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Editor's Notebook

Practice Makes Perfect

By Andrew Parker

aparker@accessintel.com



What do Al Pacino, a squirrel and a moose, the “human operating system,” rogue management, graphical world charts, lions and bears, dangerous behavior, SMS toolkits and safety videos all have in common? OK, maybe those last two gave it away, but they’re all subjects that have appeared in the International Helicopter Safety Team’s recent “Safety Notes” campaign.

Over the past three-plus months (since mid-April), IHST has been sending out e-mails each week focusing on different aspects of safety and training. The group is falling short of its goal to reduce helicopter accidents 80 percent worldwide by 2016, but progress is still being made to push the trend downward, as the rate has decreased by 30 percent in the past five years (since 2006 when IHST began its accident reduction efforts) vs. 2001-2005.

According to figures from the group, the worldwide civil accident rate decreased from 9.7 accidents per 100,000 operating hours during 2001-2005 to around 5.7 accidents per 100,000 from 2006-2011. IHST’s target is to bring that figure down to 1.9 accidents per 100,000 by 2016.

In addition to the SMS toolkits, safety videos, training tips, etc., there is some really interesting material that’s worth a look. August is one of the months that *Rotor & Wing* puts a heavy focus on training (features include “Era Training Center Profile” on page 22, “Rotorcraft Training Guide” on page 30, “Hot Blade Exercise” on page 44, “Training News” on page 48 and “Safety Watch” on page 52), so it’s appropriate to highlight a few excerpts of what I’ve found interesting in reading through the IHST Safety Notes material.

Take a look at the IHST toolkits and safety programs at www.ihst.org, and join the cause to help reduce helicopter accidents worldwide. Fly Safe!

From “*What’s the Operating Status of the Most Critical System on Your Helicopter?*” by IHST team member Lee Roskop:

“Consider the importance of the ‘human system.’ The pilot (and crew, if applicable) is arguably the most important operating system on the helicopter. Yet, one of three scenarios typically is true when it comes to assessing the health of the ‘human system’ before each flight: 1). We don’t do it, 2). We aren’t honest with ourselves if we do take the time to do it, or 3). We don’t consistently take the right action even if we know our ‘system’ isn’t quite right...”

“When our system is operating at its worst, it still has to be good enough to handle the most challenging situation while we fly. None of us would ever think about taking an aircraft to fly if maintenance told us that one of the critical systems was only working at less than 50 percent of what we could normally expect. Given the importance of the ‘human system’ for safer flying and preventing accidents, it’s imperative that we apply the same stringent standard of minimum acceptable performance to our own bodies.”

From “*How Safe is Dangerous?*” by IHST team member Scott Tyrrell:

“Former pilot and internationally recognized expert in the field of aviation human error Tony Kern explains this issue succinctly: ‘Failures of flight discipline can—in a single instant—overcome years of skill development, in-depth systems knowledge and thousands of hours of experience.’

The aviation community must demand accountability at all levels so that full adherence to the highest level of flight discipline will ensure the safest flying environment. ‘At Risk’ Behavior—a behavior in which an individual is willing to assume ‘unnecessary risks’

while performing a particular task in his or her everyday life—along with rogue management, operations, pilots, aircrew and maintainers have no place in the profession of aviation.”

From “*A Plea to Personal/Private Operators*” by Lee Roskop:

“The number of helicopter accidents in the personal/private category is not at all proportionate to the number of flight hours flown. In fact, there is a stunningly large gap between the low percentage of U.S. helicopter hours flown in personal/private operations as compared to the high percentage of U.S. helicopter accidents. The bottom line in the comparison is that for the 10 years analyzed, the personal/private category accounted for only about 5 percent of U.S. helicopter hours flown, yet resulted in 20 percent of the helicopter accidents.”

Top 10 Ways to Prevent Helicopter Accidents (Source: IHST)

1. Install cockpit recorders
2. Improve autorotation training
3. Add advanced maneuvers to simulator training
4. Emphasize critical issues awareness in training
5. Enhance aircraft performance & limitations training
6. Strengthen emergency procedures training
7. Implement a personal risk management program
8. Establish a mission-specific risk management program
9. Follow compliance of ICA procedures
10. Implement a quality assurance maintenance program

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On the Cover: Eurocopter X3 (X-cube) over the Dallas-Fort Worth area a few days prior to the June 20 launch of the prototype's U.S. summer tour. *Photo courtesy of American Eurocopter*

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With roots tracing back to 1948, Era Helicopters has been consistent in its ongoing commitment to safety and training. *By Dale Smith*

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WHAT DO THE EXPERTS THINK?

- Ask questions to three experts on the topics of helicopter aerodynamics, AS9100 quality management systems audits and night vision goggle (NVG) certification at rotorandwing.com. Che Masters, certification engineer for NSF-ISR, discusses aerospace quality registration. Frank Lombardi, test and evaluation pilot, provides insights about the science behind helicopter flight. NVG certification expert Jessie Kearby fields questions about NVGs for both military and commercial uses.

DIRECT TO YOUR DESKTOP: CHECK YOUR E-MAIL

AUGUST 1:

- Digital edition of *Rotor & Wing* August 2012. Electronic version with enhanced web links makes navigating through the pages of *Rotor & Wing* easier than ever.

WEEK OF AUGUST 20:

- *Rotor & Wing's* Military Insider e-letter. Get the latest updates from helicopter defense companies around the world, from Military Editor Andrew Drwiega.

WEEK OF AUGUST 27:

- HOT PRODUCTS for Helicopter Operators—Latest in equipment upgrades, performance modifications, training devices and other tools for the rotorcraft industry.

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Feedback

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S-76 Safety

It was noted in the *CHC Safety & Quality Summit* article in the May 2012 issue (page 40) that the Sikorsky S-76 was specifically cited as “lacking in safety design requirements” in part because it does not have a crashworthy fuel system. I’m sure we all prefer to base our beliefs on facts instead of rules, so let’s look at the numbers. About 800 S-76 helicopters have been delivered since 1978 and these aircraft have accumulated about six million flight hours.

During that period, the S-76 has experienced four post-crash fires in survivable accidents. In those four accidents no person was injured by fire. In other words, if the S-76 had been equipped with a heavy, expensive crashworthy fuel system since the first delivery, not one person would have been saved from being burned. The reason that the S-76 has had such a good track record is the use of a suction fuel system, something that has been standard practice at Sikorsky since the early 1970s. Suction fuel systems are also rare even in current helicopter designs. Why they are not mandated by rule and by the customer is beyond me. They work.

Vaughan Askue
Stratford, Conn.

Gyroscopic Precession

Frank Lombardi’s June column (“A Couple of Things,” page 44), credits gyroscopic precession as one of the phenomena positioning the rotor disc in cyclic control. The rotor system is a rotating system, so gyroscopic tendencies are present; but only to a very minor extent, existing hinge to hinge and insufficient to move the rotor disc.

R&W’s Question of the Month

Please describe your training regimen. What operational tips and safety practices have you learned through continuous training and experience?

Let us know, and look for responses in a future issue. You’ll find contact information below.

The rotor system is not a rigid body due to hinging and/or blade flexibility so gyroscopic moments sufficient to move the disc can not be transmitted across the hub. Because such moments can not be transmitted across the hub, the rotor system can not react as a gyroscope.

Rotor disc attitude control is achieved through blade aerodynamics and flapping, and not gyroscopic precession.

Thanks for your great magazine. It contains a wealth of rotary wing info and news. I always read it and leave it in the ready room for other pilots and have done so for more than 30 years!

Chip Lancaster
Commercial Pilot and AGI
MS Aeronautical Engineering
Flight Simulator Instructor
San Diego, Calif.

Aerodynamic Precession

Chip, you are correct. I inaccurately credited gyroscopic precession when I described how the blades flap to

a new position relative to the mast. As you said, it is aerodynamics that provide blade flapping. The phase lag, which most people attribute to gyroscopic precession, can be more correctly referred to as “aerodynamic precession.”

It is the angular difference between the input lift force location and its perceived reaction, and the reason I mentioned as a source of acceleration cross-coupling. The lag angle is dictated by the ratio of how quickly the blade flaps up and down to how quickly it rotates.

This ratio is a function of hinge offset and air density, not angular momentum (i.e., gyro effects). The reference to the rotor acting like a gyro occurs quite often in text I believe, due to the fact that it is a rotating system that seems to exhibit the physical traits of one, and it is simpler for people to grasp the resulting motions. To be a purist, I must stand corrected.

I’m glad to see that *Rotor & Wing* has insightful readers who take time to provide us all with valuable feedback. It is always welcomed!

Frank Lombardi
Rotor & Wing contributor
Leading Edge columnist

Do you have comments on the rotorcraft industry or recent articles and viewpoints we’ve published? Send them to Editor, Rotor & Wing, 4 Choke Cherry Road, Second Floor, Rockville, Md. 20850, USA, fax us at 1-301-354-1809 or e-mail us at rotorandwing@accessintel.com. Please include a city and state or province with your name and ratings. We reserve the right to edit all submitted material.

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Meet the Contributors



KEITH BROWN is the founder and principal of Defense Strategies, a company focused on defense aerospace strategic planning and marketing. Keith retired from the Army as a career Aviator and acquisition/procurement professional. He's held numerous command, staff, joint and acquisition assignments including four years as an Army Aviation platform PM within PEO for Aviation, having an annual budgets exceeding \$400 million and contracts exceeding \$3 billion. He's also participated in source selection processes and chaired an aviation Source Selection Evaluation Board. Keith resides in Huntsville, Ala.

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ANDREW DRWIEGA, Military Editor, is a senior defense journalist with a particular focus on international military rotorcraft. He has reported on attachment from Iraq three times (the latest of which was with a U.S. Marine Corps MV-22 squadron), and three times with British forces in Afghanistan (Kandahar and Camp Bastion), as well as from numerous exercises. He has flown in a wide variety of rotorcraft including the MV-22B Osprey, AH-64D Apache, Roovalk and many others.



IAN FRAIN graduated with BSc in Engineering Studies (Aerospace & Mechanical subjects) from University of Hertfordshire in 2002. He then worked at an EASA Part 145 fixed-wing MRO at London Gatwick Airport, participating in aviation recruitment with a rotary wing EASA Part 145 MRO. Ian then moved into B2B media in aviation and has worked as researcher for aviation information software for four years and is now running aviation research consultancy, Hel-Ian. He can be reached at ian@hel-ian.eu.

EMMA KELLY has been an aviation journalist since the late 1980s, starting her career with *Air Cargo News International*.



Following a number of years working on regional airline publications and for Inmarsat, Emma served in various editor roles at *Flight International*. In 2003 Emma emigrated to Australia and became a freelance aviation journalist where she contributes regularly to aviation and defense publications around the world.

FRANK LOMBARDI, an ATP with both fixed-wing and rotary-wing ratings, began his flying career in 1991 after graduating with a bachelor's of science in aerospace engineering, working on various airplane and helicopter programs as a flight test engineer for Grumman Aerospace Corp. Frank became a police officer for a major East Coast police department in 1995, and has been flying helicopters in the department's aviation section since 2000. He remains active in test and evaluation, and holds a master's degree in aviation systems-flight testing from the University of Tennessee Space Institute.



MARK ROBINS is an experienced and accomplished editor who has bylined more than 50 full-length feature articles in his career, most dealing with technical and manufacturing developments. He has written for such technical trade magazines as *Quality and Electronic Packaging and Production*. He has also worked full-time for the editorial departments of the American Society of Civil Engineers and Society of Manufacturing Engineers.

DALE SMITH has been an aviation journalist for 24 years specializing in business aviation. He is currently a contributing writer for *Rotor & Wing* and other leading aviation magazines. He has been a licensed pilot since 1974 and has flown 35 different types of general aviation, business and WWII vintage aircraft.



ERNIE STEPHENS, Editor-at-Large, began flying in the 1980s, earning his commercial pilot's license and starting an aerial photography company as a sideline. In his regular job as a county police officer, he was transferred to the department's newly established aviation unit, where he served as the sergeant in charge and chief pilot until his retirement in 2006. 🇺🇸

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Michael Young
Former Senior Captain
Eastman Kodak
Aviation Services

Scott Fera, Vice President Marketing
FlightSafety International

Dear Mr. Fera,

I have been employed by Eastman Kodak Company in Rochester, New York, for the past 13 years. As you are undoubtedly aware, Kodak filed for bankruptcy on January 19 of this year. On that morning, all members of our 65-year-old flight department were called into the hangar and told we were closing effective immediately. Though not entirely unexpected, it was nevertheless a shock for us all to leave our home of many years [we had all been there more than ten would no longer be there].

The closure came less than a week prior to my next scheduled Global Express recurrent training in Wilmington. Prior to the fateful day, I had prayed I would at least secure one more recurrent, in order to retain the credentials needed to stay afloat doing contract work until I landed another permanent job. However, that was not to be, and I'd been forced to come to terms with the fact my \$1,58 Global currency would expire at the end of April.

So, imagine the elation my wife and I experienced a few weeks ago as we sat drinking coffee, staring at each other, wondering what to do next, when I received an email notification that FlightSafety was reinstating its phenomenally generous Proficiency Protection Plan. A friend and long-time co-worker benefited from the program in 2009 after being downsized, but that was immediately following the onslaught of the financial crisis of 2008.

I hadn't even imagined it would be available to me at this time. What a gift! Having trained at FlightSafety for nearly 20 years, I've always considered it the pinnacle of flight training. The leader. The team of professionals I've dealt with over the years, primarily in Wilmington, has made each training experience a true pleasure. They welcome me on the first day, greeting me by name. Throughout the week everyone there, up to and including the cleaning staff and the gentlemen who take care of the coffee area upstairs, treat me and my buddies like we truly matter. It's a culture of customer service based on competence and cordiality. So honestly, though this is one of the most generous gifts I've ever received, it comes as little surprise based on FlightSafety's history of benevolence within the aviation industry.

All that said, I'd just like to say thank you, from the bottom of my heart, to all involved in presenting the overwhelming gift of a complimentary recurrent training session. It will help us immensely in seeing our way through this unfortunate turn of events, enabling me to remain marketable and employable as we plan for the future. Due to FlightSafety's overwhelming generosity and loyalty, I am in turn a loyal customer, promoter and friend for life. Thanks again!

Sincerely,
Mike Young
(Michael D. Young, former Sr. Captain, Eastman Kodak Aviation Services)

To find out about the many benefits of being a FlightSafety Customer, please call Scott Fera, Vice President Marketing, at 718.565.4774. sales@flightsafety.com • flightsafety.com • A Berkshire Hathaway company

Rotorcraft Report

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■ PUBLIC SERVICE | FIREFIGHTING

Australia Plans Aerial Firefighting Future



An Erickson Air-Crane dumps water over a 2009 bushfire in Victoria, Australia.

Early next year, Australia's National Aerial Firefighting Center (NAFC) will decide on the aerial firefighting fleet that will do battle against the country's annual bushfire threat over the next few years.

With the NAFC's existing tenders reaching the end of their three years plus two years extension life at the end of the coming 2012/2013 fire season, a call for tenders for the national fleet for 2013/14 onward is scheduled to be released in late August or early September, according to Richard Alder, general manager of the central body that coordinates the national aerial firefighting fleet. The

tenders will initially cover a three-year fire season period, with options to extend.

Australia has years of experience fighting bushfires and has determined what works best in its climate and environment. As a result, the aerial fleet under the new contracts is unlikely to be very different to what has been employed under the current ones. Australia relies on type one helicopters, classified as having an internal payload of 2,268 kg or greater and a water carrying capacity of 2,650 liters or greater; type two with an internal payload of between 1,134 kg and 2,267 kg and a water carrying capacity of 1,135-2,649 liters; type three with an internal payload of 544 kg to 1,133 kg and a water carrying capacity of between 380 and 1,134 liters; and type four—less than 544 kg internal payload and a water carrying capacity less than 380 liters.

Tenders will cover type one, two and three rotary wing services and type four fixed-wing services, as well as other specialist services. A request for proposals will also be issued this year to supply larger fixed-wing airtanker services, including very large airtankers and type one and 2 multi-engine airtankers, says the NAFC.

The new tenders come as the country prepares for the 2012/13

fire season, which will start in late August in some parts of the northeast and continue through to April in the southwest of the country.

Over the last two years, much of the country, with the exception of Western Australia (WA), has come off lightly—particularly compared to the devastating 2008/9 fire season in which more than 170 people died in the Black Saturday fires in Victoria. But Australia cannot be complacent with bushfires a constant threat in the summer months in vast areas of the country.

NAFC has yet to receive all the activity and mission figures from the states and territory for the 2011/12 fire season, but Alder says the last fire season was very similar to that of 2010/11. During that year, the national fleet of 53 helicopters and fixed-wing aircraft was activated on 550-plus occasions for firefighting and made more than 4,378 drops, delivering over 7.5 million liters of water/retardant.

As in the previous year, the aerial firefighting fleet was also put to use in 2011/12 on flood recovery and storm support missions in parts of Queensland, NSW, Victoria and WA. This shows the versatility of the firefighting fleet and the sharing arrangements, says Alder.—By Emma Kelly

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■ PUBLIC SERVICE | FIREFIGHTING

Tokyo Fire Dept Purchases EC225



This Eurocopter EC225 Super Puma is part of the Tokyo Fire Department's fleet expansion. The unit bought its first Super Puma in December 2011.

Eurocopter has agreed to provide another EC225 Super Puma to the Tokyo Fire Department. This follows the December 2011 purchase of a Super Puma as part of a fleet expansion after the Great East Japan Earthquake in March. This newest order is configured for emergency medical services and search and rescue, as well as firefighting missions. ✈

■ COMMERCIAL | AIRFRAMES

GKN, Goodrich, IAI, Triumph Among Bell 525 Relentless Suppliers

Bell Helicopter has expanded the list of equipment, parts and tooling suppliers that will be involved with the development of the 525 Relentless. The Textron subsidiary unveiled the "super medium" class helicopter in February 2012 at Heli-Expo in Dallas.

