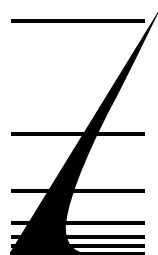


The Market for Medium/Heavy Military Rotorcraft

Product Code #F603

A Special Focused Market Segment Analysis by:



FORECAST INTERNATIONAL

Analysis 2

The Market for Medium/Heavy Military Rotorcraft 2011-2020

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PROGRAMS

The following reports are included in this section: (**Note:** a single report may cover several programs.)

AgustaWestland AW101
Bell/Boeing V-22 Osprey
Boeing AH-64 Apache
Boeing CH-47
Eurocopter AS 332/532/EC 225/725
KAI Korean Utility Helicopter
Kamov Ka-28/29/31/32
Kamov Ka-50/52
Kamov Ka-60/62
Mil Mi-8/17
Mil Mi-24
Mil Mi-26
Mil Mi-28
NH Industries NH90
Sikorsky CH-53/MH-53
Sikorsky S-92
Sikorsky SH/MH-60 Seahawk
Sikorsky UH-60/S-70 Black Hawk

Introduction

At least for another few years, the medium/heavy segment of the military rotorcraft market will be able to maintain the steady growth track that it has followed in recent years. However, the era of sustained market growth is coming to an end. Build rates can be expected to start declining as soon as 2014, and then continue declining through the remainder of the forecast period.

Our projections for the medium/heavy segment indicate that annual production will total 418 units in 2011, rise to 504 units by 2013, and then start a gradual but steady decline. Yearly output is expected to total only 366 units in 2020.

One of the primary market drivers in the segment has been the continuing high level of acquisition of medium/heavy rotorcraft by the U.S. armed services. As the U.S. represents a very large portion of the world market for such machines, U.S. procurement levels tend to have a substantial influence on the shape and scope of the global market.

The U.S. is not the only nation that has ramped up military helicopter acquisition in recent years. The nature of present-day military conflict calls for heavy reliance on the use of rotary-wing assets. Not coincidentally, the medium/heavy military rotorcraft market has witnessed an influx of new products, production ramp-ups of which are helping to drive overall production levels in the segment.

Nevertheless, both in the U.S. and elsewhere, many of these acquisition programs will soon run their course. The result is that, by the second half of the forecast period, annual production in the medium/heavy military market will be declining. Very few nations are embarking on major new procurement programs for such rotorcraft.

Thus, by 2014 or so, the current procurement cycle will be nearing an end. Many of the new rotorcraft models developed in past years will have already been in production for several years.

The medium/heavy military rotorcraft market comprises a number of submarkets such as attack helicopters, transport/utility, anti-submarine warfare (ASW), search-and-rescue, and so forth. Most of the products currently sold on the market compete in more than one of these subsegments. Many are marketed in a variety of versions and configurations that are individually tailored for use in specific roles. This broadens the market appeal of a helicopter product family, and can also assist a military customer in achieving fleet consolidation and rationalization.

Multirole capability is therefore an important attribute for a medium/heavy rotorcraft in the military marketplace. Thus, when it comes to analyzing and forecasting the medium/heavy segment, a methodological approach is required that, at least to some extent, can look beyond the various submarkets. While these submarkets need to be considered and evaluated, they must be seen in correlation with each other and not treated as isolated and discrete elements.

Methodology. Forecast International generally defines a medium/heavy rotorcraft as having a maximum gross weight greater than or equal to 6,804 kilograms (15,000 lb). Rotorcraft with a gross weight of less than 15,000 pounds are generally defined as light rotorcraft.

In applying these definitions to the current range of products on the rotorcraft market, however, we allowed ourselves some leeway. Our goal was to group together directly competing products as much as possible, and a too-strict application of our gross-weight-based definitions would interfere with this. So, a few exceptions were made, and we placed some models in the opposite class than would seem to be indicated by their weight. For example, the Bell UH-1Y, despite its gross weight of 18,500 pounds, has been categorized for our purposes as a light rotorcraft since much of its direct competition is found in the light class.

Besides year-by-year production forecasts for individual rotorcraft models, this study also includes manufacturer market share projections. In calculating such projections, joint ventures and other types of industry teams are treated as separate entities from the individual firms that make up their membership. Thus, the market shares of the Bell/Boeing V-22 team are calculated independently from either Bell or Boeing. This avoids the problem of having to apportion the shares among the various team members.

Included in this market analysis are production forecasts for the following rotorcraft families:

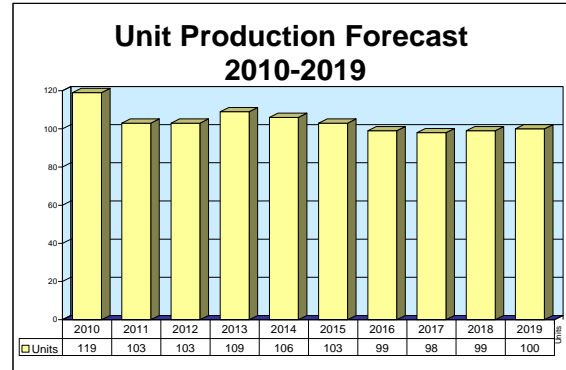
AgustaWestland AW101
Bell/Boeing V-22
Boeing AH-64 Apache
Boeing CH-47 Chinook
Eurocopter AS 532/EC 725
KAI Korean Utility Helicopter
Kamov Ka-28/29/31
Kamov Ka-50/52
Mil Mi-8/17
Mil Mi-24/25/35

Continued...

Sikorsky UH-60/S-70 Black Hawk

Outlook

- The U.S. Army plans to acquire a total of 1,235 UH/HH-60Ms
- New Black Hawk models are being developed for the international market



Orientation

Description. Twin-turbine, single-main-rotor, medium-lift military transport helicopter.

Sponsor. U.S. Army Aviation & Missile Command, Redstone Arsenal, Alabama, USA.

Status. Production by Sikorsky in the U.S. Licensed production by Mitsubishi in Japan.

Total Produced. Through 2009, approximately 2,697 Black Hawks had been produced.

