

THE STATE OF TRAINING

By Matt Thurber

Aviation industry investigating multiple factors to improve initial pilot training

The world breathed a sigh of relief as 2011 came to a close; aviation had experienced two remarkably safe years, following 2009, during which two extraordinary airline accidents focused the public's attention on what appear to be serious lapses in fundamental airmanship. The two accidents—**Colgan Air/Continental Connection Flight 3407 on Feb. 12, 2009**, and **Air France Flight 447 on June 1, 2009**—aren't the only ones that uncovered airmanship problems, but they captured the public's attention in a way that is still having reverberations. The Colgan accident in particular has led to political action in the U.S. to tighten FAA minimum standards for Part 121 airline pilots as well as a push for **increased professionalism in all segments of aviation**.

Both the Air France and Colgan accidents raised probing questions about something as elementary as **stall recognition**. Other accidents serve as reminders of recurring and preventable accident scenarios, including the **December 20 TBM 700 accident in New Jersey**, in which the pilot appears to have flown into an area of reported moderate icing conditions then lost control and crashed near Morristown, N.J.

Political attention to pilot training quality was summarized in the November 2010 Government Accountability Office (GAO) report, "Initial Pilot Training: Better Management Controls Are Needed to Improve FAA Oversight." The report noted that the most recent six U.S. airline accidents involved regional airlines, and in four of those accidents, the NTSB cited pilot performance as a contributory factor. The report examines pilot training in the U.S. and in other countries and the FAA's role in overseeing pilot training and testing.

Former FAA Administrator Randy Babbitt took up the call for professionalism. At the Society of Aviation and Flight Educators (Safe) Pilot Training Reform Symposium, held May 5, 2011, Babbitt said, "I have often wished I could just mandate professionalism. We can make rules to require certain professional behavior, but professionalism is a mindset. To use flight instructor terms, professionalism requires application and correlation. It's an attitude that drives you to do the right thing—every time, all the time, regardless of who's watching. It's about being a good aviation citizen."

There is widespread concern that some pilots aren't being good aviation citizens.

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And this behavior, some worry, not only causes the same types of accident to occur over and over again in hundreds of general aviation crashes every year but is also a key reason for the decline of general aviation, poor sales of new aircraft, low levels of flying activity and lack of interest in learning to fly.

It was just such questions, in fact, that prompted the Safe Symposium at which Babbitt spoke. According to Safe, "Throughout 2010, Safe members conducted an internal dialogue regarding the stagnant general aviation fatal accident rate during the preceding decade, as well as the alarming declines in student pilot starts, retention and completions. We hypothesized that deficiencies in the general aviation pilot training system were a root cause for all of these phenomena. We concluded that Safe should initiate an effort to examine the training system with the intention of changing pilot training doctrine, standards, curricula and instruction methods."

At the other end of the spectrum is the concern that questionable pilot quality ultimately may result in accidents such as Colgan, Air France 447 and others. If pilots are learning to fly in a substandard, unprofessional and undisciplined fashion, what does this portend for the future of business and commercial aviation, given that the majority of pilots hired to fly professionally today have civilian training backgrounds and no military experience?

IS THERE A PROBLEM?

"I think we've been in denial on this subject," said John King, co-founder with his wife, Martha, of King Schools. Both Kings hold almost every airman's certificate and rating possible and fly their own Falcon 10. The Kings are outspoken about safety, and John King highlighted their feelings in a controversial presentation about what he calls "the big lie."

"If you deny the seriousness of something you're probably not going to do much to fix it," he explained. "A big lie is one that you've told often enough and long enough that you believe it yourself. I think that many general aviation pilots truly believe that general aviation is safer than driving. The fact is we're atrociously worse than driving in terms of fatalities per mile. We have to overcome the big lie."

In raw numbers, during 2010 general aviation accidents in the U.S. claimed the lives of 450 people. That's down from 478 in 2009, which may not necessarily be attributable to improvements in safety equipment or pilot training and expertise. The amount of flying has dropped, too, as evidenced by significant declines in avgas deliveries and also lower numbers of operations at general aviation airports. The 1,435 general aviation accidents during 2010 were a 20-year low, and the 2010 fatalities and number of accidents dropped for the fourth year in a row. Non-commercial general aviation accident rates, however, have climbed to 6.60 per 100,000 flight hours in 2009 from 5.78 in 2000.