The Fort Worth, Texas-based manufacturer has secured agreements with GKN Aerospace and Triumph Group involving airframe structures, including complex engineering and composites. Charlotte, N.C.-based Goodrich will provide ice protection systems, Israel Aerospace Industries will work on the seating, with Mecaer Aviation Group focused on the landing gear, Kuka on major structure tooling, and Pacifica Engineering on rotor and drive tooling. According to Bell, the suppliers will also work with the manufacturer on the design and delivery of the components as part of the drive toward the first 525 prototype.

Larry Thimmesch, vice president of commercial programs, notes that the agreements come as the program is transitioning from the preliminary into the detailed design phase. As part of the preliminary phase, Bell gathered input from a customer advisory panel to help shape the design and features of the helicopter, which will receive power from GE CT7-2F1s. ✈

■ MILITARY | AIRFRAMES

AW139M Participates in Army AAS Demo

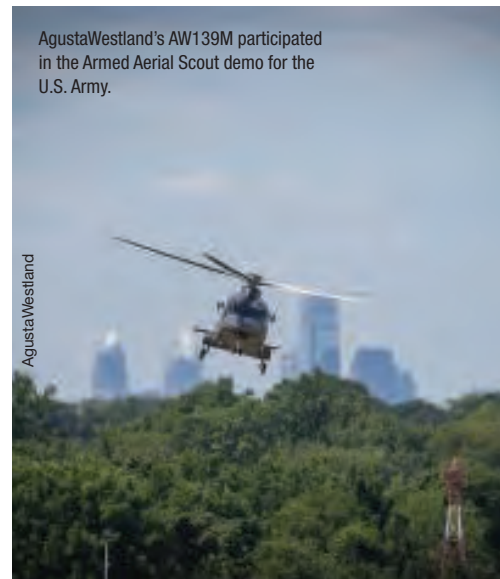
AgustaWestland North America has wrapped up a week of flight demonstrations for the U.S. Army, as part of the Armed Aerial Scout (AAS) program.

AgustaWestland used an AW139M to serve as a technology demonstrator, and plans to present a militarized version of the AW169 for the AAS program upon receiving the Army's request for information (RFI). Both the AW139 and AW169 have similar flight, design and maintenance aspects.

According to R. Scott Rettig, CEO of AgustaWestland North America, the AW139M was the first helicopter to participate in the AAS flight display. "We were prepared, ready and we're moving forward," Rettig said.

The AW169 is on track for FAA and EASA certification and the AW139M has completed testing to receive Army certification of its survivability suite during safe separation at the Army Materiel Command's Redstone Technical Test Center in Huntsville, Ala. ✈

AgustaWestland's AW139M participated in the Armed Aerial Scout demo for the U.S. Army.





Master Sgt. Cheresia Theilral

Members of the Nebraska Army National Guard, Company C, 2nd Battalion, 135th General Support Aviation, use a Bambi bucket to douse the flames of the High Park fire in Larimer County, Colo. The fire destroyed more than 87,000 acres and 200 homes before being contained.

■ PUBLIC SERVICE | LAW ENFORCEMENT

Fairfax County Receives Second Bell 429

Bell Helicopter has completed delivery of a second multi-mission Bell 429 to the Fairfax County Police Department in Virginia. The helicopter is equipped for both emergency medical services (EMS) and law enforcement missions. FCPD's first Bell 429 was delivered in December 2011 and has seen more than 500 flight hours and performed more than 30 medevac missions in that time. 🚁

■ COMMERCIAL | HEAVY LIFT

UTair Transports Mi-26Ts with Sling

Russia-based UTair Aviation has delivered two Russian Helicopters Mi-26T airframes via a cargo sling attached to another Mi-26T. The transport covered more than 1,200 miles (2,000 kilometers) and is the first Mi-26T delivery of its kind. Due to the size and weight of the airframes, land-based transport was not an option. The operation took 25 days and more than 70 flight hours to complete. 🚁



Russian Helicopters

UTair's Mi-26T carries another airframe via sling.

■ COMMERCIAL | OFFSHORE

Bristow Secures Contracts for 20 Helicopters

Offshore services operator Bristow Group has signed several long-term contracts and extensions covering 20 helicopters. In Norway, Bristow has added a five-year option to a seven-year contract for four Sikorsky S-92s; a new five-year contract with an option for another five years was inked for the Norway search and rescue provision, providing three new Eurocopter EC225s. Both Norwegian contracts are slated to start in September 2014.

Bristow also received a contract in the UK North Sea for one S-92 that went into service in July 2012 and for an EC225 that is scheduled for an August start.

The company obtained a 10-year contract with Australian oil and gas operator INPEX for up to six EC225s for drilling support and operations, with an option to add a search and rescue (SAR)-configured aircraft.

Petrobras in Brazil has awarded Lider a five-year contract for five S-92s, one of which is leased from Bristow and will begin service in August, with the remaining four starting in April 2013. 🚁

■ SERVICES | MAINTENANCE

Ukraine Approves Bell Maintenance Center

Bell Helicopter has received a Part 145 Maintenance Organization Approval from the Ukraine State Aviation Administration (SAA) for its aviation service facility in Prague, Czech Republic. The maintenance, repair and overhaul (MRO) location—which Bell acquired in February 2010—already has EASA Part 145 approval. The Ukraine SAA approval also covers Bell Helicopter's fellow Textron company, Cessna. 🚁



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JetGo precision diesel-hybrid GPUs are compact units offering impressive continuous and peak power in addition to sophisticated aircraft protection systems. Its light weight and compact size lends to easy portability, whether it be across the ramp or around the world. Applications include engine starts, avionics support, electric air conditioning and aircraft maintenance. These user-friendly units are your affordable answer to all 28V DC power requirements.



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550Mti / 28eco



■ PRODUCTS | ENGINES

Turbomeca Inks Deal with Russian Helicopters for Support

Russian Helicopters and Turbomeca have joined forces on a general support agreement for engines powering the Ka-226T and Ka-62. As part of the agreement, Ural Works of Civil Aviation, a division of Russian Helicopters' Helicopter Service Company, will service and repair the engines for both military and government operators. The recently unveiled Ka-62 will receive power from two Turbomeca Ardiden 3Gs. 𠄎

■ PUBLIC SERVICE | LAW ENFORCEMENT

German Police Receive Final EC155s



German National Police use a fleet of 87 Eurocopter variants to patrol the county.

Eurocopter has handed over the final two EC155B1s out of a 20-helicopter order to the German Federal Police. The helicopters were part of a fleet upgrade program, which brings the German law enforcement air wing numbers up to 87. The all-Eurocopter fleet includes AS332L1 Super Pumas used for disaster relief, sea rescues, special operations, surveillance and transport; EC120s for training; and the EC135T2i variant that conducts air rescue, disaster control and law enforcement missions. 𠄎

■ PRODUCTS | ENGINES

Operators in Sweden, Western U.S. Employ Donaldson Filters

Donaldson Aerospace & Defense has equipped a Scandair Eurocopter AS350B3e and a Summit Air Ambulance AgustaWestland AW109 with inlet barrier filter (IBF) systems. The Swedish utility operator provides aerial applications, including in “very dusty environments while fertilizing, and the indicator still shows good filter performance,” according to owner Fredrik Ulander. Summit Air Ambulance, based in Idaho, was the first operator to incorporate a Donaldson IBF into an AW109E. The system is also designed to cover the S (Grand) and SP (GrandNew) variants. Summit assisted Donaldson with the initial flight testing and certification of the IBF on the AW109. Larry Bacus, senior vice president of Summit—which conducts high-altitude rescues in Idaho, Nevada and the western U.S.—noted that the IBF “enhances our safety program.” 𠄎

■ MILITARY | TECHNOLOGY

NASA Seeks Fix for Rascal Avionics

NASA Ames Research Center issued a request for information (RFI) in June seeking sources to diagnose and repair, or rebuild, malfunctioning electronic input-output processor (IOP) circuit cards for the research flight control computer assembly (RFCCA) on the JUH-60 helicopter. Boeing and Lear Astronics developed the Rotorcraft Aircrew Systems Concepts Airborne Laboratory (Rascal) in the 1990s, and the RFCCA unit features the same design standards as existing production military helicopter electronics, according to NASA.

The U.S. government owns the RFCCA designs and schematics of its major circuit cards, but “detailed design documentation, including Gerber files and bill of materials for the IOP cards, are not available,” the RFI states, adding that some “reverse engineering may be required to reconstruct required detailed design information.”

NASA received two RFCCAs with Rascal's initial development and a third qualification test unit. One of them is still working properly, the other experiences “intermittent IOP card malfunctions,” while the qualification unit is no longer operational. Ames Research Center envisions a two-phase approach, with the first involving a contract to review existing RFCCA design data to investigate IOP card malfunctions—to potentially include reverse engineering—and come up with a plan to repair or remanufacture the cards. The second phase will cover the actual repair/reconstruction of the IOP cards.

The RFI seeks to determine companies that have the required technical and manufacturing expertise, including “information, tools, supplies and techniques,” to repair flight control components in military helicopters. It is also searching for information that will contribute to developing a request for proposals (RFP) related to the IOP circuit board repairs. 𠄎

■ MILITARY | UTILITY

International Naval Interest Grows for Sikorsky MH-60R/S



Two Lockheed Martin/Sikorsky MH-60Rs Sierras are headed to the Royal Thai Navy, following the FMS sale of 24 Sierras to Australia.

Following the first foreign military sales (FMS) of 24 Lockheed Martin/Sikorsky MH-60Rs to the Australian Navy in the summer 2011, as well as two MH-60 Sierras to the Royal Thai Navy in August—a deal stated at the time to be worth around \$3.2 billion—Mike Sears, director of international programs, MH-60R/S Seahawk stated at the Farnborough Airshow that further potential customers now include the navies of Korea (R), Denmark (R), Qatar (R/S), Saudi Arabia (R/S) and India. The total Seahawk MH-60R/S program of record for the U.S.

Navy is 575 aircraft, comprising 275 MH-60S (with 213 already delivered as of June 5, 2012). There have been 130 MH-60R helicopters delivered to the Navy (as of June 18). Nine dedicated MH-60R squadrons are already operating with the U.S. Navy with a further 19 Squadrons still to be equipped by 2018.

Although the maximum production capacity for MH-60Rs is set at 35 aircraft, according to Sears there is an international capacity to produce 24 helicopters annually. In terms of the MH-60S there is a production capacity of 48 aircraft per year.

The two types have already logged 130,000 hours at sea and improvements are being introduced steadily. “Since IOC in 2006 there have been three individual spiral upgrades,” said Sears. “With the confirmed program of record the price the overall price point has been dropped by well over 10 percent,” he confirmed. This saving could be passed on to international customers, he continued.

The U.S. MH-60R/S roadmap includes the acoustic, radar and weapons upgrades and the main mission computer upgrades will be completed in time for the Australian Navy deliveries. There is also work being done on a laser mine detection system for the MH-60S which could be mounted on the side of the aircraft and could detect near-surface mines.—By Andrew Drwiega, Military Editor

For more military stories, visit www.rotorandwing.com and sign up for our monthly *Military Insider* newsletter at www.aviationtoday.com/rw/subscribe.html







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PEOPLE

Keith Flail has joined Bell Helicopter as director of military program office operations. The U.S. Army veteran was previously senior manager of business development for Lockheed Martin Missiles and Fire Control Company. Flail will take charge of the program management and core process teams for his department.

Vancouver, B.C.-based CHC Helicopter has hired **Peter Bartolotta** to serve as chief operating officer and president of the company's Helicopter Services division. A former operations manager at AlliedSignal/Honeywell, Bartolotta joins CHC from Morrisville, N.C.-based computer firm Lenovo Corp., where he was senior vice president of global services.

Esterline CMC Electronics has brought **Christian Olivier** on as vice president of operations. Olivier, formerly with Nortel Networks, STMicroelectronics and e2v Technologies, will oversee facilities management, master planning, IT, operations and supply chain management. He is also a licensed pilot.

Broussard, La.-based RLC has named **Edie Hunt** as vice president of human resources. Hunt will oversee benefits administration, employee relations, organizational development and talent acquisition. Hunt comes to RLC from Dynamic Offshore Resources, where she was in charge of the HR/IT administrative departments.



FlightSafety International has promoted **Doug Gill** (left) to director of engineering for its visual simulation facility in St. Louis, Mo. Gill was previously the manager of real-time software and display management systems and has worked for

FlightSafety since 1998. The company also added **Woody McClendon** (bottom left) as sales manager for rotorcraft training. He will develop tailored training programs in this new role. McClendon has trained with FlightSafety and previously worked as an instructor.

IN MEMORIAM



Metro Aviation of Shreveport, Louisiana, has lost its production manager and longtime employee,

Russell Garner, who died unexpectedly on June 26. Garner worked with the company for more than 25 years. "Russell was a key component to the success of our company as well as a great friend to us all," remarked Metro Aviation President and owner Mike Stanberry. "His kind manner as a true gentleman and his innate ability to bring a concept to reality was his hallmark. We will all miss him dearly."

coming events

2012:

Sept. 4-7: European Rotorcraft Forum 2012, Amsterdam, The Netherlands. Contact National Aerospace Laboratory NLR, phone +31 88 511 3165 or visit www.erf2012.nlr.nl/index.html

Oct. 22-23: Police Aviation, Kuala Lumpur, Malaysia. Contact Tangent Link, phone +44 (0) 1628 660400 or visit www.tangentlink.com/events

Oct. 22-24: 2012 Air Medical Transport Conference, Seattle, Wash. Contact AAMS, phone 1-703-836-8732 or visit www.aams.org

Oct. 22-24: AUSA Annual Meeting, Washington, D.C. Contact AUSA, phone 1-703-841-4300, 1-800-336-4570 or visit www.ausa.org

Oct. 30-Nov.1: Helicopter Military Operations Technology Specialists' Meeting (HELMOT XV), Williamsburg, Va. Contact AHS Intl, phone 1-703-684-6777 or visit www.vtol.org

Nov. 6: High-Rise Aerial Firefighting & Rescue, Dubai, UAE. Contact Tangent Link, phone +44 (0) 1628 660400 or visit www.tangentlink.com/events

Nov. 6-8: Dubai Helishow 2012, Dubai, United Arab Emirates. Contact Mediac Communications and Exhibitions, phone +44 (0)1293 823 779 or visit www.dubaihelishow.com

2013:

Feb. 20-21: Avionics Europe 2013, Munich, Germany. Contact PennWell, phone 1-888-299-8016 or visit www.avionics-event.com

Mar. 4-7: HAI Heli-Expo 2013, Las Vegas, Nev. Contact HAI, 1-703-683-4646 or visit www.rotor.com

March 18-20: 9th Annual CHC Safety & Safety Summit, Vancouver, Canada. Contact CHC, phone +1-604-232-7424 or visit www.chcsafetyqualitysummit.com

March 25-28: 56th Annual AEA International Convention & Trade Show, Las Vegas, Nev. Contact Aircraft Electronics Assoc., phone 1-816-347-8400 or visit www.aea.net

April 10-14: Quad-A Annual Convention, Fort Worth, Texas. Contact Quad-A, phone 1-203-268-2450 or visit www.quad-a.org

May 21-23: AHS International 69th Annual Forum and Technology Display, Phoenix, Ariz. Contact AHS, phone 1-703-684-6777 or visit www.vtol.org

PUBLIC SERVICE | FIREFIGHTING

Japanese Agencies Purchase Two Additional Firefighting AW139s

The Fire Disaster Management Agency (FDMA) and Yokohama City in Japan have each ordered a firefighting-configured AgustaWestland AW139. The helicopter will become FDMA's second AW139 and will be equipped with a Bambi bucket, belly tank and an enhanced ground proximity warning system (EGPWS). The Yokohama City Fire Department's helicopter features a main rotor blade with a high visibility paint scheme, a satellite-based augmentation system (SBAS)-capable GPS, and a belly tank. Both aircraft are slated for delivery in 2013. ✈



AgustaWestland

The FDMA's newest fleet addition is an AgustaWestland AW139.

PRODUCTS | AVIONICS

FreeFlight Obtains ADS-B Approval

NextGen avionics provider, FreeFlight Systems, has received an FAA supplemental type certificate (STC) to incorporate a rule-compliant automatic dependent surveillance-broadcast (ADS-B) system into the AgustaWestland AW139.

Free Flight's RANGR FDL-978TX "ADS-B Out" was developed specifically for Gulf of Mexico helicopter operators using Chevron's fleet of AW139s for the FAA testing and certification process.

FreeFlight's ADS-B increases the tracking range for air traffic controllers monitoring offshore helicopters that are operating in the Gulf, according to the Irving, Texas-based company. ✈

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■ PUBLIC SERVICE | GOVERNMENT AGENCIES

EMERCOM Receives 5th Russian Helicopters Kamov Ka-32A11BC

Russian Helicopters has handed over the last of five Ka-32A11BCs to the Russian Emergencies Ministry (EMERCOM). All five helicopters are outfitted for SAR missions, and can also be configured for firefighting and medical operations. The Ka-32A11BCs will monitor the principal road between Moscow and St. Petersburg as part of EMERCOM's road safety program. As part of this project, the Ministry may add more than 60 light and 120 medium helicopters to the fleet. ✈



Russian Helicopters

EMERCOM's fifth Ka-32A11BC will patrol a main highway between Moscow and St. Petersburg, Russia.

