



K-MAX<sup>®</sup> Unmanned Aircraft System  
Optionally Piloted Cargo Lift Helicopter for the Warfighter



Kaman Aerospace  
**KAMAN**

**LOCKHEED MARTIN** 

U.S. Marine Corps Photo

# The K-MAX<sup>®</sup> Unmanned Aircraft System — A Power Lifter Transformed

Kaman Aerospace and Lockheed Martin have successfully transformed Kaman's proven K-MAX power lift helicopter into an unmanned aircraft system (UAS). Its mission: battlefield cargo re-supply.

As a UAS, the unmanned K-MAX can lift and deliver a full 6,000 lb of cargo at sea level, or more than 4,000 lb at 15,000 ft density altitude. And it does so with autonomous flight capability.

Flight autonomy allows the UAS to safely deliver sling loads to multiple, beyond line-of-sight drop zones, and return to home base — all during a single flight and with minimal ground operator oversight.



## Managing the Mission

Lockheed Martin brings advanced UAS command, control and on-board intelligence to the unmanned K-MAX for truly autonomous military operations.

UAS management consists of Mission Management and redundant Flight Control Computers (FCC) connected via data links to a ground controller.

**Ground control** — A ground controller uses a ruggedized laptop with command and control software to develop and upload a mission flight plan to the aircraft's on-board Mission Management Computer (MMC) prior to launch. The controller can upload new mission plans at any time during flight. At the

drop site, the system or receiving controller can maneuver the aircraft to perform a precision delivery.

**Data links** — Portable antennae for line-of-sight and satellite-based beyond line-of-sight data links maintain continuous connectivity with the unmanned K-MAX anywhere in the world.

The MMC downlinks aircraft status and flight parameters to a ground controller, who can upload new flight commands if required at any time during the mission.

**Mission/Flight computers** — The MMC communicates the ground controller's objectives to the FCC (autopilot). FCC dual redundancy provides high reliability. The computers perform contingency management in an aircraft emergency or during a lost communications link.

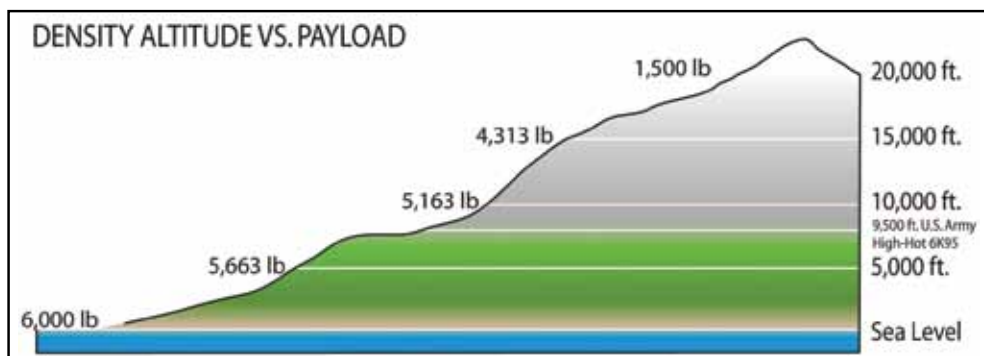
## Optionally Piloted

The Lockheed Martin and Kaman team have retained the single seat cockpit in the K-MAX UAS, enabling piloted operation for maximum flexibility and lower risk to the platform.

## Better by Design

When it comes to cargo lift, operational safety and reliability, noise signature, maintenance and operating costs, no other rotary wing UAS can outperform the unmanned K-MAX.

**Intermeshing rotors** — Twin counter-rotating, intermeshing main rotors eliminate the need for a tail rotor drive system. Without a tail rotor, all engine power goes directly to the main rotors for significantly improved lift performance, critical to maintaining power and performance at high altitudes and high temperatures.



**Servo control** — The K-MAX generates rotor pitch control via a mechanical servo flap positioned along each of the four rotor blades. Servo flap control eliminates the need for a complex, redundant, high-pressure hydraulic system.

**Safer by design** — No tail rotor and minimal downwash mean safer ground and flight operations.

**Low noise** — No tail rotor yields a low noise signature collectively that will give the K-MAX UAS and the warfighter a tactical advantage during cargo delivery.