There is concern, and not just among the general aviation industry worrying that accidents drive away business, but also at

airlines, which stand to inherit pilots with potentially poor training backgrounds.

The executive in charge of pilot hiring at a large U.S. airline (who preferred to remain anonymous so he could speak freely) worries about how pilots learn about a robust safety culture. In his experience, most pilots don't become acquainted with the concept of a safety culture—a commitment to safety that permeates an organization—until they go to work for an airline or operator that truly takes safety seriously.

According to the GAO initial pilot training report, "Over time, U.S. pilot schools have become the primary source for producing pilots for the airline industry." And this underscores one of the problems facing commercial aviation: finding pilots with the right background and experience. The GAO report notes that the Air Line Pilots Association believes that there is "a wide range of initial training experiences, not all of which are well suited for the airline industry," and this is due to "the lack of specific training requirements to be an airline pilot."

Al Benzing, a retired airline pilot, learned to fly in a typical general aviation environment then earned his multiengine rating and airline transport pilot certificate at his first regional airline job. He flew for another regional before joining the major airline from which he retired last year. "A fundamental issue," he observed, "is that there are different tracks to training and experience—Part 141 schools, ab initio schools right into [regional jets], military, Part 61, flying freight and so on. Each of these has its strengths and weaknesses. The more formal schools [military and ab initio] are likely more rigorous and cull out poor performers, but I don't know if even these are adept at ensuring only those with good judgment and an attitude of safety get through."

"Indeed, one would hope those drawn to fly, especially as a commercial pilot, would have a safe attitude from the beginning. I think the issue is that some/many/most *do* have this attitude, but the 'system' doesn't do a good job of sorting out those who don't. While standards vary, if someone can pass the checkride, perhaps after several attempts, and is paying his bills, he is 'A-OK' at the end of the course."

"Most fatal accidents are judgment-related," notes Bruce Landsberg, president of the AOPA Foundation, which includes the Air Safety Institute (ASI). "You can overcome any amount of skill with lack of judgment." Landsberg agrees that the Colgan and Air France 447 accidents and other typical general aviation accidents warrant worry about the quality of pilots who will move up the ranks into professional flying. "Absolutely we should be concerned about future pilots," he said.

But with regard to the Colgan accident, he added, "Congress got that all wrong. The problem was you had a couple of pilots who were flat exhausted. And a training program to transition a captain of questionable skill." What was missing from this pilot's training, Landsberg believes, was comprehensive stall awareness training, including flying at

minimum controllable airspeed and performing a variety of actual stalls. "We've got to see how the airplane is going to behave," he said.

Doug Stewart, a designated pilot examiner, sees the results of initial pilot training first-hand during checkrides that he gives from his base at Columbia County Airport in Hudson, N.Y. Stewart also operates a flight school, but spends most of his teaching time helping pilots learn how to fly IFR safely. Stewart's primary tool for teaching IFR is a multi-day trip along the East Coast, forcing his clients to fly in and deal with real-world conditions.

The biggest flaw that Stewart sees in pilots who come to him for checkrides or recurrency training is a lack of familiarity with slow flight and full stalls. Stewart takes the opportunity to reacquaint these pilots with fundamentals or even teach basic concepts, such as "issues of stall and angle of attack having nothing to do with pitch attitude and speed."

During an approach-to-landing stall, Stewart sees over and over the student pitching the airplane nose up into an accelerated stall instead of slowly pulling back into the buffet then recovering. "Yet we wonder why a pilot hauls back on the stick and is fighting the stick all the way to the ground," he said, referring to highly publicized accidents like Colgan and Air France 447. "I see that the quality of the instruction needs to be raised many levels."

Jim Lauerman, who during the next six months is transitioning his job as president of Avemco Insurance to newly hired Jonathan Greenway, offers an insurer's perspective on the question of quality in pilot training. Avemco is the only aviation insurer that is both the underwriter of the risk and the seller of policies to end-users, and thus its employees see first-hand the accidents that clients have. "This mind-numbing consistency of the causes of losses and the rate of loss is really depressing," he said. "We keep throwing money and regulations [at these causes] and never see anything change."

