Threat-and-Error
DETECTIVES

A pioneering regional airline recounts its LOSA experience for other turboprop operators.

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R egional airlines, especially those operating turboprop airplanes, for the first time can visualize potential benefits of a line operations safety audit (LOSA) program by considering the experience of a comparable operator, thanks to an Australian case study. By comparison, more than 20 operators of commercial passenger jets have used the LOSA program since its 1996 introduction by a human factors research team led by Robert Helmreich, Ph.D., and the 2001 creation of the University of Texas (U.S.) Human Factors LOSA Collaborative, which runs the program.

Data from 57 observations of 30 flight crews at Regional Express showed that, on average, they experienced 4.9 LOSA-defined threats per flight sector — with at least one threat on every flight sector, said a January 2007 report prepared for the Australian Transport Safety Bureau (ATSB), which funded this LOSA case study.[1] The most prevalent threats were air traffic control (ATC) issues and weather issues — each threat category affecting 32 percent of all flight sectors — and ground and ramp operations issues, affecting 19 percent.

Trained LOSA observers, who assume error to be an inherent part of flying, analyze data collected on a confidential basis through a prism of various human factors models. The outputs of their analysis enable airlines to determine safety margins during routine flight operations. The data collected represent factors such as environmental conditions, operational complexities and flight crew performance as pilots manage, or mismanage, problems. Current LOSA programs also incorporate among their methods Helmreich's threat-and-error management model of reducing the risk of accidents.

An international outreach by the LOSA Collaborative, part of a plan to bring regional airlines into the LOSA sphere, attracted both Regional Express and an unnamed New Zealand–based

From the jump seats of commercial jets, such as the Boeing 737, trained LOSA observers have collected data since the late 1990s.

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operator to be the world's first regional airlines to implement LOSA. "Traditionally, the regional airline sector has experienced a higher accident rate than larger carriers, both in Australia and worldwide," the ATSB safety report said. "Regional carriers generally operate with less stringent regulatory requirements, fewer company resources, less sophisticated aircraft and in a more hazardous operating environment than their mainline jet counterparts. Furthermore, unlike jet operators, regional airlines rarely have the resources to implement flight data recorder–based flight operational quality assurance programs. … A LOSA [program] can help an airline discover the safety margins associated with its operations [and] provides unique data about an airline's defenses and vulnerabilities."

Regional Express was created by the 2002 merger of Hazelton Airlines and Kendell Airlines. The new airline was successful in encouraging voluntary participation by its flight crews in a LOSA program while seeking insights into the effects of dynamic organizational changes on safety performance. Other company goals were to explore the feasibility of routinely using this tool, to eventually "focus and redirect training" within the country's regional airlines, and to help the LOSA Collaborative to refine its data archive and methodology for use by all regional airlines.[2] Regional Express operates Saab 340 and Fairchild Metro 23 airplanes; the Saab 340 fleet was the focus of its LOSA observations.

Affordability Problems

"Until now, largely due to cost, LOSA [has] only been available to larger airlines operating above the regional airline profitability threshold," the report said. "While this project specifically

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sampled Saab 340 turboprop operations … the LOSA Collaborative also conducted a number of observations on the Fairchild Metro 23 turboprop fleet as a case study, to examine how LOSA might be further developed for smaller aircraft applications that do not have a dedicated cockpit third pilot/observer jump seat station."

Six observers flew the LOSA flight sectors during April and May 2005, including operations at 26 Australian airports. The observers included two representatives from the LOSA Collaborative and a captain and three first officers from the airline.[3] "An agreement … between Regional Express airline management and the Regional Express pilots' association … ensured that all data was de-identified, kept confidential and sent directly to the LOSA Collaborative for final analysis," the report said.

Coding of data was checked for technical accuracy by LOSA Collaborative analysts, then the airline's fleet subject matter experts conducted a "data cleaning roundtable," ensuring that coding corresponded to the airline's standard operating procedures. "This enhanced not only the credibility of the findings [but also] instilled confidence within the airline to use the data to implement meaningful safety changes," the report said. "Completing this task also included the [highlighting,] extraction and amplification of any high-risk events [undesired aircraft states (UASs)] that may have been observed."[4]

The resulting data set captured numbers and types of threats to flight safety, flight crew

management of threats, errors made by flight crews and flight crew management of errors. The observers also rated flight crews according to crew resource management (CRM) behavioral markers. The LOSA Collaborative produced a confidential final report for Regional Express containing analysis of these data accompanied by comparisons with some of the data added most recently to the LOSA data archive. This report — accompanied by raw data and full-text observer narratives — presented findings on threats, errors, UASs and organizational threat-and-error countermeasure profiles.

Threat/Error Profiles

The following findings were in the ATSB report:

- Captains and first officers were equally represented as the pilots flying on the observed flight sectors.

- Most threats — 59 percent — were categorized as "environmental threats," or beyond the airline's control, and the remaining 41 percent were "airline threats," or related to operations such as pilot, maintenance and ground support issues.

- Within the environmental category, the ATC-related threats and adverse weather–related threats occurred on 54 percent of flight sectors; about 50 percent of all threats in this category were during the descent or approach-and-landing phases of flight.

- Within the airline category, threats related to ground and ramp operations occurred on 46 percent of flight sectors; 75 percent of all threats in this category were during the pre-departure/taxi phase of flight.

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Twenty-three of the 30 flight crews, during the cruise phase of flight on the observed flight sectors, answered four standardized open-ended questions that were asked by observers, probing the pilots' perceptions of various safety and training issues, including potential accident risks, safety improvement opportunities, aircraft operational confusion/automation traps and differences between training and line operations.

Post-LOSA changes at Regional Express have included an internal review of training and checking policies with a related business plan to improve quality assurance processes; database tools to compare pilot training and outcomes with measurable internal benchmarks; and remedial initiatives, supported by regulatory amendments, that will address any individual pilot issues that surface during new training/checking processes. "Regional Express will consider scheduling an internally run LOSA [program] toward the end of 2007 or in early 2008 … after the current safety programs and initiatives become embedded in

the Regional Express flight operations culture," the report said. ●

Notes

1. This article is based on the Australian Transport Safety Bureau (ATSB) safety report *Regional Airline Line Operations Safety Audit* by Capt. Clinton Eames-Brown and Geoffrey Collis. The 39-page report, published in January 2007 under ATSB Aviation Safety Research Grant B2004/0237, includes tables. Eames-Brown is safety manager of Regional Express.

2. The database of the Line Operations Safety Audit (LOSA) Archive contains more than 4,000 de-identified observations from approximately 20 participating airlines based in several countries.

3. The LOSA Collaborative's observers collected data on six flight sectors; observers employed by Regional Express collected data on 51 flight sectors.

4. An undesired aircraft state is "a position, condition or attitude of an aircraft that clearly reduces safety margins and is a result of actions by the flight crew." Examples in the report were unstabilized approaches, lateral deviations, hard landings and flight crews proceeding toward the wrong taxiway or runway.