



MICHAEL MECHAM/AW&ST

Composite Entry

Sikorsky turns to composite specialists to help triple lift of Marines' CH-53

MICHAEL MECHAM/WICHITA, KAN.

Spirit AeroSystems was in the early days of designing the most intricate of Boeing's single-wind composite sections for the 787 when Sikorsky sought it out to make the main fuselage for the CH-53K for the U.S. Marine Corps.

Sikorsky had used composite fuselage

assemblies in its helicopters for years, but they were not major structures. To reach that manufacturing level, the Stratford, Conn., company knew it needed outside expertise if it was to satisfy the Marines' expectations for a complete remake of its 1982-vintage CH-53E Super Stallion, says Sikorsky Military Systems President



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Sikorsky's use of composites for the CH-53K fuselage prompted it to turn to outside specialists, including Spirit.

Mick Maurer. The Marines have 152 CH-53Es in service, not enough to support the nine heavy-lift squadrons they are allocated. The full CH-53K purchase of 200 rotorcraft would give them that ability, says Deputy Assistant Navy Secretary Thomas Laux. If implemented, that contract will be worth \$20-30 billion to Sikorsky and its suppliers.

Among the requirements for the Marine Air-Ground Task Force (MAG) is a helicopter that can take standard U.S. Air Force 88 X 108-in. 463L pallets directly from a C-17 without the tedious task of breaking down their loads to fit 48 X 48-in. wooden pallets, as must be done on CH-53Es. The MAG also is looking for a helicopter that can lift 27,000-lb. payloads at sea level in 100F conditions and fly them 110 nm. to 3,000-ft.-high dropoff points. The -53E's limit under those circumstances is 7,600 lb.

Additionally, the Marines want the new helicopter, which has an 88,000-lb. gross takeoff weight, to have sufficient armament to allow it to routinely operate behind enemy lines, says Marine Col. Robert Tobin, 3rd. The -53E is not rated for such assignments. The MAG wants "forward basing with increased reliability and increased survivability" but with the same shipboard footprint as the CH-53E, he says.

The new rotorcraft is to carry 37 troops (55 with center-line seating), have a 170-kt. maximum speed and a basic range of 620 mi. Its armament includes a .50-caliber tail gun—not found on the CH-53E—besides two side guns. It also carries defenses for man-portable air defense systems.

"The CH-53K is the only major helicopter development project underway in the world," says Laux, a former CH-53 program manager. He asserts that it meets the "do more without costing more" mandate advocated by Pentagon acquisition chief Ashton Carter. As to the \$1.1 billion in added costs and any other effects of a three-year development delay, Laux says he's confident that Sikorsky and its suppliers are now on track.

Spirit's contract is for seven aircraft: the first ground-test prototype rolled

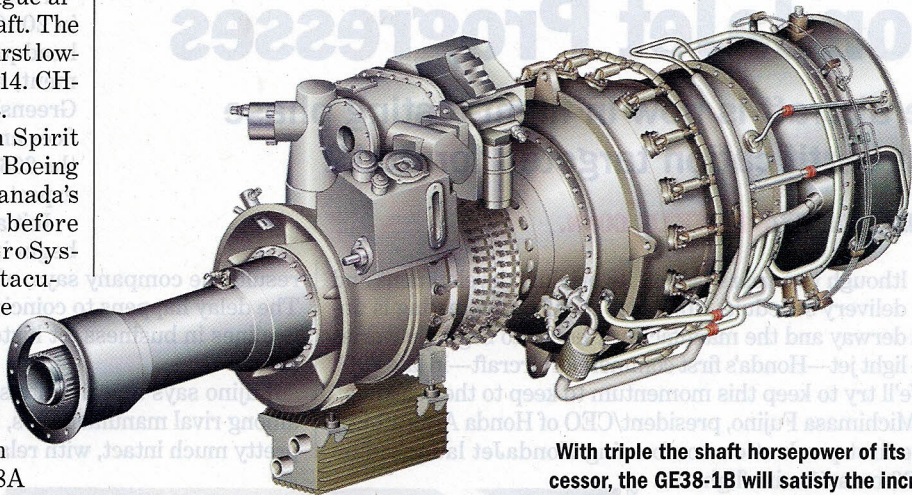
GKN produces the composite aft transition (see "Marines" symbol), which Spirit integrates into the fuselage before shipping to Sikorsky for final assembly.

out here Dec. 16, static and fatigue articles, and four flight-test aircraft. The company expects to receive its first low-rate-production contract in 2014. CH-53K service entry is set for 2018.

Sikorsky's initial talks with Spirit in 2006 came only a year after Boeing spun off its division here to Canada's Onyx Corp. Those talks were before the new company, Spirit AeroSystems, produced its most spectacular composite component—the Section 41 nose for the 787. But the factory had experience in composite assemblies and a major profile as builder of the 737-800 fuselage on which Boeing was developing the P-8A Poseidon anti-submarine patrol aircraft for the U.S. Navy. "That's one reason they were so interested in us," says Spirit's chief operating officer, Buck Buchanan.

