Night Light

Flight crew distraction and confusing lighting were implicated in misaligned nighttime takeoffs.

REPORTS

Staying Centered — Or Not

Factors Influencing Misaligned Take-Off Occurrences at Night

Todd, Melanie A. Australian Transport Safety Bureau (ATSB) AR-2009-033. June 2010. 44 pp. Figures, tables, appendixes.

"The night pleases us, because it suppresses the idle details, just as our memory does," wrote the Argentine literary figure Jorge Luis Borges. But for flight crews lining up to roll their aircraft down the runway when most of the world is dark, there are no idle details. They must see and understand the picture presented partly through visual cues, such as runway centerline and edge lighting systems, which are different from lighting and markings they rely on in daylight.

The study was triggered by five misaligned nighttime takeoff occurrences investigated by the ATSB during a four-year period. All involved aircraft with takeoff weights greater than 5,700 kg/12,500 lb. In addition, the report examines ATSB and international aviation safety investigation reports, as well as data from the U.S. National Aeronautics and Space Administration Aviation Safety Reporting System, of misaligned takeoffs in night visual meteorological conditions.

For example, on the night of Jan. 30, 2006, an Airbus A319 was flying scheduled passenger service from Las Vegas to Montreal. Shortly after beginning the takeoff, the flight crew realized that the aircraft was rolling along the runway edge instead of the centerline. Three runway edge lights were damaged.

The investigation determined that the pilot flying was likely to have been relying on peripheral vision while steering because of the need to concentrate on the forward view; that the rolling takeoff reduced the time available to check position; and that the pilot was misled by "confusing aerodrome markings, especially taxiway lead-in lines that directed aircraft onto the runway edge lights, resulting in the misalignment of the aircraft at the beginning of the takeoff roll."

The search for contributing factors encompassed 24 occurrences of taking off on the runway edge lighting and eight occurrences of taking off on closed or wrong runways or on taxiways. Causal factors were ranked by frequency.

In both types of occurrences, the most common factor was "flight crew divided attention/distraction/eyes inside" because of workload or unfamiliarity with the airport layout. That situation was found in 14, or more than half, of runway edge takeoffs, and seven of the eight takeoffs from the wrong location.

Fourteen of the runway edge takeoffs included "confusing runway/taxi entry/lighting," involving lights, markings and signage. That factor was found in four wrong-location takeoffs.

Almost as common — in 13 occurrences — among runway edge takeoffs was "displaced threshold (lights and markings start further down runway) or intersection departure."

Additional factors responsible for misaligned takeoffs included poor visibility or rain; a wide runway or extra pavement near the taxiway; centerline lighting absent or out of service; an air traffic control (ATC) clearance while the aircraft was taxiing or entering the runway; crew fatigue; and recessed runway edge lights at taxiways.

"Distraction was reported to occur in the events analyzed for a number of reasons, including flight crew dealing with an unusual event or problem, or flight crew performing checklist items or setting power/checking instruments/readings," the report says. "Some of these items, such as completing checklists, are a normal and necessary part of the departure phase of flight. However, they may act as a distraction to flight crew if conducted out of sequence, such as during the line-up phase."

Divided attention is created when flight crewmembers must be "eyes inside" the cockpit for an excessively long time during taxi because of an unusual situation, the report says: "While multi-crew operations partially mitigate this risk by articulating and dividing aircraft handling and monitoring roles between the pilots, there are still times when both crewmembers may not be processing the external environmental cues accurately."

Besides poor visibility, unusual pavement configurations create particular difficulties at night. "Pilots operating from a runway with a greater width, or additional paved areas at taxiway entry, than most standard runways can believe that they are in the center of the runway when they are actually lined up on the edge," the report says.

The report discusses the problem that sometimes can be caused by recessed lighting — flush with the surface — on taxiway and runway edges. Centerline lighting is always recessed so that the aircraft wheels can cross without damage. "Often runways will have recessed lights at the runway edge where the taxiway meets the runway," the report says. "Recessed runway edge lighting can therefore act as confirmation that the flight crew have lined up on the centerline, when this is not actually the case."

The report notes the significance of the color, position and brightness of taxiway and runway lighting in the events the study reviewed. "In some cases, the difference in color between taxiway lights and normal runway lights was either not noted by the flight crew, or they believed the lights were the correct color when they were not," the report says.

The ATSB has produced a "pilot information card" to raise awareness of factors that could lead to a misaligned takeoff. Side 1 of the card reads, "Don't lose the edge." Side 2 asks, "Got any of these?" and lists distraction or divided attention; confusing runway layout; displaced threshold or intersection departure; poor visibility or weather; ATC clearance during runway entry; no centerline lighting on runway; fatigue; and recessed runway edge lighting. It concludes, "If so, the risk of a misaligned takeoff or landing has just increased."

— Rick Darby

BOOKS

Culture, Meet Safety

Safety Culture: Theory, Method and Improvement

Antonsen, Stian. Farnham, Surrey, England and Burlington, Vermont, U.S.: Ashgate, 2009. 184 pp. Figures, tables, reference, indexes.

"The proposed relationship between organizational culture and safety is the topic of this book," Antonsen says. "This relationship, epitomized by the concept of safety culture, has undoubtedly become one of the hottest topics of both safety research and practical efforts to improve safety. For instance, most oil companies today have programs devoted to improving the company's safety culture." Yes, safety culture will continue to be a hot topic.

The book's framework is an effort to answer a general question: "How can a cultural approach contribute to the assessment, description and improvement of safety conditions in organizations?" Antonsen says that the question can be subdivided for clearer understanding into subordinate questions:

- "What are the theoretical foundations of a cultural approach to safety?
- "How can the relationship between organizational culture and safety be investigated empirically?

