

GOLDEN LIFT

Israel eyes UAV for medevac

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AirMule UAV from Urban Aeronautics is a candidate for battlefield duties.



URBAN AERONAUTICS

The Israel Defense Forces medical corps is looking at procuring an innovative unmanned aerial vehicle (UAV) that will evacuate critical casualties directly from the battlefield to the hospital. This would get more wounded to the hospital within the "golden hour," the critical time in which a medical evacuation has the best chance of saving a wounded soldier's life.

One of the candidates for the program is the AirMule, a vertical takeoff and landing UAV developed by Urban Aeronautics Ltd., an Israeli company specializing in Fancraft technology. Other aircraft being considered include helicopters converted to unmanned vehicles.

Lt. Col. Gil Hirschorn, a doctor and former flight medic who leads the medical corps' trauma branch, says an important benefit of AirMule is its ability to land in areas of a fire-saturated battlefield that would be inaccessible to other vehicles. Hirschorn says the UAV, which is now being tested, will be equipped with stretchers, air conditioning and a communications system that establishes video contact between injured soldiers and the medical center. The wounded will be transported in a protected compartment and monitored throughout the flight. The current design holds two wounded soldiers lying prone. Future versions will include space for a medic.

The vehicle would add an important capability to the logistics of casualty evacuation, and be able to support amphibious operations as well as ground forces.

AirMule is a ducted-fan vehicle that uses Urban Aeronautics' patented Fancraft lift system, based on internal rotors that provide lift and propulsion systems. The core of the technology is the Vane Control System (VCS), which consists of a cascade of vanes at the inlet and outlet ducts that can be deflected simultaneously (top and bottom) or differentially to generate side force or a rolling movement. Front and rear ducts are deflected differentially for yaw. "The VCS generates six degrees of freedom independent of one another. For the first time we have a vehicle that moves sideways without the need to roll," says Rafi Yoeli, founder and CEO of Urban Aeronautics.

The company successfully completed the first phase of tethered flight trials, which consisted of autonomous hovers in which the vehicle maintained stable height and attitude. An onboard fly-by-wire system controls pitch, roll and yaw. The next series of tests will evaluate the

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AirMule's position-keeping capability, and the vehicle will fly untethered for the first time.

The UAV is powered by a 730-shp. Turbomeca Arriel 1D1 turboshaft engine, which drives the fore and aft ducted rotors and aft thrusters through gearboxes and shafts. Its unique propulsion capabilities reportedly enable safe flight through areas of dense vegetation, in urban areas, over rough terrain and at high temperatures. The flight-control developed by Urban Aeronautics is a four-channel redundant system that relies almost entirely on inertial measurements and is augmented by GPS for translational position and velocity readings. Two laser altimeters indicate the vehicle's height above ground. According to Yoeli, data show that the AirMule will hover with high precision even in gusty wind.

The vehicle carries a useful payload of 227 kg. (500 lb.). It has a maximum takeoff weight of 1 ton, and is designed to fly missions of 2-4 hr. at up to 100 kt. Its maximum ceiling is 12,000 ft. An operational version is expected to be available by 2012.

The concept of ducted-fan technology was popular among aircraft designers in the late 1950s and early 1960s when Piasecki Co. developed ducted-fan vehicles known as "flying jeeps" for the U.S. Army. The configuration was similar to the design used by Urban Aeronautics—two ducts, fore and aft, with a cabin in the middle. The concept, though, was ahead of the technology needed to develop a viable aircraft. The flying jeeps were difficult to control and had little endurance—only about 20 min. Because of this, vertical takeoff and landing remained a feature exclusive to helicopters. An array of technologies that have evolved since—efficient, lightweight engines, composite materials and flight-control computers—solved most of the problems associated with ducted-fan vehicles. What remained were aerodynamic challenges, notably in the areas of drag and controllability. Urban Aeronautics patented a package of innovations that reportedly resolves these problems.

The company is working on two other unmanned applications of the Fancraft technology—Panda, a small, electrically powered surveillance UAV, and Mule, a mid-sized UAV with a 500-lb. payload capacity.

In 2006 the company began working with Bell Helicopter to design the X-Hawk, a large, man-carrying ducted-fan vehicle for urban missions in the military and civilian sectors. ■



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