■ SERVICES | MAINTENANCE

SkyBOOKS Updates Tracking Software

Bell Helicopter affiliate SkyBOOKS has packaged its Version 4.7 SAAS software into two areas—flight operations and maintenance tracking—for analyst or user-managed operations. SkyBOOKS lists tracking/alerting, component management, discrepancy/MEL tracking and inventory/tool management among the benefits for the maintenance tracking “bundle,” with features in the flight options package to include operations logs/manifests, scheduling and expense reports. ✈

■ MILITARY | MAINTENANCE

Lockheed Wins \$44M Navy Contract

The Naval Air Warfare Center Aircraft Division has contracted Lockheed Martin Logistics Services to supply avionics maintenance, documentation and technical support as part of its Avionics Architecture and Systems Engineering Division. The aircraft serviced under the \$44-million contract are part of the presidential helicopter and executive transport programs. ✈

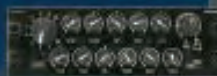
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www.tech-tool.com



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The 500-30 is the latest member of the highly successful Techtest PLB range offering 406-MHz transmission and Guard frequency transmission combined with embedded GPS to provide positional accuracy of $\leq 100\text{m}$. With both manual and automatic activation capability the beacon offers maximum flexibility across a fleet of aircraft. Providing interface solutions for inclusion in PSPs within ejection seats such as ACES II/III and in combination with parachute activation mechanisms such as the BA22. Once activated upon ejection the PLB will transmit SAR frequency signals via remote antennas allowing rapid recovery. Once on the ground aircrew can continue to transit using remote or integrated dual frequency antennas including GPS providing portable functionality and the ability to control beacon transmission according to circumstance. With five-year battery life, 48 hours transmission on 121.5MHz and 24 hours on 406MHz at -20°C , the 500-30 meets COSPAS SARSAT, ED-62A, STANAG 7007 and MIL-STD 810F specifications. Contact Andrew Dawson at andrew.dawson@hr-smith.com or visit www.hr-smith.com



DAC International's Solution for Tarsyn on the Bell 212/412 Helicopter

If you have issues with your Tarsyn gyro installation, consider replacing the Tarsyn gyros with the proven Northrop Grumman Litef LCR100 fiber optics AHRS. Installation consists of removal of the existing rate gyro, replacement of the Tarsyn VG/DGs with two AHRS and trays, which mount into the existing Tarsyn position and wiring an additional panel annunciator. Advantages of replacing the Bell 212/412 mechanical gyros with the dual LCR-100 AHRS include Fiber Optic Attitude Heading Reference System—no moving parts; a long MTBF (mean time before failure) equals reduced maintenance and cost; the LCR100 has increased accuracy and less weight than the gyros it replaces; simplified one-time flux valve calibration—no compass rose required and it comes with a two-year warranty. The installation is simple with a kit that includes: two Tarsyn adapter trays, one rate gyro jumper/annunciator harness, one panel annunciator and a flight manual supplement. Downtime for installation is minimal. Give us a call today to discuss replacing or upgrading your Bell 212/412. 飛



OPERATOR PROFILE:

**What I hear, I forget. What I see, I remember.
What I do, I understand. —Kung Fu Tzu
(Confucius)**

Era Helicopters AgustaWestland AW139.



Photos courtesy Era Training Center

By Dale Smith

When you think about it, the helicopter industry is truly amazing. Especially when you consider how many of today's mega-service-providers started out as "one ship" operations. Take Era Group, for example. The company was started in 1948 when an adventurous young pilot named Carl Brady started Economy Helicopters and brought a Bell 47A to Alaska to provide aerial mapping services to the U.S. government. The success of that initial venture led Brady to expand to support the region's growing petro-

leum industry. And the rest, as they say, is helicopter industry history.

Today, as a subsidiary of Seacor Holdings, Era Helicopters is a leader in the operation, support and training for helicopters and crews supporting a variety of land based and offshore industries around the world. The company is proud of the fact that they hold the oldest standing Part 135 helicopter air carrier certificate in the U.S.

While the company has grown from a single Bell 47A to a global fleet of some 170 helicopters, one thing hasn't changed—the company's com-

mitment to training pilots to be able to make good decisions that ensure the safety of those they serve.

Back in Mr. Brady's day, "training" was whatever you did in the past 15 minutes that you could reuse in the next 15 minutes. But, to have any future on-the-job-training and helicopters just don't mix.

So, as you might surmise, it wasn't long before the rapid growth and expansion of the business meant that Era's leaders decided that they had to make training a core part of the company's expanding business model.

ERA TRAINING CENTER

"Training has always been a primary effort. From a regulatory perspective it's not a choice, but Era has always placed an exceptionally high value on quality training beyond the regulations," explained Randy Rowles, vice president/general manager of the training center. "Management really started get-

ting devices (FSTD) for the Eurocopter AS350B2 and EC135.

While the company knew that these new simulators were critical to providing the best training possible for their in-house pilots and maintainers, they actually had even bigger plans in mind.

"Like any good helicopter company, you just don't acquire an asset and not try to produce some additional revenue from it," Rowles said. "So they built the capability to offer training to pilots outside the company, into the Training Center's operating portfolio."

Today, the Era Training Center is the only operator-owned training facility in the Gulf of Mexico region to hold an FAA Part 142 training certificate. The facility does not only provide training for Era pilots, but also pilots that work for direct competitors. That's right, they actually train pilots for their competition.

"We've gotten really, really good at building and maintaining strong relationships. Not only are our competitors now our customers, but our vendors are also our competitors," Rowles said. "Even Flight-Safety will send their instructors to us. We train them up on the actual aircraft, then back-train them into the simulator devices so their customers get the highest level of training quality."

The unique difference between Era and a lot of other companies "is the simple fact that we have extensive experience in the operation of the aircraft we

train in," he added. "For example, right now we are one of the highest-time operators of the AS350 in the world. So when we train someone on that type, a lot of the information comes directly from the experience we have on the aircraft in many different situations."

The Era Difference

"What's really unique about our training center is our model," Rowles said. "Most Part 142 facilities, in helicopters I think all of them, rely on Level D, full-motion flight simulators for all of their training. We do it differently."

Era's model "is built around the assets that we have available. Because of the fact that we have the aircraft right here, the decision was made to have our Part 142 training program created around having 75 percent of the training done in the simulator and 25 percent in the actual aircraft," he said. "We've invested heavily in Frasca International Level 6 training devices that require the actual aircraft to be used to complete the training curriculum—that's very unique in the industry."

According to the company, with Era's 75/25 split students gain proficiency with basic aircraft operations including pre-flight, start-up, run-up, autopilot, systems operational procedures and engine shut-down in the FSTD, which dramatically cuts down on "dead time" in the actual aircraft. In addition, students also use the FSTD to perform and practice normal and emergency procedures before performing the same maneuvers in the actual aircraft.

ting an idea to grow our training offerings when they realized it wasn't just us who needed quality training."

One of the major contributors to the company's decision to jump into the training business with both feet was the availability of cost-effective simulators in the helicopter industry. Era Training Center opened its dedicated training center in Lake Charles, La. in 2008. Highlighting the center were new Frasca International flight train-





Era Helicopters Agusta AB139 lands in snow with a Northern Lights show taking place overhead.

As a complement to the training provided by the Level 6 FSTD, Era also relies heavily on scenario-based training. “With the advent of the new-generation FSTDs and the high-quality visual graphics, we’re able to integrate, for our offshore pilots for example, a number of the more challenging offshore platforms and the environments they are actually operating in,” Rowles said. “We also use it for our air medical customers. We have a lot of scenarios built into that type of training.”

Rowles stressed that Era’s training scenarios are created to give pilots and crews not only experience in particular locations or situations, but more importantly to give them the knowledge and experience to make good decisions no matter what the situation or location.

“We get a lot of information from IHST (International Helicopter Safety Team, www.ihst.org) accident data. What you see it that no matter how far you look back, you find that we have not found any new ways to break a helicopter. It just keeps happening over and over again,” Rowles said.

“The key is to identify the causes and understand how to prevent them. We look carefully at what their (IHST) analysis team and implementation teams recommend and go from there.”

The biggest thing is not just telling someone about it, he continued, “but showing and enabling them to make a decision in the same circumstances that will avoid an accident.” Era has a safety reporting system “which goes out to everyone. Any employee at any time can stop work if they see anything that is not safe. That situation is then put in the online reporting system and shared with the whole company.”

Rowles admits that this type of honesty can be hard for many people to face up to. “Sometimes your baby is called ugly and it’s real,” he quipped. “But you can’t hide from the truth ... not if you want to learn from it.”

Change Happens

Whether it’s a new procedure in reaction to something on the company’s Safety Reporting system or a change in aircraft operations brought on by information from the helicopter’s Flight Quality Assurance (FOQA) technology, Rowles said that Era’s processes are always changing to improve efficiency and safety.

And when there’s some new information or procedures to share with the company, it all channels through the training center. “Depending on the timing or criticality of the information,

we use a combination of recurrent training and our company Intranet to get information to our pilots and mechanics,” Rowles said.

“One example is something we just released to our mechanics. Through our SharePoint system we just released 22 new maintenance training videos that are on key support elements we’ve identified through the efforts of our maintenance technicians to improve our inspection and maintenance procedures.”

“We put those videos out there and we can tack who goes in for the remote training,” he added. “We have a whole e-courseware department here at the center. We truly believe in the value of computer-based training.”

Rowles also explained that if the situation is more time-sensitive, the company will dispense new information through a combination of its current field-based instructors and by sending instructors from the Lake Charles out into the field for hands-on instruction.

“Of course, all of our mechanics and pilots come back here at least once a year for recurrent training,” he said. “Most of our pilots come here every six months for a 61.58 proficiency check or instrument recurrency training.”

Training to 'Fill the Gap'

While it's true that Era is one of the largest helicopter operators in the world, they're not immune to the same problems facing everyone else in the industry: Namely the looming shortages of qualified pilots and mechanics.

But, true to the spirit of the company's founder, they're taking an active role in doing something about it. "There are a number of new things we are looking at here at Era," Rowles said. "We realize there is a gap between from when a pilot is certified to fly a helicopter up to the point where that pilot reaches the experience level to be considered for employment."

That gap "extends from when they typically get their ratings at around 200 hours until they can be brought back in and trained to fly a medium-twin at around 1,700 to 2,000 hours," he added. "We're actively engaged with that gap analysis now and determining the best way to extend the training cycle out through more of that gap. The solution will require industry participation."

The first thing the industry needs to do, he thinks, "is to take responsibility for it. As an operator you can't expect everyone else to help ensure you can find the pilots that you will need. You need to take a championing approach

and lead qualified candidates to their own success. Era is fully engaged in a leadership position to engage the industry and training community to help establish and cultivate a standardized program to meet emerging needs for pilots and mechanics."

Another new, and really unique program that Rowles discussed is Era Training Center's introduction of its Second-In-Command (SIC) Familiarization Course for the AgustaWestland AW139.

Operators realize "that one of the problems with bringing new pilots into a crew environment is that they aren't trained to be co-pilots," he said. "Pilots are pilots. They are trained from the beginning to think on their feet and for themselves. Other than the U.S. military, there is no component that actively trains pilots to be in a supporting role—until now."

According to the company's information the SIC Familiarization Course will include the same ground and FSTD training as the PIC, but without the aircraft requirement. There is no regulatory certification, FAA or otherwise, involved. It's purely a



In 1948 Carl Brady started Economy Helicopters, which merged with Rotor Aids a decade later to become ERA (later Era).

course to train second-in-command pilots a high degree of standardization for the AW139 helicopter. The course also encourages the use of customer-specific checklists and documentation to enhance the SIC's supporting role in the two-pilot crew environment.

"We've taken the bull by the horns and decided that we need to teach, particularly the young pilots, early on in their careers—that's who this is created for—how to be good, supportive and capable pilots flying in the left seat," Rowles continued. "This program was developed to meet our needs and the needs of our various customers. Because we are such a large operator, we tend to feel the need for things before other operators do."

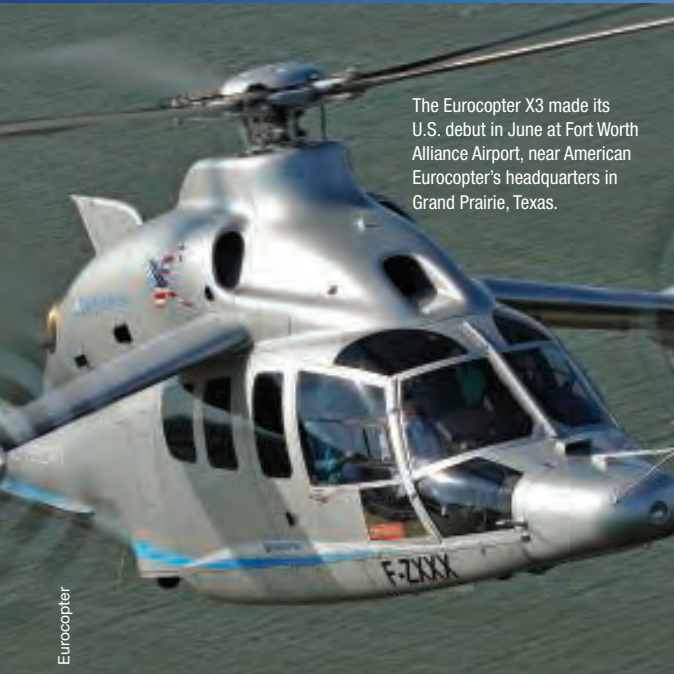
Era saw the need "to enhance the skills of qualified SIC crew members for the AW139, so we created a new program to train them," he said. "Now that we've introduced it, other operators are saying they need it too."

Whether it's introducing new aircraft types, or pushing the envelope of training and ensuring the future availability of qualified pilots, Era Group and Era Training Center tackles each new opportunity with the same dedication and commitment to doing something new that motivated Mr. Brady to fly his Bell 47A into Alaska's great unknown. 🇺🇸



Simulator training is among the various programs that Era uses to instruct helicopter pilots.

Pilot Report: THE EXCITING, EXPERIMENTAL



The Eurocopter X3 made its U.S. debut in June at Fort Worth Alliance Airport, near American Eurocopter's headquarters in Grand Prairie, Texas.

Eurocopter



Overhead panel of the X3 cockpit.

Photo by Ernie Stephens

Eurocopter invited *Rotor & Wing* to fly the X3 on June 18 before the official start of its U.S. tour.

By Ernie Stephens, Editor-at-Large

Picture this: A mad scientist takes a helicopter and a twin-turboprop into his laboratory, wires them together, then sends millions of volts of electricity coursing through their frames. When the smoke clears, a strange combination of the two is left. When released from its iron straps, the creature hovers for a moment, then jets away like an airplane.

That creature is Eurocopter's X3, a hybrid machine designed to offer the vertical flight capabilities of a helicopter, and the speed of an airplane. To save development time, Eurocopter engineers started with its EC155 medium-twin helicopter. They then replaced the

Fenestron with a bobbed tail, tweaked the shape of the fuselage to accommodate new components, and added propellers to stubby wings. Eurocopter says, though, that the X3 testbed flying today will have a different hull design a few years down the road.

Eurocopter invited *Rotor & Wing* to fly the X3 at Fort Worth Alliance Airport (KAFW), located 22 nm northeast of American Eurocopter's headquarters in Grand Prairie, Texas, two days prior to its official U.S. public debut. I would only be the second person outside of the company's own personnel to fly the machine they call the "X cube." The day began with a technical briefing by Jean-

Jacques Ferrier and Paul Eglin, two of the X3's senior engineers. "It is quite simple," Ferrier explained. "We slow down the main rotor at high speed to reduce Mach at [the blade tip]. Then we have a wing which develops additional lift to unload the main rotor at high speed and to compensate for retreating blade stall."

Because the rotor has zero pitch at high speed to reduce drag, Ferrier said that an X3 pilot does not tilt the rotor disk to achieve forward flight. Thrust is provided entirely by the two, five-bladed, constant-speed propellers, which receive power from a pair of Rolls-Royce-Turbomeca RTM322s conventionally mounted atop the fuse-

TAL, EXCEPTIONAL X3

X3 landing at Alliance Airport.



Photo by Ernie Stephens

Up close look at the X3's rotor hub.



Photo by Ernie Stephens

lage. The turboshaft engines and props are coupled to the same transmission that drives the X3's five-bladed main rotor system.

The propellers also provide anti-torque services through differential thrust. And to keep it simple for pilots, the pedals control the anti-torque thrust the same as they would in a conventional helicopter.

The wings on the X3 play a key role in its performance. The added lift they produce minimizes the need for lift from the main rotor. Consequently, once 60 kts has been achieved, the collective is lowered. However, this does not cause the main rotor to enter an autorotative state. It merely reduces its RPMs to a point where drag is minimized.

"Fin flaps are used in cruise flight to counteract the main rotor torque," Eglin said. "Of course, we have less power on the main rotor, so a very small setting is sufficient." Wing and horizontal stabilizer flaps are used

to pitch the aircraft, not the rotor disk. "It is very easy to fly," boasted Ferrier. Before being escorted out to the X3, I pulled weather for KAFW. The winds were 160 at 12 kts gusting to 17, with a temperature/dew point spread of 34/18.

It's a tall ship, standing at what I would guess is about 12 feet high. The engine nacelles bulge farther out than the EC155 it was bred with, probably to house the engines and transmission. Inside, the aircraft looks like a standard Dauphin with decorative trim panels missing. (Engineers prefer having easy access to a test bed's cables, wires and structural members.) The aft cabin was stuffed with flight test gear and an engineer's station.

The instrument console—as well as the ceiling-mounted starter and fuel management quadrants—is standard AS365 and EC155 fare, with just two major exceptions. First, and most obvious, is the throttle con-

trol lever (TCL) on the right side of the center console. It looks like the throttle in a fighter jet, but with three times the travel. The other unusual item is a square, LCD display located on the main instrument panel. It's called the power management display (PMD), and provides a digital view of how the TCL is set, and how much power it's delivering to the propellers—amounts that will vary between the left and the right prop during flight. As I got settled into the left front seat, senior X3 test pilot Hervé Jammayrac, clad in a powder blue Eurocopter flight suit, saddled up on the PIC side. Behind us was Dominique Fournier, the flight engineer. Jammayrac and Fournier went through a before-start checklist, followed by an engine start procedure very similar to the one used for the AS365 Dauphin.

As the No. 1 engine spooled up, so did the main rotor and both propellers—proof

that only one transmission drives all three spinning members. Once the second engine was online and everything was ready, Jammayrac gave me a quick lesson on how to read the special instrument aboard the X3, and we were ready to roll. Taxiing the X3 requires the same technique used in an airplane: Just give it some gas to start moving, and steer with the pedals. The only difference is in how the X3's throttle is manipulated. In the X3, the TCL on the center console isn't touched. Forward thrust is applied by thumbing a small, momentary-contact, hat switch mounted on the collective. Push it forward to increase the power, tap it backwards to decrease it. The TCL moves forward and back as the hat switch is actuated, but is only manipulated by hand as an emergency procedure if the hat switch fails. (The logic behind that design would become apparent to me soon.)

