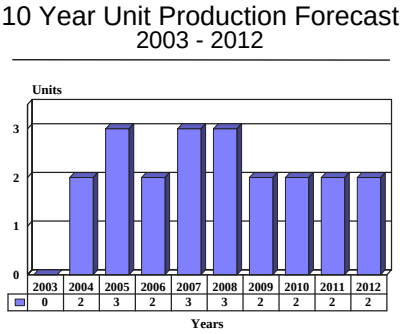
Kaman K-MAX - Archived 11/2003

Outlook

- The forecast calls for production of 21 K-MAX helicopters during the next 10 years
- Kaman has reinstituted a K-MAX leasing program



Orientation

Description. Twin intermeshing rotor equipped, single-seat utility helicopter.

Sponsor. The K-MAX is privately sponsored by Kaman Corp, with additional financial assistance provided by the Department of Economic Development of the state of Connecticut.

Contractors. Kaman Corp, Kaman Aerospace Corp; Bloomfield, Connecticut, USA.

Status. Production

Total Produced. Through 2002, Kaman had produced two K-MAX prototypes, one non-flying test article, and approximately 36 production aircraft.

Application. Engineering/construction, power line installation, and resource development, including oil and gas exploration and support, seismic survey, and logging.

Price Range. $3.9-$4.06 million, in 2003 U.S. dollars.

Technical Data

Design Features. The K-MAX features an inter-meshing, counter-rotating main rotor system that eliminates the need for a tail-mounted anti-torque system. The rotors are turned by a single main trans-mission called Synchro-Lift by Kaman. This is, in turn, powered by a single Honeywell T5317A-1 turboshaft engine, a commercial version of the T53-L-703 engine. Composite main rotor blades utilize Kaman's patented servo-flap control mechanism which eliminates the need for hydraulic boost. The airframe is designed for rugged, maintenance-free operation and is constructed entirely from aerospace light alloys. A single-seat cockpit comprises the forward section of a very narrow fuselage and has superior pilot visibility. Besides a vertical fin, the aircraft features twin vertical/horizontal stabilizers located at the midpoint of the aft fuselage unit. The K-MAX is equipped with a fixed combination ski-wheel tricycle landing gear.

	Metric	U.S.
Dimensions		
Length	15.85 m	52.0 ft
Width	4.11 m	13.50 ft
Height	4.14 m	13.60 ft

	Metric	U.S.
Rotor diameter (each)	14.70 m	48.20 ft
Weight		
Empty weight	2,178 kg	4,800 lb
Gross weight	5,216 kg	11,500 lb
Sling capacity	2,722 kg	6,000 lb
Capacities		
Standard fuel	863 liters	228 U.S. gallons
Performance		
Never-exceed speed (V_{NE})	185 km/h	100 kt
Maximum climb rate	762 mpm	2,500 fpm
Service ceiling	4,572 m	15,000 ft
Range with maximum fuel	494 km	267 nm

