BY J.A. DONOGHUE | FROM DUBLIN

SIMPLE CLUES

Seminar speakers point at simple solutions for familiar risks that refuse to go away.

Pilots violating standard operating procedures (SOPs) — plus poor or missing SOPs — and pilots with inadequate flying skills are insidious problems that continue to kill many. This was the opinion of several speakers at Flight Safety Foundation's 24th European Aviation Safety Seminar in Dublin on Feb. 29–March 1.

While the world's airline community chalked up a record safety year in 2011, it was barely better than the previous high-water mark, said David Learmount, operations and safety editor, *Flight International* magazine. However, historical accident patterns persisted; "all the serious accidents, even over the past several years, have been preventable," Learmount said.

Of the 32 fatal airline accidents last year — jet and turboprop — nine happened "because the crews busted minimums on approach," he said. The five controlled flight into terrain

(CFIT) accidents last year, the highest number since 2005, included "three with TAWS (terrain awareness and warning system) working; pilots will still ignore good advice."

Another eight accidents were caused "by wanton carelessness by the airline, the crew or both," he said. "Twenty-two of the remaining 32 could have been avoided … by a bit of discipline, and perhaps the other 10, as well."

A similar theme was struck by Robert Sumwalt, member of the U.S. National Transportation Safety Board (NTSB), who pointed at studies of recent accidents: "In an NTSB study of 37 crew-caused air carrier accidents, 1978–1990, procedural errors, such as not making required callouts or failing to use appropriate checklists, were found in 29 of the 37, 78 percent of the reviewed accidents." Looking at more recent accidents in the 2001–2010 period, "NTSB identified at least 86 accidents involving lack

Fatigue Strategy Mapped

Most safety innovations, after a period of development and experimentation by the industry, arrive on the doorstep of the International Civil Aviation Organization (ICAO) to be hammered into shape for uniform implementation. Such is the story for fatigue risk management systems (FRMSs), which last year got the ICAO treatment in a new document that was applicable as of this past December. Speaking at the Flight Safety Foundation's European Fatigue Risk Management Symposium in Dublin on Feb. 28, Michelle Millar, technical officer (human factors) with ICAO, said the organization approved amendments to Annex 6 Part I, to include FRMS Standards and Recommended Practices (SARPs), combining all fatigue management standards into one section, Chapter 4.

This is serious stuff, since "standards" contain the operative word "shall," meaning that regulators "must have regulations for managing fatigue based on scientific principles," either through "mandatory prescriptive regulations," more commonly known as flight and duty time limitations (FTLs), or "optional FRMS regulations," she said.

FRMS is defined as "a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience, that aims to ensure relevant personnel are performing at adequate levels of alertness," she explained, adding that the definition implies that FRMS "is a misnomer, focusing on how alert you are, rather than how fatigued."

Millar

In the SARPs scheme — "recommended practices are 'really good ideas,'" she said — operators, "where FRMS regulations are offered, can choose how to manage their fatigue risks," she said. Operators' options include "complying with [FTLs]; or an FRMS for all operations; or an FRMS for some operations and [FTLs] for the remainder of the operations." The intent of this is that operators choosing not to use an FRMS must manage fatigue risks "within constraints of FTLs using SMS (safety management system) processes." She said that the new FRMS section of Annex 6 "is a very powerful document, designed to minimize arguments back home because we have already had these arguments" in meetings that included operators and regulators. Despite the arguments, "we are all in agreement about what is in the guidance," based on science and operator experience.

"With an FRMS, an operator continues to have flight and duty time limitations, but these are identified through their FRMS processes, are specific to a defined operational context and are continually evaluated and updated in response to their own risk assessments and the data the operator is collecting," Millar said. "It is up to the regulator to assess whether the risk assessments, mitigations and the data collected are appropriate, and that the [FTLs] identified are reasonable responses as evidenced in safety performance indicators."

Details on what SMSs and FRMSs must contain are in ICAO's Annex 8, "at the same level as a standard, and uses 'shall' language, but it provides more detail than a standard," Millar said. "Despite FRMS requiring performance-based regulation, Appendix 8 is prescriptive about just what each of the components of an FRMS has to have."

How the requirements of Appendix 8 can be put into practice is not abundantly clear, so ICAO issued two documents, *FRMS Implementation Guide for Operators* and *FRMS Manual for Regulators*. Millar noted that all of this information is available on the ICAO website but warned that some digging through the site might be needed to come up with the appropriate documents.

