Aerodynamic decelerators

This was a year of solid progress in R&D initiatives, with major emphasis again placed on "smart" and active systems. There were substantial advances in applying controls to parachute systems in a variety of applications, including high-glide delivery systems, high-altitude/low-glide delivery systems, and impact reduction devices.

As part of the Air Force Office of Scientific Research's New World Vistas Precision Aerial Delivery initiative, a 2,600-lb payload was dropped with manual controls. It demonstrated a controllable glide ratio of 0.8 with a nongliding standard Army parachute. This year the same system was flown with autonomous guidance based on GPS navigation at Yuma Proving Ground (YPG). The Army's Natick Soldier Center (NSC) led the effort; YPG's Aviation Systems Div. provided guidance, navigation, and control hardware, and Vertigo provided control actuation hardware and support. The program's goal is to develop an affordable system for placing standard cargo containers into a drop zone with 50-m accuracy from release altitudes of 20,000 ft and higher.

Textron demonstrated an autonomous powered parafoil, including multiple small payload/parachute drops, with the Army, MMIST of Canada, and Performance Design. The Army Special Operations Command and NSC, with MMIST, have initiated development of an autonomously guided, powered parafoil vehicle for long-range delivery of Psychological Operations material.

Several Army initiatives led by the NSC are aimed at reducing injuries to troops participating in mass assault airdrop operations. Cybernet Systems is developing an improved automatic parachute activation device for use with mass assault reserve parachutes. Several groups are working to apply biomechanics principles to parachute landing falls. The Advanced Tactical Parachute System is a major initiative for a new troop parachute, with the goal of reducing landing velocity to 16 ft/sec for a fully equipped soldier.

The Army has also started work in several areas of cargo airdrop. At the aircraft end, the Dual Row Airdrop System will increase the effectiveness of C-17s in cargo airdrop operations by allowing palletized cargo to exit along two parallel sets of rails. Narrower pallets are being developed for this purpose, and some will include new antirollover arms. Special low-cost parachutes are being developed for humanitarian relief missions. The Rapid Rigging/Derigging Airdrop System, an NSC initiative, is aimed at reducing the time to rig and derig heavy cargo, particularly vehicles. Current methods use paper honeycomb for impact attenuation, which takes hours to cut and fit by hand. Two approaches are being pursued, both of which would eliminate paper honeycomb. One approach is an advanced airbag being developed by Irvin Aerospace and Warrick Associates. The other is a retraction soft-landing system being developed by a group comprising team leader Vertigo and Irvin Aerospace, Primex Aerospace, and Alliant Techsystems.

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Midair retrieval has been revived in a new role with JPL's Genesis solar wind sample return mission. The fragile samples will be recovered by snagging a specially reinforced parafoil with a helicopter, instead of descending to a damaging ground impact. Prime contractor Lockheed Martin selected Pioneer Aerospace for the parafoil system and Vertigo for the helicopter modifications and operations. Several simulated spacecraft recoveries, including radar vectoring to intercept, were accomplished at UTTR. The method is under consideration for other future sample return missions.

The ability to provide target presentations from standard cargo aircraft was successfully demonstrated in the Short-Range Air-Launch Target program. Coleman Aerospace heads a team, including Irvin Aerospace, that is providing parachute components. The success of this activity has led to the development of the Long-Range Air-Launch Target program. Both efforts provide realistic targets for several theater missile defense programs.