The GAO report concludes, "Public and media concerns about aviation safety escalated as a result of the Colgan crash in early 2009, and Congress and the FAA have taken steps to improve aviation safety by making revisions to the training requirements that airlines must provide for airline pilots. Our analysis indicates that the FAA has an opportunity to ensure that the initial pilot training process for producing pilots' commercial certificates is still relevant for the necessary knowledge and skills for airline positions."

But the initial training process needs to be relevant for all pilots, not just airline pilots. At the 2011 **Bombardier Safety Standdown** last October, human factors expert Dr. Tony Kern predicted a 400-percent increase in the business aviation accident rate unless there are significant upgrades to pilot training.

In any case, Congress seems not to have taken the GAO's advice into account, as evidenced by its members' proposing legislation that could force the FAA to write new rules mandating that all airline pilots



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have at least 1,500 hours of flight time. Both Colgan pilots had more than 1,500 hours. "I do not believe just going to 1,500 hours is sufficient," asserts Jason Blair, executive director of the National Association of Flight Instructors. "It's a skill-based issue." Blair is a pilot examiner and conducts 80 to 100 checkrides per year.

New rules may be coming. In 2010 the FAA issued an Advance Notice of Proposed Rulemaking titled, "New Pilot Certification Requirements for Air Carrier Operations." The notice sought comments about "the necessity to improve pilot performance and professionalism standards with specific emphasis on training for commercial pilots involved in Part 121 operations."

FIXING THE TRAINING PROCESS

Many parties are working to improve the flight training process, from FAA oversight, testing changes and safety programs to alphabet groups such as AOPA, Safe and NAFI to large flight academies and small flight schools. AOPA recently launched the AOPA Flight Training Excellence Awards, "to encourage best practices and recognize flight schools and independent training professionals who put those practices to work every day." The National Association of Flight Instructors offers the Master Instructor program. The International Association of Flight Training Professionals Best Practices Forum launched a year ago already has 300 registered members, and contributions to the website are flowing in. The Safe Pilot Training Reform Symposium held last year has generated key focus areas that are being addressed. The AOPA Foundation's Air Safety Institute planned to complete research for the FAA-industry General Aviation Joint Steering Committee at the end of February, which includes a root-cause analysis of general aviation accidents.

Discussing training issues with various industry participants identified the following key elements for training to reach a better place.

START WITH QUALITY CANDIDATES

In its study of the initial pilot training process, the GAO notes intriguing differences between U.S. and European training requirements. The basic regulatory standards aren't too different, but in Europe two training methods have developed: the modular system and the integrated method. In the former, pilots learn

and progress in stages, by learning then obtaining each certificate or rating. In the latter, students attend a formal academic institution dedicated to flight training in a multi-crew environment, with the goal of becoming qualified as airline pilots. Of course, there are plenty of flight academies and aviation colleges and universities in the U.S., but the GAO report sees a difference between the two countries' approaches, in that U.S. pilots train for flying jobs where they can gain additional experience before hiring on with airlines, while European pilots train with the goal of joining an airline right away.

Whatever the differences in process, there is a key difference in who gets to become a pilot under each system. Of course, generally anyone who can pay the cost can become a pilot. But in Europe the cost is so extraordinarily high that few people pay their own way just for fun or even for the possibility of a career. To prevent a shortage of qualified pilots, European airlines have had to create a sort of apprenticeship program, under which sponsors pay for so-called "ab initio" pilot training. Because sponsors—usually airlines—are paying for training, they have a vested interest in making sure candidates are qualified, and thus they carefully screen applicants.

As the GAO report notes, "According to officials at European airlines, basing selection on fixed standards instead of selecting candidates influenced by commercial pressure assures airlines that they are training a qualified pilot. In the U.S., however, the most intensive screening process occurs when pilots seek employment with airlines. The airlines independently assess candidates' work experience and technical and non-technical skills before hiring."

TEACH THE FUNDAMENTALS FIRST

Many of the experts interviewed for this article agree that there is too much focus on teaching new pilots about the systems in their aircraft, such as LCD-based avionics and automated controls.

