



Civil Service

Leveraging its fixed-wing and military products, Honeywell Aerospace is expanding its offerings for civil rotorcraft

By Robert W. Moorman

Despite the softening of civil helicopter sales, Honeywell Aerospace continues its long-term strategy to penetrate this sector with numerous products ranging from sophisticated avionics and sensors to engines, safety and satellite-based connectivity technology.

At a recent presentation, Honeywell President and CEO Tim Mahoney said now was the time for the company to invest in the vertical-flight industry, so as to be prepared when the oil and gas business recovers.

Among the key points in his presentation, Mahoney noted that the company's sales in avionics is up 6% vs. industry growth of 4%; mechanical systems is growing at 4%, compared to the industry average of 2%. To keep operations costs in line, Honeywell is cutting costs in all areas except research and development, where it continues to invest, he said.

"Within the last 24 months, we've made a conscious shift to focus our products on the helicopter industry, not as an afterthought, but as a strategic initiative of the company," said Tom Neumann, director of Global Commercial Helicopter Business, Honeywell Aerospace. Neumann is responsible for Honeywell's \$300M commercial helicopter business, which includes a diverse product line.

The Honeywell HTS900 engine provides a high performance capability for the Bell 407HP, particularly at high altitude and hot ambient temperatures. (All photos courtesy of Honeywell Aerospace)

Honeywell and Honeywell BendixKing avionics, sensors and safety products are on Leonardo Helicopters' AgustaWestland AW139, the Sikorsky S-92 and S-76 variants, the Bell 429, and on smaller, single-engine helicopters.

In addition to forward-fit products, Honeywell has numerous supplemental type certificates (STCs) for several civil helicopters, including the Airbus Helicopters AS350, EC135 and Bell 407.

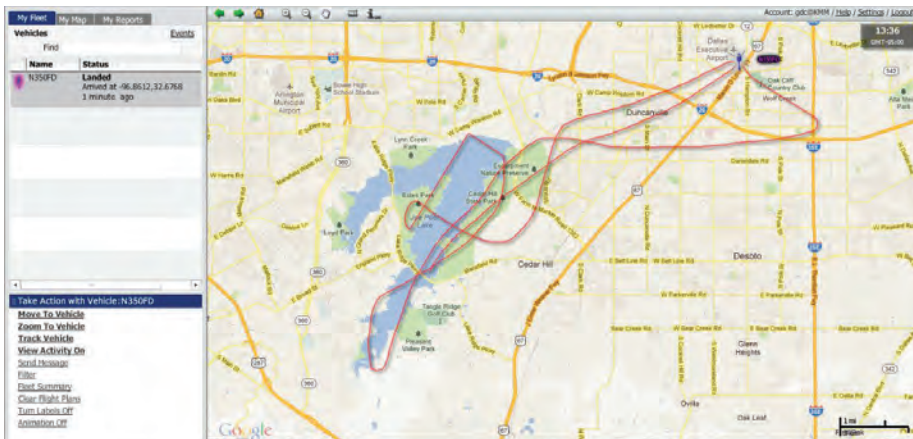
Honeywell's commitment to the civil rotorcraft sector is laced with cautious optimism, understandably. Sales of

new helicopters supporting the oil and gas business particularly are down and will remain flat for the next few years. The projected drop in deliveries will be concentrated in the light-twin, medium-twin and heavy-twin product classes.

In its 18th Annual Turbine Powered Civil Helicopter Purchase Outlook, Honeywell forecasts 4,300 to 4,800 civilian-use helicopters will be delivered from 2016 to 2020, roughly 400 helicopters lower than the 2015 five-



Sky Connect Tracker III is a lightweight Iridium satellite transceiver enabling aircraft tracking and flight data monitoring. Combined with the optional Sky Connect MMU-II panel-mounted dialer, the system simultaneously supports two-way text messaging and voice telephony.



Sky Connect Tracker Map is a full-featured web-based map used by fleet operations centers to track aircraft, monitor flight plans, and observe sophisticated weather data. Interfaces provide two-way text messaging with aircraft and management of notifications for operational and flight data monitoring alerts.

year forecast. This is prompting fleet managers to “evaluate new helicopter purchases closely, and that’s why we’re seeing a more cautious five-year demand projection compared with previous years,” said Carey Smith, defense and space president at Honeywell Aerospace.