Application. Tactical troop/assault transport, medevac, and various multipurpose tasks.

Price Range. UH-60M, \$16.05 million in 2010 U.S. dollars.



UH-60 BLACK HAWK

Source: U.S. Department of Defense

Sikorsky UH-60/S-70 Black Hawk

Contractors

Prime

Sikorsky Aircraft Corp	http://www.sikorsky.com , 6900 Main St, Stratford, CT 06614 United States, Tel: + 1 (203) 386-4000, Fax: + 1 (203) 386-7300, Prime
Mitsubishi Heavy Industries Ltd (MHI)	http://www.mhi.co.jp/en/ , 16-5 Konan 2-chome, Minato-ku, Tokyo, 108-8215 Japan, Tel: + 81 3 6716 3111, Fax: + 81 3 6716 5800, Licensee

Subcontractor

CMC Electronics Inc	http://www.cmcelectronics.ca , 600 Dr Frederik Philips Blvd, Ville Saint-Laurent, H4M 2S9 Quebec, Canada, Tel: + 1 (514) 748-3148, Fax: + 1 (514) 748-3100 (Vertical Scale Engine Instruments)
Chicago Rawhide Mfg Co	http://www2.chicago-rawhide.com/ , 900 N State St, Elgin, IL 60123-2147 United States, Tel: + 1 (847) 742-7840, Fax: + 1 (847) 742-9673 (Rotor Head Elastomeric Bearings)
Curtiss-Wright Corp	http://www.curtisswright.com , 10 Waterview Blvd, 2nd Fl, Parsippany, NJ 07054 United States, Tel: + 1 (973) 541-3700, Fax: + 1 (973) 541-3699 (Collective Trim Actuator; Roll Actuator; Yaw Actuator)
Electroid Co	http://www.electroid.com/ , 45 Fadem Rd, Springfield, NJ 07081 United States, Tel: + 1 (973) 467-8100, Fax: + 1 (973) 467-2606 (Yaw & Pitch & Roll Actuator Friction Clutch)
Emergency Beacon Corp	http://www.emergencybeaconcorp.com , 15 River St, New Rochelle, NY 10801-4351 United States, Tel: + 1 (914) 235-9400, Fax: + 1 (914) 576-7075 (Emergency Locator Transmitters)
Engineered Fabrics Corp	http://www.kfetc.com , 669 Goodyear St, Rockmart, GA 30153 United States, Tel: + 1 (770) 684-7855, Fax: + 1 (770) 684-7438 (Main Fuel Cell)
GE - Aviation	http://www.geae.com , 1000 Western Ave, Lynn, MA 01905-2655 United States, Tel: + 1 (617) 594-0100, Fax: + 1 (617) 594-4729 (T700 Turboshaft)
GE - Aviation Systems, Actuation and Landing Gear	http://www.geaviationsystems.com , 2040 E Dyer Rd, Santa Ana, CA 92705-5710 United States, Tel: + 1 (949) 250-3123, Fax: + 1 (949) 261-2013 (Landing Gear Components)
Goodrich Fuel & Utility Systems	http://www.goodrich.com , 197 Ridgedale Ave, Cedar Knolls, NJ 07927 United States, Tel: + 1 (973) 267-4500, Fax: + 1 (973) 734-7982 (Tail Landing Gear Actuator; Stabilator; Pedal Adjuster; Pitch Bias; Pitch Bias Actuator; Pedal Adjuster Actuator; Stabilator Actuator)
Goodrich Sensors and Integrated Systems	http://www.goodrich.com , 14300 Judicial Rd, Burnsville, MN 55306-4000 United States, Tel: + 1 (952) 892-4000, Fax: + 1 (952) 892-4800 (Air Data Transducer; Blade Ice Detector Signal Converter; Ice Rate System; Low Airspeed Sensor System; Pitot-Static System; Pressure System)
Hamilton Sundstrand	http://www.hamiltonsundstrand.com , One Hamilton Rd, Windsor Locks, CT 06096-1010 United States, Tel: + 1 (860) 654-6000, Fax: + 1 (860) 654-2621, Email: hs.general@hsd.utc.com (Automatic Flight Control System)
Hitchcock Industries Inc	http://www.hitchcockusa.com , 8701 Harriet Ave S, Minneapolis, MN 55420-2787 United States, Tel: + 1 (952) 881-1000, Fax: + 1 (952) 887-7858 (Main Gearbox Housing Casting)
Honeywell Aerospace	http://www51.honeywell.com/aero , 1944 E Sky Harbor Circle, Phoenix, AZ 85034 United States, Tel: + 1 (602) 231-1000, Fax: + 1 (602) 365-2075 (Electrical Power Generators)
Honeywell Aerospace, Lighting & Electronics	http://www.honeywellaes.com/lighting/index.jsp , 550 Route 55, PO Box 247, Urbana, OH 43078 United States, Tel: + 1 (937) 484-2000, Fax: + 1 (937) 484-2008 (Heating & Ventilating Valve & Sensor)
Hughes-Treitler Manufacturing Corp	http://www.hughes-treitler.com , 300 Endo Blvd, Garden City, NY 11530-6708 United States, Tel: + 1 (516) 832-8811, Fax: + 1 (516) 832-8054 (Oil Cooler)