Given the extraordinary successful saves by pilots who have backgrounds flying gliders such as Chesley Sullenberger or Robert Pearson, some wonder whether new pilots ought first to learn how to fly gliders for a solid grounding in understanding how every knot of speed and every foot of altitude is gained, nurtured

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TBM 700 N731CA, Dec. 20, 2011, Morristown, N.J., 5 fatalities

(Preliminary NTSB and LiveATC.net information) The single-engine turboprop crashed following loss of control. According to the NTSB, "While flying at 17,000 feet msl the pilot reported that he was in icing conditions. The pilot requested a climb, and the flight was subsequently cleared to Flight Level 200. The aircraft reached a maximum altitude of 17,900 feet and then began to descend."

Before the crash, the following radio communications took place (as provided by LiveATC.net):

Departure: "Reports of moderate rime 15 through 17, but light rime [unintelligible] was a problem at 14. I'll keep you out [unintelligible] there; if it gets worse let me know and when Center takes your handoff I'll climb you and they can get you higher."
N731CA: "Charlie Alpha, we'll let you know what happens when we get in there, and yeah, if we can go straight through it, that's no problem for us."
Center: "Attention all aircraft, severe icing reported at 14 thousand."

AC44123: "Center, AC44123, where's that severe icing in relation to us?"

Center: "All along the area, pretty much everywhere I'm talking to has had at least light to moderate, and I've had one report of extreme at 14...and I have reports of moderate to severe icing through 14 and [unintelligible] still have moderate up to 17...reports of moderate to extreme icing in the climb, extreme reported around 14 thousand and moderate up all the way up to 17."

Bombardier DHC-8-400, Colgan Air, Feb. 12, 2009, Clarence Center, N.Y., 50 fatalities

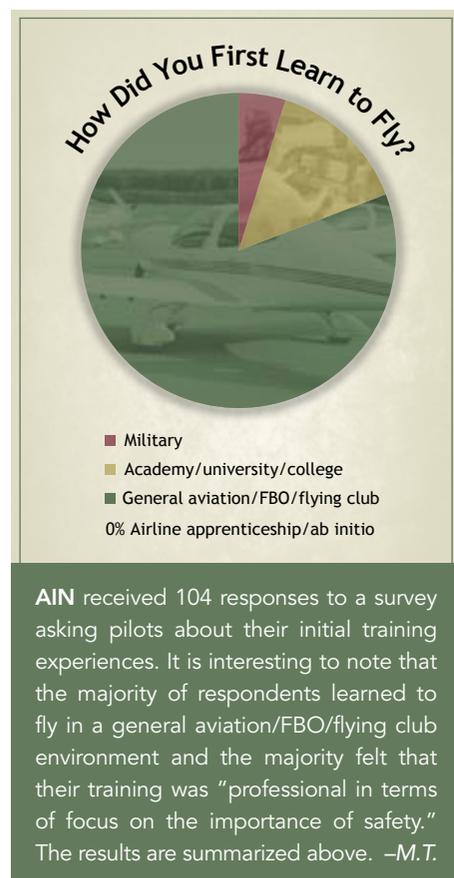
(Final NTSB report) According to the NTSB, after leveling off during the approach with the autopilot engaged, the crew neglected to advance the throttles. The autopilot automatically switched off, and the stick shaker activated. The captain responded by moving the yoke aft, stalling the airplane.

The NTSB noted that the captain had attended Gulfstream Training Academy, where the program includes flight time in a Gulfstream International Airlines Beech 1900D flown in Part 121 passenger-carrying service. The captain was not hired by the airline after logging the 250 hours included in the academy program.

The airline's training records indicated, according to the NTSB, that he "had experienced continuing difficulties with aircraft control. For example, during simulator periods three and four, the captain was graded unsatisfactory in 'approach to stall-landing configuration,' although he received a satisfactory grade in later sessions. During simulator period seven, the captain's altitude and airspeed control was unacceptable, and comments included: 'Airspeed more than 10 knots below VREF + 10. Fly correct airspeed!' 'Airspeed 10 knots below VREF crossing threshold,' 'Gear remains up during entire approach,' and 'Repeated deviation from altitude 200-300 feet.'