Still, the forecast noted that the lull in the civil rotorcraft sales is temporary.

“Honeywell is playing the long game in the helicopter market,” said Rich Pettibone, aerospace analyst with Forecast International. “They know that this market isn’t going to be depressed forever. They are getting everything in position when the inevitable upswing occurs. And when that happens, they will be there to take advantage of it.”

History and Expansion

Honeywell Aerospace today produces aircraft engines, avionics, auxiliary power units (APUs), wheels, brakes, synthetic vision technology, runway systems and other aviation related products. The aerospace segment is an amalgamation over the years of many companies, including Sperry, AlliedSignal, Garrett and BendixKing.

The history of the Aerospace segment dates back over 100 years. The roots of its parent, Honeywell International, Inc., a multi-national conglomerate, date back to April 1886 when inventor Albert Butz invented a device called the “damper flapper,” the predecessor to the modern thermostat. Honeywell International today is composed of three groups: Honeywell Aerospace, Honeywell Automation and Control Solutions, and Honeywell Performance Materials and Technologies.

Significant growth in the aerospace segment began in November 1986 when Honeywell purchased Sperry Aerospace from Unisys Corp. for \$1.025B. Sperry was a provider of flight controls, space vehicles and the first FAA-certified windshear warning system.

Another key acquisition occurred in the mid-1980s when then-named Allied Corporation purchased Bendix Aviation and King Radio and combined them to create BendixKing Avionics. In late 1985, Allied Corporation merged with Signal Companies to become Allied-Signal and shortened the name to AlliedSignal in 1993. AlliedSignal acquired Honeywell in June 1999 and elected to retain the Honeywell name for its brand recognition.

In a lean-minded move, Honeywell International Chairman and CEO David M. Cote later combined three competing cultures of AlliedSignal, Pittway (another Honeywell acquisition) and legacy Honeywell to form a “One Honeywell” structure. Although Cote announced in June that he would step down in March 2017, he will remain the executive

chairman through April 2018. Darius Adamczyk, who became the president and chief operating officer in April 2016, will take over as CEO.

Avionics and Connectivity

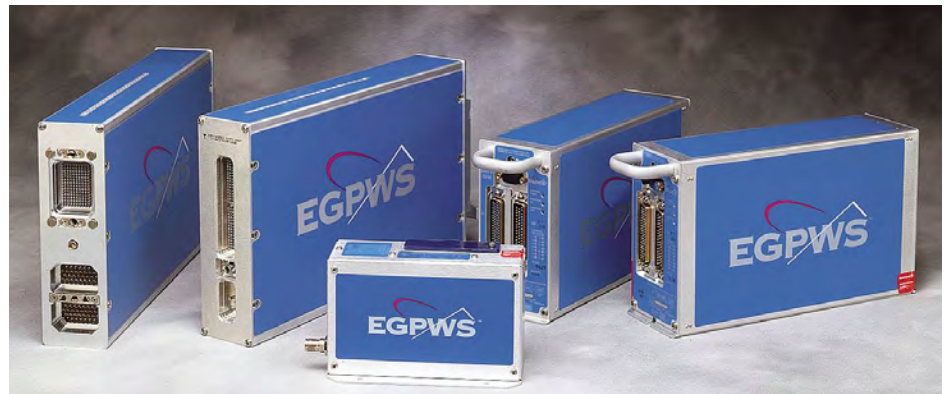
Honeywell’s long-term commitment to the civil rotorcraft business is showcased by numerous leading avionics, connectivity and propulsion products.

Among those products being marketed to the civil helicopter industry is the **Sky Connect Tracker III** flight data recording system, which enables voice, text, aircraft fleet tracking and real-time flight data monitoring in a single box. The system can collect data from onboard systems and transfer them to the ground operations center via satellite. Tracker III can monitor airspeed, altitude, oil pressure, torque and fuel flow. The system is designed to improve operations, speed up maintenance and reduce direct operating costs.