Sikorsky UH-60/S-70 Black Hawk

LP Aero Plastics Inc	http://www.lpaero.com , 1086 Boquet Rd, Jeannette, PA 15644-4707 United States, Tel: + 1 (724) 744-4448, Fax: + 1 (724) 744-7372 (Windshields)
Labinal	http://www.labinal.com , 36, rue Raymond Grimaud, Blagnac, 31700 France, Tel: + 33 5 34 60 00 00, Fax: + 33 5 34 60 01 99 (Damping Mount)
MarathonNorco Aerospace Inc	http://www.mptc.com/ , 8301 Imperial Dr, PO Box 8232, Waco, TX 76712-6588 United States, Tel: + 1 (254) 776-0650, Fax: + 1 (254) 776-6558 (Engine Compartment Hold Open Strut)
Moog Inc	http://www.moog.com , Jamison Rd, East Aurora, NY 14052 United States, Tel: + 1 (716) 652-2000, Fax: + 1 (716) 687-4457 (Trim Actuator; Pitch Actuator; Roll Actuator)
Parker Aerospace Hydraulic Systems Division	http://www.parker.com , 2220 Palmer Ave, Kalamazoo, MI 49001-4165 United States, Tel: + 1 (269) 384-3400, Fax: + 1 (269) 384-3862 (Hydraulic Pump)
Parker Aerospace Nichols Airborne Division, Elyria Facility	http://www.parker.com , 711 Taylor St, PO Box 4032, Elyria, OH 44036 United States, Tel: + 1 (440) 284-6300, Fax: + 1 (440) 322-6094 (Fuel Pump)
Parker Aerospace Stratoflex Products Division	http://www.parker.com , 220 Roberts Cut-Off Rd, Fort Worth, TX 76114 United States, Tel: + 1 (817) 738-6543, Fax: + 1 (817) 738-9920 (Hydraulic Hose)
Parker Hannifin Aerospace Group	http://www.parker.com , 14300 Alton Pkwy, Irvine, CA 92618 United States, Tel: + 1 (949) 833-3000, Fax: + 1 (949) 851-3277 (Main Rotor Servo Actuator)
Precision Gear Inc	http://www.precisiongearinc.com , 112-07 14th Ave, College Point, NY 11356 United States, Tel: + 1 (718) 321-7200, Fax: + 1 (718) 321-7001 (Main Engine Output Shaft Gearbox)
Timken Aerospace Transmissions LLC	http://www.timken.com , 586 Hilliard St, PO Box 1898, Manchester, CT 06040-1898 United States, Tel: + 1 (860) 649-9000, Fax: + 1 (860) 645-6293 (Hub Assembly)

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

(UH-60M)

Design Features. Single-main-rotor helicopter with integral tail boom and rotor system. Twin turboshafts drive from the cold end directly into the main rotor gearbox. Landing gear is fixed.

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Length overall(a)	19.79 m	64.92 ft
Length, folded(b)	12.62 m	41.42 ft
Main rotor diameter	16.38 m	53.75 ft
Tail rotor diameter	3.35 m	11.0 ft
Height overall	5.16 m	16.92 ft
Cabin volume	11.2 cu m	396 cu ft
Weight		
Maximum gross weight	9,979 kg	22,000 lb
Capacities		
Standard fuel	1,361 liters	360 U.S. gal

Sikorsky UH-60/S-70 Black Hawk

		<u>Metric</u>	<u>U.S.</u>
Performance			
		280 km/h	151 kt
		3,206 m	10,520 ft
		1,831 m	6,010 ft
		4,626 m	15,180 ft
		511 km	276 nm
Propulsion			
UH-60A	(2)	General Electric T700-GE-700 turboshaft engines rated 1,163 kW (1,560 shp) each.	
UH-60L	(2)	General Electric T700-GE-701C turboshaft engines rated 1,447 kW (1,940 shp) each.	
UH-60M	(2)	General Electric T700-GE-701D turboshaft engines rated 1,652 kW (2,215 shp) each, or	
	(2)	General Electric T700-GE-701E turboshaft engines rated 1,652 kW (2,215 shp) each.	
S-70C	(2)	General Electric CT7-2C/D turboshaft engines rated 1,212-1,285 kW (1,625-1,723 shp) each.	

Seating

Pilot, copilot, and 15-20 troops is the standard troop transport arrangement.

Armament

One or two machine guns in forward cabin area. Provision for HELLFIRE missiles.

(a) Rotors turning.

(b) Rotors and tail pylon folded.

Variants/Upgrades

UH-60L. Sikorsky and the U.S. Army had planned to introduce a much improved UH-60B model in the early 1990s; however, funding constraints prevented a major effort. Still, the Army was able to structure a program aimed at enabling the Black Hawk to attain the performance of the original UH-60A. Since its introduction in 1978, the UH-60A had gained about 2,000 pounds in weight and had lost a great deal of its original performance capability, such as hover-out-of-ground-effect at altitude, payload, etc. The first improved model was the UH-60L, or interim Black Hawk. It incorporates a 3,400-horsepower main gearbox with improved reliability and durability, 1,940-shp GE T700-GE-701C engines, and, from July 1991, a Honeywell auxiliary power unit (APU). The UH-60L has more payload than the A model, and is currently capable of sling-loading 9,000 pounds.

Initial deliveries of the UH-60L occurred in November 1989. Original plans called for a further-enhanced model, dubbed the UH-60M, to enter production in 1992, but this variant was subsequently canceled. The designation UH-60M is now used for a new Black Hawk version (see below).

UH-60J. Variant for the Japan Air Self-Defense Force and the Japan Maritime Self-Defense Force. It is

license-produced by Mitsubishi. UH-60Js have replaced H-3 Sea Kings and KV-107s in the search-and-rescue role.

UH-60JA. Variant for the Japan Ground Self-Defense Force. It is license-produced by Mitsubishi.

UH-60P. Designation for UH-60L for South Korea.

UH-60M. The UH-60M features increased-performance engines, composite spar wide-chord main rotor blades, a new stabilator system, and a fully digitized cockpit with four multifunction displays, a four-axis fully coupled flight director, a digital map, dual embedded global positioning/inertial navigation systems, and an Integrated Vehicle Health Management System (IVHMS). The initial version of the UH-60M is powered by 1,652-kW (2,215-shp) General Electric T700-GE-701D engines.

Compared to the UH-60A/L, the UH-60M provides increased payload and range, and improved handling qualities and survivability.

At one time, the U.S. Army had intended to remanufacture 1,213 of its existing Black Hawks to the new UH-60M configuration. However, in late 2004, the service decided to abandon the remanufacturing effort

Sikorsky UH-60/S-70 Black Hawk

and instead procure all of its UH-60M production aircraft as new-build helicopters. The Army determined that building UH-60Ms from scratch involved only a small cost increase compared to rebuilding existing UH-60A/Ls to the M standard. The Army now intends to acquire 1,235 UH/HH-60M helicopters. This total includes eight test aircraft and 1,227 production aircraft.