During simulator period eight, the instructor noted, "Basic attitude flying cause of repeated deviations," "Constant deviations up to full scale on glideslope," and "Additional training required." All maneuvers were graded satisfactory the next day (by the same instructor as the day before) during an extra ninth simulator period, and the simulator checkride was completed that same day." —M.T

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and lost. Sullenberger was at the controls when he ditched a [US Airways Airbus A320 into the Hudson River on Jan. 15, 2009](#), saving all 155 people on board following a double engine failure due to a [birdstrike](#). Pearson glided a Boeing 767 into a closed air force base north of Winnipeg, Manitoba (Canada) after a misfueling caused both engines to quit. Glider pilots learn how to control an airplane that is almost always flying in slow flight and close to stall speed.

The consensus, however, is that while gliding training would be beneficial, so would a strong focus on learning the fundamentals of flying to perhaps a greater degree than is typically taught. And this early training ought to be done in simple airplanes without distracting technologically advanced instrument panels.

"One reason why training is unrealistic is that it's geared to pass a checkride instead of create aviators," notes Lauerman.

SHARE BEST PRACTICES

How do we know what works? Robert Barnes has thought a lot about that and early last year founded the International Association of Flight Training Professionals (IAFTP) as a means of sharing such information. "IAFTP's focus is not to establish standards, create a certification body or even attempt to influence regulators. Its primary goal is to provide a credible, independent, international clearinghouse for pilot training best practices that have been developed by flight training professionals to respond to individual pilot or operator needs."

Barnes points out that in his Air Force experience, he became an instructor shortly after learning how to fly, just as happens with civilian instructors. "The problem isn't young instructors," he said. "The problem is the system doesn't expose

young instructors to ways to do anything other than build hours. There are a lot of good instructors out there. Who's helping them become better instructors?" In the Air Force, more experienced instructors helped teach fresh new instructors. Barnes believes that the IAFTP database can also help, but it wouldn't hurt to have mentors working with inexperienced instructors, too.

IAFTP has also recently added a second goal, creation of an electronic curriculum vita (eCV), a system that allows any pilot to maintain a personal training record throughout his career. The eCV can be accessed by anyone authorized by the individual record holder. "It has long been recognized that there should be a way to securely document every pilot's identity, training, experience and certifications," explains Barnes. "It simply has never happened. However, if growth projections for air transport over the next 20 years are correct, the need for such a secure and verifiable pilot CV will become more critical as employers turn increasingly to the worldwide pool of applicant pilots to achieve their staffing goals."

Asked whether the eCV could help identify a pilot who repeatedly fails checkrides, Barnes observed that a pilot might not include that information in his records, but there would be a record of having applied to take a checkride. "We could record the fact that a student applied to have a checkride. It's a fact. Whether he passed or not is immaterial. If he didn't pass, we would have a way to record that he has scheduled this same checkride 14 times in a row."

ADDRESS RISK MANAGEMENT/PSYCHOLOGY

After Lauerman saw what King Schools cofounders John and Martha King said about the big lie—that flying in a general aviation aircraft is safer than the drive to the airport—he emailed the Kings, asking, "Don't we have a duty to do something?" Thus began a dialogue that led to a new program at Avemco, an insurance premium credit for customers who take risk-management courses offered by King Schools. Avemco also financed research currently being conducted by Dr. Bill Rhodes of Aerworthy Consulting, who is studying attitudinal issues and how these can affect accident rates. "That's becoming a major focus of our company," Lauerman said.

The goal, he explained, is to try to "help change our culture." What he means is changing the way a pilot thinks about flying, being able to resist the psychological pressure to take too high a risk, one that can't be brought to an acceptable level. An example of this is a pilot, typically male, who has sold his wife on the idea of buying a high-performance single-engine airplane. The closing argument is that they can take the kids and visit grandma whenever they want to. She acquiesces, then the first time the family plans a trip, the weather is poor. "The psychological pressure not to admit he oversold the airplane is pretty strong. Think about the dynamic going on there," says Lauerman.

Another scenario has the pilot buying the airplane for business, "convinced it's going to be an airline replacement. If you want to know you're going to get there, get on an airline. We're just at the beginning of this," Lauerman cautions.

"We're lousy at evaluating risk," asserts John King. "Sometimes we do something and don't scare ourselves and that wasn't too bad. The more times you do it, the more comfortable you are, but you're courting disaster every time. Risk management requires training. That's exactly what we're failing to do."

National Association of Flight Instructors executive director Jason Blair agrees. "We have to get the risk-management skills developed to the point that people can recognize potential risk and use the decision-making process to minimize risks. Those are fundamentals

that we have to teach in the most basic levels and reinforce later."