Satellite-based connectivity systems have until recently been the province of airlines trying to attract and retain market share through multi-part, in-flight entertainment systems. Now, helicopter crews and passengers benefit from these systems as well.

Whether targeted for fixed- or rotary-wing aircraft, “the trend in the industry is moving to having a fully connected aircraft,” said Rick Angelo, director of strategic marketing, Global Commercial Helicopters, Honeywell Aerospace. “That means the aircraft is talking to the ground, the ground is talking to the satellite and the satellite is talking to the aircraft.”

Honeywell’s next generation **Aspire 200** satellite communications system, enhanced by High Data Rate (HDR)



The Enhanced Ground Proximity Warning System (EGPWS), a Honeywell innovation, offers advanced safety functions for larger IFR-equipped helicopters with radio altimeters.

software, reduces the impacts of rotor blade interference to create a high-bandwidth environment for helicopter operators worldwide. The Aspire 200 is lightweight and rugged to withstand the pounding of helicopter operations. The system is now available on the AW139 and is being marketed for other platforms.

What was once unthinkable for rotorcraft a few years back is now possible with the Aspire 200, according to Honeywell executives. In layperson parlance, the signal is able to penetrate through the rotor in the same synchronized fashion as machine gun rounds that successfully went between prop blades on World War I fighter aircraft, Neumann said. Aspire 200 provides high-speed connectivity in spite of rotor blade interference. (For more on satellite-based communications and the Aspire system, see "HUMS Over The Horizon," pg 32.)

Honeywell is offering its **Health and Usage Monitoring Systems (HUMS)** to helicopter operators. HUMS sensors are embedded diagnostic software monitors and communicate the health and maintenance needs of critical components while the helicopter is in flight. HUMS provide operators with a range of diagnostic tools for better maintenance troubleshooting and planning.

Honeywell's **Primus EPIC** Flight Management System (FMS) is being targeted for mid-size and large twin-engine helicopters. Numerous search and rescue (SAR) and emergency medical service (EMS) helicopters are potential users of Primus EPIC, with the Honeywell interactive navigation system. The system allows for simultaneous display of traffic, terrain, airways, airspace, airports and nav aids.

Primus EPIC includes an Automatic Flight Control System (AFCS), as well as active dual autopilots and yaw damper. A failure of any line-replaceable unit (LRU) prompts the dual system to transfer control to the side that doesn't have a problem, Honeywell said.

Situational awareness and advanced navigation equipment is important



To date, Honeywell has delivered more than 2,000 helicopter EGPWS units. The display provides the pilots with real time maps of terrain.

when conducting onshore and offshore helicopter operations for the energy industry, as well as for EMS operations that involve navigating through tight corridors, and over and between buildings, telecommunications towers and cables.

Honeywell's Mark XXII Enhanced Ground Proximity Warning System (EGPWS), a Honeywell invention, offers advanced safety functions for larger instrument flight rules (IFR)-equipped helicopters with radio altimeters. The Mark XXII is a "Class A" terrain awareness warning system (TAWS), meaning it combines GPS with radio altimeter input for altitude and warning prediction. At present, the company has delivered more than 2,000 helicopter EGPWS units.

The **BendixKing Mark XXI** is targeted for visual flight rules (VFR)-equipped lighter helicopters; it's a "Class B" TAWS, using only GPS input for altitude and warning prediction.

The **BendixKing KRA-405B Altimeter** offers expanded scale for helicopter operations and provides analog and ARINC 429 outputs to link with EGPWS, collision avoidance and other aircraft systems.

Honeywell also is marketing the **BendixKing TRA-45A EGPWS/Radar Altimeter Indicator** for displaying radar altitude and EGPWS information in an easy-to-view color display.

Other Honeywell products are making their way onto helicopters. They include the AH-1000 Attitude and Heading Reference System (AHRS), the Embedded Global Positioning System/Inertial Navigation System (EGI) for military applications, and the LASEREF VI Inertial Reference System for civil uses.

Honeywell **BendixKing RDR 2000** digital weather radar provides enhanced situational awareness, particularly useful for EMS and offshore helicopter operations. The RDR 2000 offers not only weather, but also an overlay of flight plan, traffic and lightning data.