Recognizing the reluctance of some to adopt a FRMS, Millar said, "Over the years FRMS will evolve, and regulators and operators will become more familiar with it, and it won't be perceived as such a threat."

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of adequate procedures, policies or checklists, or lack of flight crew adherence to procedures, policies or checklists.

"To improve safety, improving procedures is a great place to focus," Sumwalt said, placing a portion of the blame on the operator: "Why aren't procedures followed? The organization lacks SOPs, doesn't adhere to its SOPs or flight crews intentionally do not follow SOPs. … Well-designed SOPs are absolutely essential to safety."

The solution starts with the organization, he said, by "making a strong commitment for procedural compliance to be a priority and a core value of the organization. Simply having the procedures is not enough; religiously following them — and insisting they be followed — must be a way of

Photos: J.A. Donoghue

doing business. Go through all manuals, check-lists and procedures. Change those that don't work, are not clear, are outdated and/or are not followed. Establish a culture of compliance."

A survey showed that 50 percent of the nearly 1,000 pilots surveyed said they would deviate from SOPs if a deviation would increase safety, while 29 percent would deviate if it would not reduce safety, reported Barbara Holder, lead research scientist at Boeing. She said that 37 percent of the pilots deviated from checklist protocols once a year and 30 percent deviated several times a year. Callout requirements were ignored either every flight or in one of every 10 flights by 49 percent of respondents, and 78 percent admitted to violating stable approach criteria once or several times a year, she said.

Shifting the study focus to training, a major-ity — 54 percent — had a negative experience in training, with the most commonly cited prob-lem being the simulator instructor. "If we start here," working to improve instructor selection and performance, "we can see an immediate improvement in training," Holder said.

Training also has a role in combating a new category of accidents that has developed in recent years, "black swan events" that cannot be pre-dicted based on past experience, Learmount said. "Jets are getting more reliable and safety events are getting fewer, but when it [a black swan event] happens, it tends more to be unforeseeable."

The only possible approach to the unknow-able nature of these events is enhanced piloting "resilience, a newly sought quality that comes from good, broad comprehensive training, that provides pilots with the operational and technical knowledge levels that enable them to recognize priorities when they have to deal with the unexpected," Learmount said.

Another important training process overhaul should be a move toward "evidence-based train-ing" … an International Civil Aviation Organi-zation (ICAO) principle, he said. "You train to a performance objective, and don't stop until that objective has been achieved. 'Not failing' an exercise does not result in a pass. There has been a loss of pilot exposure to anything other

than pre-packaged flight planning, followed by automated flight."

Training, or the lack thereof, also plays a role in loss (or lack) of control (LOC) accidents, he added. "There have been 12 fatal LOC accidents since 2000; all could have been prevented, some quite easily. Unless the causes are understood and mitigating training put in place, more LOC accidents will occur."

Attacking LOC through design is diffi-cult, as Airbus has learned with its fly-by-wire concept intended to keep the aircraft within its flight envelope. "Air France 447 [the South Atlantic A330 crash] shows that this doesn't always work," he said, and even the best LOC training won't help "because it presupposes that the crew of an aircraft that has got into an unusual or extreme attitude will have the mental capacity to recover from it."

Lagging governmental support for oversight efforts was discussed by Nicolas Rallo, ICAO's regional safety officer from the European and North Atlantic (EUR/NAT) Office. Most recent ICAO Universal Safety Oversight Audit Program examinations of civil aviation authorities (CAAs) showed problems. The world average lack of effective implementation of CAA responsibilities for qualification and training of technical staff is the most problematic, achieving only 41.1 percent of necessary levels, he said. And while CAA fund-ing was considered to be within 58 percent of target levels globally — 60 percent for the EUR/NAT region — in judging a sufficient level of human resources, the global average of 24 percent beat the EUR/NAT results of 22 percent. And on the question of whether the CAA is a competitive employer, the world average of 46 percent beat out the 42 percent of EUR/NAT.

The reasons for the poor EUR/NAT perfor-mance, Rallo said, include discontinued positions, failure to replace departing technical staff, blocked recruitments and reductions in CAA training budgets. The basis of these problems, often in "high political levels," he said, are a lack of aware-ness of the consequences for the CAA, the nation and the industry; lack of understanding of the needs of civil aviation; and lack of political will. ➥

**Learmount (top)
and Rallo**

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