The eight test aircraft included four prototypes and four preproduction aircraft. The initial prototype was converted from a UH-60A, and took to the air for the first time in September 2003. It was used to test performance and handling. The second prototype was a converted UH-60L, and was utilized for structural, performance, and avionics testing. The remaining two prototypes included a new-build UH-60M and a UH-60A converted to the HH-60M medevac configuration.

In February 2004, Sikorsky received a \$40 million contract to deliver four preproduction UH-60Ms to the Army. These four helicopters, all of which were converted UH-60Ls, joined the four UH-60M prototypes in the development program.

Sikorsky delivered the first production UH-60M to the Army in July 2006. In June 2007, the Pentagon approved full-rate production of the UH-60M.

The Army intends to acquire 303 new-build HH-60Ms; these helicopters are included in the Army's planned buy of 1,227 production UH/HH-60Ms. Denver-based Air Methods Corp produces the medical interior system for the HH-60M.

In August 2008, a further-improved version of the UH-60M, called the UH-60M Upgrade, made its initial flight. Among the improvements incorporated in this new version are FADEC-equipped T700-GE-701E engines, the Rockwell Collins Common Avionics Architecture System (CAAS), and a fly-by-wire flight control system (with triple redundant Hamilton Sundstrand dual-channel flight control computers and BAE Systems active control sticks).

EH-60A. Black Hawk derivative equipped with the Quick Fix IIB electronic warfare system. Sikorsky received a \$3.2 million prototype development contract in late 1980, and the YEH-60A prototype flew in September 1981. Initial delivery of an EH-60A occurred in 1987. Sikorsky delivered 26 production EH-60As to the U.S. Army by the end of 1988. An additional 40 were converted for the service from inventory UH-60As by Tracor Aerospace.

VH-60A/N. Operated by the U.S. Marine Corps. Originally known as the VH-60A, it was later redesignated VH-60N. Nine aircraft were procured. The first six were delivered in 1988, and the final three were delivered in 1989.

MH-60K. In January 1988, Sikorsky received an \$82.8 million, 38-month contract to develop an MH-60K prototype for the U.S. Army's Special Operations Forces. The contract also included 22 production aircraft and options on another 38 units. Powered by uprated T700-GE-701C engines, the MH-60K is fitted with two external 230-gallon fuel tanks, an IBM-designed Integrated Avionics Subsystem, a Texas Instruments APQ-174A terrain following/avoidance radar, a Hughes AAQ-16 forward-looking infrared (FLIR) system, a folding stabilator, a rotor brake, an air-to-air refueling probe, and a starboard fuselage-mounted rescue hoist. A pair of .50-caliber machine guns is also fitted, and the MH-60K has provisions for carrying Stinger air-to-air missiles.

MH-60G. The U.S. Air Force MH-60G replaced the canceled HH-60D Nite Hawk rescue helicopter. The MH-60G is a Black Hawk derivative that is used by the Air Force for a variety of missions. It is fitted for extended-range operations, has a precision low-level tactical navigation system and upgraded communications and weapon systems, and can perform in marginal weather. The MH-60Gs have been redesignated HH-60G.

S-70A. Military utility models marketed to international customers.

S-70C. Sikorsky has marketed a civil Black Hawk variant, the S-70C, which received FAA type certification in the restricted category in 1983. The aircraft has an empty weight of 4,607 kilograms (10,158 lb), a cruise speed at sea level of 268 km/h (145 kt), and a range with maximum fuel and no reserves of 550 kilometers (297 nm).

S-70 Firehawk. Firefighting version of the Black Hawk. It has a removable 1,000-U.S.-gallon water tank and extended landing gear. Existing Black Hawks can be retrofitted to the Firehawk configuration, or the Firehawk can be built as a new-production helicopter.

HH-60L. Medevac version for the U.S. Army.

Sikorsky UH-60/S-70 Black Hawk

Program Review

Background. In 1968, the U.S. Army launched studies of a new troop-carrying helicopter to replace the Bell UH-1. Study contracts firmed up the requirement for a twin-engine helicopter able to carry 11 combat-ready troops plus a crew of three. This helicopter was known as the Utility Tactical Transport Aircraft System (UTTAS).

Parallel development at the Army's Aviation Materiel Laboratories at Fort Eustis, Virginia, resulted in the design of a new turboshaft engine, for which Requests for Quotations (RFQ) went out in mid-1971. In December of that year, General Electric's GE12 powerplant was selected for the UTTAS. The T700 production engine was derived from the GE12.

UH-60A Selected for UTTAS

Airframe Requests for Proposals (RFP) went out to nine companies in early 1972 and, in August of that year, Sikorsky and Boeing Vertol were selected as finalists. Sikorsky flew the first prototype YUH-60A in October 1974, and completed two more flight test units shortly thereafter. The first unit was delivered to the Army in March 1976. In December 1976, Sikorsky's UH-60A was declared the UTTAS winning design. The prototype machines accumulated 650 flight test hours.

The UH-60A had a long fuselage that presented a low, squat profile. The four blades of the main rotor were pressurized, utilized structural integrity indicators, and featured tips that were swept back 20 degrees. Leading edges each carried electrically heated de-icing mats. The rotor head incorporated bifilar vibration absorbers and elastomeric rotor hub bearings that required no lubrication, thereby reducing hub maintenance by 60 percent. The Black Hawk was originally slated to have

a fluidic stability augmentation system but was eventually fitted with an electronic unit instead. The tail rotor, which was mounted at the top of a high vertical fin, was canted 20 degrees off the vertical. This placement created about 181 kilograms (400 lb) of vertical thrust and allowed for greater center-of-gravity travel. An all-flying stabilator automatically sensed airspeed changes, and its position ranged from 39 degrees down at a hover to horizontal at cruise speeds.

RTM322 Engine. Westland fitted an S-70C with a pair of 2,100-shp Rolls-Royce Turbomeca RTM322-01 turboshafts, and flew the aircraft in June 1986. UH-60/RTM322 certification was obtained in late 1987. The U.S. Army evaluated the RTM322 against GE's updated T700-GE-701C before selecting the GE engine in early 1988 to power Black Hawks delivered from 1989 onward.