Propulsion

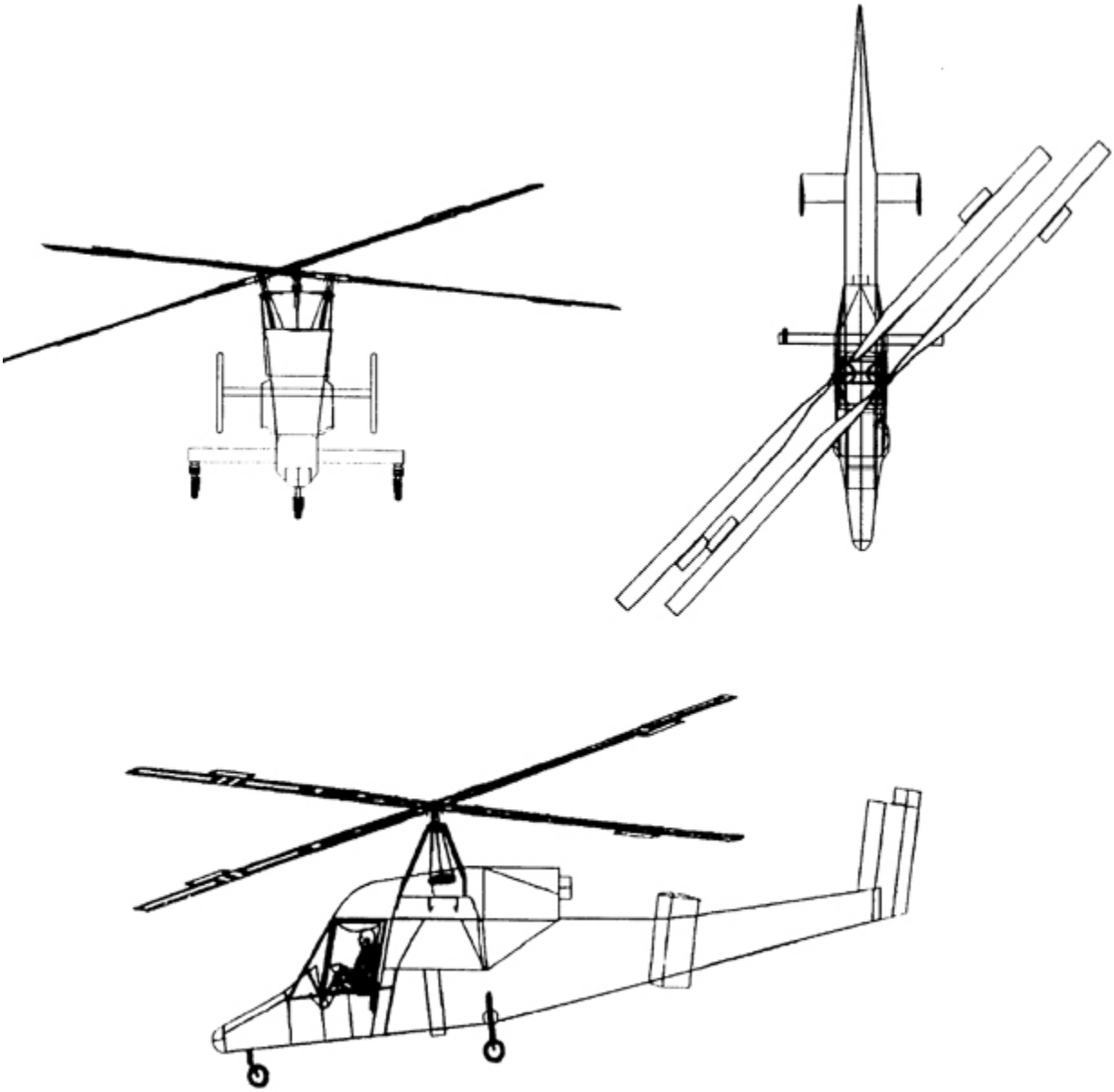
K-MAX (1) Honeywell T5317A-1 twin-spool turboshaft engine rated 1,119 kW (1,500 shp).

Seating

One pilot in an energy-absorbing, crashworthy seat, the first to pass new FAA requirements.

K-MAX

Source: Kaman Corp.



KAMAN K-MAX

Source: Kaman Aerospace

Variants/Upgrades

Not applicable.

Program Review

Background. In early 1992, Kaman Corp announced a new commercial helicopter designed specifically for vertical lift applications. The initial prototype had first flown in late 1991. Intended to be an aerial truck, the K-MAX is the first commercial helicopter designed for repeated load/unload cycles. Textron Lycoming was a major partner with Kaman on the program, and provided its T53-L-17A powerplant for use on the aircraft. In 1994, AlliedSignal purchased Textron Lycoming Turbine Engine Division and inherited

production responsibility for the T53 powerplant. In 1999, AlliedSignal was merged with Honeywell.

The K-MAX uses an intermeshing, counter-rotating main rotor system similar to that used on earlier Kaman helicopters such as the military H-43 series. The K-MAX also features composite rotor blades, a single-seat cockpit with large side windows, and an extremely strong but lightweight airframe designed specifically for external lifting. The blades and the transmission are rated for infinite life under full-load operation.