Once we were cleared for take-off, the procedure was simple: Just lift the X3 off the ground and hover it like any other helicopter. In a 10-foot hover, the hydraulically boosted controls felt a little heavy to me, but I was still able to hold it over a spot, and do some pedal turns with little effort. In fact, it spun through a 15-kt quartering tailwind without protest. "Are you ready to go flying?" asked Jammayrac. "Yes, sir," I replied. "All you have to do is push the throttle switch forward," he instructed. "Don't do anything else." And that was when the X3 stopped being a helicopter and became a King Air!

Regardless of whether I "beeped" the throttle hat switch on the collective or held it forward, I could feel the power come in. At 60 KIAS, Jammayrac told me to lower the collective all the way down. It didn't feel natural at that speed while still 10 feet off the deck, but I did as instructed. By the way, it was at that moment I understood the logic behind controlling the throttle with the hat switch instead of the jet-like throttle lever: You need to simultaneously have your hand on the collective

and thumb on the throttle when transitioning between flight modes that close to the ground! Bumping the hat switch forward changed everything. Almost instantly, the thrust developed by the props pushed me back into my seat. "It just doesn't feel right," I said without bothering to key my microphone. "I'm moving at corporate-plane speed with the collective down!"

Climb out was both thrilling and abnormal. As covered in the briefing, the rotor disk remains at a zero-degree pitch, so aft cyclic isn't used. Instead, there's a hat switch on the cyclic that changes pitch during forward flight above 60 KIAS. When I beeped it back,



The X3's instrument panel varies little from its cousin the EC155. The primary differences are the test gear mounted atop of the glare shield, a special power management display (PMD) for the propellers (circled), and the thrust control lever (indicated by the arrow).

the horizontal surface on the tail of the X3 pointed the nose up, and the ship climbed into the air with great ease.

At 2,000 feet MSL at an airspeed of 167 KIAS, the X3 demonstrator handled like a twin turboprop airplane. Turns were accomplished by deflecting the cyclic to the left and right, speed changes by bumping the hat switch on the collective, and altitude adjustments were the responsibility of the switch on the cyclic. The onboard computers pretty much handled coordinating the turns, as well as keeping the aircraft trimmed.

Exploring the X3's envelope at altitude was surreal. It offered the surroundings of a helicopter, but the performance of a fast plane. I wish I could have taken

a video of the return to KAFW, but had my hands full. Jammayrac had me shoot my approach fast, as if in an airplane. As a guy with precious little fixed-wing time, it required my undivided attention. The X3 handled just as smoothly on the descent to the runway as it did when I was twisting and turning it over the Texas countryside. The odd part for me was to be in a "helicopter" on a two-mile final, pitched down, doing 100 KIAS, collective on the floor, and tweaking my rates of closure and descent with two thumb switches. Somewhere around 2,500 feet out from the touchdown zone, every bone in my body wanted to start slowing down. But Jammayrac insisted that I keep the speed up until he gave me the word to back off on the throttle. It seemed to take forever—a pretty funny illusion, considering our speed—but at about 100 feet off the deck and 1,000 feet from our touchdown point, he finally gave me permission to slow down.

The same way advancing the throttle smartly pushed me back in the seat during takeoff, holding the switch back pulled me into the harness as if I had just hit the brakes. Of course, the entire approach could have been made at a crawl—or straight down—but the purpose of that technique was to demonstrate the responsiveness of

the propellers to power demands, and to show that the X3 could have also landed like a corporate plane had I kept the speed up. As my intended touchdown point began to disappear under the X3's nose, it occurred to me that in order to land in helicopter mode, I would have to transition soon. There's a blue range on the propeller and power torque display that tells the pilot when to switch, but it's easy to figure out without it: When your speed drops below 60 KIAS and the ship begins to settle, add collective. The main rotor wakes up, the propellers counteract the torque, and it's a helicopter again! Whether it's in rotorcraft or hybrid mode, the X3 concept looks like a winner. 🚁



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Civil Helicopter Training Programs

AgustaWestland AW109 – Sesto Calende

AgustaWestland AW139 – Kuala Lumpur (2013), New York, Sesto Calende

Bell 212 – Dubai

Bell 412 – Bengaluru, Dubai, Mexico City, Stockholm

Eurocopter AS332L/L1 Super Puma – Stavanger

Eurocopter AS332L2 Super Puma – Aberdeen

Eurocopter AS350B2 Astar – Phoenix

Eurocopter AS365 Dauphin – Bengaluru

Eurocopter EC-225 – São Paulo (2014)

HAL Dhruv – Bengaluru

Sikorsky S-61 – Stavanger

Sikorsky S-76B, S76C+ – New York

Sikorsky S-76C++ – São Paulo (2012), Vancouver, Zhuhai (2012)

Sikorsky S-92 – Rimba (2014), São Paulo (2014), Stavanger (2014)

2012 ROTORCRAFT TRAINING GUIDE

Photo by Ian Frain

First of a multi-part *R&W* Training Guide
focuses on Australia, Europe, South
Africa and the United States.

Aeromega G-RALA Robinson R44, which the author trains in.

There is and will always be room and need for qualified and experienced pilots and crews to fill the parapublic, corporate or offshore roles. Why one may ask, is this assured in the current economic climate? There are many answers to this, and for which one looks at the offshore marketplace. The oil will always be found, and there is no immediate sign that the wells around the world will dry up within the decade. In the North Sea, some of the crews filling either the right or left hand seat of a Eurocopter AS332L2 or Sikorsky S-76, came up via military service. In this case a Bristow pilot could conceivably be ex-British Army Air Corps, Royal Navy Fleet Air Arm or looking further south at Inaer's (Helisur-este, Helisca) whereby the crew could be a product of the FAMET (Army Aviation) and entered the commercial world. The parapublic marketplace is increasing with new equipment such as the Eurocopter EC145T2, and the AgustaWestland AW169 coming over the horizon into service within the next few years, requiring good crews. Then military budgets found themselves being slashed, so following on that a smaller intake of pilots thereafter and less individuals retiring or leaving before time for the other side of the fence. A sizable number of commercial helicopter pilots who went through the U.S. military during the Vietnam War era, are in the retirement bracket.

There were a sizeable number of pilots who got their experience and training via the civil route who complemented their ex-military colleagues on the flight deck, if not outnumbering them in the company. Those who earned their CPL-Hs (Commercial Pilots License-helicopter) and ATPL (Airline Transportation Licenses) by paying their own way or some lucky few managed to pass stringent interviews and psychometric testing and PPL (Private Pilots License) with the operators and be sponsored.

Though not to be forgotten who make up the majority of the also those who hold PPL-H, which could range from the enthusiast/recreational pilot/owner for there are quite a few schools that do just provide the PPL course and no more. Then there are those who want to pursue a career but start off gently by achieving their PPL and then build up hours, add more ratings followed by flight instructors course.

The downside of the economy is the drying up of the student well due to cost unless the training school is part of a bigger operation whereby the income comes from day-to-day tasks and general duties. In the case of less-than-needed or a lack of students, then unfortunately schools have been known to close. However it is not all doom and gloom as in the case of one or two have started up in the last year, such as the Virage Helicopter Academy in Beccles in the county of Suffolk

in UK with a single S-300 solely providing its PPL course.

This training guide reflects the areas in the world market where the current and next generation of successful crews will probably graduate from. This first part of a comprehensive list that *Rotor & Wing* will explore in the coming months gives both large and small schools around Europe and North America and Australasia, with some examples from to sunnier climes in South Africa and Australia. The examples include Bristow Academy located primarily in Florida, on Cape Kennedy's doorstep, and to British Columbia-based Chinook Helicopters, where one can train in the classic Bell 47. The major manufacturers are included, such as AgustaWestland in Italy and the U.S., Bell Helicopter located in Texas and Eurocopter located in Europe and U.S.

Fundamentally the guide states: What is around and where; What curriculum is offered; What types that can be trained on; What special additional courses are available; What certifications and cross certifications are available from what schools; and In-house MRO capabilities. In the future, we'll address the former eastern Europe and Russian states to see how they are entering the commercial training marketplace, and focus on other smaller countries in the Pacific region (both Southeast Asia and Latin America) as well as the Middle East. ✈

AUSTRALIA

Aeropower Ltd

Redcliffe Airport
(61) 7 3204 1280
Fax: (61) 7 3204 1260
<http://www.aeropower.com.au/flightSchool/index.htm>
Types: R22, R44, S300, EC120, B206
Certification: CASA
Ab Initio: Yes
Sling load training done with S300
Additional Notes: Other ratings conversion available upon request
Low level flight taking place below 500 feet

Airwork Helicopters

Cabootture Airport
(61) 75495 8000
Fax: (61) 7 5495 8008
info@airwork.com.au
<http://www.airwork.com.au>
Types: R22, B47, S300, B206, MD500, AS350, B205
Certification: CASA
Ab Initio: Y

Austcopters Pty Ltd

Archerfield Airport
(61) 7 3274 1477
Fax: (61) 7 3274 3920
lsnell@austcopters.com.au
<http://www.austcopters.com.au>
Types: R22, R44
Certification: CASA
Ab Initio: Y

Becker Helicopters

Sunshine Coast Airport
(61) 7 5448 9888
Fax: (61) 7 5450 7266
enquiry@beckerhelicopters.com
<http://www.beckerhelicopters.com>
Types: R22, R44, B47, AS350, AW119, AW109, B206
Certification: CASA

Ab Initio: Y
MRO: Y
Additional Notes: 1 x GeoSim Bell206 synthetic trainer
Team Building course and Physical Training included in military flight school

Bankstown Helicopter (also include Central West Helicopter)

Bankstown Airport
(61)2 9791 0500
<http://www.bankstownhelicopters.com.au>
Types: R22, R44, B206, AS350
Certification: CASA
Ab Initio: Y

Blue Tongue Helicopter Services

Sunshine Coast Airport
(61) 7 544 88166
Fax: (61) 7 54 488447
<http://bluetonguehelicopters.com.au/training>
Types: B47
Certification: CASA
Ab Initio: Y

Chopperline Academy

(61)7 55993445
Fax: (61)7 55366242
info@chopperline.com
<http://chopperline.com/helicopter-licence-course/>
Types: R22, R44
Certification: CASA
Ab Initio: Y
MRO: Y
Additional Notes: R22; R44; H300; H500; B47; B47T; B206; B407; AS350; AS355; EC120; EC135 endorsements

Fleet Helicopters

Armidale
mail@fleethelicopters.com.au
<http://www.fleethelicopters.com.au>
Types: R22, R44
Certification: CASA
Ab Initio: Y

Helibiz

Gold Coast Airport
(61) 7 4946 9422
info@helibiz.com
<http://www.helibiz.com>
Types: R22, R44, EC120, AS350
Certification: CASA
Ab Initio: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Heliwest Group

Jandakot Airport
(61) 8 9499 7700
Fax: (61) 8 9414 1080
fly@heliwest.com.au
<http://www.heliwest.com.au>
Types: R44
Certification: CASA
Ab Initio: Y

Kestrel Aviation

Mangalore Airport
(61) 3 5796 2373
Fax: (61) 3 5796 2449
admin@kestrelaviation.com.au
<http://kestrelaviation.com.au/services/training-solutions/>
Types: R22
Certification: CASA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Mackay Helicopters

(61)7 4944 0455
<http://www.mackayhelicopters.com.au>
Types: B206
Certification: CASA
Ab Initio: N
MRO: Y
Additional Notes: Curry Kenny has flight school called Chopperline Academy to call up additional IFR/MPT captains
Has GeoSim simulator and Australia's only IFR certified Bell 206

Melbourne Helicopters

Essendon Airport
(61) 3 9374 7500
Fax: (61) 3 9374 4099
info@melbourneheli.com
http://melbournehelicopters.net.au/Training-Flight_Training.html
Types: R22, R44
Certification: CASA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Precision Helicopters

Coffs Harbour Airport
(61) 2 6652 9988
Fax: (61) 2 6652 5688
info@precisionhelicopters.com.au
<http://www.precisionhelicopters.com.au/page4.htm>
Types: R22
Certification: CASA
Ab Initio: Y
MRO: Y

FRANCE

ABC Helicopteres Aerodrome de Nory

(33) 1 69 90 14 18
Fax: (33) 1 69 90 16 23
alain@abchelicco.com
<http://www.abchelicco.com>
Types: H300
Certification: EASA/JAA
Ab Initio: Y
MRO: Y

Air & Compagnie Aerport Toussus le Noble

(33) 1 39 56 05 26
Fax: (33) 1 39 56 67 24
contact@airetcompagnie.com
<http://www.airetcompagnie.com/>
Types: R22, R23, R24
Certification: EASA/JAA
Ab Initio: Y

Azur Helicopter Aerport de Cannes

(33) 4 93 90 40 70
Fax: (33) 4 93 90 40 80
info@azurhelicco.com
<http://www.azurhelicco.com>
Types: R22, R44, EC120, AS350
Certification: EASA/JAA
Ab Initio: Y

Eurocopter Training Services

Marseille Provincial International Airport
(33) 4 42 85 60 08
<http://www.eurocoptertrainingservices.com>
<http://www.azurhelicco.com>
Types: AS350, AS355, AS365, AS332, EC120, EC130, EC135, EC145, EC155, EC175, EC225, EC725, EC225, EC635
Certification: EASA 147, CCAR 147, TOCA 147, CASR 147

Ab Initio: Y
MRO: Y
Additional Notes: Customer Training, also maintenance training
Training with different types within the same family of aircraft is Difference Training
Specific Training is for operating safely in context of particular mission
Approvals from Australia, Canada and China
Application of Safety Management System

Golf Tango Helico

Chateaufort
(33) 6 12 71 84 72
Fax: (33) 1 69 32 14 99
info@golf-tango.com
<http://www.golftango.com>
Types: R22, R44, AS350
Certification: EASA/JAA
Ab Initio: Y
Additional Notes: Beginning to get Flight Crew Licensing FCL

Helicentre

Noyers
(33) 6 07 77 17 32
<http://helicentre.pagesperso-orange.fr/>
Types: R22, R44
Certification: EASA/JAA
Ab Initio: Y

Heliclass

Aix En Provence
JAA@heliclass.com
<http://www.heliclass.com>
Types: R22, R44, AS350, B206
Certification: EASA/JAA
Ab Initio: Y
Additional Notes: Has school in USA at Van Nuys Airport - Heliclass USA

Heli Securite Academy

St Tropez
(33) 4 94 555 999
contact@helsecurite.fr
<http://www.helicopter-saint-tropez.com/pages/english/helitainingacademy-gb.html>
Types: R22, R44
Certification: EASA/JAA

Helidan

Aerodrome De Toussus Le Noble
(33) 1 39 56 16 92
Fax: (33) 1 39 56 2936
helidan@club-internet.fr
<http://www.helidan.fr>
Types: R44, S300, SA315, AS350, EC120, B206
Certification: EASA/JAA

Heli-Union Training Centre

Brie-Champniers Airport
(33) 5 45 90 33 30
Fax: (33) 5 45 90 33 33
info@heli-union-training-center.com
<http://www.heli-union.com/helicopter/Helicopter-Training-School.html>
Types: S300, EC120, AS365
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes:

Heli Union has FTD and FNP2 simulators
They train pilots in particular for their own fleet which varies from mainly Eurocopter and Sikorsky airframes

Heli Oxygene

l'aerodrome de Saint-Cyr-l'Ecole
(33) 1 39 42 05 68
contact@helioxygene.com
<http://www.helioxygene.com/>
Types: R22, R44, EC120, AS350
Certification: EASA/JAA
Ab Initio: Y
Qualifications: FCL2
Additional Notes: Also can do conversions of a license that has been issued by a foreign country

Mont Blanc Helicoptere

Annemasse
(33) 4 50 92 78 00
Fax: (33) 4 50 38 01 01
info@mbh.fr
<http://www.mbh.fr/>
Types: R22, R44, AS350
Certification: EASA/JAA

Rotor Angouleme

Aerodrome d'Angouleme
(33) 545 93 68 60
Fax: (33) 545 93 68 62
plemoine@rotor-france.com
<http://www.rotor-france.com/baserae.html>
Types: B47, R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Authorized Bell Helicopter Service Center

GERMANY

AHS Air

Stralsund
(49) 3831 26 30 10
Fax: (49) 3831 26 30 15
<http://www.ahs-air.de>
Types: H300, AS350, EC120
Certification: EASA/JAA
Ab Initio: Y
Air Lloyd
Bonn Hangelar
(49) 2241 230731
schulung@airlloyd.de
<http://www.airlloyd.de>
Types: R22, R44, B206, B0105
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

BHL Bodensee Helicopter

Frederichshafen Flugplatz
(49) 75 41 304985
Fax: (49) 75 41 30 7635
<http://bodensee-helicopter.de>
<http://www.bodensee-helicopter.de/>
Types: R22, R44, B206
Certification: EASA/JAA
Ab Initio: Y

DND Heliservice

Brandenberg
(49) 35204 47101
Fax: (49) 35204 47101
dhd-heliservice@t-online.de
<http://www.dhd-heliservice.de/html/flugschule.html>
Types: H269, H369
Certification: EASA/JAA
Ab Initio: Y

Eurocopter Training Academy

Donauwoth
(49) 906 714481
Fax: (49) 906 714499
trainingacademy@eurocopter.com
http://www.eurocopter.com/site/en/ref/Training-Academy-Donauwoth_1070-1080.html
Types: B0105, BK117, EC120, EC135, EC145
Certification: EASA/JAA
Ab Initio: N
MRO: Y
Additional Notes: EC135 Full Flight Simulator (FSS Level B) is a full motion simulator approved by LBA

Hanseatic Helicopter Service

Hamburg
(49) 40 54802997
office@hanseatic-helicopter.de
<http://www.hanseatic-helicopter.de/flugschule/>
Types: H269, R44
Certification: EASA/JAA
Ab Initio: Y

Heli Air GmbH

Baden Airpark
info@heli-air.de
<http://www.heli-air.de/flugschule/index.html>
Types: R22, R44, AS350
Certification: EASA/JAA
Ab Initio: Y

Heli Aviation GmbH

Augsburg Airport
(49) 821 747965 16
Fax: (49) 821 747965 0
info@heli-aviation.de
<http://www.heli-aviation.de>
Types: R44, AS350, AS365, B0105, R44, Cabri
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Heli-Flight GmbH

