Big Sim-Style Training for Smaller Helicopter Operators

With the large helicopter oil-and-gas market in the doldrums, some training companies are turning their attention to operators of smaller rotorcraft: search-and-rescue, emergency medical services, law enforcement, and other missions which can benefit from simulated scenarios. **Rick Adams** looks at how some so-called lower-end flight training devices are incorporating quite sophisticated technologies.

Switzerland is one of the most challenging places in the world to fly a helicopter. Between the urban areas along the valley lakes and the Alps with peaks such as the Matterhorn and the Dufourspitze exceeding 4,000 metres (more than 15,000 feet), a pilot may encounter three or four different weather conditions on a single flight, from fog to sun to snow and strong winds. Some operators use night vision goggles on more than half their flights because of demanding conditions. And then there are the hazardous cables – and plenty of them in the ski resort areas. Helicopters are ubiquitous in a country where it's cheaper to fly than build a tortuous road to the top of a mountain.

But for the three dozen helicopter companies operating from Geneva to Zurich to Ticino, their challenge was compounded two years ago when their regulator, the Federal Office of Civil Aviation (FOCA), elected to transition from Swiss national requirements to European Aviation Safety Agency (EASA) regulations, a shift which threatened to increase costs by an estimated 250 percent. Helicopter operators had 18 months to get into compliance.

More than 20 of the operators chose a typically Swiss efficiency approach. They banded together to produce common operating manuals and training courses, subcontracting with Next Generation Flight Training (NGFT), which is based in Cham on Lake Zug in central Switzerland. NGFT accountable manager and senior consultant Christian Mueller told *CAT* the joint approach has significantly offset the increased costs for operators.

Mueller said the project includes operating manuals, exemptions, approvals, standard operating procedures (SOPs), safety management system (SMS), compliance monitoring, and techlog, as well as pilot and staff training, tied together with a web-based management system. There are currently manuals for 20 different helicopter types. "We want to make life easier for our clients so they can focus on what really matters: their clients," Mueller stated.

More recently, NGFT has partnered with another Swiss company, 26-year-old Elite Simulation Solutions of Dubendorf, to offer affordable pilot training in FNPT II/MCC-level simulators. When I visited the NGFT/Elite facility last month, the new helicopter trainer was still in development. But already it was evident from the Elite-designed image generator (based on a gaming industry engine) that this will be a flight training device (FTD) on steroids. The visual database, though Swiss terrain-like, does not represent an actual area in Switzerland because pilots are too familiar with the local landscape, which could distract from the training scenario value.

René Huddlestone, Elite's business development leader, told *CAT* the visual scenes are based on 60-centimetre ground texture resolution and include actual 3D

Above
The Thales-built Airbus AS350 simulator in service at the helicopter training centre in Albertville, France.
Image credit: Thales Training & Simulation/ Nicolas Durand.

buildings in airport environments. He said the company is also developing an all-electronic, "future proof," upgradeable, dynamic control loading system for both rotary-wing and fixed-wing training devices.

Mueller estimates training on the new helicopter simulator will cost about one-fifth of typical aircraft operation, perhaps 250-300 Swiss francs (a similar value in US dollars) per hour compared with 2,000 CHF/USD for the aircraft. But it's not only the direct cost that operators consider; many also factor the respective salaries of the student and instructor pilots against their travel time to and from the simulator centre. Mueller is hoping helicopter companies will use the new simulator for required Operator Proficiency Checks (OPCs) and to teach situational awareness.

Thales Partners for Small Operators

When Thales Training & Simulation (TT&S) sold its fixed-wing flight simulator business to L-3 Communications in 2012, many in the industry were surprised that the helicopter simulator component was not part of the sale. Thales' strategy for the helicopter training market is gradually emerging.

Not surprising, they are building Level D full-flight simulators, and recently launched a training centre for the Airbus Helicopters H225 (formerly EC225) in Stavanger, Norway with Blueway Offshore Norway AS and Dancopter as launch customers. TT&S is also producing an FFS for the new six-tonne, twin-engine Airbus H160 to be installed at the Helisim simulation centre in Marignane, France (a joint venture between Airbus Helicopters, Thales, and Defense Conseil International). The H160 aircraft is in flight test and is hoped to be certified by 2018.