Tough and Reliable. The principal goal of the K-MAX program was a helicopter with lower life-cycle costs than any existing light/intermediate twin-engine helicopter used for external lift. The airframe is simple yet strong, and the pilot sits in an FAA-certificated crashworthy helicopter seat. The derated T53 engine, essentially the same powerplant used in the Bell AH-1S Cobra, has a significant temperature margin and therefore a very long life. The main rotor gearbox is designed for maximum lift capability with excess margin. There are no tail rotors and accompanying gearboxes, shafts, couplings, and controls. There are no hydraulic pitch change servos, pumps, or plumbing.

Certification of the K-MAX by the U.S. Federal Aviation Administration (FAA) to FAR Part 27 standards was achieved in August 1994. Deliveries began the following month, with Erickson Air Crane of Central Point, Oregon, receiving the first K-MAX to be delivered to a customer. In November 1994, the K-MAX was certificated by Transport Canada, and first delivery in Canada (to Midwest Helicopters of Winnipeg, Manitoba) occurred in mid-1995.

Kaman dropped a lease-only approach to marketing the K-MAX in mid-1995. The initial lease phase was an attempt to get the new helicopter into service and provide reliability and maintainability feedback. This lease program was known as Kaman's "A Grand for a Grand" program. The lease customers had an option to buy. Under this program, the aircraft were fielded under leases with costs running at approximately $1,000 per flight-hour. The basis for the leases was a 1,000-flight-hour program.

Kaman has developed an external passenger seat for the K-MAX that enables extra crew to join missions in remote locations. The metal seat is designed to carry a 90-kilogram (200-pound) load. FAA certification was awarded in April 1998.

VERTREP Demonstrations. In August 1995, the U.S. Navy awarded Kaman a $690,000 contract to provide two K-MAX helicopters for a 60-day demonstration to test the feasibility of using commercial helicopters to resupply Navy ships at sea. This vertical replenishment (VERTREP) mission is currently performed by aging CH-46s. During the demonstration, which occurred in August-October 1995, the K-MAX helicopters moved a total of 10 million pounds of cargo in less than 300 flight hours. The rotorcraft were 100 percent mission capable during the demonstration, and maintenance man-hours per flight-hour were 0.83.

The Navy awarded a second contract to Kaman in April 1996 for another demonstration. Under this contract, Kaman operated two K-MAX helicopters in support of the Military Sealift Command's airborne cargo movement for a period of 30 days, followed by an optional 180-day period. The total value of the contract, with option, was $5.7 million.

In early 1997, the Navy selected Evergreen Helicopters, McMinnville, Oregon, for a third VERTREP demonstration. Kaman had bid for this contract. At the time of the contract award, Evergreen had planned to use two Sikorsky S-61As, but later changed to a Bell 212 and a Bell 214ST.

In May 1999, the K-MAX was certified by the FAA for operations under instrument flight rule (IFR) conditions. This certification met a Navy requirement for VERTREP aircraft. The Navy had requested proposals for leasing civil IFR-certified VERTREP helicopters able to transfer cargo between ships at sea by day or night. The service planned to deploy a detachment of VERTREP helicopters aboard Military Sealift Command ships for resupplying the Atlantic Fleet.

The Navy had expressed its wish for IFR certification after the 1996 sea deployment of two K-MAX helicopters.

In order to gain IFR certification, Kaman designed a new stability augmentation system (SAS), hydraulically assisted flight controls, and electrical system modifications. In the near future, the SAS and control boost may be marketed separately or in a fully certified IFR package for commercial K-MAX operators.

In October 1999, the Navy awarded a $20.3 million contract to Geo-Seis Helicopters, Fort Collins, Colorado, to provide two SA.330J Pumas for Atlantic Fleet VERTREP missions. Kaman and Evergreen, among others, had competed for this contract.

The Pacific Fleet might open a competition for a similar contract. Kaman may compete for this contract.