Reichelsheim Flugplatz
(49) 6035 91000
rank@heli-flight.de
<http://www.heli-flight.de>
Types: R22, R44, R66
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Heli Trans Air European Air Services GmbH

Flugplatz Egelsbach
(49) 6103 94 15 0
Fax: (49) 6103 94 15 55
info@helitransair.com
<http://www.helitransair.com/schule/ausbildung/index.html>
Types: R22, R44, EC120, Cabri
Certification: EASA/JAA
Ab Initio: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Heli Viaggi

Erlangen
(49) 9131 771552
Fax: (49) 9131 771505
info@hubschrauberschulung.de
<http://www.hubschrauberschulung.de>
Types: H269
Certification: EASA/JAA
Ab Initio: Y

Hubschrauber Akademie

Augsburg Flughafen
(49) 821 705075
Fax: (49) 821 705077
info@hubschrauber-akademie.de
<http://www.hubschrauber-akademie.de/>
Types: H269
Certification: EASA/JAA
Ab Initio: Y

LGM Luftfahrt GmbH

Mannheim City Airport
(49) 621 328180
info@lgm-mannheim.de
<http://www.lgm-mannheim.de/helikopterpilot.php>
Types: R22, R44, EC120, S300
Certification: EASA/JAA
Ab Initio: Y
Additional Notes: Has FNPT II instrument trainer

Rotorflug GmbH

Egelsbach Flugplatz
(49) 6103 202 8746
Fax: (49) 6103 202 8748
egelsbach@rotorflug.de
<http://www.rotorflug.de/de/flugschule/>
Types: R22, R44
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

ITALY

AgustaWestland Training Academy

Sesto Calende
(39) 0331 915096
Fax: (39) 0331 915145
stefano.biagini@agustawestland.com
<http://www.agustawestland.com>
Types: AW109, AW119, AW139
Certification: EASA/JAA, Part 142
Ab Initio: N
MRO: Y
Additional Notes: Customer training for AgustaWestland products. Has JAR-STD-1H Level D simulator for AW109 and AW139
Also FAA
FAA Part 142

Air Corporate

Airport Centre via Monte Baldo
(39) 45 8600910
Fax: (39) 45 8618105
<http://www.aircorporate.it/rto.html>
Types: AS350, AS365
Certification: EASA/JAA
Ab Initio: N
MRO: Y

Alidaunia Srl

Palermo
(39) 881 617961
Fax: (39) 881 617960
<http://www.alidaunia.it>
Types: AW109, BK117, S76, R22
Certification: EASA/JAA
Ab Initio: Y
MRO: Y

Air Service Centre

Frazione Fabbrica Arena Po
(39) 385 272117
Fax: (39) 385 272357
scuola@airservicecenter.com
<http://www.airservicecenter.com/aso/ScuolaVolo.aspx>
Types: S300
Certification: EASA/JAA
MRO: Y

Airgreen

Robassomero
(39) 119236370
Fax: (39) 11 9235885
info@airgreen.it
<http://www.airgreen.it>
Types: R22, AS350, SA315, AW109, B412, AW139, EC135
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Type Rating Type Organization
Recognized Pratt & Whitney maintenance facility

Agusta Westland Service Centre

Butterfly Helicopters
Pisa
(39) 733 288 151
Fax: (39) 733 288 151
info@butterflyhelicopters.com
<http://www.butterflyhelicopters.com>
Types: AS350
Certification: EASA/JAA
Ab Initio: N
Additional Notes: Type Rating Training Organization

Elicompany

Carpi
(39) 59 660 344
Fax: (39) 59 660 344
info@elicompany.it
http://www.elicompany.it/flotta_frameset.htm
Types: R22
Certification: EASA/JAA
Ab Initio: Y
MRO: Y

Elfriglia

c/o Aeroporto F.V.G. Piazzetta Luigi Coloatto, 1
(39) 481 778901
Fax: (39) 481 778902
school@elfriglia.it
<http://www.elfriglia.it/>
Types: R22, R44, AS350, AS365, EC135, AW109
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Elgibili

Pilano
(39) 55 866 57 70
Fax: (39) 55 866 71 866
info@elgibili.com
<http://www.elgibili.com/home.aspx?sid=aaec6da-be732470c87aa0d2c50fd60e1&lang=ita>
Types: R22, AS350
Certification: EASA/JAA
Ab Initio: Y

Elisem

Suimona
(39) 864 251676
Fax: (39) 864 253768
scuola@elisem.it
<http://www.elisem.it>
Types: R22
Certification: EASA/JAA

Heligrup

http://www.heligrup.it/scuola_volo
Types: R22, R44, AS350
Certification: EASA/JAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Center

SOUTH AFRICA

Base 4 Flight Academy

Cape Town International Airport
(27) 21 934 4405
Fax: (27) 21 934 4406
reception@base4.co.za
http://www.base4.co.za/flight-academy.html
Types: R22, R44, B206
Certification: SACAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

BAC Aviation

Greystones Heliport
(27) 35 7973610
Fax: (27) 35 7975314
mickyj@bell.co.za
http://www.bacaviation.com/helicopter-training
Types: R22
Certification: SACAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Civair

Cape Town International Airport
(27) 21 934 4488
jeff@civair.co.za
http://www.civair.co.za/cape-town-helicopter-training
Types: R22, B206
Certification: SACAA
Ab Initio: Y

Hover Dynamics

Grand Central Airport
(27) 11 315 1834
Fax: (27) 11 805 3914
reception@hoverdynamics.co.za
http://www.hoverdynamics.co.za/
Types: R22
Certification: SACAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

National Airways Corporation (43 Air School)

Lanseria Airport
(27) 11 267 5000
Fax: (27) 11 267 5054
gary.phillips@nac.co.za
http://www.nac.co.za/
Types: R22, B206
Certification: SACAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Also has R22 and B206 simulator

Starlite International Training Academy

Virginia Airport
(27) 44 692 0006
Fax: (27) 86 502 3307
http://www.starliteaviation.co.za/training/private-pilots-license
Types: R22
Certification: SACAA
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

UNITED STATES

Alyeska Helicopters LLC

Anchorage
(1) 907 277 2007
Fax: (1) 907 277 2009
info@alyeskahelicopters.com
http://www.alyeskahelicopters.com
Types: R22, R44
Certification: EASA Part 61
Ab Initio: Y

Group 3 Aviation

Anchorage
(1) 907 243 0147
group3@group3helicopters.com
http://group3helicopters.com
Types: R22, R44, S300
Certification: Part 61, Part 141
Ab Initio: Y
Additional Notes: Part of Group 3 Aviation based at Van Nuys

Gold Coast Helicopters

Glendale Municipal Airport
(1) 623 935 3388
(1) 623 935-6568
FlightOps@goldcoasthelicopters.com
http://www.goldcoastflighttraining.com
Types: R22, B206
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Also provides fixed-wing training
Authorized Robinson Helicopter Service Center

Phoenix Helicopters

Mesa
(1) 480 654 8984
kris@phxheli.com
http://www.phxheli.com
Types: R22, R44
Certification: Part 141
Ab Initio: Y

Quantum Helicopters Inc

Chandler
(1) 480 814 8118
Fax: (1) 480 814 8737
neljones@quantumhelicopters.com
http://www.quantumhelicopters.com
Types: R2, R44, R66
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Provides R66 transitional course
Authorized Robinson Helicopter Service Center

Universal Helicopters Inc

Scottsdale Airport
(1) 480 951 6283
Fax: (1) 480 951 6285
Info@universalheli.com
http://www.universalheli.com/
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: N
MRO: Y
Additional Notes: Also provides rotary wing flight training to Embry Riddle University at Prescott Love Field as part of Aerospace Science – Helicopter Have schools located in Utah and Kansas
Authorized Robinson Helicopter Service Center

American Helicopters LLC

Fresno Airport
(1) 559 233 4411
Fax: (1) 559 233 4411
nyipilot@yahoo.com
http://www.renthelicopters.com/
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
Additional Notes: Also provides fixed-wing flying training

California Aviation Services

Riverside
(1) 951 354 5274
Fax: (1) 951 354 5219
http://californiaaviationservices.com
Types: R22, R44
Certification: Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Also Robinson Helicopter Dealer-ship & Service Center
Police aircrew training due to contracted out by local authority such as Fontana-San Bernardino
Turbine transition on ad hoc aircraft

Civic Helicopters

Carlsbad
(1) 760 438 8424
Fax: (1) 760 438 0451
inquiries@civichelicopters.com
http://www.civichelicopters.com
Types: R22, R44, S300, B206
Certification: Part 61, Part 141
Ab Initio: Y
Additional Notes: Also has FLYIT FAA-approved VFR and IFR trainer simulator
Turbine conversion also in MD500 but a/c not in fleet
Authorized Robinson Helicopter Service Center

Corporate Helicopters

San Diego
(1) 858 505 5650
Fax: (1) 858 505-5658
http://www.corporatehelicopters.com
Types: R22, R44, B206, AS350
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Also has FLYIT FAA approved VFR and IFR trainer simulator
Authorized Robinson Helicopter Service Center

Eurocopter Service Centre

Cutting Edge Helicopters
McClellan Airfield
(1) 916 760 8404
Fax: (1) 916 641 8969
http://cehusa.com/
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Group 3 Aviation

Van Nuys Airport
(1) 818 994 9376
group3@group3aviation.com
http://www.group3aviation.com
Types: R22, R44, S300, B206
Certification: Part 61, Part 141
Ab Initio: Y
Additional Notes: Also do fixed-wing training and have school in Alaska
Authorized Robinson Helicopter Service Center

Helipro Inc

San Luis
(1) 805 543 2713
info@helitraining.com
http://helitraining.com/index.php?lang=en
Types: R22
Certification: Part 141
Ab Initio: Y
Additional Notes: Founded by Pete Stahl, more emphasis on assisting prominent students from Germany, Switzerland, Austria
Also able to get JAR license from FAR license

Heliclass

Van Nuys Airport
(1) 661 253 1437
info@heliclass.com
http://www.heliclass.com
Types: R22, R44, B206
Ab Initio: Y
Additional Notes: Has school at Aix en Provence in France

Helistream

John Wayne Airport
(1) 714 662 3163
http://helistream.com
Types: R22, R44, R66, B205, MD500
Certification: Part 61, Part 141
Ab Initio: Y

LA Helicopters

Van Nuys Airport
(1) 562 377 0396
Fax: (1) 562 377 0449
training@lahelicopters.com
http://www.lahelicopters.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Robinson Helicopter Service Center
Authorized Rolls-Royce Service Center for RR300
Transition courses for R66, AS350, B206, AW109
Offsite training on request for S300, MD500/520N, B407, BV107/BV234

Mazzei Flying Service

Fresno International Airport
 (1) 559 251 7501
<http://www.flymfs.com>
 Types: R22, B206
 Certification: Part 141
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Orbic Air LLC

Van Nuys Airport
 (1) 818 988 6532
 Fax: (1) 818 988 2014
fly@orbicaire.com
<http://orbicaire.com/c-259814-training.html>
 Types: R22, R44, R66
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Robinson Helicopters Inc

Torrance
 (1) 310 539 0508
 Fax: (1) 310 539 7594
courses@robinsonheli.com
<http://www.robinsonheli.com>
 Types: R22, R44, R66
 Ab Initio: N
 MRO: Y
 Additional Notes: Robinson Helicopter Safety Course
 Customer Training
 Test flying

Frontier Helicopters

Fort Collins
 (1) 970 663 7200
info@frontrangehelicopters.com
<http://frontrangehelicopters.com>
 Types: R44, S300, B206
 Certification: Part 61, Part 141
 Ab Initio: Y

TYJ Global

Broomfield
 (1) 303 635 0496
<http://www.tyjglobal.us/>
 Types: S300, R44
 Certification: Part 61, Part 141
 Ab Initio: Y
 Additional Notes: Have Helleg invention to enable students with paralysis such as military vets to be able to fly, as this is fitted to the R44

Kaman Helicopters

Bloomfield
 (1) 860 243 6377
 Fax: bob.manaskie@kaman.com
<http://www.kaman.aero.com>
 Types: KMAX, SH2, HH43
 Ab Initio: N
 MRO: Y
 Additional Notes: Provide training to customers like Royal New Zealand Air Force, Polish Navy, Egyptian Navy
 For civilian K-MAX operators utilizing the Kaman Husky

Sikorsky

Stratford
 (1) 800 946 4337
<http://www.sikorsky.com>
 Types: S76, S92
 Ab Initio: N
 MRO: Y
 Additional Notes: Customer training in alliance with FlightSafety International

North East Helicopter Flight Services LLC

Ellington Airport
 (1) 860 871 2054
 Fax: (1) 860 875 2861
<http://www.northeasthelicopters.com/>
 Types: R22
 Certification: Part 141
 Ab Initio: Y
 MRO: Y

Horizon Helicopters Inc

Newark
 (1) 302 368 5135
 Fax: (1) 302 368 4438
<http://www.horizonhelicopters.com>
 Types: F280, B206
 Certification: Part 61, Part 141
 Ab Initio: Y

Air Orlando

Orlando Executive Airport
 (1) 407 896 0721
<https://flyairorlando.com>
 Types: R22, R44, S300
 Certification: Part 61, Part 141
 Ab Initio: Y
 MRO: Y

Boca Raton Helicopters

Boca Raton
 (1) 561 290 9700
info@bocaratonhelicopters.com
<http://bocaratonhelicopters.com>
 Types: R22, R44
 Certification: Part 61

Bravo Helicopters LLC

Kendall-Tamiami Airport
 Bravo-Helicopters@yahoo.com
<http://flybravohelicopters.com>
 Types: R22, R44, 206
 Ab Initio: Y

Bristow Academy Inc

Titusville
 (1) 321 385 2919
 Fax: (1) 321 267 1061
<http://www.heli.com>
 Types: S300, R22, R44, B206
 Certification: Part 61, Part 141, EASA
 Ab Initio: Y
 MRO: Y
 Additional Notes: Military Training Program (MTP) can be customized to customer needs, training carried out with on Schweizer or Bell 206. Training can also be carried out in customers country
 Other specialised training for the MTP can include maintenance test pilots, type transition and operational training.
 Combined FAA/EASA CPL course
 Primary customer for Bristow Academy being Bristow Group
 Authorized Robinson Helicopter Service Center

Cloud 9 Helicopters LLC

West Palm Beach
 (1) 561 799 3636
info@cloud9helicopters.com
<http://www.cloud9helicopters.com/>
 Types: R22, R44, S300, MD500, B206, AW109
 Certification: Part 61, Part 141, EASA
 Ab Initio: Y
 MRO: Y
 Additional Notes: Has combined JAA qualification course, also NVG course coming soon
 Turbine transition for the AW109 is primarily for the Grand
 Authorized Robinson Helicopter Service Center

Florida Coast to Coast Helicopters

Pompano Beach Airpark
 (1) 954 943 5353
Instruction@fcochi.com
<http://www.floridacoasttocoasthelicopters.com>
 Types: R22, R44
 Certification: Part 61
 Ab Initio: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Florida Suncoast Helicopters

Sarasota
 (1) 941 355 1259
info@floridasuncoasthelicopters.com
<https://floridasuncoasthelicopters.com>
 Types: R22, R44
 Ab Initio: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Helicopter Academy.com LLC

Hollywood/North Perry Airport
 (1) 954 525 9747
helicademy@aol.com
<http://www.helicopteracademy.com>
 Types: R22
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: Helicopter Academy has nationwide locations
 Authorized Robinson Helicopter Service Center

London Helicopters Inc

Naples Municipal Airport
 (1) 239 643 4468
 Fax: (1) 239 643 7129
info@londonaviation.com
<http://www.londonaviation.com>
 Types: R22, B206
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Ocean Helicopters

West Palm Beach
 (1) 561 625 1900
<http://www.oceanhelicopters.com>
 Types: R22, R44
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: Long line training carried out in conjunction with VR Heli Academy
 Also accredited by Flight School Association of North America (FSANA)

Ocean Helicopters

West Palm Beach
 (1) 561 625 1900
<http://www.oceanhelicopters.com>
 Types: R22, R44
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: Long line training carried out in conjunction with VR Heli Academy
 Also accredited by Flight School Association of North America (FSANA)

Palm Beach Helicopters

Palm Beach County Airport
 (1) 1 866 527 0601
jamesd@palmbeachhelicopters.com
<http://www.palmbeachhelicopters.com>
 Types: R22, R44, B206
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: NVG training carried out in Lantana at Palm Beach County Airpark or at customer location
 NVG training is carried out on R44 and B206 airframes
 Authorized Robinson Helicopter Service Center

Pelican Flight Training

Pembroke Pines
 (1) 954 966 9750
 Fax: (1) 954 985 8271
pelicanftc@pelican-airways.com
<http://pelicanflighttraining.com>
 Types: S300
 Certification: Part 141
 Ab Initio: Y

Sun State Aviation

Kissimmee Gateway Airport
 (1) 407 944 3592
<http://www.sunstateaviation.com>
 Types: R44
 Certification: Part 61, Part 141
 Ab Initio: N
 Additional Notes: Primarily a fixed-wing school, the helicopter courses offered require experience and no ab initio as they are commercial and instrument courses. The commercial course requires 150 hours PPL as a prerequisite

Tallahassee Helicopters

Tallahassee Regional Airport
 (1) 850 841 1111
 Fax: (1) 850 538 0149
<http://tallahassee-helicopters.com>
 Types: R44
 Ab Initio: Y

Air Atlanta Helicopters

Delkab Airport
 (1) 770 458 7771
<http://www.airatlantahelicopters.com/>
 Types: R44
 Certification: Part 141
 Ab Initio: Y

Blue Ridge Helicopters

Gwinnett County Airport
 (1) 770 963 0590
rbcarr274@aol.net
<http://www.blueridgehelicopters.com>
 Types: R22, R44
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Prestige Helicopters

Chamblee
 (1) 770 458 6047
 Fax: (1) 770 451 7152
mrussell@prestigehelicopters.com
<http://www.prestigehelicopters.com/>
 Types: R22, R44
 Certification: Part 61
 Ab Initio: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