Korean Coproduction. In 1990, Sikorsky and Korean Air announced U.S. government approval of licensed coproduction of the Black Hawk in South Korea. The helicopter was built for the South Korean military under the UH-60P designation. The UH-60P is a standard U.S. Army UH-60L with minor changes tailored to meet South Korean government requirements. Korean Air built over 100 Black Hawks.

No WS-70 Orders

Westland Licensed Program. A Sikorsky/Fiat acquisition of a nearly 16 percent share in Westland involved licensed production of the UH-60 by the U.K. manufacturer. In September 1986, Westland officially launched the WS-70 program, followed by a first flight in April 1987. However, Westland never gained a single order for the WS-70.

Related News

200th UH/HH-60M Delivered to U.S. Army – Sikorsky delivered the 200th UH/HH-60M Black Hawk helicopter to the U.S. Army in July 2010. "The UH-60M aircraft have been performing phenomenally well in theater, supporting our troops and providing them with the latest technology for the mission," said Doug Shidler, Sikorsky vice president for army programs. "The feedback from the U.S. Army has been extremely positive, as more M models are introduced into the fleet." (Sikorsky, 7/10)

First Flight of S-70i – The initial S-70i International Black Hawk completed its first flight in July 2010. Aircraft 0001 was built at Sikorsky subsidiary PZL Mielec in Poland. The flight took place at the Sikorsky Development Flight Center in Florida.

Production of the S-70i involves the use of a global supply chain. The helicopter is the first Black Hawk to ever be assembled in Europe. "As Sikorsky Aircraft continues to grow internationally, we recognize the significance of this

Sikorsky UH-60/S-70 Black Hawk

new integration of manufacturing and supply chain activities as a major leap forward for our company," said Michael Ambrose, Sikorsky vice president for international military programs. (Sikorsky, 7/10)

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Funding

U.S. FUNDING								
	FY08	FY08	FY09	FY09	FY10	FY10	FY11	FY11
	QTY	AMT	QTY	AMT	QTY	AMT	(Req)	(Req)
							QTY	AMT
U.S. Army								
UH-60	77	1,421.6	66	1,091.5	81	1,468.8	74	1,393.3
Less: Advance Proc (PY)	-	(183.0)	-	(116.8)	-	(134.5)	-	(102.2)
Total	-	1,238.6	-	974.7	-	1,334.3	-	1,291.1
UH-60 Advance Proc (CY)	-	116.0	-	136.8	-	98.7	-	100.5
U.S. Air Force								
HH-60M	-	-	-	-	4	95.2	6	218.4
H-60 Mods	-	124.1	-	17.2	-	64.0	-	92.6
USSOCOM								
MH-60 SOF Modernization	-	76.2	-	96.0	-	151.0	-	179.4

All \$ are in millions.

Contracts/Orders & Options

Contractor	Award (\$ millions)	Date/Description
Sikorsky	1,477.1	Dec 2007 – Contract from U.S. Army for procurement of Army and Navy H-60 helicopters and tooling, program systems management, and production of technical publications.
Sikorsky	1,509.9	Dec 2007 – Contract from U.S. Army for UH/HH/MH-60 helicopters.
Sikorsky	368.4	Mar 2008 – Contract from U.S. Army for six UH-60M and 20 HH-60M Black Hawk helicopters and installation of auxiliary power unit (APU) kits.
Sikorsky	30.4	Apr 2008 – Contract from U.S. Army for conversion of nine UH-60M Black Hawk helicopters into a unique aircraft configuration for the Bahrain Defense Force, and to provide training, technical publications, integrated logistics support, a field service representative, a warranty, and ferry flight technical shipping support.
Sikorsky	34.1	May 2008 – Contract from U.S. Army for three UH-60M helicopters and installation of APU kits.
Sikorsky	46.3	Jun 2008 – Contract from U.S. Army for four UH-60M helicopters, material inspection, and installation of APU kits.
Sikorsky	9.8	Jul 2008 – Contract from U.S. Army for UH-60M Upgrade long-lead parts.
Sikorsky	110.6	Jul 2008 – Contract from U.S. Army to convert the production configuration of 26 UH-60M aircraft.
Sikorsky	286.0	Aug 2008 – Contract from U.S. Army for procurement of UH-60Ls, to include the provision of and support for technical publications and ground station radios to the Royal Saudi Land Forces.

