



Restraint system improves aircrew safety

by John Schutte
Air Force Research Laboratory Human Effectiveness
Directorate

6/17/2008 - **WRIGHT-PATTERSON AIR FORCE BASE, Ohio (AFPN)** -- A new restraint system based on the same technology that brings speeding roller coasters to a smooth stop may soon help save warfighter lives and reduce military mobile aircrew injuries.

Air Force Research Laboratory engineers teamed with Wolf Technical Services, Inc., under a Small Business Innovation Research contract to develop the universal mobile aircrew restraint system, or UMARS. The collaborative effort was largely a response to Air Force statistics indicating the need for an improved helicopter safety system for loadmasters, flight engineers, medics, pararescuers, and gunners -- all of whom must remain mobile while working in the cabin of military aircraft under unpredictable conditions.



The universal mobile aircrew restraint system shown could reduce aircrew injuries. The new restraint system is based on the same technology that brings a speeding roller coaster to a smooth stop. (U.S. Air Force photo/Chris Gulliford)

Data from Air Force Special Operations Command pointed to slack in existing tether systems as the culprit precipitating five fatalities in incidents defined as "Class A survivable crashes." UMARS is a smart system that automatically self-adjusts tension level based on the severity of flight maneuvers or anticipated impacts. This new restraint system enables a crewmember to adjust his or her tether incrementally, to a total length of 8 feet. This feature accommodates freedom of movement throughout the cabin during normal flight. During a violent maneuver or crash, UMARS increases tension fluidly in order to soften the impact of being restrained.

Current military aircraft restraints consist of either a long, fixed leash or a locking, inertia-based system, each with inherent shortcomings. The fixed-leash system requires constant manual adjustments to ensure safe mobility; if a mishap occurs when the fixed tether is extended too far, the crewmember could actually be ejected from the aircraft. The inertia-based system locks up if the reel rotates too quickly; its retraction force increases with tether length, meaning that crewmembers may find it difficult to remain standing with a fully extended tether; and once unhooked from a safety harness, its webbing can retract violently into the reel like an oversized, lethal tape measure.

In contrast, UMARS is designed specifically to meet the rigorous demands of military flight and to attenuate energy without unnecessarily stopping motion entirely. It is suitable for use at multiple locations in an aircraft due to its adjustable maximum working length. Further, once UMARS engages, it is easily released with just a small pull.

Other UMARS applications include fixed-wing military aircraft such as the C-130 Hercules, as well as commercial medical transport aircraft, tall-building escape systems, and fall-arrest systems for construction workers, aircraft maintenance personnel, and others who rely on safety restraints for work accomplished high above the ground.

[Comment on this story](#) (comments may be published on Air Force Link)

[View the comments/letters page](#)