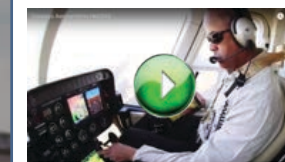


HAA OPERATORS ADDING AUTOPILOT TO LIGHT SINGLE TURBINES

BY JAMES CARELESS



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In a bid to improve operational safety, helicopter air ambulance (HAA) operators Air Evac Lifeteam and Air Methods are incorporating two-axis autopilots into their light single-turbine helicopters. Air Evac Lifeteam is updating the Bell 206 Long Rangers and Bell 407 helicopters in their 150-plus helicopter fleet with Genesys Aerosystem (formerly Cobham) HeliSAS Autopilot and Stability Augmentation System (as well as Garmin 500H glass cockpits) by the end of 2017. Air Methods is focussing on including autopilots whenever it purchases new helicopters for its 400-plus fleet, including the 200 Bell 407GXP it is purchasing between now and 2024. The Bell 407GXP comes with a Garmin G1000H glass panel avionics system integrated to a Bell-designed autopilot system for a cutting-edge combination that can also be retrofitted into the Bell 407GX.

“Genesys Aerosystem’s HeliSAS Autopilot and Stability Augmentation System enhances flight safety by reducing pilot workload and increasing flight stability,” says Seth Myers, Air Evac Lifeteam’s president. “Since we adhere to visual flight rules (VFR), this new system, together with the Garmin 650 and Garmin 500H (glass cockpit), will allow the pilot to focus on other things outside the aircraft.”

Raj Helweg, Air Methods’ chief pilot, adds, “Autopilots free up pilots to focus on other aspects of flight. This is particularly useful for pilots who are on their own, flying single pilot on HAA transports. They can significantly enhance operational safety.”

REDUCING RISK WITH AUTOPILOT

Thanks to safety enhancement efforts by helicopter operators and industry regulators, civil helicopter accident rates have fallen substantially in the United States. According to the United States Helicopter Safety Team (USHST), which works with the International Helicopter Safety Team (IHST) to promote safety, the annual accident rate has been cut in half since 2006, down from 85 accidents that year to 46 accidents in 2015.

In-cockpit technology has played a big role in improving civil helicopter flight safety, especially for HAA. "For

instance, our pilots are 100 percent equipped with night vision goggles for night flights," says Helweg. "We have also incorporated helicopter terrain avoidance warning systems (HTAWS), GPS, XM Satellite Weather, and real-time satellite tracking of our HAA helicopters; all of which provide for safer operations."

Tony Bonham, Air Evac Lifeteam's senior director of flight operations, says that autopilots are the next step in enhanced helicopter flight safety. "We are a VFR company, so autopilots can help our pilots fly safely when they lose visibility during inadvertent entry in instrument

meteorological conditions (IIMC) when their helicopter flies into clouds and/or fog." With the loss of visual flight references, VFR pilots can lose an accurate sense of their location, altitude, and angle with respect to the ground and horizon, thus they are flying "blind."

"Inadvertent IMC encounters are some of the most demanding, disorienting, and dangerous conditions a pilot can experience," warns the IHST fact sheet titled "Inadvertent Entry into Instrument Meteorological Conditions (IIMC)" available at ihst.org. These encounters result in the highest percentage of fatal injuries from

helicopter accidents. National Transportation Safety Board 2011 figures show that 45 of the 52 IIMC accidents occurring that year were fatal. That is 86 percent.

The autopilots selected by both Air Evac Lifeteam and Air Methods automatically maintain their aircraft at the same altitude and level, thus having them on board can potentially save an HAA pilot from a controlled flight into terrain accident. Should an HAA pilot encounter IIMC conditions during the pre-programmed, autopilot-controlled section of flight—which is typically the entire point-to-point transit except for