A CH-53K production order will bring Spirit its first pure military contact and further enlarge its manufacturing presence. Besides working on every Boeing program, Spirit has gained major new commercial contracts from Airbus, Gulfstream and Mitsubishi since its spinoff. Of the CH-53K work, Buchanan says, "it's less than 5% [of revenues] but it gets us going."

The cabin Spirit builds is 15% larger than the CH-53E's and a complete redesign, although the rotorcraft's total length of 99 ft. requires no more deck



GE AVIATION CONCEPT

With triple the shaft horsepower of its predecessor, the GE38-1B will satisfy the increased lift requirements of the CH-53K.

space than the -53E's. The cabin is 30 ft. long, 8.5 ft. high and 10 ft. wide. The cockpit is 8 ft. long.

The fuselage is basically four large pieces—12-ft.-wide, full-length left- and right-side skins; and a 10-ft.-wide, 30-ft.-long top and bottom. Unlike the 787 nose, which Spirit delivers with wiring, tubing and systems installed, the CH-53K's fuselage is a basic composite shell, although it has some embedded tubes, Buchanan says. It will be built in an International Traffic in Arms Regulations-compliant facility on the opposite side of the Spirit campus from the 787 factory.

In the cockpit is a Rockwell Collins

avionics management system that includes a next-generation design for a common avionics architecture. Tobin says one advantage of fly-by-wire is the redundant linkages it brings in flight controls against enemy fire over mechanical systems.

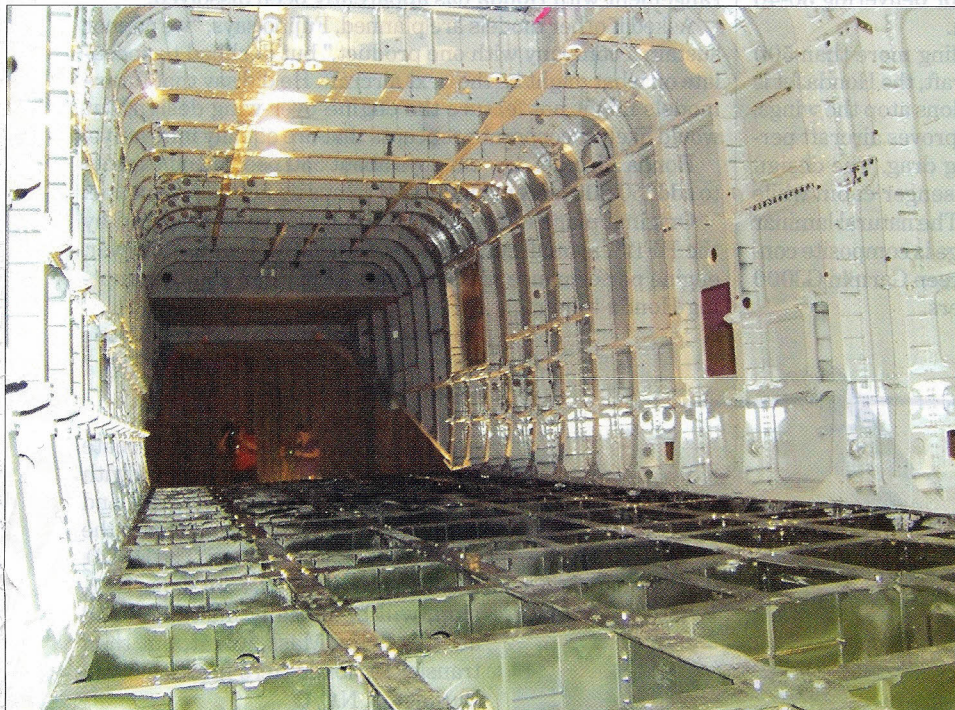
The fuselage includes sponsons from ITT Aerospace of Salt Lake City that house components such as the main landing gear, fuel, and mechanical and electrical assemblies, freeing space in the cabin. Because the sponsons are made of composites, Sikorsky says they "represent a significant technology advancement" over metal for operations in harsh environments.

The aft transition is from GKN Aerospace of St. Louis. Spirit integrates it with the main cabin before shipping the complete fuselage to Sikorsky's Assembly and Flight Operations in West Palm Beach, Fla. The first shipment was made on Dec. 23.

The new helicopter will fly with three GE Aviation GE38-1B engines developing 7,500 shp. each. They upgrade the three 4,380-shp T64-GE416/416As on the CH-53E. The first engine to test (FETT) run was last spring in Lynn, Mass. First engine deliveries are set for the second quarter. As of Dec. 10, the GE38 engines had run 305 hr. with 332 starts in test.

The aircraft uses a single 49-ft.-dia., seven-blade rotor. Hamilton Sundstrand is contributing a new auxiliary power unit that achieved FETT last July in San Diego. ☐

One Marine priority was to increase internal space so that pallets can be loaded directly from C-17s.



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