Propulsion

Honeywell has taken steps to increase support of its helicopter engines. In addition to the military **T55 turboshaft engine** used on the CH-47 Chinook, the company recently signed a licensing agreement with McDermott Aviation — Australia's largest privately owned heli-aviation company — under which McDermott will support the 2,930 shp (2,185 kW) T55-08D turboshaft engine that powers the Bell 214B "Heavy-Lifter," which it calls "the largest, most powerful single engine helicopter manufactured and operated in the world."

The T55 has logged more than 12 million hours of operation on the Boeing H-47 fleet. Since its introduction in 1955, Honeywell has produced more than 6,000 T55 engines. The latest T55 provides a 22% boost in power and a 6% increase in fuel efficiency compared with earlier versions.

The T55 and the T53 were originally developed by the Lycoming Division of Avco Corporation, with more than 20,000 engines produced in total. Over the years, the engines have been a product of Textron, Garrett, AlliedSignal and now, Honeywell. The T53 was the ubiquitous engine of the 1960s and 70s, powering the Bell UH-1/AH-1 and 204B/205A, the Kaman HH-43 Huskie and K-MAX, as well as the Bell XV-15 tiltrotor and many others. Over the decades, T53 engines have logged more than 50 million flight hours.

Elsewhere on the military side, the Advanced Turbine Engine Company (ATEC), the 50:50 joint venture between Honeywell and United Technologies Corporation's Pratt & Whitney continues development of the **HPW3000 engine** that it hopes will power AH-64 and UH-60 helicopters, and possibly some of the next generation Future Vertical Lift (FVL) rotorcraft. ATEC's 3,000 shp (2,200 kW)

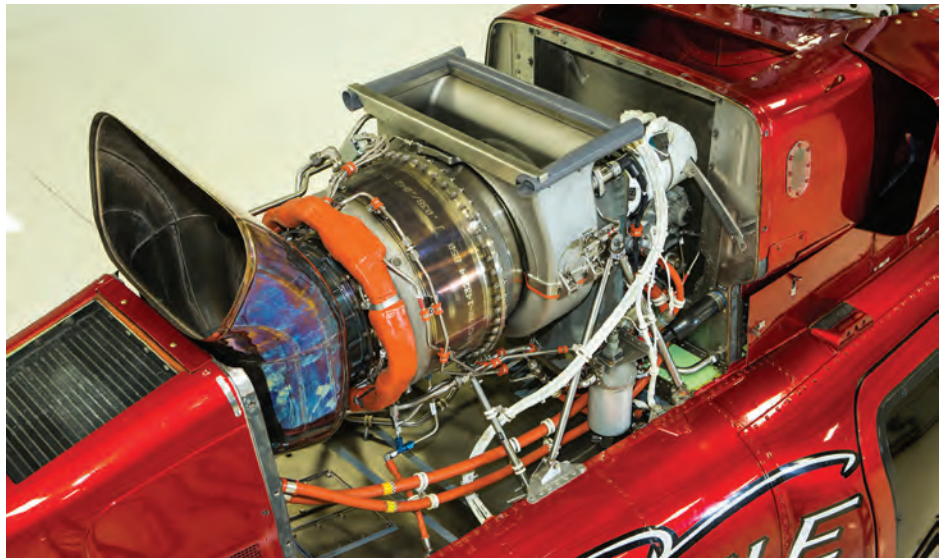
engine is said to be 50% more powerful than the General Electric T700 engines that power the Apache and Black Hawks currently. In September 2015, the Army issued a Request for Proposal for the more powerful and fuel-efficient engine for the Improved Turbine Engine Program (ITEP). ATEC is competing against the General Electric GE3000 as part of the program.

ATEC has run two engine demonstrators successfully and the engine has impressive capability in hot and high conditions — at 6,000 ft (1,830 m) and 95°F (32°C) — on a fully loaded helicopter. Honeywell says the HPW3000 is more full efficient than a single spool design, with 25% more growth capability and lower direct operating costs.

