

Different Course, Same Destination



Curtiss-Wright maintains its strong link with fixed- and rotary-wing aircraft through organic growth and key acquisitions

By Robert W. Moorman

Born at the Birth of Flight

The story of Curtiss-Wright is a compelling one from a historical perspective, old and new.

The past history is well known to aviation enthusiasts. Orville and Wilbur Wright — two “bicycle mechanics” without post-secondary educations — are credited with building and flying the world’s first controlled powered aircraft on December 17, 1903, off the dunes at Kitty Hawk, North Carolina. The two brothers founded the Wright Company in 1909. After Wilbur’s death and Orville left the business, the company merged with the (first) Glenn L. Martin Company in 1916, and was soon called the Wright Aeronautical Corporation.

Meanwhile, in the early 1900s, Glenn H. Curtiss, a bicycle racer and motorcycle builder turned aircraft designer with an 8th grade formal education, had a prodigious talent for all things mechanical. He formed the Curtiss Aeroplane Company in 1909 (see sidebar), and developed many aviation firsts in his own right.

Although Glenn Curtiss retired from his company in 1920, the Curtiss Aeroplane and Motor Company merged in 1929 with its once bitter rival, Wright Aeronautical, to form Curtiss-Wright

Curtiss-Wright has significant content on the CH-47 Chinook, AH-64 Apache, UH-60 Black Hawk and CH-53K King Stallion, as well as the Sikorsky S-92, AgustaWestland AW609 tiltrotor and many other platforms. (US Army photo by Capt. Peter Smedberg. All other photos via Curtiss-Wright.)

Corporation. The combined company would become one of the leading aircraft manufacturers through the Second World War.

100 Years Later

Less known, perhaps, is the modern story of Curtiss-Wright and its continued growth in the fixed-wing and rotorcraft industry. Over time, the business transformed from a niche market player producing surface technologies and controls into a diversified, multi-national corporation with three major divisions — Commercial/Industrial, Defense and Power — under which all programs fall.

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Lately, growth has been achieved through targeted acquisitions, market diversification and product development. The “One Curtiss-Wright” concept installed in 2014 “appeared to be intended to better unify and integrate the company,” observed Ray Jaworowski, senior aerospace analyst with Forecast International, an aerospace consultancy.

The company has grown tremendously. The acquisitions have diversified the company to the point that its reliance on any one market has lessened, which provides a more reliable revenue stream during down years. Full-year net sales in 2014 increased 6% to \$2.2B, from \$2.1B in 2013.

George Hamlin of Hamlin Transportation Consulting said Curtiss-Wright’s transformation is “emblematic of the growth and maturity in the aerospace industry.” In some ways, Curtiss-Wright’s move is Darwinian. “The more agile, adaptive former primes had to move into other areas to survive and prosper,” said Hamlin.

As part of its reorganization, Curtiss-Wright sold some businesses to improve

operating margins and because they weren't part of the current three-pronged core business. In June 2015, the corporation sold its downstream oil and gas business units DeltaValve, TapcoEnpro International (TEI) and GROQUIP.

In the years ahead, Curtiss-Wright will likely "focus more on growth through increases in organic revenue by leveraging the company's critical mass rather than growth achieved through acquisition," said Jaworowski.

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"Rotorcraft has, and continues to represent an important segment of our aerospace market and growth plans," said Lynn Bamford, senior vice president and general manager, Defense Solutions division. "On military helicopters, we provide industry leading sensing, actuation and electronics. In addition, our video management system maximizes the effectiveness of airborne Intelligence and Surveillance and Reconnaissance [ISR] missions."

Increased performance and efficiency are "two key growth areas for our products and services," she added.

Curtiss-Wright has significant content on the Boeing AH-64 Apache and CH-47 Chinook; Sikorsky UH-60 Black Hawk, CH-53K King Stallion and S-92; the Northrop Grumman MQ-8 Fire Scout Unmanned Aerial Vehicle (UAS); AgustaWestland AW609 tiltrotor; and other platforms.

The business manufactures a wide variety of systems for rotorcraft, such as avionics, displays, mission digital air data computers, data storage units, flight control, ice protection and ISR Electronic Warfare systems. Bamford said Curtiss-Wright "expects to have a solid technological presence on this [CH-53K] aircraft."