But TT&S is also addressing pilot training for light and medium helicopters by partnering with respected specialty mission operators. Their first foray is with SAF Group (Service Aérien Français, or French Air Service), whose founder, the late Roland Fraissinet, pioneered mountain rescue in the region nearly 30 years ago. Thales and SAF are operating a helicopter training centre at Albertville, located in the French Alps about an hour from Lyon, France or Geneva, Switzerland.

The 5-million-euros SAF-Thales facility features AS350 and EC135 Reality H simulators qualified to Level B/FTD 3 under EASA regulations (equivalent to US Federal Aviation Administration FTD 6). These two aircraft types form the bulk of the European search-and-rescue (SAR) and emergency response fleet for mountain areas. SAF is part of United Helicopter Services, which has branches in France, Portugal, Brazil, Turkey, and Liberia.

Later this year, Thales and CareFlight Group, one of Australia's largest air medical retrieval operations, will install what is claimed to be the first Down Under civil helicopter simulator, for the AW139, at Brisbane International Airport on the Gold Coast. CareFlight's Jeremy Ovens said the new sim will "let us really push the pilots to get the best out of them so that when they actually are out there doing the missions, hopefully they're armed with much more specific and better training then we would have if we do it in a real helicopter."

Vincent Megaides, TT&S strategy and marketing director, told *CAT*, "Unfortunately, for the small and medium operators, the accident rates are still very high. It's a concern for the whole community. We believe we can help the community reduce the level

of accidents by offering training packages at very affordable costs."

Formal training is not typically mandated for operators of lighter-weight helicopters, but Megaides told us there is "lobbying pressure" from national authorities, as well as the European Helicopter Safety Team (EHEST).

Megaides said the price for training at the Albertville centre is lower than the cost of flying in the aircraft type. Moreover, he said some insurance companies are adding to the incentive by reducing premiums for operators who train in simulators.

Thales and SAF saved some money by performing their own data collection flights rather than purchasing flight control aerodynamic models from Airbus Helicopters (then known as Eurocopter).

Though technically "lower end" FTDs, the AS350 and EC135 devices offer Hexaline full motion and vibration plus a ThalesView visual system which is only slightly smaller (210 degrees horizontal by 70 degrees vertical versus 235x80, than the company's Level D sims). Megaides says the Level B can accomplish 80 percent of training compared to a Level D. Operators from France, Switzerland, and Italy have made their way to Albertville, as have pilots from Africa and even China. "We are surprised at the international diversity of our first customers," said Megaides.

An initial type rating training course might require several weeks, and encompasses classroom ground courses, Thales simulator sessions, and flights in the real aircraft by SAF instructors. Recurrent training can be managed within a single week.