"There is no process," King notes. "Risk management is a process, a way of thinking, and what we have to do as an industry is get people to do a better job of risk management because we have an absolutely unacceptable fatality rate, and for many reasons we're not going to be able to continue in the future with that fatality rate as we have in the past. The answer is to teach people the process of identifying, evaluating and managing risks. It's a skill that's not intuitive; it needs to be trained."

"Someone once said you cannot teach good judgment and logic," recalls Rick Tutt, who operates an independent in-airplane recurrency training school, RJ Tutt Aviation, in Stockton, Calif.

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FLY UPSIDE DOWN

Pilots complain that recurrent training gets repetitive. One way to prevent tedious repetition is to try something new, like emergency maneuver training to help prevent one of the most prevalent accident causes, loss of control.

Aviation Performance Solutions (APS) of Phoenix offers upset training in both Extra 300L aerobatic airplanes and in Level D-certified regional jet simulators. All pilots can benefit from this training, according to APS president and CEO BJ Ransbury, a former Canadian Armed Forces F/A-18 and airline pilot. Ransbury is also vice president global integration for the Upset Prevention & Recovery Training Association (UPRTA), which promotes research and standards development.

In an agreement finalized last month, Bombardier is including with the sale of all Learjets, Challengers and Globals live upset recovery training provided by APS. The training is part of Bombardier's Leading Edge program, in turn based on the company's well received Safety Standdown program. Pilots of those Bombardier aircraft will receive four flights in an Extra 300L to expose them to upset and recovery techniques. They will also get upset training in level-D simulators.

"In the Extras we teach strategy that applies to a wide variety of fixed-wing aircraft; in the simulator it is more tailored to the jets these pilots fly and introduces such elements as trim and speed brakes," Ransbury told *AIN*. (Pilots of Bombardier jets already delivered will be able to take the training for a price decided case-by-case, according to Wichita-based Kristen Williams, Safety Standdown program coordinator and manager of the Leading Edge program.)

While Ransbury believes that professional pilots are better able to deal with loss of control because their aircraft are designed with greater redundancy and operate with more than one pilot, he notes, "Once [pilots] are pushed beyond a certain threshold, their skill levels are all about the same and nonexistent."

Current pilot licensing training is excellent, Ransbury believes, but when pilots get into an upset situation, they are exiting the envelope of what their training covered. "They're not taught in that region of flight." And when pilots are thrown into the surprise of an upset that they have never experienced, they have a tendency to panic.

Techniques that work in normal flying suddenly don't help. "This is driven mostly by the psychophysiology of pilots," says Ransbury, who is convinced there would be far fewer loss-of-control accidents if all pilots received initial and recurrent upset recovery training. In a before-and-after evaluation of the benefits of upset training, APS found that the average success rate for trainees more than doubled, to 97.6 percent from 41.6 percent after training. Of the participants, 51.4 percent were flight instructors.

Ransbury and UPRTA are working closely with the International Committee for Aviation Training in Extended Envelopes (ICATEE), which is developing a harmonized strategy to develop a roadmap to reduce loss-of-control in-flight accidents.

"Loss of control has become the number-one threat to commercial aviation," says Dr. Sunjoo Advani, ICATEE chairman and member of the Flight Simulation Group of the Royal Aeronautical Society. Advani's company, International Development of Technology, Breda, The Netherlands, develops simulator solutions for flight, medical rehabilitation and driving applications.

Ransbury and Advani are developing an iPad app version of the FAA's [Upset Recovery Training Aid](#), which is also available online.

The bottom line, according to Advani, is that all pilots need training in three areas to prevent loss-of-control accidents: academics (the training aid); exposure to real-life situations in a capable airplane; and simulator training that incorporates accurate scenarios and feedback so instructors can later review how students moved the controls in reaction to an upset. —M.T.



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“But I think you can remind them that you can practice good judgment and there is logic involved.”

KEEP LEARNING

Early in the jet age and the dawn of corporate aviation, vast improvements in accident rates underscored the benefits of recurrent simulator training. These benefits are also apparent in type-specific training, and the FAA requirement for a type rating in jets has had a hugely beneficial effect. Yet there is no type-rating requirement in the U.S. for turboprops weighing less than 12,500 pounds, which arguably can be just as complex to operate as a jet.