The Professional Helicopter Academy

Atlanta
 (1) 877 359 7421
<http://www.flypha.com>
 Types: R22, R44, S300
 Certification: Part 141
 Ab Initio: Y

Silver Hawk Aviation

Caldwell
 (1) 208 453 8577
 Fax: (1) 208 453 1538
fly@silverhawkaviation.net
<http://www.silverhawkaviation.net/home.html>
 Types: R22
 Certification: Part 61, Part 141
 Additional Notes: Authorized Robinson Helicopter Service Center

Utah Helicopter

(1) 801 794 2480
 Fax: (1) 801 794 2470
 info@utahhelicopter.com
 http://www.utahhelicopter.com/utah_helicopter/index.php
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Central Illinois Air Corporation

Mattoon
 (1) 217 234 8146
 http://www.flywithcia.com
 Types: R44, S300
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Freedom Helicopters

Indianapolis Metropolitan Airport
 (1) 317 432 4525
 info@freedomhelicopters.com
 http://www.freedomhelicopters.com
 Types: R22
 Ab Initio: Y

Iowa Helicopters

Ankeny Regional Airport
 (1) 515 240 4328
 copterjohn@gmail.com
 http://www.iowahelicopter.com
 Types: R22, R44
 Ab Initio: Y
 Additional Notes: Private tuition

Kansas State University

Salina
 (1) 785 826 2640
 k-state@k-state.edu
 http://www.salina.k-state.edu/aviation/helicopter.htm
 Types: R22, R44, S300
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: In partnership with Universal Helicopter

Crescent City Helicopters

New Orleans Lakefront Airport
 (1) 504 914 5955
 Fax: (1) 504 244 4449
 http://www.crescentcityhelicopters.com/
 Types: R22
 Ab Initio: Y

Era Training Center LLC

Lake Charles Airport
 jcalvo@eratrainningcenter.com
 http://www.eratrainningcenter.com
 Types: AW109, AW139, EC225, S76
 Certification: Part 61, Part 142
 Ab Initio: N
 MRO: Y
 Additional Notes: Primarily for Era Aviation pilots. Recurrent training on types used by Era Flight Simulation Training Devices used primarily

York County Helicopters

Sanford Airport
 (1) 270 651 4344
 dave@flightlineaviationservices.com
 http://www.yorkcountyhelicopters.com/
 Types: R22, R44
 Certification: Part 141
 Ab Initio: Y
 MRO: Y
 Additional Notes: Based and work at/with Southern Maine Aviation
 Authorized Robinson Helicopter Service Center

Advanced Helicopters Concepts

Frederick Flight Centre
 (1) 301 694 5313
 info@advancedhelicopter.com
 http://www.advancedhelicopter.com/site/
 Types: R22, R44, B206
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Blue Hill Helicopters

Norwood Memorial Airport
 (1) 781 688 0263
 info@bluehillhelicopters.com
 http://www.bluehillhelicopters.com
 Types: S300
 Certification: Part 141
 Ab Initio: Y
 Additional Notes: Has FlyIt flight simulator

East Coast Aero Club

Hanscom Field
 (1) 781 274 6322
 ecacbed@eastcoastaeroclub.com
 http://eastcoastaeroclub.com
 Types: R44
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Has other locations in New Hampshire area Boire Field and Norwood Memorial Airport
 Authorized Robinson Helicopter Service Center

North Andover Flight Academy

Lawrence Airport
 (1) 978 689 7600
 Fax: (1) 978 682 3788
 http://www.northandoverflightacademy.com
 Types: R22, R44
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Company has New England's only Authorized Robinson Helicopter Service Center which is MBM Helicopters
 Schools in Massachusetts and New Hampshire
 Enstrom Helicopter

Menominee

(1) 906 863 1200
 customerservice@enstromhelicopter.com
 http://www.enstromhelicopter.com
 Types: F2, F280, 480
 Ab Initio: N
 MRO: Y
 Additional Notes: Customer training for owners of Enstrom products or for those wishing to have Enstrom rating
 However to do the Turbine Course, the Piston Course is considered a prerequisite

Helicopter Air Speciality Service

Fowlerville
 (1) 517 223 7809
 dennisb@helicopterairspecialityservice.com
 http://www.helicopterairspecialityservice.com
 Types: R22
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Heliflight of Michigan

Oakland-Troy Airport
 (1) 248 543 6405
 http://www.heliflightofmichigan.com
 Types: R22, R44, S300
 Certification: Part 61
 Ab Initio: Y
 Additional Notes: Will be receiving Schweizer 300 shortly

Magnum Helicopters

Waterford
 (1) 248 730 1230
 Fax: (1) 248 666 2600
 alan@magnumheli.com
 http://www.magnumheli.com
 Types: R22, R44, B47, r66
 Ab Initio: Y
 Additional Notes: Authorized Robinson Helicopter Service Center
 new R66 for turbine transition
 Set up as FAA WINGS - Pilot Proficiency program

Complete Helicopters

Blaine
 (1) 763 780 2898
 http://www.completehelicopters.com
 Types: R22
 Ab Initio: Y

Hummingbird Aviation Inc

Flying Cloud Airport
 (1) 952 944 2628
 info2@hummingbirdhelicopters.us
 http://www.hummingbirdhelicopter.us
 Types: S300
 Certification: Part 141
 Ab Initio: Y
 MRO: Y

Lake Superior Helicopters LLC

Superior
 (1) 218 203 7095
 http://www.lakesuperiorhelicopters.com
 Types: S300, R44
 Certification: Part 61, Part 141
 Ab Initio: Y

Minnesota Helicopters

Blaine
 (1) 763 784 4354
 mnhelis@gmail.com
 http://www.mnhelicopters.com
 Types: R22, R44
 Certification: Part 61, Part 141
 Ab Initio: Y

Northern Helicopters

Hibbing
 (1) 218 262 0099
 info@NorthernHelicopters.com
 http://www.northernhelicopters.com
 Types: R22, R44, B206
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center
 Has Fly It simulator

Cape Copters

Cape Girardeau
 (1) 573 334 0540
 capecopters@yahoo.com
 http://www.capecopters.com
 Types: R22, R44
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

D and D Aviation

St Louis
 314 540 5260
 http://www.dandd-aviation.com/
 Types: R22, R44
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Helisat

Moscow Hills
 (1) 636 366 9110
 janet.wirtel@helisat.com
 http://www.helisat.com
 Types: S300
 Certification: Part 61, Part 141
 Ab Initio: Y
 MRO: Y
 Additional Notes: In spite of not operating R22 or R44, they still maintain an Authorized Robinson Helicopter Service Center

Midwest Helicopter

Spirit of St Louis Airport
 (1) 636 532 5613
 http://www.flymidwest.com
 Types: R22, S300
 Certification: Part 61
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

Canyon Lake Helicopters

Hamilton
 (1) 406 380 6842
 http://www.canyonlakehelicopters.com/training.html
 Types: S300
 Certification: Part 61, Part 141
 Ab Initio: Y
 Additional Notes: Schools also in Wyoming as well

Homestead Helicopters Inc

Missoula
 (1) 406 544 0402
 info@homesteadhelicopters.com
 http://www.homesteadhelicopters.com
 Types: B206
 Ab Initio: N

International Helicopter Services

Great Falls
 (1) 406 899 4483
 info@internationalhelicopterservices.com
 http://internationalhelicopterservices.com/
 Types: R22
 Certification: Part 141
 Ab Initio: Y

Northern Skies Aviation Inc

Laurel
 (1) 406 628 2219
 Fax: (1) 406 628 8439
 info@northernskies.com
 http://www.northernskies.com/training/helicopter/
 Types: S300
 Certification: Part 141
 Ab Initio: Y

Northern Skies Aviation Inc

Laurel
 (1) 406 628 2219
 Fax: (1) 406 628 8439
 info@northernskies.com
 http://www.northernskies.com/training/helicopter/
 Types: S300
 Certification: Part 141
 Ab Initio: Y

Rocky Mountain Rotors

Belgrade
 (1) 850 830 7467
 Fax: (1) 406 995 7826
 http://www.rockymountainrotors.com/index.php/flighttraining
 Types: R22, R44
 Ab Initio: Y
 MRO: Y
 Additional Notes: Authorized Robinson Helicopter Service Center

702 Helicopters

North Las Vegas Airport
(1) 702 271 7611
http://www.702helicopters.com
Types: R22, R44
Certification: Part 61
Ab Initio: Y

Monarch Sky

Henderson Executive Airport
(1) 702 631 0386
Fax: (1) 702 947 6578
info@monarchsky.com
http://www.monarchsky.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y

Reno Tahoe Helicopters

Lake Tahoe Airport
(1) 530 208 5247
claudio@RenoTahoeHelicopters.com
http://helitahoe.com
Types: R22, R44
Ab Initio: Y

C R Helicopters

Nashua
(1) 603 881 4356
Fax: (1) 603 578 5553
pilot@crhelicopters.com
http://www.crhelicopters.com
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Helicopter Flight Services

Medford
(1) 609 265 0822
Fax: (1) 609 265 1190
doug@helicopterflightservices.com
http://www.helicopterflightservices.com
Types: S300
Certification: Part 61, Part 141

Sky River Helicopters

Sky Manor Airport
(1) 908 809 5942
Fax: info@skyrh.com
http://www.skyriverhelicopters.com
Types: R22, R44
Certification: Part 61
Ab Initio: Y

Helicopter Flight Training Inc

Long Island McArthur Airport
(1) 631 467 2232
Fax: (1) 631 588 2780
http://www.helicopterflighttraininginc.com/
Types: R22
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Western New York Helicopters

Hamburg Airport
(1) 716 353 1144
brett@wnyhelos.com
http://www.wnyhelos.com
Types: S300, R44
Ab Initio: Y

Independent Helicopters

New Windsor
(1) 845 549 3755
independenthelicopters@gmail.com
http://independenthelicopters.com/
Types: R22, R44
Ab Initio: Y

Pegasus Flight

Linden Municipal Airport
(1) 908 862 7982
http://www.pegasusflight.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y

Heli Ventures Inc.

Concord Regional Airport
(1) 704 792 1807
Fax: (1) 704 792 1907
http://www.heliventuresnc.com
Types: S300
Certification: Part 61, Part 141
Ab Initio: Y

Total Flight

Louisburg
(1) 919 497 5511
Fax: (1) 919 853 7531
http://totalflight.com
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Hi-Tech Helicopters Inc

Elkin
(1) 336 366 3563
john@hitechhelicopters.net
http://www.hitechhelicopters.net
Types: S300
Ab Initio: Y
Additional Notes: Also has school in Pennsylvania
Authorised Sikorsky Global Helicopters Sales Center

UND John D Odegard School of Aerospace Sciences

Grand Forks
(1) 701 777 4934
flyund@aero.und.edu
http://flightops.aero.und.edu/
Types: S300, B206
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: University of North Dakota John D. Odegard School of Aerospace Sciences, teach B.S. in Aeronautics with a Major in Commercial Aviation - Helicopter Focus

Higher Ground Helicopters

Middletown
(1) 513 217 6700
Fax: (1) 513 217 5243
fath_heli@yahoo.com
http://www.hghelicopters.com
Types: R22, R44
Certification: Part 61
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Stratus Helicopters

Cincinnati Municipal Airport-Lunken Field
(1) 513 533 4354
Fax: (1) 513 533 3777
john@stratushelicopters.com
http://www.stratushelicopters.com/
Types: R22, R44
Certification: Part 61
Ab Initio: Y

Vertical Advantage Helicopters

Warren County Airport
(1) 513 746 7994
info@vaheli.com
http://vaheli.com
Types: F28
Certification: Part 61
Ab Initio: Y

Crumpton Aviation LLC

Jones Jr Airport
(1) 918 209 4900
Fax: (1) 918 779 7752
charlie@crumptonaviation.com
http://www.crumptonaviation.com
Types: R22, R44
Certification: Part 141
Ab Initio: Y

Interstate Helicopters

Bethany
(1) 405 440 1053
Fax: (1) 405 440 0115
j.johnson@interstatehelicopters.com
http://www.interstate-helicopters.com/default.htm
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Apex Helicopters

Florence
(1) 541 997 327
http://apexheli.com/
Types: R22, R44
Certification: Part 61
Ab Initio: Y

Erickson Aircrane

Central Point
(1) 541 664 5544
Fax: (1) 541 664 7613
http://www.ericksonaircrane.com/flightcrewtraining.php
Types: S64
Certification: Part 141
Ab Initio: N
MRO: Y
Additional Notes: Sole manufacturing and maintenance of S-64, CH-54 airframes

Hillsboro Aviation

Hillsboro Airport
(1) 503 648 2831
flightschool@hillsboroviation.com
http://www.hillsboroviation.com
Types: R22, R44, B206, B407, B205
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Airman's Proficiency Center (APC)
Authorized Robinson Helicopter Service Center

Leading Edge Aviation

Bend Municipal Airport
(1) 541 383 8825
Fax: (1) 541 317 0709
http://www.leadingedgeavn.com/
Types: R22, R44, B206
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

AgustaWestland Training Academy

Philadelphia
(1) 1 215 281 1400
http://www.agustawestland.com
Types: AW109, AW119, AW139
Ab Initio: N
MRO: Y
Additional Notes: AgustaWestland customer training facility for primarily U.S.-based customers
Training done in accordance with CFRR Part 142 Syllabus

Dutch Country Helicopters

Lancaster Airport
(1) 717 735 2208
Fax: (1) 717 735 3985
daren@flydch.com
http://www.flydch.com
Types: B47, B206, R44, S300
Certification: Part 141
Ab Initio: Y

Independence Helicopters

Northeast Philadelphia Airport
(1) 215 673 0100
Fax: (1) 215 673 0601
matt@independenceheli.com
http://www.independenceheli.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
Additional Notes: Partnered with Utah Valley University

Pee Dee Helicopters

Lake City
(1) 843 374 4354
info@peedeeheli.com
http://www.peedeeheli.com
Types: R22, R44
Certification: Part 61
Ab Initio: Y

Chappell Helicopters LLC

Newberry
(1) 803 321 3100
Types: R22, S300
Certification: Part 61
Ab Initio: Y

Shadowhawk Aviation

Greenville Downtown Airport
(1) 864 613 0000
Fax: (1) 864 613 0012
flights@shadowhawkaviation.com
http://www.shadowhawkaviation.com
Types: R44
Ab Initio: Y

Bills Helicopter Flight School

De Smet
(1) 800 216 9924
bcalbrecht@dishmail.net
http://www.billsflightsschool.com/
Types: S269
Ab Initio: Y

Helistar Aviation

Nashville
(1) 615 350 1122
Fax: (1) 615 350 3355
info@flyhelistar.com
http://www.flyhelistar.com
Types: R22, R44
Ab Initio: Y

Sevier County Helicopters

Gatlinburg Pigeon-Forge Airport
(1) 865 453 5867
Fax: (1) 865 365 1206
garst@seviercountychoppers.com
http://www.seviercountychoppers.com
Types: R22, R44, MD500
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center



Photo by Ian Frain

Bond Air Services EC135.

American Eurocopter

Grand Prairie Municipal Airport
(1) 972 641 3509
training@eurocopterusa.com
http://www.eurocopterusa.com
Types: AS350, AS355, AS365, BK117, B0105, EC120, EC130, EC135, EC145, EC155, AS332
Certification: Part 141
Ab Initio: N
MRO: Y
Additional Notes: Customer training primarily including use of FTD simulators
Maintenance on most Eurocopter types
Offsite training available for customers

Bell Helicopter Training Academy

Ft Worth
(1) 817 590 6249
Fax: (1) 817 278 1179
NMPZara@bh.com
http://www.bellhelicopter.com
Types: B205, B206, B407, B412, B427, B429, B430
Certification: Part 61, Part 141
Ab Initio: N
MRO: Y
Additional Notes: Customer training and Part 61 on request use of FTD simulators
Law enforcement training only for U.S. customers
Bell 205/UH-1H / OH58 training on customer aircraft

Epic Helicopters

Fort Worth Meacham Airport
(1) 817 625 1800
Fax: (1) 817 625 1852
info@epichelicopters.com
http://www.epichelicopters.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center also based at Addison Airport

Flap-Air Helicopter Services

(1) 806 323 8255
Fax: (1) 806 323 8324
trey@flap-air.com
www.flap-air.com
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Also train in customers aircraft

Flight School USA Corp

West Texas High Plains Meadow
(1) 806 585 6500
fsusa@poka.com
http://www.flightschoolsusa.com/
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Helicopter Experts Inc

Bulverde Airport
(1) 210 930 0125
Fax: (1) 830 438 5496
administrator@helicopterexperts.com
http://www.helicopterexperts.com
Types: R22, R44
Certification: Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Helicopter Services Inc

(1) 281 370 4354
Fax: (1) 281 251 1207
copters@flash.net
http://www.heliserv.com
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Longhorn Helicopters

Denton Municipal Airport
(1) 940-387-2193
Fax: (1) 817 491 3636
http://www.longhornhelicopters.com/
Types: S300, B206
Ab Initio: Y
Additional Notes: NVG training in conjunction with Aero Dynamix

River Bend Helicopters LLC

Goliad
(1) 361 564 7174
riverbendhelicopters@wildblue.net
http://www.riverbendhelicopters.com/instruction.html
Types: R22, R44
Certification: Part 61
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Sky Helicopters

Garland DFW Helport
(1) 214 349 7000
Fax: (1) 214 342 8616
sky@skyhelicopters.com
http://www.skyhelicopters.com/SKY/Flight_Training.html
Types: R22, R44, S300
Certification: Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Has FLLYT Simulator

US Aviation Academy

Denton Airport
(1) 940 383 2484
Fax: (1) 940 381 5385
http://www.usaviationacademy.com/helicopters.php
Types: R22
Certification: Part 141
Ab Initio: Y
Additional Notes: Also has school at Hondo Airport. Helicopter school operates as All American helicopter
Veracity Aviation

Huber Airpark

(1) 830 379 9800
Fax: (1) 210 855 8030
info@veracityaviation.com
http://home.veracityaviation.com/
Types: R22
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Mountain Ridge Helicopters

Logan Cache Airport
(1) 435 752 3828
Fax: (1) 435 752 5460
info@mountainridgeheli.com
http://www.mountainridgeheli.com/
Types: R22, R44, B206, MD500
Certification: Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Utah Helicopter

Spanish Fork
(1) 801 798 9888
Fax: (1) 801 798 2900
gary@utahhelicopter.com
http://www.utahhelicopter.com/utah_helicopter/index.php
Types: R22
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Whirlybird Helicopters

Spanish Fork
(1) 801 726 3627
Fax: info@flywhirly.com
http://www.flywhirly.com/flighttraining/
Types: R22, R44, F28
Certification: Part 61
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Also school in Iowa

American Helicopters

Manassas Regional Airport
(1) 703 368 9599
Fax: (1) 703 368 9445
info@americanheli.com
http://www.americanheli.com/
Types: R22
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Hampton Roads Helicopters

Hampton Roads Executive Airport
(1) 757 488 9044
Fax: (1) 757 488 2033
hrheli@hrheli.com
http://www.hrheli.com
Types: R22, R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Mansfield Helflight

Milton
(1) 802 893 1003
Fax: (1) 802 893 0151
echase1784@aol.com
www.mansfieldhelflight.com
Types: R22
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Classic Helicopter Corp

Seattle
(1) 206 767 0515
Fax: seshima@classichelicoptercorp.com
http://www.classichelicoptercorp.com/flight-school
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Command Aviation

Bellingham International Airport
(1) 360 733 3174
Fax: (1) 360 527 9451
www.commandaviation.ne
Types: R22
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Inland Helicopters

Felis Field
(1) 509 534 9114
flight@inlandhelicopters.com
http://www.inlandhelicopters.com
Types: R22, R44
Certification: Part 61, Part 141
Ab Initio: Y

Kiwi Air Helicopters

Clarkston
(1) 509 758 6478
Fax: (1) 509 758 6478
kiwaiir17@hotmail.com
http://www.kiwiairhelicopters.com/svc_training.html
Types: R44
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center
Part 135 Operation with certified helicopters so not Part 141

Helicopter Solutions

Davin
(1) 304 239 0370
info@helicoptersolutions.com
http://www.helicoptersolutions.com/
Types: R44, AS350
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

Midwestern Helicopters

Kenosha
(1) 262 657 7700
Fax: (1) 262 657 7734
chris@midwesternhelicopter.com
http://www.midwesternhelicopter.com/flight_instruction/training.htm
Types: R22
Certification: Part 61, Part 141
Ab Initio: Y
MRO: Y
Additional Notes: Authorized Robinson Helicopter Service Center

(Left) NDT plays a vital role in keeping air travel safe. (Right) An immersion ultrasonic machine ensures that joints have not deteriorated. (Below) NDT allows inspections without disassembling internal areas.