Funding

Not available.

Timetable

Month	Year	Major Development
	1990	Kaman surveys commercial helicopter market
Dec	1991	First flight of initial prototype
Sep	1993	First flight of second prototype
Jan	1994	First flight of initial production aircraft
Aug	1994	FAA certification (FAR Part 27)
Sep	1994	Initial delivery
Nov	1994	Canadian certification

Worldwide Distribution

A complete and detailed list of K-MAX inventories is not available.

Forecast Rationale

Kaman delivered no new-production K-MAX helicopters in 2002. The company also did not gain any orders for new-build K-MAX helicopters during the year. However, Kaman did sell two used K-MAX helicopters in 2002, and leased out an additional three used machines.

Superior Helicopter of Grand Pass, Oregon, purchased one of the used K-MAX helicopters. Grizzly Mountain Aviation, also based in Oregon, bought the other. The sale to Superior was the conversion of a leased K-MAX. Superior currently operates a fleet of four K-MAX aircraft, three of which are owned outright by the company, while the fourth is leased.

Following several years of market difficulties for the K-MAX, Kaman launched a review of the program in 2001 in order to determine the amount of time and additional investment that would be needed to achieve successful sales development and profitability for the program. Following this evaluation, Kaman decided in the second quarter of 2002 to pursue both sales and short-term lease opportunities for its existing inventory of K-MAX helicopters. The company had previously discontinued an earlier K-MAX leasing program. Kaman also decided that it would not build any aircraft without a firm order from a customer. As of mid-2003, Kaman had five incomplete K-MAX airframes on the production line.

Superior Helicopter and the Swiss operator Eagle Helicopters became the first two customers for the new K-MAX lease program in mid-2002. Each company leased one used K-MAX.

The market difficulties of the K-MAX in the past few years have been due in great part to depressed conditions in the logging industry. This industry has so far been the helicopter's principal market. Kaman is concentrating on developing sales opportunities in other markets for the K-MAX, such as oil and gas exploration, power line and other utility construction, law enforcement, aerial firefighting, and equipment transport. It is clear that the company has to find customers for the K-MAX beyond the logging industry.

Military sales are a potential opportunity. A number of military services around the world have been considering a K-MAX purchase.

While a technical success, the K-MAX has yet to be a real sales success. Arguably, the helicopter could be a bit too specialized in that its market niche may be too narrow to generate a very high level of sales. The K-MAX is essentially a tool. It does not carry passengers, other than the pilot and perhaps someone in the optional external seat. This limits its market potential.

Kaman is developing a firefighting version of the K-MAX equipped with the IFEX 3000 water cannon system. The helicopter can be used to extinguish fires in high-rise buildings.

The forecast chart below shows continued K-MAX production through the next 10 years, although none are

projected to be completed in 2003. However, it is quite possible that K-MAX production could end sometime during the forecast period.

The K-MAX may have some market potential as an unmanned aerial vehicle (UAV). In May 2000, the U.S. Marine Corps awarded a $2.7 million follow-on contract to Kaman for further development of a remotely piloted K-MAX. This contract followed an initial $4.2 million award to Kaman in June 1999 to design, fabricate, and install a remote piloting package in a K-MAX helicopter as part of the Marine Corps' BURRO (Broad-area Unmanned Responsive Resupply Operations) concept. The ultimate objective of the BURRO program was to demonstrate the feasibility of using an unmanned vertical take-off and landing platform to deliver supplies to widely dispersed troop units on a battlefield.

Kaman hopes to demonstrate the unmanned K-MAX to the U.S. Army.

Any potential unmanned K-MAX helicopters are not included in the forecast below, which covers only manned helicopters.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level			Good Confidence Level				Speculative			
Aircraft	**(Engine)**	**thru 02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**Total 03-12**
KAMAN													
K-MAX(a)	T5317A-1	38	0	2	3	2	3	3	2	2	2	2	21
Total Production		38	0	2	3	2	3	3	2	2	2	2	21

(a)Does not include non-flying test article.