helmets. The helmet fits more securely and is easily fitted to a pilot's head. An ear-cup tensioning device improves noise protection.

The chemical/biological/cold-water immersion garment for flights over large bodies of cold water or into chemical/biological warfare situations exceeds Air Force requirements. During cold-water immersion tests, the body temperature of test subjects wearing the garments fell no more than a fraction of a degree after sitting in nearly 32-degree F. water for two hours. Suits currently in use allow body temperature to drop below the minimum of 96.8 degrees F within an hour-and-a-half.

Other advantages of the Boeing design include its ability to fit a wider range of sizes and body shapes and its integrated design for chemical and biological warfare and cold-water immersion.

The F-22 life-support system integrates all critical components in one ensemble. In the past, these elements would have been designed separately. Those components include the on-board oxygen generation system (OBOGS); breathing regulator/anti-g system (BRAG); chemical/biological (C/B)/cold-water immersion protection garment; upper pressure garment; lower pressure garment; air-cooling garment; helmet and helmet-mounted systems including C/B goggles and C/B hood; breathing mask; and hose system.

Boeing is working with Helmet Integrated Systems, Ltd. of Wheathampstead, U.K. to design and manufacture the head-mounted equipment. Pilot garments are supplied by META Research of Richmond, British Columbia, Canada, and ILC Dover of Dover, Del. Breathing hoses are supplied by Parker Symetrics of Newbury Park, Calif. OBOGS and BRAG valve are designed by Normalair Garrett, Ltd. of Yeovil, United Kingdom.

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