Bell Helicopter



Vector Aerospace Corp.

Sonatest Inc.



SEEING BENEATH THE SURFACE: NDT FOR HELICOPTERS

Nondestructive testing allows operators to detecting defects without destroying the helicopter.

By Mark Robins

Nondestructive testing (NDT) of helicopters via ultrasonics is an essential facet of any maintenance and manufacturing program. NDT is a cost-effective way to quality check rotorcraft components and structures for defects, thickness, cracks, flaws and other problems without tearing apart your helicopter to access them. The helicopter industry is dependent on NDT.

“Without NDT, the cost of maintaining and flying helicopters would increase dramatically, while the safety of flying would decrease,” says Arthur C., marketing specialist at Qualitest Inc. of Plantation, Fla. “When people ride in helicopters they trust it will get them to their destination with as little turbulence as possible. NDT plays a vital role in keeping air travel one of the safest modes of transportation.”

NDT allows helicopter inspection that otherwise would not be possible without disassembling to gain access to internal areas. “The engine, rotors hub, link assemblies, blades assembly, transmission and major structure areas in the engine deck are frequently tested with ultrasonics because they have the highest amount of wear and tear, and moving parts,” says Wayne Weisner, aerospace director and NDT global government sales for Olympus NDT in Kennewick, Wash. “Also, the high amount of heat generated by the engine can cause heat-affect damage in the nearby structure and over lifetime can cause in-service failures.”

Damage such as tiny cracks too small to see visually can be detected via ultrasonic testing. Ultrasonics can measure helicopter skin thickness from the outside and corrosion-caused metal thinning on skins’ inside surfaces too. “When a rotorcraft lands and the door is opened, it fills with warm moist air,” says Arthur C. “When it takes flight and reaches altitude, the skin becomes very cold due to the outside air temperature. Water will collect at low areas and

serve as the electrolyte needed for corrosion to occur.”

Ultrasonic testing can inspect installed attachment fasteners. “You can detect subsurface defects within these installation fasteners if you have access to the nut or collar side of a fastener, main rotor head or fear box,” says James Bittner, senior sales engineer at Olympus NDT. “This would reduce removal time and save labor, service time, and cost.” Ultrasonic testing also can detect a lack of fusion in a helicopter’s electron-beam welding geometries and inspect porosity, inclusions and lack of fusion in aluminum friction-stir welding.

How it Works

Ultrasonics use high-frequency sound energy sent straight or angled into helicopter parts to detect subsurface flaws. A typical ultrasonic inspection system consists of several functional units like a pulser/receiver, transducer and display devices. Driven by the pulser, the transducer generates high-frequency ultrasonic energy. The sound energy is introduced and propagates through the helicopter material being tested in the form of waves. When there is a discontinuity (such as a crack) in the wave path, part of the energy will be reflected back from the flaw surface.

A reflection phenomenon occurs when an ultrasonic beam meets an interface with a different acoustical impedance enabling defect detection such as delamination, cracking and disbonding. From this impedance, information about a defect’s location, size, orientation and other features can be obtained. Because of their recording function, ultrasonic mappings ensure traceability of manufactured parts.

Four Main Methods

There are four main ultrasonic NDT methods for helicopters: pulse-echo, through-transmission, pitch-catch and

lasers. With the pulse-echo method, a piezoelectric transducer with a longitudinal axis located perpendicular to and mounted on or near the test material surface transmits and receives ultrasonic energy. The transducer is typically separated from the test object by a couplant (such as oil) or by water, as in immersion testing. The couplant increases process efficiency by reducing the losses in the ultrasonic wave energy due to separation between the surfaces. The ultrasonic waves are reflected by the material’s opposite face or by discontinuities, layers, voids or inclusions in the material. The waves are then received by the same transducer where the reflected energy is converted into an electrical signal.

With the through-transmission method, an ultrasonic transmitter is used on one side of the material, while a separate receiver is placed on the opposite side. This method will locate defects, flaws and inclusions in the X-Y plane of multi-layered and multi-component materials like helicopter insulation, and composite materials and other attenuative materials.

The pitch-catch method transmits ultrasonic energy at any surface angle in the tested material and receives reflected energy returning at the reflected angle. It is used primarily for cylindrical and other nonlinear parallel-sided helicopter surfaces. It can determine flaw depths and locations in the X-Y plane.

Laser ultrasonic testing is a remote, noncontact extension of conventional, contact or near-contact ultrasonic testing. A laser pulse interacts at the surface to induce an ultrasonic pulse that propagates into the sample. This ultrasonic pulse interrogates the sample then returns to the surface. A separate laser receiver detects the small displacement generated when the pulse reaches the surface. The electronic signal from the receiver is then processed to provide the desired measurement.

Compared to conventional transducer-based ultrasonic testing, laser ultrasonic testing generates and detects the full complement of ultrasonic waves: bulk (compressional and shear), surface and plate. The non-contact nature of laser ultrasound is its prime advantage over conventional ultrasound. Also, no coupling is needed.

Most laser ultrasound systems do not require particular knowledge of a component's shape prior to inspection.

One of major challenges laser ultrasonic technology is price. Industrial laser ultrasonic systems range from \$500,000 to \$2 million, although R&D systems are less expensive. This can be a setback for end-users with limited budgets.

Close-up View of Composites

Composite materials are increasingly being used in helicopter construction. "The Bell-Boeing V-22 and Bell 409 are composed of approximately 50 percent composite structures, including the airframe, wing and rotor system," according to Jerry Nissen, engineer specialist at Bell Helicopter in Fort Worth, Texas. "Composite components are being chosen because they are lighter and stronger than their aluminum equivalents, allowing the aircraft to fly faster, farther and carry heavier loads while costing less to maintain."

As composite use has increased, so has the need to test its bond integrity. Virtually all composite parts of a helicopter will be ultrasonically inspected at least once during its life, and some fuselage and empennage components will be inspected many times, some as often as every 25 flight hours. Eddy current testing, another NDT methodology which involves generating electrical currents by a changing magnetic field and noting flow disruption, cannot be used on composites.

"Ultrasonic inspection is used at Bell for both primary and second-

Bell Helicopter Utilizes Ultrasonics

Rotor & Wing asked Bell Helicopter to describe in its own words how it uses ultrasonics to confirm quality and detect defects. The following response is from Jerry Nissen, engineer specialist:

"A validated and effective ultrasonic process can mean a life-or-death difference to bringing a soldier home in one piece and getting a patient to emergency care quickly. We, as inspectors and manufacturers, need to keep that in mind during each inspection.

Bell uses a number of ultrasonic test methods from contact pulse echo inspection to phased array, to large multi-axis gantry scanning. We use a number of devices from various NDT equipment suppliers to ensure we've got the right tool for the job and do so with minimal cost.

Additionally, Bell is continually evaluating new and advanced technology resulting in lower costs to manufacture and operate our aircraft. One these, one of the new instruments being developed for our applications is the ultrasonic camera from Imperium. With it, instant c-scan images are produced on a visual-based display. This technology has demonstrated a number of benefits such as reduced training requirement, lower defect characterization times and increased inspector confidence. Providing data in an intuitive visual-based display allows the un-indoctrinated personnel to quickly assess an aircraft component's airworthiness."

Forty-tude

Here at Heli-Mart we have forty-tude - forged by 40 years serving you the best way we know how. And we express our gratitude for trusting us with your specific needs, always exceeding your expectations.

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California Aero Components
714-755-2999
Component overhaul

www.helimart.com





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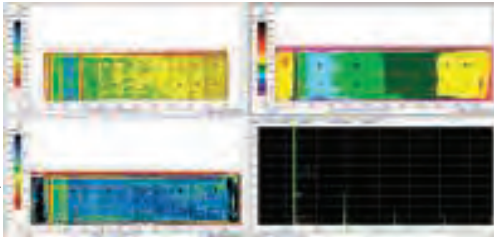


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A reflection phenomenon occurs when an ultrasonic beam meets an interface with a different acoustical impedance enabling defect detection such as delamination, cracking and disbanding.

ary structures from composite filler blocks to tiltrotor spars,” says Nissen. “It can assess bond quality or composite integrity for thin and thick structures. Ultrasonic inspection can detect and characterized processing and fielded defects so inspectors can verify component airworthiness.”

Once a rotorcraft has been put in service, ultrasonics can ensure flight safety. Rotorcraft can be damaged by something as simple as a dropped tool by

repair more straightforward,” says Brooks Longley, product manager at Imperium of Beltsville, Md. “Ultrasonic testing can assess barely visible impact damage that might occur on composite structures. Composite structures, when impacted, may not show any visible effect of the impact, and yet may have been weakened enough to fail at some time in the future. Advanced composite materials are more tolerant to impact damage than traditional aluminum structures.”

a mechanic, to more severe impacts from service vehicles and hail storms.

“Traditional aluminum aircraft structures deform, dent and crack when impacted, thus making damage assessment and subsequent

Testing & Training

Despite its many advantages, ultrasonic testing is not applicable for all helicopter parts and does have some limitations. “Very absorbent materials or ‘multi-materials’ (with multiple acoustical impedances) can’t be easily or even tested at all with ultrasound,” says Caroline Korosec, NDT Responsible in the Quality Materials Laboratory for Eurocopter in Marignane, France.

Helicopter surfaces must be accessible to transmit ultrasound. Ultrasonics cannot successfully inspect any material where it cannot penetrate or provide resolution. Components that are rough, irregular in shape, very small, exceptionally thin or not homogeneous are difficult to inspect. “There are all kinds of applications that are not suited for ultrasonic inspection,” says Nissen. “It is important as an OEM to develop

a reliable inspection process that validates the design intent and certifies aircraft airworthiness. Having nondestructive design influence during the initial stages of a program or product development ensures that high quality is maintained without adding additional cost to new products.”

Ultrasonic testing must always be carried out by trained personnel and its training is more extensive than other testing methodologies. The ability to interpret and understand results, and use the tools to analyze and report the data will always have to be taught. “Ultrasonic operators are subject to certifications and follow training courses dedicated to ultrasonic methods,” says Korosec. “They need to pass theoretical and practical examinations every five years. Certification is acknowledged worldwide through the application of EN4179/NAS410 standards.” Following these standards, and implementing the right training and nondestructive technology on the ground will mean a lot less trouble in the air. ✈

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Photo by Andrew Drwiega

Hot Blade 20

EUROPEANS TRAIN FOR COMBINED AIR OPS IN PORTUGAL

The European Defence Agency's annual multinational helicopter force exercise has financial backing and is gathering pace with more countries looking to join.



Portuguese Merlin EH101 inserts a protection force via fast roping during the EDA training exercise.

By Andrew Drwiega, Military Editor

Duke 21, you are cleared to proceed to the southern landing zone, Sabre. With that order, transmitted by the airborne mission commander working out of a Belgium Air Force A109B hovering just below a ridgeline with a view of the battlefield, two Austrian Air Force AB212s sped across the northern Portuguese landscape at low level bringing in a ground protection team. Above them a pair of high flying Portuguese Air Force F-16s on station as combat air patrol (CAP) had been using their onboard sensors to sweep the previously identified landing zones (LZs) for unfriendly forces—and had just reported back to ‘Sabre’ that the zones were clear.

Intense air and ground activity was focused around the two LZs. Enemy forces were threatening to intervene in the rapidly developing operation, with troop insertions and extractions were planned to occur over the next hour.

As the operation got into its stride, ‘Sabre’ in his over-watch A109B was beginning to struggle as two helicopters raced in to the wrong landing zone, and almost concurrently he could not reach Grizzly 71, a Royal Netherlands Air Force (RNLAF) Chinook CH-47D with a vehicle under-slung for a section of the newly arrived ground forces. Eventually his orders were relayed through Viper 1, an overhead F-16. Elsewhere in the mountainous valleys and popping over ridgelines other helicopters were either lining up to take their turn in the LZs, or clearing the area to avoid air conflict. These include a pair of Finnish Air Force NH-90s, two CH-53 Sea Stallions from the German Air Force (just recently transferred from the army in the latest defense review). There was also a RNLAF Cougar AS-532U2. A NATO AWACS had been available for the first half of the exercise period, but had returned to its more regular duties the day before. Ground crews supported all helicopters. While this drama could actually have occurred anywhere

operationally from Bosnia to Afghanistan, it was in reality just one day during the recent European Defence Agency’s (EDA) annual helicopter training exercise in Portugal (July 4-19), centered on Ovar military airfield, near Porto. The EDA annual exercise has been managed for the last few years by Wing Commander Andy Gray (Royal Air Force) and his planning team.

Exercise Hot Blade 2012 is the most recent of a series of exercises stretching back to France in 2009, Spain in 2010, and Italy in 2011. Its purpose is to train participating multinational helicopter crews and their support teams in as wide as possible range of joint operability tasks including Air Assault (AA), Special Operations Aviation (SOA), Combat Service Support (CSS), Close Air Support (CAS) including Urban CAS and Emergency CAS, convoy/helicopter escorts, Reconnaissance and Security (R&S) operations, Combat Search and Rescue (CSAR), Personnel Recovery (PR), Military/Non Military extractions (NEO Ops), Medical Evacuation (MEDEVAC) and Casualty Evacuation (CASEVAC).

It provides Composite Air Operations (COMAO) training and is all achieved in the space of a couple of weeks. So for the air controller previously described to show signs of feeling the pressure that this multinational mixture of assets and nationalities brings is not only understandable, it is expected. The point of such a large meeting is to expose these crews who would not normally be faced with such challenging conditions to the realities of warfighting in countries such as Afghanistan, where combined air operations have been the norm. According to EDA figures, since its conception the annual exercise program has delivered training involving 72 helicopters, 152 crews and over 1,800 personnel. Over 50 percent of crews that have participated have subsequently deployed to Afghanistan.



Photo by Andrew Drwiega

Portuguese EH101 Merlin arriving behind CH-53 tail rotor.

Organizing and planning such an exercise has to begin years in advance and for the succession of annual exercises to keep rolling means that Grey and his team have a full-time job. One such example was the arrival of the German CH-53s by sea, a deployment the like of which has not been seen for more than 20 years. Grey says that simply organizing the international military in advance to ensure that they make assets and people available, commit to the exercise,

and fulfill on that commitment is hard enough, but there is also the political dimension of working within the framework of the EDA and the impact of ever changing national politics.

That said, what he and his team continue to provide on both the military and political fronts in terms of delivering a tangible, multinational training event is on the face of it good news for everyone. However, wider political developments do raise questions over future training priorities for European Union member states.

European nations are in a financially induced transformation of capability. Budget cutting is a reality with procurement being slowed or cancelled, as well as the obsolescence of aircraft being brought forward. Wide cuts in military personnel are also featuring strongly. This reduction is set to continue for the short to medium term.

One of the consequences has been a number of bilateral agreements outside the standard defense pact that is the

North Atlantic Treaty Organization (NATO). Recent bilateral agreements include those between the United Kingdom and France signed in November 2010 and the Franco German Letter of Intent signed in June this year. While France's agreement with Britain looks at harmonizing needs, pooling capabilities and enhancing cooperation over training and logistics, its Lol with Germany is focused on defense procurement and development, in particular in helicopter terms at the integration of the Tiger and NH-90 helicopters that both countries are procuring.

The undercurrent of bilateral agreements is already beginning to dilute the availability of aircraft and personnel. There is a growing dilemma of priority: do NATO, EU or bilateral exercises take priority? Added to this is the further confusion of competing yet similar training ambitions within the EU.

In a typical European anomaly, this EDA-managed international helicopter training program is being replicated by

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another international defense agency within NATO, the European Air Group (EAG). The sixth running of the EAG's personnel recovery course takes place at Holzdorf air base in Germany from Oct. 9-26, 2012.

