Aerospace Journalist Of The Year – Safety

Corboy & Demetrio Award for Contributions to Improve Aviation Safety

EDITORIAL EXCELLENCE AWARD WINNER

Air Safety Week®

Air Safety & Security Trends, Policy and Regulation

October 20, 2003
Washington, D.C.

Vol. 17 No. 40
www.aviationtoday.com

Smoke Triggers More Diverted Flights Than Engine Problems

During the cruise phase of flight, a "smoke" event is more than twice as likely to cause an unscheduled landing than an engine problem, according to a new study of service difficulty reports.

Capt. Jim Shaw of the **Air Line Pilots Association** (ALPA) did the study. Shaw flies for **Delta Air Lines** (NYSE: DAL) and the findings clearly have implications for extended-range operations (EROPS). The extension of EROPS flight planning to 180 minutes from a divert airfield is predicated largely on engine reliability, and the steps taken in design, maintenance and flight planning for twinjets to preclude the loss of the second engine should the first have to be shut down *(see ASW, March 24, p. 1, March 31, p. 6)*. Shaw's study suggests that crews on EROPS flights are more likely to face an in-flight smoke event, and that this potential threat to the safety of ever-longer EROPS flights may warrant elevated priority. His findings are consistent with reports submitted to the Aviation Safety Reporting System (ASRS), which show – among other things – that the proliferation of in-flight entertainment systems has increased the potential for smoke and fire events, for which aircrews may lack training, emergency equipment, and the ability to pinpoint and isolate the source of smoke *(see ASW, Sept. 22, p. 1)*.

EROPS & Unscheduled Landings

- "Warning Indications" are the most common condition for unscheduled landings. Of these (cargo smoke, fluid loss, etc.), the most common cause was "smoke," making up 15 percent of the panoply of warnings leading to an unscheduled landing.
- Most events initiating unscheduled landings occurred during climb, but a large number – 39 percent – occur in cruise.
- When looking only at the cruise portion of flight, "smoke" events increased to more than 20 percent of all the initiating causes for unscheduled landings.
- Fully 54 percent of all smoke events that cause an unscheduled landing occur during cruise.
- During cruise, a smoke event is more than twice as likely to cause an unscheduled landing than an engine problem.

Source: Shaw

In the process of examining hundreds of service difficulty reports (SDRs), Shaw originally concentrated on unscheduled landings due to engine problems. During the process of this examination, he found a surprisingly large number of smoke events that also were forcing crews to divert and land.

Shaw looked at unscheduled landings for a variety of two, three and four-engine aircraft, including the A330, B757, B767 and B777 twinjets, the MD-11 trijet, and the four-engine B747. The SDRs were filed over the 2000-2002 time frame, so Shaw basically was analyzing the most current data available.

His findings need to be couched with a disclaimer. Carrier participation in the SDR program varies widely. This being the case, rates cannot be derived from the SDR data. Moreover, the total number of SDR reports can be a misleading indicator of the number of events actually occurring. The actual number could be twice that reported to the SDR database.

Furthermore, while the aircraft selected for the review often are used in EROPS flights, the reported diverts did not all occur during the EROPS portion of the flight. *(Cont'd on p. 2)*

With these caveats in mind, Shaw's study is nonetheless significant. It points to the greater likelihood that crews on EROPS flights are more likely to face a smoke incident than an engine event serious enough to force landing at a divert airfield *(see box, p. 1)*. "An EROPS flight must operate for an extended period of time with whatever condition caused the crew to begin the divert," Shaw said.

Video Smoke Detection

An ideal amalgamation of technologies? Security ***and*** smoke detection, to assuage the weight and cost challenges:

"Video smoke detection (VSD) is based on sophisticated computer analysis of the video image seen by a standard closed circuit television (CCTV) camera (sensor). Using advanced image-processing technology and extensive detection (and known false-alarm phenomena) algorithms, the VSD can automatically identify the distinct characteristics of smoke patterns. The fire detection industry has an abundance of known smoke signatures and all of these are built into the system to give an accurate decision on whether smoke is present. The VSD is so accurate in its analysis that it can even differentiate between steam and smoke. (*ASW* comment: for aviation, the steam vs. smoke capability would involve the ability to distinguish between oil-fumes in the air conditioning system and electrical smoke.)

"The VSD system uses standard CCTV equipment linked to a self-contained processing system which is capable of recognizing small amounts of smoke within the video image and alerting the system operator both at the processor and by a variety of remote outputs." (*ASW* note: "Remote outputs" could include the digital flight data recorder, DFDR.)

Source: www.designfire.com.au/detection_methods.htm

In comparing smoke to engine related unscheduled landings in the cruise portion of flight, Shaw found 59 reports of engine-related diverts, but more than 130 events where smoke triggered the decision to divert.

The findings suggest there is a real dilemma posed to crews by smoke," Shaw wrote. "Current regulations only require that once the smoke generation stops, the air ventilation system must be able to clear the cockpit of smoke within a preset time limit."

"Current regulations do not deal adequately with the problem of continuous smoke generation, which so often is a feature of the more serious smoke and fire events, such as the **ValuJet** Flight 592 crash and the **Swissair** Flight 111 accident," Shaw wrote.

With current aircraft designs based on the limited ability to clear the cockpit of smoke after the smoke stops being generated, Shaw asserted that "crews and passengers on EROPS aircraft are placed in the difficult position of trying to operate and survive for long periods of time in a smoke-filled aircraft."