There is evidence that type-specific training is beneficial for turboprop pilots, not just because simulator training is available, but more telling is the change in the accident rate of the Mitsubishi MU-2 after the FAA imposed a training requirement. The training is required by [Special FAR 108, which mandates specific initial, recurrent and recurrency training](#), including ground and flight instruction and the curriculum content, for any pilot who is going to fly the MU-2. Since the SFAR became law (the improvements began before this because training to the new standard started earlier), there has been just [one fatal MU-2 accident](#), a remarkable improvement, and proof that focused training offers significant benefits.

The MU-2 experience not only shows

Airbus A330, Air France Flight 447, June 1, 2009, Atlantic Ocean, 228 fatalities

(Final report not yet published. The following is from the third preliminary report by the French Bureau d'Enquêtes et d'Analyses [BEA] and an article by Jeff Wise, published by *Popular Mechanics* on Dec. 6, 2011, based on the book *Erreurs de Pilotage*, Volume 5, written by Jean-Pierre Otelli. The book claims to include the full transcript from the accident airplane's cockpit voice recorder.)

The A330 is seconds away from impacting the surface of the ocean. (All systems are now operating normally, although it's likely the flight controls are operating in alternate law mode because of the earlier pitot icing problems. In alternate law, stall protection is not provided in the fly-by-wire control system.) The pilot in the left seat pushes forward on his stick, and according to the BEA, this triggers the stall warning because the airspeed had dropped below the horn trigger level. The Airbus averages control input between two pilots who are manipulating the sidesticks, and at one point both pilots are moving their controls simultaneously, but in opposite directions.

From the BEA: “The angle of attack, when it was valid, always remained above 35 degrees.” Less than three seconds before impact, the right-seater says, “But I've had the stick back the whole time!” According to the French BEA, the last recorded values were a vertical speed of -10,912 fpm, a groundspeed of 107 knots, pitch attitude of 16.2 degrees nose-up, roll angle of 5.3 degrees left and a magnetic heading of 270 degrees. —M.T.

how type-specific training offers benefits, but perhaps more important, the benefit of regular recurrent training. “Look at what your friendly airline pilot has to do,” says Jonathan Greenway, the new president of aviation insurer Avemco. Airline, charter and corporate aviation owes much of its excellent safety record not only to sophisticated simulators but also to regular recurrency training.

Doug Stewart, the New York pilot examiner and instructor and head of the Society of Aviation and Flight Educators, focuses recurrency training on stall practice, not just ordinary stalls, but circumstances that a pilot might encounter. “When are the times you might stall?” he asked. “Few pilots think about being heavily loaded, at a high density altitude, trying to clear a ridge. That's where we see accidents.”

RJ Tutt Aviation owner Rick Tutt advocates regular and focused recurrent training. Tutt's clients fly high-performance single- and twin-engine aircraft, and part of the reason they train regularly is because insurance providers require it.

To improve the GA accident rate, he said, “I would instill a discipline of training more than the FAA-mandated every-other-year biennial flight review.” The one hour of ground and one hour of flight instruction, with no specific requirements for what must be covered, “can be cursory at best. A lot of this is economic-driven. The only reason people train with me and my school colleagues is because [the training is] insurance company mandated.

“[Flying] is just the law of physics,” he emphasizes. “We're constantly students of the law of physics and have to be reminded now and again.”

CHANGE THE PROCESS

Jim Lauerman, retiring president of aviation insurer Avemco, is encouraged by a recent development: low-cost flight simulators based on simple computers, visual displays and even motion capability, like those built by Redbird Flight Simulations of Austin, Texas. “I think low-cost simulators are the next quantum leap in addressing [training] issues,” he said. “With the cost of fuel and insurance, an airplane is a terrible classroom. Eventually the FAA is going to have to get on board and recognize the value [of these low-cost simulators].”

Jerry Gregoire, founder and chairman of Redbird, is one of the pioneers of low-cost simulators, many of which run on a commercial version of Microsoft's Flight Simulator software. The Redbird devices replicate actual avionics, including systems such as [Garmin's G1000](#) and Rockwell Collins's Pro Line 21, right down to the knobs and switches. They also closely match the performance of various aircraft, from simple Cessna 172s to more complex Beech King Airs. Redbird simulators with motion bases start at about \$60,000 without control loading or \$67,000 with loading (which provides control feedback to the pilot). Redbird also sells a desktop flight training device that replicates G1000 avionics and includes landing gear and controllable-pitch propeller for \$7,995. The King

Air simulators were built for an FAA contract and cost more.