- "In actual organizations, what links exist between organizational culture and safety? [and,]
- "How can research on safety culture be translated into techniques and principles for improving safety?"

As a foundation for the book, the author examines the meaning of both organizational culture and safety. The first is hard to pin down, but he says, "I reserve the term organizational culture to apply to the informal aspects of organizations."

The idea of safety is inseparable from the idea of risk and is often expressed in terms of the likelihood of an event occurring multiplied by the seriousness of the event's consequences. That seems simple and theoretically unarguable, but measuring the risk is less clear in practice. Antonsen says, "The traditional quantitative risk analysis is based on the assumption that there is some objective and true level of risk 'out there' and that one can come close to estimating this through the use of standardized techniques. Cultural theorists like Mary Douglas and Douglas Wildavsky have voiced strong objections to this concept of risk. Their argument is that risk will always be, at least to some extent, socially constructed."

The "social construct" theory does not imply that the dangers are partly or wholly imaginary — although in extreme cases, like belief in witchcraft, they might be — but that decisions about what risk is acceptable have a culturally influenced component. Antonsen cites "research [that] has shown that people are usually more afraid of events that in all likelihood they will never experience, such as nuclear radiation and plane crashes, than the events that are quite likely to cause serious harm, such as driving a car or painting their house."

Putting together the various outlooks on the subject, the author says that a definition of safety will have three elements: "a *state* or *situation* where the statistical risk is deemed to be acceptable, or as low as reasonably practicable"; "a *feeling* of security and control"; and "a form of *practice*, in the sense that it refers to our ability to reduce or eliminate the likelihood of hazardous events occurring."

The subject is explored in chapters including "Safety Culture and Power," "Assessing Safety Culture," "An Empirical Case Study — Safety Culture on Offshore Supply Vessels," and "Improving Safety Through a Cultural Approach — Limitations, Constraints and Possibilities."

— Rick Darby

WEB SITES

Heliport Safety Manual

Heliport Safety, Educational and Regulatory Information, <www.raysyms.com/heliport-safety-educational-and-regulatory-information>

"Next to design faults, the next most common cause of helicopter accidents at heliports is human error," says Raymond A. Syms & Associates (RAS&A). "Most of these errors could have been avoided with proper training and heliport operational knowledge."

Syms developed a prototype "Heliport Facility and Training Manual Development Training Aid" to help professionals safely operate their hospital heliports. The training aid helps interested parties customize their own safety materials, training programs and operations manuals. Rather than starting with a blank slate, heliport owners, operators and others can use

the training aid as a guide. RAS&A says, "This heliport facility manual is designed for the heliport owner and users and covers the minimum

standards that should be addressed with respect to facility administrative management, flight operations, safety and training. This manual has been written to become a mandatory training requirement for all personnel whose job descriptions include activity around the heliport."

The 16-page document identifies guidelines and responsibilities for four departments — hospital administration, medical teams, security teams and ground maintenance teams. It offers suggestions, examples and recommendations on such topics as general operating rules; pilot and facility briefing sheets; emergency procedures and notifications checklists; sample illustrations, such as a campus map labeling streets and buildings; a sample security policy; and an equipment list (for example, hearing and eye protection and portable oxygen) to be stored in a connecting passageway.

The safety and training portion of the document provides standard operating procedures for maintenance personnel and familiarizes heliport personnel with hazards and safety concerns associated with helicopter flight operations. A catch-all general safety list targets all staff members with instructions from the obvious, "Do not throw anything toward or from the aircraft" to the not-so-obvious, "Never approach the helicopter until signaled by the pilot or other member of the flight crew."

Detailed information about the training aid, its contents and intended use, and information for requesting a copy are available on the Web site. The free training aid is available to qualified helicopter aviation professionals.

— Patricia Setze

Ash Cloud Guidance

International Federation of Air Line Pilots' Associations, <www.ifalpa.org>

The International Federation of Air Line Pilots' Associations (IFALPA) was formed in response to creation of the International Civil Aviation Organization (ICAO) by the United Nations. According to IFALPA's history, "The fact that ICAO was to make decisions on aviation policy without pilot representation immediately began to interest several pilots' associations. … This was the reason for the birth of IFALPA in April of 1948 during a conference of pilots' associations held in London for the express purpose of providing a formal means for the airline pilots of the world to interact with ICAO."

IFALPA has permanent observer status in the ICAO Air Navigation Commission. In this capacity, IFALPA recently submitted its position paper, *Volcanic Ash Operations*. The executive summary says, "The ultimate responsibility for the safe conduct of a flight rests with the pilot-in-command. The pilot-in-command must therefore be given adequate tools, training information and guidelines to deal with volcanic ash." The eight-page paper makes recommendations regarding standards, recommended practices and guidance materials; aircraft and operator certifications; ash cloud modeling; risk analysis; airspace management; aerodromes; and flight operations. References and an appendix are included.

The IFALPA Web site has a significant amount of information for members and non-members, such as briefing leaflets, safety bulletins and the *InterPilot* newsletter. Three new briefing leaflets from the aircraft design and operation committee are "Volcanic Ash Guidance for CRJ Series," "Boeing Volcanic Ash Advice" and "Airbus Volcanic Ash Advice." Position papers and other documents may be read online or downloaded at no cost.

If you find yourself swimming in an alphabet soup, check out the "aviation jargon buster," a lengthy list of acronyms, terms and definitions. Or, maybe you already know that VAAC means Volcanic Ash Advisory Centre and VAW means volcanic ash warnings.

— Patricia Setze