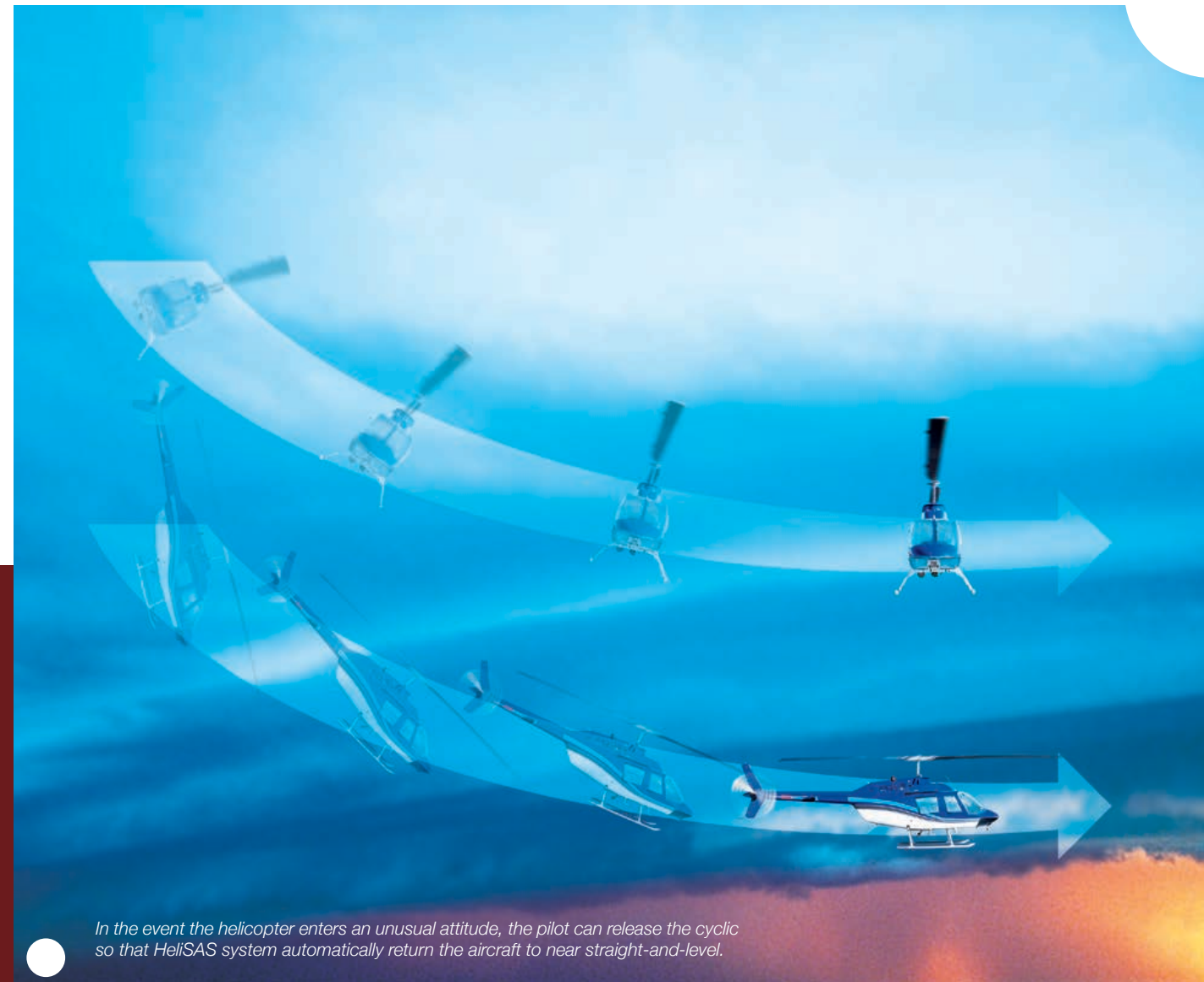
takeoff and landing—they will not be in danger. Their helicopter will just continue on its heading as if nothing happened. Should IIMC occur during takeoff or landing, autopilot provides an easy escape for human pilots: "They can just resort to autopilot and their helicopter will level

itself," says Helweg. "This gives the pilot the chance to recover and assess the situation before making their next move."

Autopilots also give single pilots the chance to reduce their workload. "Input fatigue is a constant issue for HAA

pilots, especially when they are alone and flying in demanding situations," Helweg says. "By programming in their heading and altitude into the autopilot before takeoff, and then being able to let the autopilot take over until it is time to land, HAA pilots can experience less demanding,

less tiring transports. Given how tough HAA transports can be, reducing pilot in-flight workloads wherever we can is a good idea."



In the event the helicopter enters an unusual attitude, the pilot can release the cyclic so that HeliSAS system automatically return the aircraft to near straight-and-level.