The company also produces the transducers for the CH-53K that control the main and tail rotors, data concentrator units for monitoring, processing data and controlling assorted subsystem components. It also provides blade fold technology to initiate the folding or spreading of the main rotor blades for shipboard compatibility.

As for helicopter products, Curtiss-Wright is developing digital air data computer technology (ADCs) that can accurately measure very low airspeed on rotorcraft. This is presently



Curtiss-Wright combined the legacy companies begun by the Wright Brothers and Glenn Curtis, the three greatest founders of American aviation. The company was a major producer of aircraft through World War II.

a challenge because of the difficulty differentiating between rotor downwash and airspeed. To improve the pilot's situational awareness, a new display format has been added, which depicts the horizontal situation indicator with a wind vane and vector, showing wind speed and direction.

In late-August 2015, Curtiss-Wright's Defense Solutions division was awarded a \$3M contract from the US Coast Guard to provide its ADC technology for the Coast Guard's Airbus MH-65 Dolphin helicopter fleet. The technology will provide flight-critical altitude and speed information to the pilots. Deliveries are expected to run through 2019.

New Rotorcraft Solutions

Among the products showcased at Heli-Expo 2015 was Curtiss-Wright's new 5.7 lb (2.6 kg) Fortress crash recorder. The recorder features dual-redundant Cockpit Voice Recorders (CVR), Flight Data Recorders (FDR) and video recording, and data link message capability. The company will offer several iterations of the recorder for the civil and military fixed- and

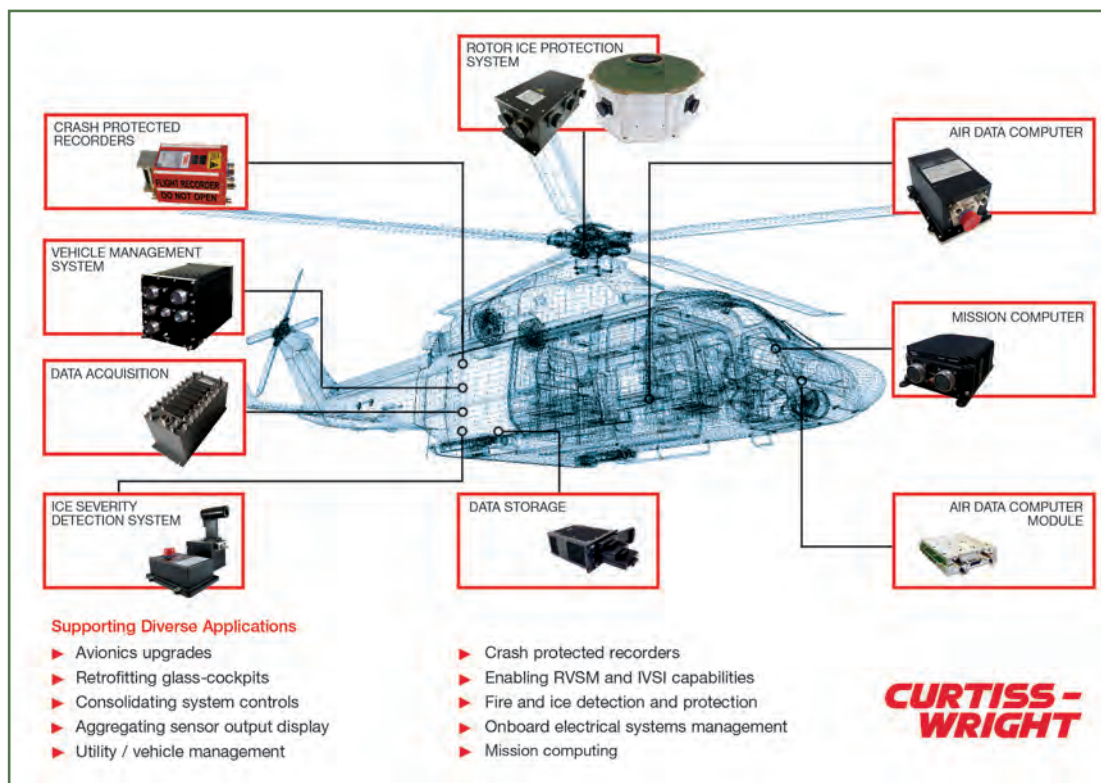
rotary-wing markets, including aircraft operating under Part 91, Part 121 and Part 135 regulations.

