Active VTOL Crash Prevention Ltd

Emergency Descent Arrest System (EDAS) for VTOL Aircraft Protection

Leading Edge Technologies for VTOL Aircraft Protection

The delivery of cargo or personnel to the battlefield by autonomous VTOL rotorcraft is a new and fast evolving alternative to delivery by piloted helicopters or aircraft parachute-drops.

New electric battery multi-rotor VTOL (eVTOL) aircraft being developed for Urban Air Mobility (UAM) and AAM (Advanced Air Mobility) markets demonstrate what is possible.

Novel propulsion & lift power architectures utilising hydrogen fuel-cells or micro-turbines, can extend range and payload capability over lithium-ion batteries, making VTOL cargo delivery a feasible option for both civil & military users.

What if there is an Emergency?
Many eVTOL aircraft designs cannot glide or autorotate to safety and therefore an autonomous safety system is required to provide a soft landing in an emergency.

Ballistic Parachute Recovery Systems are available and currently used in civilian light-aircraft having saved many lives over the last 20 years; however, there is a safety gap between c.300 and 1,000ft before the 8–10m/s design descent rate is achieved.

The AVCP Solution
Retro-rocket effectors incorporated into the Ballistic Parachute Recovery System can provide a controlled landing in essentially all circumstances. Depending on the descent velocity the retro-rockets are activated within 5 - 15m of the ground to provide a safe controlled landing.

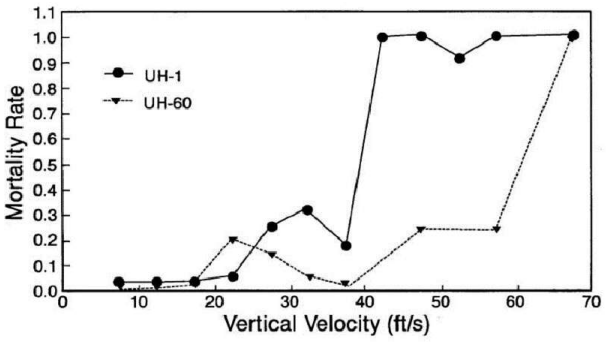
AVCP, working with Aviation Safety Resources LLC (ASR), are developing a system based on the same combination of parachutes and retrorockets, designed specifically for eVTOL aircraft types. ASR combine multiple ballistically-extracted recovery parachutes with a retro-rocket effector to slow the VTOL aircraft descent in its Xtreme Rapid Deployment (XRD) vehicle recovery system. Having been deployed on a tether from the airframe with the parachutes, the XRD retrorocket continues to produce thrust and deliver lift to the aircraft to prevent it acquiring a high descent rate whilst the parachutes inflate thereby reducing the minimum deployment altitude to c.100ft/33m

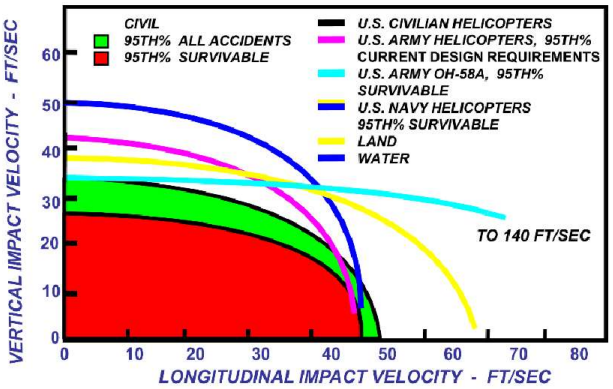
The technology is judged to be at TRL4.

If required a rapid descent mode could be designed so that the aircraft can descend rapidly from height after the emergency develops and minimise the time it is vulnerable to attack.

In this case AVCP's Emergency Descent Arrest System further extends the role of the Retro-Rocket system, with just a small drogue parachute (which can be launched over a broad aircraft speed range) stabilising the aircraft attitude and limiting the maximum descent rate to 25m/s with a twinned, rotating, self-extinguishing solid rocket motor system delivering emergency lift during the final 15m to 5m of the descent to the ground.

The altitude at which the motors are fired is dependent on the weight and the current descent rate of the aircraft. On landing, an automatic gas quench system ensures the rocket motors are fully extinguished and cools the motor casings to prevent fire and avoid a hazard to occupants escaping from the aircraft.





AVCP
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Active VTOL Crash Prevention Limited
Unit 1, Hazelhurst Farm, Mercaston, Ashbourne, Derbyshire,
United Kingdom DE6 3BH
www.evtol-safety.com

Contact Roger M. Sloman (Managing Director)
r.sloman@abbs-usa.com
Tel. +44 7989 381057