Sikorsky UH-60/S-70 Black Hawk

Contractor	Award (\$ millions)	Date/Description
Sikorsky	35.0	Sep 2008 – Contract from U.S. Army for three UH-60M helicopters for Army systems engineering, the Environmental Program, and the Corrosion Prevention Program.
Sikorsky	812.8	Dec 2008 – Contract from U.S. Army for funding of the multiyear contract's third program year for Army Lot 33, consisting of 51 UH-60M and 12 HH-60M Black Hawk helicopters along with tooling, program systems management, and the provision of technical publications.
Sikorsky	60.4	Jun 2009 – Contract from U.S. Army for the procurement of four UH-60L aircraft uniquely configured for the Brazilian Air Force.
Sikorsky	6.8	Jun 2009 – Contract from U.S. Army for overhaul/upgrade of 25 UH-60M transmissions and the associated product verification audit.
Sikorsky	5.6	Jul 2009 – Contract from U.S. Navy for the procurement of non-recurring engineering efforts associated with top deck structural enhancement of the VH-60N in-service presidential helicopters. In addition, this contract provides program management and logistics support.
Sikorsky	37.7	Aug 2009 – Contract option from U.S. Army for two UH-60Ms, one HH-60M, and three APU inlet barrier filter kits.
Sikorsky	73.2	Sep 2009 – Contract from U.S. Army for the procurement of six UH-60L Black Hawk aircraft configured for the Brazilian Air Force, plus publications and aircraft warranty.
Sikorsky	5.4	Nov 2009 – Contract from U.S. Army to procure the refurbishment of one Egyptian Air Force UH-60 VIP helicopter.
Sikorsky	168.7	Dec 2009 – Contract from U.S. Army for H-60 supplies and technical, engineering, and logistical support services for a period of 12 months in support of overhaul, repair, and recapitalization of the H-60 weapon system at Corpus Christi Army Depot.
Sikorsky	171.1	Dec 2009 – Contract from U.S. Army to produce 14 UH-60M aircraft and convert them to a unique configuration for the United Arab Emirates.
Sikorsky	29.0	Dec 2009 – Contract from U.S. Army for advance procurement funding for the multiyear contract's fifth program year for Army Lot 35 for UH-60M and HH-60M helicopters.
Sikorsky	923.7	Jan 2010 – Contract from U.S. Army for funding of the multiyear contract's fourth program year for Army Lot 34, consisting of 46 UH-60Ms, 21 HH-60Ms, 10 optional UH-60Ms, tooling, program systems management, and technical publications.
Sikorsky	46.9	Feb 2010 – Contract option from U.S. Army for four UH-60M aircraft for the U.S. Air Force.
Sikorsky	6.7	Jul 2010 – Contract from U.S. Army. This contract is a definitization of the not-to-exceed price for the conversion of nine UH-60M helicopters into a unique aircraft configuration for the Bahrain Defense Force. The contractor will also provide technical publications, integrated logistics support, a field service representative, a warranty, and ferry flight technical shipping support.
Sikorsky	35.3	Aug 2010 – Contract from U.S. Army for three UH-60M aircraft for the Mexican Navy and three APU inlet barrier filter kits.
Sikorsky	36.6	Sep 2010 – Contract from U.S. Army to convert three diverted UH-60M aircraft to the Mexican Navy configuration, plus integrated operator manuals, technical data packages, and the aircraft warranty.
Sikorsky	9.4	Sep 2010 – Contract from U.S. Army for long-lead parts for the UH-60M aircraft.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1968	UH-1 replacement studies begun
	1971	UTTAS specifications firmed up
Early	1972	Airframe RFP
Aug	1972	Boeing Vertol and Sikorsky selected as finalists
Oct	1974	YUH-60A first flight

Sikorsky UH-60/S-70 Black Hawk

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Mar	1976	YUH-60A delivered to U.S. Army
Dec	1976	YUH-60A selected as UTTAS winner
Oct	1978	Initial production deliveries
Aug	1990	First flight of U.S. SOF MH-60K
Early	1991	First UH-60L delivered to U.S. Army
Jul	2006	First production UH-60M delivered to U.S. Army
Aug	2008	First flight of UH-60M Upgrade
Beyond	2010	Production to continue

Worldwide Distribution/Inventories

(As of October 2010)

Operator	Designation	Quantity
Argentina Air Force	S-70A	1
Australia Army	S-70A-9	35
Austria Air Force	S-70A	9
Bahrain Air Force	UH-60L	2
Bahrain Air Force	UH-60M	2
Brazil Air Force	UH-60L	6
Brazil Army	S-70A	4
Brunei Air Force	S-70C	2
Brunei Air Force	UH-60L	4
Chile Air Force	S-70A	1
China, People's Republic of, Air Force	S-70C	19
Colombia Air Force	UH-60L	33
Colombia Army	UH-60L	29
Colombia National Police	S-70A	7
Egypt Air Force	S-70A	4
Egypt Air Force	UH-60A	2
Hong Kong Government	S-70A	2
Israel Air Force	S-70A	38
Israel Air Force	UH-60A	10
Japan Air Force	UH-60J	38
Japan Army	UH-60JA	29
Japan Navy	UH-60J	19
Jordan Air Force	UH-60A	5
Jordan Air Force	UH-60L	8
Korea, Republic of (South), Army	UH-60P	130
Malaysia Air Force	S-70A	2
Mexico Air Force	UH-60L	6

Sikorsky UH-60/S-70 Black Hawk

Operator	Designation	Quantity
Morocco Air Force	S-70A	2
Morocco Police	S-70A	2
Philippines Air Force	S-70A	1
Saudi Arabia Air Force	S-70A	8
Saudi Arabia Army	S-70A	12
Taiwan Air Force	S-70C	17
Thailand Army	S-70A	5
Thailand Army	UH-60L	2
Turkey Army	S-70A	59
Turkey Jandarma	S-70A	37
United Arab Emirates Air Force	S-70A	20
United Arab Emirates Air Force	UH-60M	7
United States Air Force	HH-60G	100
United States Army	HH-60L	31
United States Army	MH-60K	23
United States Army	MH-60L	35
United States Army	MH-60M	7
United States Army	UH-60A	915
United States Army	UH-60L	635
United States Army	UH/HH-60M	210
United States Customs and Border Protection	UH-60A	14
United States Customs and Border Protection	UH-60L	2
United States Customs and Border Protection	UH-60M	1
United States Federal Bureau of Investigation	UH-60M	1
United States Marine Corps	VH-60N	8

Forecast Rationale

By the fall of 2010, Sikorsky had delivered more than 200 UH/HH-60M Black Hawks to the U.S. Army. The service plans to procure 1,235 M model Black Hawks.

Current production UH-60Ms are built in what is known as the Baseline configuration. Sikorsky and the Army have been developing an improved version of the helicopter, dubbed the UH-60M Upgrade. This model features FADEC-equipped GE T700-GE-701E engines, fly-by-wire flight controls, the Rockwell Collins CAAS, and other improvements. Two UH-60M Upgrade helicopters are presently in flight testing.

Original Army plans had called for UH/HH-60M deliveries to the service to transition from the Baseline model to the Upgrade variant. However, in late 2009, the Army recommended to the Pentagon that the Upgrade model be terminated once developmental testing is completed. While the service was satisfied with the progress of the Upgrade development effort, it felt that the Baseline version was adequate for its needs and it would rather spend the money on getting additional Black Hawks into the field.

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At this writing, the Pentagon has yet to make a final decision on the fate of the Upgrade program, but indications are that the Army recommendation will probably be accepted. The Army still intends to complete the current developmental testing regimen, which is scheduled to wrap up in FY12. The reasons for this are threefold. First, ending the program immediately would actually be more expensive than completing the testing, due to contract termination costs. Second, the Army plans to gradually incorporate some of the Upgrade improvements into the Baseline production configuration. (These improvements will likely include the -701E engine.)