"We are accommodating the industry trend to record more data," said Christopher Thomson, vice president of sales, marketing and business development for Curtiss-Wright. "And we are bringing this recorder to the helicopter industry because weight and real estate are two important drivers for technology on helicopters," he added.

Curtiss-Wright, which got into the flight recorder market in 1957, and Health and Usage Monitoring System (HUMS) technology in the late 1980s, is linking the Fortress with HUMS. The goal is the development of a total integrated system linking the CVR/FDR and HUMS systems, weighing a total of about 17 lb (7.7 kg).

Integrating HUMS inside the flight recorder makes sense. "The flight recorder itself is a data collection system," said Paul Hart, chief technology officer of the avionics electronics group for Curtiss-Wright's Defense Solutions division. He is based in Christchurch, England.

The FDR provides an enclosure and



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a harness of sensors that are placed around the aircraft, which can be downloaded post-flight to an aircraft maintenance technician (AMT) on the ground. For years, Curtiss-Wright has been deeply involved with vibration monitoring and analysis, according to Hart, using a distributed network of sensors. This approach, he said, advances the science of data collection and enhances safety.

Sales of the new recorder to helicopter manufacturers recently began. Three helicopter operators had already selected it for new models by the end of January, according to the company.

Curtiss-Wright is further refining its Icing Severity Detection System (ISDS), developed over a decade ago, with better detection and ice removal capabilities. The active anti-icing system detects and removes ice automatically, and then turns itself off when not needed. ISDS continually monitors build up from liquid water, providing the pilot advanced notice of changing meteorological conditions. The system can be applied to various surfaces, including wings, rotors, windshields and engine inlets.

"Where we are now is that we have the ISDS Mark 2 with increased

detection range and higher accuracy," said Hart. Curtiss-Wright also has patented a solid-state technology for both rotary- and fixed-wing aircraft, which has undergone trials in an icing wind tunnel. A product will be available in the next few years, he added.

This ISDS and the next generation Mark 2 "have opened up the operational envelope" for the commercial rotorcraft sector, such as the offshore oil and gas business, said Thomson. The Sikorsky S-92 was the first large twin-engine civil helicopter to use ISDS, the first anti-icing system certified for commercial rotorcraft operations in known icing conditions, stated Curtiss-Wright. Up until recently, military helicopters were the only rotorcraft allowed to fly into known icing conditions.

Curtiss-Wright also offers surveillance solutions for paramilitary, policing and surveillance operations, for rotorcraft and fixed-wing aircraft. The company's intuitive

Video Management System (VMS), which includes rugged displays, video distribution and recording capabilities, operates in 26 countries. It is employed in the United Kingdom by London's Metropolitan Police Air Support Unit, Australia's Melbourne Police, the US Army's UH-72 Lakota Light Utility Helicopter fleet, allied forces in Afghanistan and, most recently, Helibras in Brazil. The VMS will be integrated into EC145 helicopters flown by the Policia Militar de Rio de Janeiro for public security video surveillance missions.

The London Police's Airbus EC145 twin-engine helicopters' VMS are outfitted with a triple sensor camera system that feeds video into any

of the five mission screens in the cabin. The aircrew typically consists of two police officers and a pilot. One police officer sits in the mid-cabin acting as the tactical commander, and has two 15 inch (38 cm) mission displays that can display any of the camera sensors, moving map, replay video and uplink video simultaneously by splitting the screen. The pilot also has a moveable screen. Left of the pilot is the forward observer, whose role is to operate the



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camera system and navigate to the task. The forward observer has a 10 inch (25 cm) display. In the rear of the helicopter is another seat and moveable screen, where a senior law enforcement official typically observes.

Curtiss-Wright also produces Parvus miniature, rugged, gigabit ethernet network route and switch systems, which are ideal for helicopters where available space is limited.

Civil Side

Curtiss-Wright provides products and services for fixed-wing aircraft and UAS, said Bamford. In the last decade, the company leveraged its advanced technologies and precision manufacturing capabilities to obtain contracts on next-generation commercial aircraft, such as the Boeing 787 and 737 MAX, as well as the Airbus A350 and A320neo family.