The **CTS800 turboshaft family of engines** was developed by the Light Helicopter Turbine Engine Company (LHTEC), a 50:50 partnerships between Rolls-Royce and Honeywell. The rugged CTS800 principal engine was developed initially to power the US Army's Boeing Sikorsky RAH-66 Comanche. The powerplant features a modular design with dual shafts, two-stage centrifugal compressor, annular combustor, two-stage high pressure turbine, and two-stage power turbine. All models are controlled by an advanced, dual channel full authority digital engine control FADEC system. LHTEC will supply the CTS800 for Turkish Aerospace Industries helicopters under the Turkish Light Utility Helicopter program.

The **LTS101 turboshaft engine** can be found on civil platforms, such as the Bell 222, Airbus BK117 and AS350, as well as the Avicopter AC311. Since being in certified 1975, more than 2,100 LTS101 engines have been delivered to customers worldwide, logging over 11 million service hours, according to Honeywell.

The **HTS900-2-1D turboshaft engine**, which comes with a full authority digital engine control (FADEC), was chosen by Calgary, Alberta-based Eagle Copters for retrofit on the single-engine Bell 407HP. Eagle Copters, which also has facilities in Australia and Chile, certified its installation of the HTS900 engine into the Bell 407HP, re-starting a project developed initially between Honeywell and Bell Helicopter in the 1990s. Eagle recently obtained an additional STC from the US Federal Aviation Administration for the engine's inlet barrier filter that enables aircraft operations in sandy conditions. Marengo



The HTS900 installation on the 407HP was approved through a Supplemental Type Certification by Eagle Copters. The engine was also selected for the Marengo Swisshelicopter SKYe SH09.

Swisshelicopter also chose the HTS900 for installation on the SKYe SH09 helicopter because of hot and high performance capabilities.

In other military-related developments, the Defense Advanced Research Projects Agency (DARPA) awarded a contract to Honeywell in February to create technology to help pilots with flying in a degraded visual environment, or DVE. Honeywell's Synthetic Vision System enhances situational awareness by providing pilots with a three-dimensional view of the landing area.

Compliance Work

Even with the lull in new civil rotorcraft sales, there are other opportunities for Honeywell: "Operators continue to fly their aging aircraft and are adding safety equipment such as HUMS, Sky Connect, EGPWS, ADS-B Out and other products to ensure their aircraft continue flying safely," Angelo said. "Equally important, operators are approaching Honeywell not only for safety solutions, but differentiating products and services to set them apart from their competition in this challenging market."

To further enhance its appeal to the rotorcraft segment, Honeywell is cleverly offering itself as a product provider and facilitator to help EMS operators meet the US Federal Aviation Administration (FAA) April 2018 Helicopter Air Ambulance mandate. Operators now have fewer than two years to equip their aircraft with flight data monitoring equipment, helicopter terrain awareness and warning system

(HTAWS) technology, and radar altimeters.

Honeywell makes its pitch to the EMS helicopter community on its website: "If you have a compliance plan in place, we can help you implement it. We can help you develop and implement a plan that minimizes cost and down time while improving the safety and operational efficiency of your fleet."

Like their fixed-wing counterparts, rotorcraft maintenance specialists are eyeing Honeywell's **MyMaintainer** App, a web-based data gathering and analyzing tool. The technology, part of Honeywell's broader plan to compile and analyze maintenance data, helps aircraft maintenance technicians obtain aircraft health-related information faster. New versions of MyMaintainer will be available in 2016 and 2017. The technology, which is available as an iPad application, is part of Honeywell's GoDirect portfolio of subscription services.

Another opportunity for Honeywell is in the supply and installation of ADS-B Out, which is mandated in all aircraft by January 2020. Honeywell has obtained STCs for various helicopter models, including the AS350, AS355 and EC120.

Opportunities

Honeywell Aerospace generates approximately \$10B in annual revenue from an equal mix of commercial and military business.

In 2015, Honeywell Corp. expanded its Automation and Controls Solutions division with the acquisition of Germany-based Elster Group, a global provider of energy metering solutions for \$5.1B,



A computer drawing of the AW139 cockpit as it would appear on an offshore oil rig. It is the first platform with Honeywell's next generation Aspire 200 satellite communications system.

from the British Melrose Industries. At the time, Cote noted that "During the past decade, we have completed more than 80 acquisitions adding approximately \$12B in revenues. We will continue to look for good acquisitions to enhance our growth profile."