Last November, Gregoire cut the ribbon on a bold venture, an investment in proving out his ideas about how to fix flight training—The Redbird Skyport at San Marcos Airport south of Austin, Texas. The Skyport is changing the way flight training is delivered in a typical general aviation setting.

One of the changes that the Skyport is implementing includes employing salaried flight instructors. “This is a completely different model for compensation,” Gregoire said. “They're not paid by the flight hour. We're not looking for people who want to build hours and go to the airlines.”

The Skyport is using a curriculum developed by King Schools, which is simulator-centric. For example, before trying a maneuver like steep turns in the airplane, the student will learn how to do it in the simulator. Redbird, Cessna and King Schools worked together to develop the Guided Independent Flight Training (Gift) system, which monitors the progress of the student during a simulated maneuver and helps the student improve with repetitive practice. Students also get extra help with radio work, by using Redbird's new Parrot ATC simulation. Parrot provides location-centric controller communications and is especially helpful for students whose first language is not English.

Students can fly a Skyport simulator any time one is available. The cost is included in the package price for a certificate or rating, so there is no hourly cost disincentive to discourage students from practicing as much as they would like. Students are also using the simulators, especially Redbird's XWind crosswind trainer, in contests to see who can achieve the best score.

As of early this year, the Skyport had already booked \$1.4 million worth of business, but that isn't close to reaching the school's capacity. The school's fleet started with four new Cessna 172s and it is taking delivery of a new Piper Seminole at the Sun 'n' Fun show later this month.

While Gregoire is delighted with the Skyport so far, he also recognizes that changing the flight training system can't be done instantly. “Our instructors have a tendency to fall back on the old methods. It's a bit of a shock for everybody. We're learning a lot.” But on the whole, Gregoire believes that the Skyport will help not only deliver more competent pilots but improve retention of people who start flying as well. One example of how to keep students happy is providing hot meals at the Skyport instead of leaving students to figure out how to grab some food on their own.

Gregoire is convinced that low-cost simulation will help instructors deliver better pilots from ab initio through instrument, commercial and multiengine. One of the ideas being tested at the Skyport is what Gregoire calls “the Jim

The Pilot Source Study

One result of the Colgan accident was the FAA's issuance of an Advance Notice of Proposed Rulemaking titled “New Pilot Certification Requirements for Air Carrier Operations.” The ANPRM asks, “Are aviation/pilot graduates from accredited aviation university degree programs likely to have a more solid academic knowledge base than other pilots hired for air carrier operations?” A Pilot Source study conducted by five universities, six regional airlines, the Aviation Accreditation Board International and the University Aviation Association attempts to answer this question.

The Pilot Source study analyzed the performance of 2,156 pilots hired by the six airlines from 2005 to 2009. Two key questions were addressed: the characteristics of those pilots and how those characteristics related to their success during training at the airlines where they went to work. Training outcomes were measured by extra training events required before initial operating experience (IOE) and whether pilots completed IOE.

The study found that while a college degree didn't make much difference in extra training required, having an aviation college degree resulted in fewer extra training events and fewer IOE non-completions. Pilots who had advanced flight training in collegiate programs had better results than pilots trained in both Part 141 and 61 non-collegiate programs. Pilot background showed an interesting result: pilots with flight instructor certificates did better than pilots with previous corporate or airline flying experience. —M.T.

Lauerman series.” He credits the retiring Avemco president with “doing a good job impressing on me where accidents are happening.”

Skyport instructors have created a series of flights to evaluate decision-making skills, including hot and high takeoffs, flying into bad weather and dealing with thunderstorms and a sudden engine failure just after takeoff. “We don't preview it for them. In the case of the turning around to try to get back, we can tell them don't do it until you're at 500 feet. But when they take off in the simulator and [lose] the engine at 300 feet, we don't tell them anything. If they try to turn, they're going to crash, which is definitely not what you want to do. Imagine being able to do these things to people?” □