Third, the results of the Upgrade test program will inform development of Sikorsky's CH-53K helicopter, a fly-by-wire helicopter intended for use by the U.S. Marine Corps.

Meanwhile, a pair of U.S. government civilian agencies have joined the Army as operators of the UH-60M. The Federal Bureau of Investigation (FBI) is acquiring three UH-60Ms, and took delivery of its initial helicopter in June 2009. That helicopter was the first UH-60M to enter service with an operator other than the U.S. Army.

In August 2009, U.S. Customs and Border Protection (CBP) took delivery of the first of four UH-60Ms. All four are scheduled to be delivered to the agency by 2011.

The U.S. Air Force will also soon join the ranks of M model operators. Acquisition of a new combat search-and-rescue (CSAR) helicopter to replace its fleet of HH-60G Pave Hawks has been delayed. In order to replace HH-60Gs that have been lost through attrition, the Air Force plans to procure 15 HH-60M Operational Loss Replacement aircraft over the next few years. The first four were funded in the FY10 defense budget.

The Air Force effort involves procuring 15 new UH-60Ms, and then modifying them to the HH-60M CSAR configuration. The CSAR modifications include an external hoist, a refueling probe, weaponry, and new avionics and communications suites. It should be noted that the USAF HH-60M CSAR helicopter is a different model than the Army's HH-60M medevac variant.

Meanwhile, the Air Force's HH-60G fleet replacement effort has been reconstituted as the HH-60 Personnel Recovery Recapitalization Program. Sikorsky has proposed the UH-60M for this program, and has teamed with Lockheed Martin to pursue the contract. Lockheed Martin would act as major subsystems supplier.

Other competitors for the USAF program include the AgustaWestland AW101, the Bell/Boeing V-22 tiltrotor aircraft, the Boeing CH-47 Chinook, the Eurocopter

EC 725, and the NH Industries NH90. Contract award is planned for FY12.

Sikorsky is also proposing the UH-60M for the Air Force's Common Vertical Lift Support Platform (CVLSP) program, and the company has said that its teaming arrangement with Lockheed Martin will extend to the CVLSP bid. The CVLSP effort involves the acquisition of up to 93 helicopters to replace USAF UH-1Ns. Contract award is planned for FY12. Besides the Black Hawk, other contenders for the CVLSP contract include the AgustaWestland AW139, the V-22, the EC 725, and the NH90.

The Air Force may well select the same rotorcraft for both the CVLSP and HH-60 Recap contracts. The UH-60M is widely regarded as the frontrunner in both contests.

MH-60M Conversion

U.S. Army plans call for a total of 71 of the service's UH-60Ms to be converted to the MH-60M configuration. The MH-60M helicopters will be utilized by Army Special Operations Aviation.

The MH-60M has a high degree of commonality with the UH-60M, including use of the same main gearbox and active vibration control. Differences include installation in the MH-60M of 2,600-shp General Electric YT706-GE-700 engines.

The planned total of 71 MH-60Ms includes one prototype and 70 "production" helicopters. The prototype was converted to the MH-60M standard by L-3 Communications Integrated Systems from the first UH-60M prototype. This aircraft flew for the first time in the MH-60M configuration in April 2007.

For methodological reasons, Forecast International categorizes the MH-60M program as a remanufacturing/conversion program. UH-60Ms slated to undergo the MH-60M conversion are included in our UH-60M/HH-60M (United States Army) forecast line, while the conversions themselves are included in the MH-60M SOF Modernization modification line. We do concede, however, that the MH-60M program could be viewed as a new-production effort, since it involves taking brand-new UH-60Ms and modifying them to the MH-60M configuration.

Beyond the U.S.

The UH-60M is also achieving some success on the export market. Deliveries began in December 2009 of nine UH-60Ms to the Bahrain Defense Forces. All nine are slated to be in service by the end of 2010.

Sikorsky UH-60/S-70 Black Hawk

Sikorsky is under contract to supply 40 UH-60Ms to the United Arab Emirates (UAE); deliveries are scheduled to be completed by the end of 2012. In August 2010, Sikorsky received a \$35.3 million U.S. Army contract to supply three UH-60Ms for the Mexican Navy. The three helicopters are scheduled to be delivered by December 2012. Not yet finalized is a deal worth an estimated \$176 million to supply four UH-60Ms to Egypt.

In September 2010, the U.S. Defense Security Cooperation Agency (DSCA) notified Congress of a possible Foreign Military Sale to Sweden of 15 UH-60Ms. The estimated cost of the deal is \$546 million.

Swedish interest in the Black Hawk is quite notable due to the fact that Europe has generally been a difficult market for Sikorsky in recent years. Sweden has embarked on a fast-track acquisition of 15 medium transport helicopters to address an urgent shortfall in CSAR and medical evacuation capability while Swedish forces are deployed in Afghanistan. The helicopters are required to be in service by 2013. Exacerbating the situation is ongoing delay in fielding Sweden's new NH90s. The UH-60M is competing against the EC 725 for the Swedish procurement.

In January 2010, the DSCA notified Congress of a possible Foreign Military Sale to Taiwan of 60 UH-60Ms. The estimated cost of the deal is \$3.1 billion.

In November 2009, the DSCA notified Congress of a possible Foreign Military Sale to Iraq of up to 15 light utility helicopters and up to 12 medium utility helicopters. The deal is worth a potential \$1.2 billion. Candidates for the medium utility portion are the UH-60M, the AW139, and the Bell 412. For the light utility portion of the proposed sale, the Iraqi government has requested either the AgustaWestland AW109, the Bell 429, or the Eurocopter UH-72A.

Meanwhile, the earlier UH-60L Black Hawk model remains in production, at least for the time being. In June 2009, Sikorsky was awarded a \$60.4 million U.S. Army contract to supply four UH-60Ls to the Brazilian Air Force under the Foreign Military Sales (FMS) program. Also under the FMS program, Sikorsky received a \$73.2 million U.S. Army contract in September 2009 to supply six more UH-60Ls to the Brazilian Air Force.