Under Cote's leadership, Honeywell continues to look at ways to enhance shareholder value by increasing market share, even if the odds are not always favorable.

Case in point: Honeywell's recent unsuccessful attempt to merge with United Technologies Corp. (UTC) in a \$90.7B transaction. Such a deal would have seen Honeywell become a \$100B behemoth with solid positions in the building supplies and aerospace sector. But UTC balked, fearing that the deal would not pass regulatory muster. The proposed merger also raised concerns at Airbus and Boeing, which felt the deal was not in their best interest. In February 2016, Honeywell abandoned its plan to acquire UTC.

This marked the second attempt to merge the two companies. In 2000, UTC tried to acquire Honeywell, but was thwarted by a competing offer from General Electric. That deal ultimately failed due to opposition from the European Union regulators.

While the coupling of two tier one suppliers failed, the plan demonstrated clearly Honeywell's determination to continue its growth through acquisition strategy.

"The company has a well-diversified portfolio that enables it to mitigate risks," said Forecast's Pettibone. "And it has not shied away from refining its operations,

acquiring some businesses and divesting others."

Meanwhile, the Aerospace division eyes growth opportunities in Canada, Latin America, the Middle East, Africa, the North Sea, Australia, China and the Arctic.

Latin America "led all global regions" in the rate of new rotorcraft purchases despite a sluggish economy in Brazil, according to Honeywell's forecast. The Middle East and Africa posted the second highest new helicopter purchase rate. More than 50% of the purchases in this region are for intermediate and medium twin-engine helicopter models. (The forecast is based on a survey of more than 1,000 chief pilots and flight department managers of companies operating 3,070 turbine and 360 piston helicopters worldwide. The survey excluded large fleet or "mega" operators, which were addressed separately.)

Honeywell has been particularly active in showcasing its helicopter technology in Australia, which has more than 2,000 helicopters working in various fields. At the Rotortech exhibition in Brisbane this May, the company demonstrated its situational awareness tool SmartView, Aspire 200 connectivity technology and its HTS900 fuel-efficient turboshaft engine. Coinciding with Rotortech, Honeywell hosted its first operator conference that included more than 30 operators from Japan, Taiwan, the US, Italy and New Zealand.

Honeywell announced deals at the event with Australian Helicopters, Toll Remote Logistics in Australia, and SFS Aviation in Thailand, which signed up for the **Honeywell Avionics Protection**

Plan (HAPP). HAPP provides commercial helicopters a cost-effective way of ensuring that their fleets are flight worthy.

HAPP is an extended warranty program covering more than 50 different platforms. Among the HAPP benefits are: full coverage on exchange and repair services, fixed price with an annual contract, 24/7 aircraft on ground emergency service and no-charge loaners.

The three-year service agreement covers a total of 17 helicopters, including the AW139 and S-76. Australian Helicopters and Toll Remote Logistics will enroll six and eight AW139 helicopters, respectively, into HAPP for Honeywell's Primus Epic integrated avionics system.

In October 2015, Honeywell signed a similar three-year agreement with Malaysia-based Weststar Aviation Services Sdn Bhd (WASSB), an offshore helicopter services provider.

China is another region Honeywell is targeting for growth. A country with a limited domestic highway system, the government is looking at helicopters to service rural areas, EMS, disaster relief and as a tool for business and government, according to company sources.

A slight increase in global civil turbine helicopter production is expected in 2017 and a greater output in 2018, according to Ray Jaworowski, senior aerospace analyst with Forecast International. Executive transport, utility, law enforcement and EMS segments will show improvements by the end of this year. Oil and gas operators should start showing improvements by 2017.

Honeywell will navigate through some rough air for the next 24 months, as will the rotorcraft manufacturers themselves. Yet the tier one supplier's ongoing mining of the rotorcraft segment is likely to pay big dividends by 2018... which might prompt another profile of this opportunistic company

About the Author

Robert Moorman is a freelance writer specializing in various facets of the fixed- and rotary-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. He can be contacted at rwmassoc@verizon.net