**Low maintenance** — Without need for high-maintenance hydraulics or tail rotor, the K-MAX UAS requires minimal daily maintenance and needs no special facilities for maintenance work.

**Low operating costs** — The K-MAX UAS uses an average of 85 gallons of fuel per hour delivering the most efficient lift-to-fuel ratio of any helicopter in its class.

**Cargo hook/trolley** — The K-MAX UAS is built around its cargo hook attached to a curved trolley system. This configuration allows the hook to track across the belly of the airframe, enhancing aircraft maneuverability and load stability.

**Four-hook carousel** — The carousel features four hooks, each activated independently. The ground controller can pre-program the UAS to release a load at four separate destinations during a single flight.

## Logistics Support

The Lockheed Martin-led team ensures high availability of the K-MAX UAS to the warfighter.

The team will bring to bear Kaman’s logistics support experience established across 250,000+ worldwide flight hours serving the commercial K-MAX fleet.

During the past three years, Kaman has met a 99 percent First Time Fill Rate for parts.

Lockheed Martin brings to the team exceptional supply chain management and global sustainment expertise.

*A K-MAX UAS lifts 1,500 pounds during contractor flight tests at Yuma Proving Ground, AZ, in January 2010.*

Weights and Measurements		
Max gross weight (with external load)	12,000 lb	5,443 kg
Max take-off weight	7,000 lb	3,175 kg
Empty weight	5,145 lb	2,334 kg
Useful load	6,855 lb	3,109 kg
Cargo hook capacity	6,000 lb	2,722 kg
Lift Performance — ISA +15°C (59°F)		
Sea Level	6,000 lb	2,722 kg
5,000 feet	5,663 lb	2,574 kg
10,000 feet	5,163 lb	2,347 kg
15,000 feet	4,313 lb	1,960 kg
Hover Performance — 4,000 feet, 35°C (95°F)		
Hover IGE	12,000 lb	5,443 kg
Hover OGE	11,500 lb	5,216 kg
Powerplant		
Model - Honeywell T53-17 gas turbine		
Thermodynamic rating		1,800 shaft horsepower
Maximum Airspeed		
Without external load	100 kt	185.2 kph
With external load	80 kt	148.2 kph
Fuel System		
Total usable fuel	219.5 gal	831 liters
Avg fuel consumption	85 gal/hr	321.7 l/hr
Jet A fuel	557.6 lb/hr	252.9 kg/hr
Maximum endurance		12+ hr
Maximum range		1,852km (est)
Maximum speed with external load		148.2km/h
Maximum speed without external load		185.2km/h
Internal fuel endurance		2 hr 41 min
Range with external load		396.3km
Range without external load		494.5km
Approved fuels		Jet A/A-1, JP-5 Jet B/JP-4 JP-8





## About the K-MAX UAS Team

Lockheed Martin's Mission Systems and Sensors facility in Owego, NY is the Corporation's rotary wing center of excellence. The company has more than 35 years of experience as a leading mission systems integrator of rotary wing aircraft, including the British Royal Navy's Merlin Mk 1 helicopter fleet and two generations of U.S. Navy helicopters, the SH-60B and MH-60R.

In keeping with its world-class systems integration status, the Owego site has achieved CMMI® Level 5 for systems engineering, software engineering, integrated product and process development, and supplier sourcing.

Kaman Aerospace Corporation is a division of Kaman Corporation, located in Bloomfield, CT and does business as a prime helicopter manufacturer; a subcontractor for aircraft structures and components; designs and manufactures safe, arm and fuzing devices for bombs and missile systems; and is a leading manufacturer of specialty bearings for commercial and military aircraft. Kaman Helicopters, a division within Kaman Aerospace, conducts business in the engineering, manufacturing, and support business for their K-MAX and SH-2G helicopters, as well as designing and manufacturing of components for other prime helicopter manufacturers.

**Lockheed Martin MS2**  
300 M Street, SE  
Washington, DC 20003  
[www.lockheedmartin.com/ms2/](http://www.lockheedmartin.com/ms2/)

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Kaman Aerospace Corporation  
Helicopters Division  
Old Windsor Road  
Bloomfield, CT 06002  
860-242-4461  
[www.kamanaero.com](http://www.kamanaero.com)

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