



Synthetic flight

Huntsville-developed simulators
are training better pilots

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By Diana LaChance

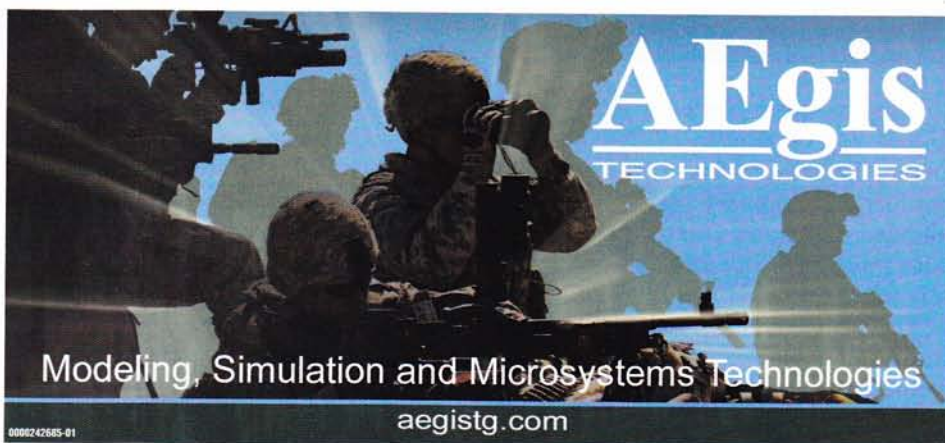
Two downed pilots are lost in the Arabian Desert and it's your job as the pilot of a search and rescue helicopter to find them. But with no food and little water left, the missing men are running out of time. You head into the clear blue skies to find them, only to lose visibility in a sand storm. A warning buzzer goes off. You're losing altitude. A crash landing is imminent. Right before impact your windshield fades to black. But then your door opens and the light from a high bay fills the cockpit. Your heart is pumping, but it was just a training exercise. You're on firm ground; safe.

Simulated training missions like these are a critical part of helicopter pilot training. They enable pilots to practice and, ideally, to perfect diverse missions while ensuring their safety. And they prevent wear and tear – and perhaps even irrevocable damage – to real multi-million dollar helicopters. But although simulators are much less expensive than the helicopters they are designed to mimic, they're nonetheless incredibly complex.

That's something Del Beilstein knows all too well. As the director of business development for Army Programs at Aegis Technologies Group Inc., Beilstein and his team recently forayed into the world of rotorcraft simulation, designing and building a full-motion flight simulator of the Bell 412 search and rescue helicopter for the Royal Saudi Air Force (RSAF). "It was our first effort in that field," says Beilstein. "We designed it from the ground up, put together the team, and built it here in Huntsville in just 22 months." Beilstein believes Aegis won the contract because it put together a best-of-breed approach.

"We heard the requirements and sat down and did an industry study to identify the best vendor for each specific need," he says. "It helped that, as a small company, we don't have an allegiance to any particular vendor or technology." And with so many Huntsville-based companies specializing in aviation and engi-

This Bell 412 EP Search & Rescue Full Motion Helicopter Simulator with exact cockpit representation was developed for the Royal Saudi Air Force.



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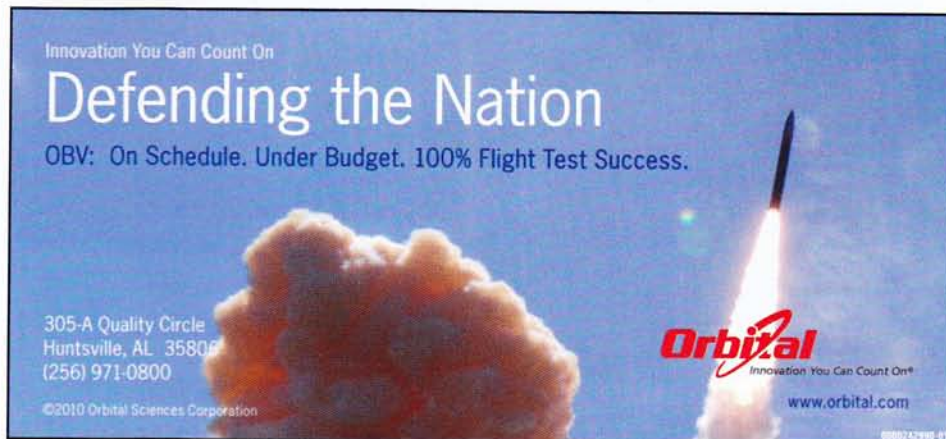
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neering, he says, "we were able to find several key vendors locally." As an example, Beilstein points to INERGI, a product development and design firm founded in August 2000. "They hadn't done this before, but they built the enclosure for the simulator from our design."