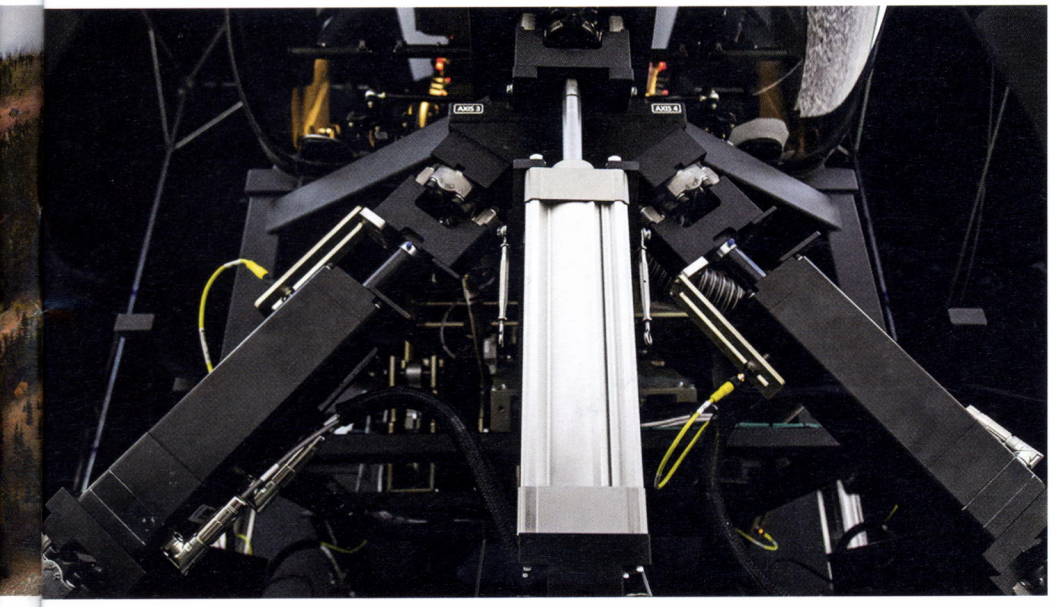
"I truly believe that the helicopter industry will follow the path of commercial airlines," Megaides stated. "There is no reason with the technology that we cannot achieve zero-time conversion in the simulator."

Above
A 'Swiss terrain-like' visual scene from Elite's new image generator.
Image credit: Elite Simulation Solutions.

Opposite
Frasca's newly developed simulator cueing and vibration system.
Image credit: Frasca International.

Frasca Introduces Mini-Motion

Pilots may need motion cueing in smaller helicopters more than pilots of larger aircraft which have built-in stability augmentation, explained Frasca International CEO John Frasca. So starting with a Level 7 FTD for the Bell 206L JetRanger, delivered in November to Air Evac Lifeteam in O'Fallon, Missouri, Frasca introduced a new motion and vibration vestibular cueing system. The system uses 6-inch actuators, versus the traditional 60-inch stroke motion systems of Level D simulators. And yet the "mini-motion"



platform provides a full six-degrees-of-freedom (6 dof) movement, same as on the big iron sims.

"What we're finding with the big motion bases – and we've used the biggest and the best – when you're moving 20,000 pounds, they cannot keep up with the data," Frasca said. "The other negative of the very big motion bases, we can put in a larger cue but then we have to wash out that larger cue and that's where some negative cueing is going on. Yes, you get the initial onset cue, but the pilot's brain gets messed up while you try to wash the cue out."

Frasca said the body is expecting a cueing response before a visual response. "It's almost an instantaneous thing. A big motion base can't do it and an FTD is fixed base so it doesn't do it. With this small cueing platform we can put that onset cue when it should be there, when the pilot's mind is expecting it to happen. Even though it's a very short stroke, the fact that it happens on time seems to be a benefit."

He said pilots tested in the FTD with the new cueing platform show they're able to hover on spot much better, "almost from the initial flight."

Frasca is mounting only the cockpit on the motion platform, not the visual system. "We're moving a much smaller payload and we're using very advanced servo technology, so we can move it very fast."

Mike Phillips, Frasca's helicopter business development manager who has been flying and instructing for more than 40 years, commented, "The most surprising thing I felt was the vibration. The Bell 206 has a very distinctive sway and vertical vibration during the start sequence, and I was amazed at the realistic feel. There was also a noticeable vibration passing through translational lift, both accelerating and decelerating, just as one would expect."

To aid new pilots, Frasca has developed a kind of artificial intelligence known as SimAssist, which dynamically monitors the pilot's actions and in effect adapts the simulator to the level of ability. "What we find is a new pilot or even an experienced pilot gets in the sim and he's making some pretty wild movements. Maybe he can't get the seat-of-the-pants feeling. Or a new pilot is just learning to deal with all the controls."

The patent-pending SimAssist system "more or less dampens it out so he has control. And then as he gets better the system dials down and then eventually goes away. It's much like a flight instructor guarding the controls or taking over when things get out of control," Frasca explained. "We've done some studies, and we've had a lot of pilots give us feedback. It seems to be a good system for improving how you spend your time in the FTD." cat