To mitigate the risk, Shaw believes several options are available. "First, reduce the risk of fire or smoke through more rigorous wiring and flammability standards," he wrote.

"Next, get the fire or smoke generation stopped as soon as possible with improved fire detection and suppression in inaccessible areas," he wrote, citing specifically the need for detection and suppression in the attic space above the cabin and cockpit. *(For vivid examples, see ASW, April 21, p. 6)*

Air Safety Week
ISSN 1044-727X

Assistant Editor: Eric Grasser, *egrasser@pbimedia.com*
Editor-In-Chief: David Evans *devans@pbimedia.com*
Managing Editor: Fred Donovan *fdonovan@pbimedia.com*
Contributing Editors: John Sampson, Dr. Alex Richman, M.D.
Director of Marketing: Jill Braun *jbraun@pbimedia.com*
Production Manager: Tracey Lilly
Publisher: Diane Schwartz
V.P. & Group Publisher: Heather Farley
President CEO: Don Pazour

For Advertising Call Jill Braun: +1-301-354-1694

Send press releases to:
Eric Grasser, Assistant Editor
FAX: +1-301-762-4196, *egrasser@pbimedia.com*

Subscription: $1097 per year (outside North America add $99 for air mail; in CO, MD and TX, please add applicable sales tax).

"Finally," Shaw urged, "devices to improve instrument visibility in a smoke-filled cockpit, improved checklist procedures for dealing with smoke, and an adequate oxygen supply so the pilots at least have a chance of completing the divert when all else fails."

Some additional thoughts come to mind. To qualify for EROPS, an operator must demonstrate a specified in-flight shut down (IFSD) rate, thereby assuring regulators that its maintenance and other practices are sufficient to minimize the likelihood of engine problems in flight. Perhaps a comparable standard could be established for in-flight smoke events. Moreover, just as EROPS-certified airplanes must feature more backup systems, perhaps video smoke detection should be a required capability built into EROPS aircraft. One of the greatest challenges in dealing with an in-flight smoke event is reliably locating the source. In this regard, video smoke detection could be a critically-helpful tool *(see box, p. 2).*

(Note: For a study hitting on the same themes done last year by aviation consulting firm ***Morten Beyer & Agnew****, see ASW, Oct. 21, 2002, p. 1) >> Shaw, e-mail jdshaw@compuserve.com <<* ✈

Decoys Offered to Defeat Missile Attacks on Airliners

Combination of ultraviolet and radar detection deemed doubly reliable

"Our goal is to make the terrorist missile miss," declared Jim Carey. He's vice president of business development for Austin, Texas-based **AVISYS**, one of many avionics and systems companies jumping on the missile defense bandwagon.

The industry is responding to the need for missile defenses on airliners with adaptability and creativity, with various potential suppliers of protective systems employing a variety of technologies aimed at defeating terrorist attacks with increasingly sophisticated man-portable air defense systems, or MANPADS *(see box, right)*.

The phrase "air defense" is a misnomer, as shoulder-fired missiles in the hands of terrorists are not defensive systems – as they would be in the hands of troops in a military organization against enemy aircraft – but rather instruments of mass slaughter of civilians, the mere threat of which pumps up the general anxiety level.

The Potential for Murder by MANPADS

- Continued instability inside Iraq has given terrorist groups *easier access to shoulder-launched anti-aircraft missiles* and, potentially, chemical or biological weapons, according to the London-based **International Institute for Strategic Studies** in its latest Military Balance survey.
Source: London Financial Times, Oct. 16 (emphasis added)

- "I am concerned about the progress being made to defend against shoulder-fired missiles. We know that terrorists have these weapons and are prepared to use them against civilian planes. I believe we need to move more aggressively in this area. If, God forbid, one of these weapons is fired at an American aircraft, it won't be enough to say we failed to act in a timely manner." *Rep. John Mica (R-Fla.), chairman, Aviation Subcommittee, Oct. 16.*

In an aviation industry flat on its back economically, potential suppliers of missile defenses see a growth industry, with an estimated $10 billion to $100 billion market, depending upon the type of defenses, installation and ongoing operational, support and maintenance costs, some or all of which may be outsourced.

U.S. government officials briefed industry representatives last week with their latest thinking on the potential need to equip transport-category aircraft with missile defenses *(see box, p. 4)*. A two-phase program is envisioned, with the notion of fielding a small number of prototype systems within two years for operational evaluation *(see ASW, Sept. 29, p. 5)*.

Previous mobilization for protection

The response of companies like AVISYS and others recalls the mandate to install fire detection and suppression in Class 'D' belly holds following the May 1996 crash of **ValuJet** Flight 592 from an uncontained fire in the forward belly hold. The **Federal Aviation Administration** (FAA) gave the industry three years to install detection and protection, and the industry responded with a variety of technologies – all designed to meet overall FAA-specified performance criteria in terms of false alarm rates and fire-fighting effectiveness. **Southwest Airlines** [NYSE: LUV] opted to install a wireless system, while **United Airlines** [OTC: UALAQ] retrofitted its fleet with a wired design.

So, too, with missile defenses. **Northrop Grumman** [NYSE: NOC] is touting its large aircraft infrared countermeasures (LAIRCM) system to detect the unique thermal signature of a MANPADS launch and cause the missile to lose "lock" on its airliner target by shooting a pulse of laser energy at the missile's