Designing the large simulator meant study and engineering so that the result would accurately reflect cockpit conditions. "We studied the helicopter in great detail to make sure we knew all of its per-

formance characteristics," Beilstein says. "That way, if there's a unique feature, we could make sure the simulator executes it exactly as it's supposed to." Each part the team completed was brought to a rented Odyssey Drive high bay in Cummings Research Park, ultimately forming a completely enclosed cockpit. After climbing the ladder to enter, a trainee turns on the motion and large screens project out-the-window imagery. "You literally sit in a replica cockpit," says

Beilstein, "and fly the device." All the vision and motion cuing of a real-life mission are included, and the simulator is light-tight in accordance with the contract requirement that the display can simulate night vision goggles.

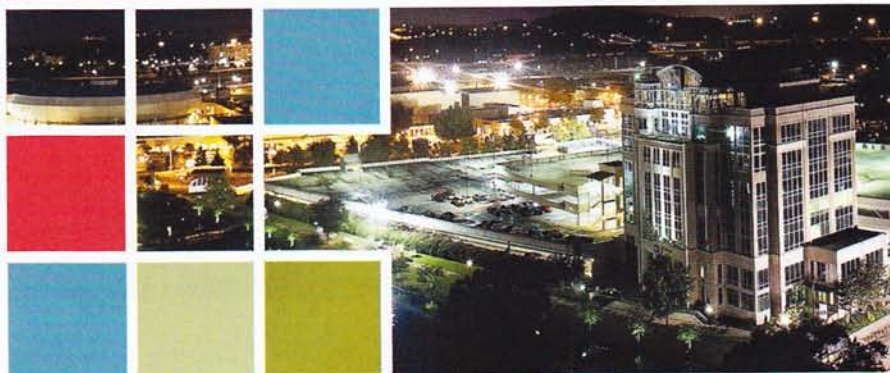
PILOT TESTED

After building the simulator, AEgis then invited RSAF pilots to participate in a factory acceptance test. "We'd have them fly during the day and then we'd get evaluated and fix issues at night," says Beilstein. "When the pilots left, there were 50 deficiencies – extremely low." After that success, the simulator was then sent to Saudi Arabia. "We tore it down, put it on a 747, shipped it overseas, got it through customs, put it together in a custom-made building, and had an on-site acceptance test completed in October of 2009," says Beilstein. "Upon completion there, we had zero deficiencies." In the year since, during which AEgis was required under contract to provide support, there have been no problems. Or as Beilstein puts it, "We did a great job and nothing broke!"

Science Applications International Corporation is another Huntsville-based company with expertise in the business of rotorcraft simulation. Senior Vice President Craig Naudain is the program manager for the U.S. Army Aviation and Missile Command (AMCOM) Expedited Professional & Engineering Support Services (EXPRESS) contract. He and his team of 245 – which includes several subcontractors – provide support services to the U. S. Army Aviation and Missile Research Development and Engineering Center's Software Engineering Directorate (SED) and System Simulation and Development Directorate (SSDD).

"We support the development of aviation trainers used by soldiers," says Naudain, whose firm is better known by its acronym, SAIC. He says the company recently completed a new Kiowa Warrior trainer that will be used to teach soldiers how to do maintenance tasks on the aircraft. "It looks just like a Kiowa Warrior and has all the capability of one, it just doesn't fly," he says. "Thus, by providing the touch, feel, and functionality of a real aircraft, maintenance providers can go through all the potential faults on the operation

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of the helicopter."

Other similar trainers are located at the SED, where SAIC developed and now supports the operation of a number of software integration labs, or SILs. These trainers are used to test new technology and upgrades in the flight software. "We have SILs to provide training on most of the major Army helicopters – the Chinook 47-F, several models of the Black Hawk, the Kiowa Warrior and the Apache," says Naudain. The trainers in the SILs are true to the tactical configuration of the helicopter and incorporate real hardware and software. "Except for being able to take off," he says, "it looks, feels, and acts like a real helicopter." As a result, pilots are able to come to the SILs and test technology updates in the software and new hardware. "They can fly" in a lab setting."

Naudain and his team have also worked on other related projects, including one earlier this year for the presidential helicopter. "Basically, we developed the aviation mission planning system (AMPS) that goes into all Army rotorcraft," says Naudain. "The AMPS is automated and loaded into the helicopter prior to each flight and, in simple terms, it tells the helicopter what the mission is." Another project involved developing software for the Military Flight Operations Quality Assurance Program; this program, says Naudain, "allowed for after-flight data collection to help improve pilot performance, and if necessary, the ability to look for ways to prevent miscues and mishaps for flight operations." Yet another project required SAIC's support of the unmanned aerial systems at SED by using a multiple unified simulation environment and the development of the improved data modem, a software program that synchronizes all of the data from the aircraft's different communication devices.

AEGIS, SAIC, and similar local companies are making a name for Huntsville in the industry. "This was very important to us because it established us as a company that could do this kind of work," says Beilstein. It may also mean more work for those companies going forward. "This was a market space that was previously dominated by big companies in the larger metropolitan areas," he says. "Now we've shown what an innovative small business can do by being able to produce such a high-quality, low-cost product." ■



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