"Our position on these platforms, coupled with the industry forecasted growth, will provide Curtiss-Wright with a solid growth and expanded market position," said Bamford. "Increased performance and efficiency are two key growth areas for our products and services."

The company has made significant inroads into the business aircraft market. It is a top-tier vendor on the new Pilatus twin-engine PC-24 medium-light business jet, which made its first flight on May 11, 2015, over Stans,

Switzerland. The company's Sensors and Controls division designed and produced the Electro-Mechanical (EM) Spoiler and Flap Actuation systems, as well as the hydraulic power generation systems on the PC-24. Estimated value of the Pilatus contract to Curtiss-Wright is \$85M.

The flight control, sensors, mission operations and navigation of the high-altitude, long-endurance Global

Hawk UAS are managed by Curtiss-Wright's Integrated Mission and Sensor Management Systems, which act as the brain of the unmanned aircraft.

Curtiss-Wright's fire protection systems for aircraft include smoke and fire detection and suppression controls. Other commercial aerospace services include thermal spray coating for turbine engine components and protective lubricant coatings to structural fasteners.

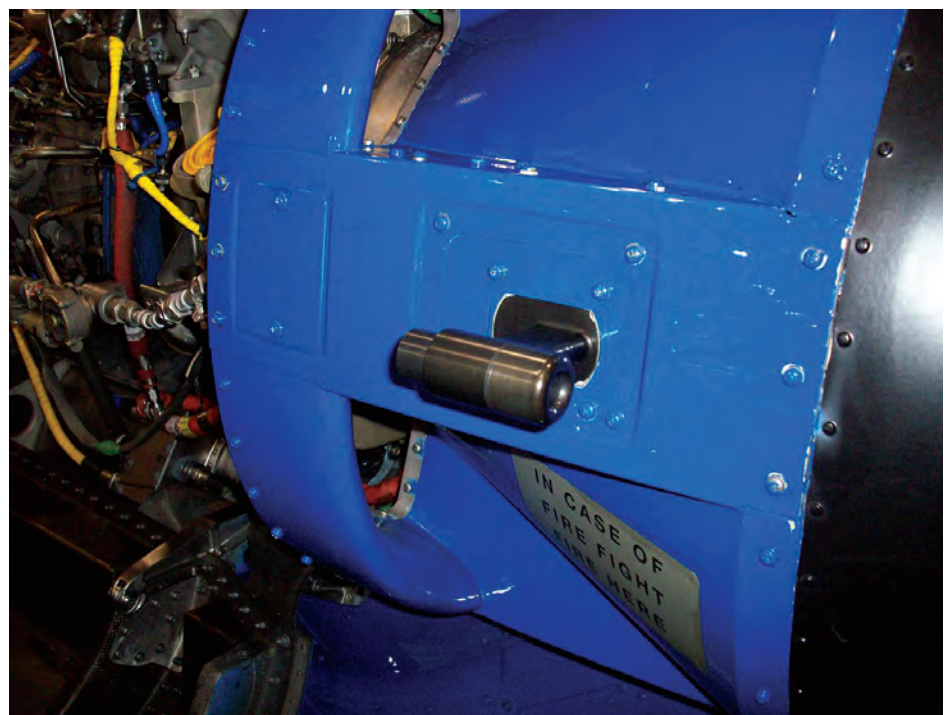
Curtiss-Wright has evolved over the years. What was once a relatively small company producing first-generation aircraft and engines is now a global enterprise with numerous products that yield annual revenues in excess of \$2B.

Not bad for a company founded by a bunch of boys with bicycles, and only high school educations.

About the Author

Robert Moorman is a freelance writer specializing in various facets of the fixed and rotor wing air transportation business. With nearly 30 years of experience, he runs a freelance writing business, RWM Associates. His writing clients include several of the leading aviation magazines targeting the civil and military markets.

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The Curtiss-Wright Icing Severity Detection System (ISDS) was the first anti-icing system certified for commercial rotorcraft operations in known icing conditions, shown here mounted on the Sikorsky S-92 engine cooling bay inlets.