In August 2010, the DSCA notified Congress of a possible Foreign Military Sale to Colombia of nine UH-60Ls for an estimated cost of \$162 million. One helicopter would be for the Colombian Air Force, four for the Colombian Army, and four for the Colombian

National Police. Also in mid-2010, press reports surfaced of a potential Saudi Arabian deal for up to 72 UH-60s.

In August 2009, the U.S. Defense Security Cooperation Agency notified Congress of a possible Foreign Military Sale to Thailand of three UH-60Ls. The estimated cost of the deal is \$150 million.

In order to enhance product availability and shorten delivery times, Sikorsky often begins production of Black Hawks in anticipation of receiving expected orders. In October 2007, the company opened its new Hawk Works completion center near the facilities of its Schweizer Aircraft subsidiary in Elmira, New York. The Hawk Works facility is the primary completion center for Black Hawks and Naval Hawks.

Mitsubishi continues to license-build UH-60Js for the Japan Air Self-Defense Force (JASDF) and UH-60JAs for the Japan Ground Self-Defense Force (JGSDF). The JGSDF plans to procure up to 80 UH-60JAs.

In mid-2010, the Japanese government issued a Request for Proposals (RFP) for a new search-and-rescue helicopter to replace UH-60Js in the JMSDF and Japan Air Self-Defense Force (JASDF) fleets. Up to 50 helicopters may be acquired, beginning with an initial order for two sometime in the 2011-2012 timeframe.

New Black Hawks

Sikorsky announced two new Black Hawk models in 2006: the S-70i International Black Hawk and the Battlehawk.

In essence, the S-70i is a hybrid of the UH-60L and the UH-60M. Less advanced and less expensive than the UH-60M, the S-70i is designed with a modular platform that is configurable to specific customer requirements. Among the new model's main features are a fully integrated glass cockpit, a dual digital automatic flight control system with coupled flight director, an active vibration control system, and dual-pilot IFR capability. Sikorsky says that the S-70i "will provide multimission, 10-ton utility lift capability at a price comparable to helicopters in the six- to eight-ton class."

Final assembly of the S-70i is the responsibility of Sikorsky subsidiary PZL Mielec in Poland. Locating S-70i final assembly at PZL Mielec frees up Sikorsky's main facility in Stratford, Connecticut, to concentrate on production of the UH-60M. The tailcone of the S-70i is manufactured by Turkish Aerospace Industries (TAI), while the cockpit section is built by Kaman Aerospace.

The initial S-70i made its first flight in July 2010. A second S-70i had been completed by September 2010. Deliveries of the new model are planned to begin in

Sikorsky UH-60/S-70 Black Hawk

2011. Sikorsky envisions output of about 20 S-70i helicopters per year.

Sikorsky announced in July 2010 that the Saudi Arabian Ministry of Interior (MOI) had become the launch customer for the S-70i. The MOI signed a contract to acquire three S-70i helicopters, and took options for an additional 12. Delivery of the first helicopter is scheduled for early 2011. The helicopters are to perform transport, border protection, and other missions.

The S-70i is replacing the UH-60L in the Sikorsky product line. When UH-60L production ends, Sikorsky expects to transfer any remaining unfilled UH-60L orders to the S-70i.

The T-70, a customized variant of the S-70i, is one of two contenders for the Turkish Utility Helicopter Program (TUHP), the other contender being a version of AgustaWestland's AW149 called the TUHP 149. The Turkish program involves the acquisition of at least 150 helicopters for the Turkish armed forces and various civil agencies.

The second new Black Hawk model announced in 2006 is an armed version called the Battlehawk, which Sikorsky is developing with the Israeli firm Elbit Systems. Armament options include missiles, rockets, and fixed forward and turreted guns. The Battlehawk will be available both as a retrofit kit for existing Black Hawk helicopters and as a new-build helicopter. A demonstrator flew for the first time in September 2008, and completed flight testing in the second half of 2009.

The Battlehawk configuration broadens the market appeal of the Black Hawk by enhancing the helicopter's multirole capability and enabling it to compete in such market segments as attack and armed reconnaissance.

In conjunction with the U.S. Army, Sikorsky is also developing an optionally piloted version of the Black Hawk. Plans are to fly a demonstrator by the end of 2010. Sikorsky is targeting introduction of the optionally piloted helicopter for 2015.

Note: Historical production (through 2009) totals do not include 26 EH-60As, 23 MH-60Ks, 41 S-70Cs, one WS-70, 1,743 U.S. Army UH-60A/Ls, and 111 U.S. Air Force UH-60A/MH-60Gs.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Mitsubishi Heavy Industries Ltd (MHI) (Licensee)												
UH-60 J <> T700												
	57	2	1	0	0	0	0	0	0	0	0	3
UH-60 JA <> T700												
	29	1	1	2	3	3	3	3	3	4	5	28
Subtotal	86	3	2	2	3	3	3	3	3	4	5	31
Sikorsky Aircraft Corp												
HH-60 M <> United States <> Air Force <> T700 -GE-701D												
	0	0	4	0	6	5	0	0	0	0	0	15
UH-60 M/HH-60 M <> United States <> Army <> T700 -GE-701D/-GE-701E												
	174	86	72	67	70	70	72	74	74	75	75	735
UH-60/S-70 <> T700 -GE-700/-GE-701C/-GE-701D/-GE-701E												
Note: Includes production for operators other than the U.S. military.												
	492	30	25	34	30	28	28	22	21	20	20	258
Subtotal	666	116	101	101	106	103	100	96	95	95	95	1,008
Total	752	119	103	103	109	106	103	99	98	99	100	1,039

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AIRFRAME													
		High Confidence				Good Confidence			Less Confidence				
Status	Thru 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total	
Estimated Potential Candidates	64	MH-60M SOF Modernization <-> UH-60 M											
Planned/In Progress	7	14	14	16	15	5	0	0	0	0	0	64	
Speculative		0	0	0	0	0	0	0	0	0	0	0	

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Power Systems			Market Intelligence Group Libraries			Binder	\$90	\$170
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