A need for better focus on CSAR was identified via the EAG's VOL-CANEX exercises between 2002 to 2006. From that a regular course was developed and specialist training exercises within the EAG were created of which the Holzdorf meet will be the latest iteration.

Considering the current employment of NATO's forces and the shift towards PR operations (to include Combat Recovery) in general, a decision was taken to rename the course "CJPRSC," to encompass current personnel recovery operations such as those being conducted by the International Security Assistance Force (ISAF) in Afghanistan. The PR course in 2009 was conducted at Cazaux airbase, France in September 2009, at Lechfeld airbase Germany in September 2010, and in October 2011 at the Tactical Leadership Program (TLP) facilities at Albacete, Spain.

The EAG makes its own claim that between 2009 and 2011 training has involved 58 helicopters, 114 crews and 1,300 personnel, of which 63 crews have been deployed to Afghanistan.

Although not identical in objectives, many of the skills and ambitions of the two exercises are similar with combined multiple helicopter missions, troop insertions, isolated personnel recovered and night operations. But it seems that there are "wheels within wheels" when the decision arises about which country will participate in each event, and with what. Some countries, such as the UK, have only sent observers to each exercise usually citing the excuse that they cannot spare aircraft away from existing deployments/commitments. U.S. forces do not participate in either exercise.

With budgets squeezing each nation's capability in what it can commit to in terms of annual exercises, there is a very real likelihood that prioritization will begin to dilute the perceived less

attended exercises, at least from the point of view of the major players.

Importantly, the EDA exercise has the backing of its own organization behind it and the financial muscle that its politically connections can deliver. The European Defence Agency (EDA) chief executive Claude-France Arnould flew in on a C-130 for the VIP day, join-

ing the Portuguese Minister of Defence, Jose Pedro Aguiar-Branco. During her address, Arnould praised the financial support provided to the helicopter training program by Luxembourg Defence Minister Jeane-Marie Halsdorf. The shortfall in helicopter lift is still one of the EDA's top ten priorities and therefore gains access to funding. ✈

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TRAINING NEWS

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RUSSIANS TO DEVELOP FLIGHT SAFETY SYSTEM, ADVANCED HUMS

'Intelligent avionics' system aims to improve helicopter safety while monitoring flight conditions.

Oboronprom subsidiary Russian Helicopters is planning to incorporate "intelligent" avionics into all of its helicopter lines from 2015 onward. The system—which seeks to increase pilot situational awareness—will be used for monitoring flight conditions, autopilot landing and collision avoidance. The company says the technology will allow pilots to carry out difficult maneuvers at low altitudes, in various weather conditions and at night. The manufacturer intends to build the avionics package around a combination of existing systems and new technology. Features will include a warning for landing zone hazards, including power lines, and the ability to update maps and charts to select an unprepared landing site in an emergency scenario.

Russian Helicopters CEO Dmitry Petrov told *Rotor & Wing* at Heli-Expo in February that flight safety and reducing accidents is a top priority for the manufacturer, noting that up to 95 percent of helicopter accidents are related to human factors, or pilot error. "Especially on our newer models," he said, "our operators are working on decreasing the influence of human factors on the safety of flight." The company unveiled another development project—advanced health

and usage monitoring system (A-HUMS)—during the Engineering Technologies 2012 forum, held in late June/early July in Zhukovsky, outside of Moscow. A-HUMS will offer control over a helicopter's technical condition in real time and help with maintenance planning. Russian Helicopters expects lower direct operating costs and higher reliability with the system. An onboard diagnostics system will allow maintainers to access specific information on various components and mechanical systems, including the engines, transmission and structural airframe.

Russian Helicopters is also planning to develop an enhanced vision system (EVS) for its in-development Advanced High-Speed Helicopter and some of its newer variants such as the Kamov Ka-62. The manufacturer is also working to establish the Training Helicopter Academy near Moscow. According to Petrov, the academy will eventually house a large training complex, with full-scale flight test grounds, simulators approved to Level D/Stage 7, and a pool of training instructors. "We've already started teaching and educating there, by 2015 we'll reach the full output of flight and technical training," he explained. —By Rotor & Wing staff

Heli-Union, SAAF Receive Eurocopter Simulators

French operator Heli-Union has added a new Eurocopter Dauphin N3/N3+ full flight simulator (FFS) to its training center in Angouleme. The unit is qualified as a Level B full flight simulator (FFS) and a Level 2 flight training device. The simulator allows Heli-Union to provide various types of training, including ab initio, IFR, low-altitude navigation, mountainous flight, night vision goggle (NVG), offshore and SAR.

Eurocopter has also delivered its first full-motion simulator to Africa. The Super Puma-designed simulator is also compatible with the South African Air Force (SAAF)'s Atlas Oryx. Col. Hardus Engelbrecht stated that having a simulator available at the SimAero training center would allow the SAAF "a much bigger bang for our limited buck" by eliminating the need to send crews to Europe for training.



Heli-Union's new Dauphin N3/N3+ simulator is Level B qualified.



Photo by Pvt. Frazer Dodson

The 36th Combat Aviation Brigade joined the Texas Air Guard and the 1-19th Special Forces Group for air assault and medical evacuation training at Camp McGregor in New Mexico. Air support was provided by Boeing CH-47 Chinooks and Sikorsky UH-60 Black Hawks.

Bell Obtains EASA Approval for 429 Pilot Training

The European Aviation Safety Agency (EASA) has approved the Bell Helicopter Training Academy (BTA) to offer 429 pilot training. EASA has also certified the Bell 429 flight-training device to a Level 2. The BTA is located in Texas at the Fort Worth Alliance Airport. ✈

Night Flight Concepts Partners with ALEA for Laser Training

Bedford, Texas-based Night Flight Concepts has teamed with the Airborne Law Enforcement Association (ALEA) to offer training with the Laser Armor Laser Defense system. Dudley Crosson, an aviation physiologist and educator, partnered with Night Flight to develop the course. According to Crosson, the training is aimed at instructing aircrews in the best manner to respond to laser strikes by giving them a "sound understanding of the affects of lasing, methods for mitigating the problem and recommendations for safety management systems." ✈

Helicentre Aviation Receives CEMARS Approval for Emissions

Helicentre Aviation has become the first UK-based utility surveillance operator to achieve certified emissions measurement and reduction scheme (CEMARS) certification with ISO 14069. Helicentre obtained the CEMARS approval for compliance with a carbon reduction program from the Achilles Group in the UK. After a trial period revealed how the fuel costs per aircraft could be monitored, Helicentre's safety team implemented the CEMARS with Achilles' help to work toward a targeted five percent increase in fuel efficiency. ✈

Plan Annual Training with Safety In Mind

Well it's that time of year again when Reserve and National Guard aviators plan and execute their annual training plans. Many commercial pilots are members of the Reserve components and take time off of their flying jobs to "switch hats" and put on the green flight suit to serve their country. The difficulty with keeping current and proficient within the active duty flight regulations requires breaking the training into blocks around weekends and a two-week period. Keep in mind that Reserve Component aviators have the same flight requirements as their active duty counterparts. The challenge for annual training is that there is a lack of continuous training time in a highly technical/tactical skill environment that makes it a more difficult-to-manage risk. This is even more important for the pilots who do not fly full-time. Good leaders remind their aviators that they are accountable for their actions and self-disciplined performance to standards that can have the greatest impact accident prevention. Planning with safety in mind is a sure-fire prerequisite for successful training.

The first step is to develop a command climate that permeates safety throughout the organization. Make it clear that standards must be adhered to and that supervisors have to enforce them. This safety philosophy starts at the top and flows downward, and then back up. Take for example, Army Field Manual 100-4 Risk Management, which states that risk management must be integrated into mission planning, preparation and execution. Leadership must continually identify hazards and assess both accident and tactical risks, then develop and coordinate control measures.—By Keith Cianfrani ✈

Leading Edge

By Frank Lombardi



Energy, Rotor Speed and Dead Men

Energy. “It cannot be created or destroyed, only changed from one form to another.” You should remember your high school physics teacher making a statement like this. You should also remember your primary flight instructor making a statement like, “Rotor speed is life.” The relevance of these two statements could not be more important, especially when the engine in your whirlybird stops.

Simply defined, energy is the capacity to do work. To make helicopters fly, the engine converts potential energy stored in fuel into rotational kinetic energy that powers the rotor system. The rotor then imparts its energy to the air by accelerating it through the disk, in order to create the thrust that provides airspeed and altitude. The rate at which this energy conversion must be done is measured as power required.

When the engine suddenly stops providing power, the rotor begins to feed on its own rotational energy, and RPM begins to drop. The decrease in thrust starts the helicopter descending. Now it is gravity and the act of falling that dictates the transfer of energy. Even in autorotation, the power required to turn the rotor and keep it “in the green” remains about the same as it was in level flight. However, instead of the rotor doing work on the air, it is the air that must do work on the rotor. Therefore, the power required can only be achieved by attaining a certain rate of descent. When the potential energy of altitude and kinetic energy of airspeed is used up, it is the

kinetic energy of rotor speed that we will once again convert back to thrust, in the final moments before the touchdown that, without an operating engine, *will* happen.

With training and physics on our side, the odds are good that our touchdown will be successful; but sometimes fate and physics work against us. This is why engineers and test pilots have brought us the Height Velocity (H-V) diagram, or “Dead Man’s Curve.” While every pilot should know they don’t want to be caught in it when the engine goes silent, also knowing the basis for it can be helpful.

The H-V diagram starts off as a mathematical estimate by designers, who compute the inertial properties of the rotor as well as its torque requirements at certain speeds, weights and lift coefficients. This gives an idea of the time it would take for the rotor to decay to an unrecoverable RPM under certain conditions. Armed with this, they first calculate, then very cautiously confirm key points on the curve with an incremental buildup of flight testing.

The “knee” of the curve is the first of three points, and is of particular importance when building the avoid area. It is defined by a “critical” speed (V^{cr}), above which an autorotative landing can be made at any height. Surprisingly, for most helicopters the height at which this point occurs (h^{cr}) remains approximately the same, between 80-100 feet. The second key point is the high hover point. This is the point at which one can expect to achieve steady autorotation and adequately flare to a safe landing from a zero air-

speed condition. The third point is the low hover point. This point is dictated by the energy absorbing qualities of the landing gear and rotor inertia, since RPM will be decaying all the way to the ground. As speed increases from this point along the curve to V^{cr} , any flare will be ineffective and only add little, if any, energy to the rotor; bumping the height up to h^{cr} .

It’s helpful to know the conditions dictated during H-V testing, as they are not always listed on the chart. For FAA certification purposes, the curve is usually developed in little, if any wind, at max gross weight and high density altitude conditions. There is a 1-second delay by the pilot before applying corrective action when demonstrating points along the curve *above* the knee, and no delay when demonstrating points *below* it. (Some military specs use 2 seconds all around!). All points are demonstrated from level flight, and therefore may be conservative in a descent, but overly hopeful if in a climb, when the failure occurs. In fact, variables such as pilot reaction time, actual aircraft weight, CG, technique, etc., will cause the H-V diagram to grow or shrink depending on the conditions you are at on that fateful day when things get quiet, so “your mileage may vary.”

One thing that cannot be overstressed is that no matter how good the pilot, the deeper you are into the “avoid” area at the time of failure, the larger the mess will be when you reach the ground. The laws of physics cannot be outwitted, so respect and manage them the best you can. ☘

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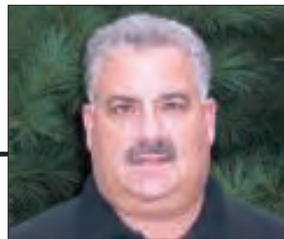
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Safety Watch

By Keith Cianfrani



Safety Goes Hand in Glove with Mission

Safety is not an entity in and of itself. Pilots need to develop a healthy perspective for safety, not think of it as an obstacle to mission accomplishment, but a means to mission accomplishment.

I'd like to highlight the links among management, standardization, training and safety. These items "go hand in glove with mission accomplishment and cannot be separated." One could define management as "the process of acquiring priorities, allocation and using resources (people, money, material, facilities, information, time and processes) in an effective and efficient manner."

We could also define safety as "the conservation of resources (human life and equipment) while accomplishing a mission or task." These two statements form the basis for the same theme leaders should follow and calls for establishing requirements as necessary for the safety and conservation of aviation resources under their control. This will conserve manpower and material by reducing losses due to accidents.

The basic gist here is to accomplish the mission while conserving resources. We do this and prepare for this with training and standardization, or standardized training. Let's look at some statements and definitions in training and standardization, and note the ties with management and safety.

Standardization can be defined as "The management principle which fosters the development and sustainment of a high state of proficiency and readiness among pilots and employees throughout an organization. Standardization is accomplished through the

universal application of uniform practices and procedures."

You may ask where or at what level this standardization or development of uniform practices begins. It starts with everyone at every level. Executing training using approved publications provides the basis for standardization. By following these guidelines, safety becomes a by-product of professionalism, and professionalism means complying with all set standards (directives, technical manuals, regulations, SOPs, training plans, and company policies). By the book, disciplined operations are mandatory. We must ensure the risk management process is incorporated into regulations, directions, SOPs, training plans, mission and task training.

We cannot forget about leadership, which we can define as "influencing others to accomplish a common goal." Leaders must set these standards for safety, provide guidance for risk acceptance decisions and conduct training risk assessments. It can be deduced that safety is a result of product of proper management, training and standardization. Also, the purpose of standardization of training, along with standardization and training is to allow accomplishment of the mission (flying or other) while conserving resources. When the standards are not adhered to, leaders must take the appropriate action to expeditiously correct non-conformities with mandated standards—including work place deficiencies, and hazards—or accidents may occur.

Safety is a part of all operations and leaders, pilots and personnel and all levels must embrace safety as a principal element in all they do. Safety pro-

cedures represent a skill—a product of enforced standards and training. Safety in planning and operations is critical in any organization to preserve resources.

As an experienced military and civilian accident investigator; I can attest that a common thread runs through all of these terms—management, standardization, training, and safety. When they are not followed and practiced, unsafe acts occur that lead to accidents. This is why we ask ourselves in the safety business: "Why do pilots keep having the same accidents over and over?"

As a safety consultant, I have the opportunity to audit many operators aviation safety programs for trends, policies, command climate, leadership involvement, accident prevention programs, risk management practices, training, maintenance and standardization. Most of the companies and government agencies understand that management, standardization, training and safety go hand in glove with mission accomplishment and cannot be separated. These companies have a highly dedicated workforce and their employees feel they have "ownership of the company" and understand what they do or don't do affect the success of their company.

I'll further expand on this story in the September issue as I report from my trip to Robinson Helicopters in Torrance, Calif. I attended Robinson's pilot safety course where I observed the company's safety practices, toured the production plant, talked to pilots and employees, interviewed the leadership of the company and even had the opportunity fly the R66 and R22. Stay tuned and until then, Fly Safe! 🛩️

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Military Insider

By Andrew Drwiega

Dogs and Ponies Seek New Shows

Attending the Farnborough Airshow in early July reconfirmed the increasingly widely held belief that the center of gravity of business, particularly military aerospace, is moving eastward and away from Europe. Everybody knows it, and while the facade was still familiar, the commitment was not there.

As a journalist, there were fewer rotorcraft press briefings than I have ever seen. AgustaWestland alone, under the bower of its parent company Finmeccanica, was the only company to host a full press conference with CEO Bruno Spagnolini in the hot seat.

Eurocopter CEO Lutz Bertling held a less public private roundtable with the press and Bell Helicopter President & CEO John Garrison hosted a press breakfast. Sikorsky had arranged 1-on-1s with new president Mick Mauer for selected journalists on the Sunday before the show. There was a time, not so long ago, that a new CEO of any major helicopter OEM would have been metaphorically “paraded through the streets of Rome” (ok, Farnborough or Le Bouquet), like a conquering Caesar.

Aside from a lone Sikorsky MH-60 R/S briefing, the usual plethora of product updates was largely missing (although the U.S. Marines did a superb job—once again—of telling everyone who will listen how well they are using the MV-22B Osprey). Perhaps the message was picked up by “faces unseen” from the UK’s Ministry of Defence, who may consider it for use onboard the Queen Elizabeth aircraft carriers. As they are now without “cat and trap,” at least until the JSF-35 is replaced by

UCAVs, it may be just the job for the Carrier Onboard Delivery (COD) role (as carrier out by the Grumman C-2 Greyhound in the U.S. Navy fleet). In fact the prospect of the U.S. Navy buying 48 MV-22s (albeit still without any defined budget to back up that aspiration) would be very supportive to Bell-Boeing’s hopes of selling the aircraft to the UK (although numbers and lifetime costs still have a major role to play in any decision).

Russian Helicopters held a press conference on three of its products—the Ansat, the Mi-171A2 and the KA-32A11BC—which, although largely sales pitches, had good English speak-



Photo by Andrew Drwiega

ers with appreciably slicker presentations (they are learning the game fast). Boeing had “off-on-off” flights lined up on one of the four MV-22Bs that flew over from the U.S. for Farnborough and the Royal International Air Tattoo held

the weekend before. But the C-17 press flight was also canceled—clearances could not be got in time, it appeared.

Perhaps industry’s reluctance to “break out the balloons” at Farnborough can be identified by something that the UK Secretary of State for Defence, Philip Hammond, said during the ADS Defence Conference on the morning of the third day. Although principally addressing British industry, Hammond warned that the defense industry, in fact industry in general, was facing a huge challenge. He stated that domestic demand was declining as government budgets contract, a factor throughout Europe. Added to this was the reality that traditional export markets were also fundamentally changing: “Previous customers now want to be partners, and perhaps in a few years’ time, see themselves as first tier competitors. So there will be a huge pressure on industry to revisit business models, and to build partnerships to reflect the new reality.”

He suggested that industry had to think about three key elements—development capital, end demand and technological capability—in a different way. He suggested that partnering in development rather than simply delivering products was now the way ahead. In the main, the rotorcraft industry has already responded to this with various partnerships progressing with Russia, China, India and Brazil, among others. The challenge will be to manage the process in a way that ensures their continuity as a prime, or at least as an equal partner. With minds on the coming struggle that lies ahead, the airshow “dog and pony show” may well be on its way to newer climes. 🐾





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