TRULY USEFUL TOOL

Both the Bell 407GXP autopilot and the Genesys Aerosystem HeliSAS Autopilot and Stability Augmentation System being implemented are two-axis flight management systems. This means they can control the helicopter's pitch and roll, plus keep its heading and altitude by comparing the preprogrammed course with the aircraft's real-time altimeter and GPS location data.

Genesys Aerosystem's HeliSAS system is a good example of what an autopilot can provide for a light single helicopter (either piston or turbine). Weighing just 15 pounds, the unit is designed to be operational during all aspects of flight, with the pilot overriding it by assuming manual control during takeoff and landing. The pilot can also override the HeliSAS system during flight by moving the cyclic stick. Left to its own devices, the HeliSAS works within pitch trim limits from +11 degrees to -6 degrees, and roll trim limits from +5 degrees to -5 degrees.

"Helicopter pilots using our HeliSAS tend to rely on it for 80 to 90 percent of their flights," says Jamie Luster, Genesys Aerosystem's director of sales and marketing. "It truly is a useful tool."





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TRAINING

Logically, the best way to offset IIMC incidents by VFR pilots is to train them as IFR pilots. Pilots with this training are then ready to cope whenever they get into IIMC situations. While in theory this approach makes sense, the reality is different. "The trouble with training is that these skills diminish if they are not used," explains Helweg. "When it comes to IFR-trained pilots, they gradually lose the skills if they are only flying VFR transports on a daily basis. The more they fly VFR, the less they rely on their instruments."

When a pilot with diminished IFR skills flies into an IIMC, they can experience stress trying to recall the right IFR response to the situation. This stress reaction distracts from the task at hand, which is to keep the helicopter level, on heading, and at the proper altitude until they get back into clear air.

Thus training VFR pilots to IFR doesn't make sense for HAA, but adding autopilot does. So does improving the quality of simulator training for HAA pilots, as does letting them experience IIMC incidents safely while in VFR mode with autopilot engaged. A case

in point: Air Methods has partnered with FlightSafety International to use the latter's full-motion Level D simulators to train the HAA operator's pilots. "That said, we believe in training more and we believe in having the right tools," says Helweg. "Our HAA pilots need the knowledge and the right equipment to fly safely, rather than one or the other."

As for Air Evac Lifeteam, they have two Frasca flight training device (FTD) simulators at their headquarters, and six additional FTDs in their 15-state footprint. One of these is a Frasca Level 7 FTD, which was recently FAA certified. The Level 7 FTD includes the Garmin G500H glass cockpit, autopilot, and Frasca high-fidelity night vision goggle simulation. The FTD also comes with Frasca's TruCue, a simulator cueing and vibration system that provides vestibular feedback (such as balance and spatial orientation information) to the pilot.

In addition, Bonham says, "We will be using FlightSafety for some sim training with different airframes in the very near future. Collectively, we are using these tools to enhance our pilots' VFR skills, including flying transports using autopilot."



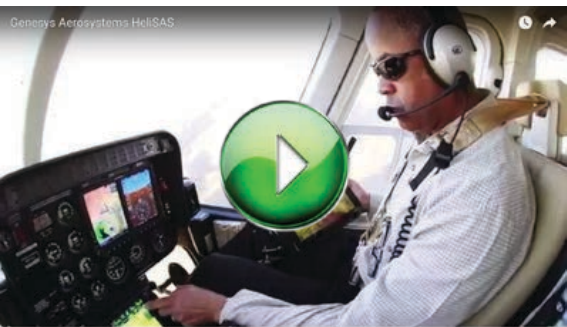
Modern light helicopter autopilots, like the HelSAS system shown here, enable pilots to safely take their hands off the controls to perform other cockpit duties.



THE BIG PICTURE

The deployment of autopilots on light single-turbine EMS helicopters is a definite safety advance for the lone pilots who fly them, the medical staff, patients, and the operating companies. Both Air Evac Lifeteam and Air Methods are putting their money where their lives are by investing in technology that makes HAA transports more predictable and less complicated for humans to execute. "It is very exciting that these tools have become accessible to the single-engine platform," says Helweg. "Combined with proper training, this will enhance the safety of our HAA operation."

Myers adds that Air Evac Lifeteam is continually looking at safety improvements. "After retrofitting our entire fleet with night vision goggles, we gathered feedback from our pilots and aviation leadership team regarding the next investment for safety enhancement," he said. "The resounding answer was autopilot and flight stabilization systems. We believe these will not only reduce pilot workload, but truly save lives in critical situations."



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