

THE GROWING RISK OF RUNWAY INCURSIONS IN AVIATION

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Business aviation, which operates over 22,000 aircraft globally and accounts for approximately 15% of all aircraft operations, faces unique challenges, with runway incursions among the most critical. This industry sector includes a wide range of aircraft, from large-cabin jets to helicopters and remotely piloted systems.

The International Civil Aviation Organization (ICAO) ranks runway incursions among the top five threats to aviation safety. A runway incursion occurs when an aircraft, vehicle, or person is incorrectly present in an area reserved for the landing or takeoff of aircraft. Recent incidents, such as the collision between a Japan Airlines A350 and a Japan Coast Guard Dash-8 at Tokyo's Haneda Airport in January 2024 and a 2023 crash in Houston between a Hawker 850XP and a Cessna Citation, highlight the increasing frequency of these events. Collisions with ground vehicles, such as the LATAM Airlines A320's collision with a fire truck in 2022 in Lima, Peru, further underscore the danger.

While safety improvements in commercial aviation have been well-documented, a recent study by Flight Safety Foundation

records that 70% of runway incursions involve general aviation aircraft, a category that includes much of business aviation.



INCURSIONS AND THEIR CONSEQUENCES

Runway incursions are increasing in frequency and pose severe consequences. ICAO data and statistics from the United States indicate a rising trend in incursions, with the Federal Aviation Administration (FAA) reporting 1,574 incursions in 2021; 1,730 in 2022; and 1,760 in

2023. Roughly 20% of these incidents involve general and business aviation aircraft.

The primary causes of runway incursions are often traced back to miscommunication and coordination failures between air traffic controllers (ATC) and flight crews. A recent report published by the Flight Safety Foundation emphasized human error as a significant contributor to these incidents. This challenge is particularly concerning as global air traffic is expected to increase in the coming years, which will heighten risks for business aviation due to factors like smaller crew sizes, varied operating environments, and inconsistent implementation of standardized safety procedures and Safety Management Systems (SMS).

A two-year study conducted by the Flight Safety Foundation published the Global Action Plan for the Prevention of Runway Incursions (GAPPRI) in August 2024, which brought together over 200 experts from 80 organizations to analyze these risks. The study revealed several high-level findings, including:

■ *Human Performance:*

Pilots, ATC personnel, and vehicle operators must constantly adapt to operational pressures. While adaptability is essential, it can lead to errors such as distraction, miscommunication, or procedural misapplication, which can result in runway incursions.

■ *Lack of Systemwide Collision Avoidance Barriers:*

Unlike airborne collision avoidance systems like TCAS, no universal technology is in place to prevent runway collisions. While there are several ground-based systems that are effective, most are often prohibitively expensive for widespread deployment, leaving many airports without adequate defenses against runway incursions.

■ *Miscommunication and Coordination:*

Communication breakdowns between ATC, pilots, and vehicle operators are common culprits in runway incursions. These incidents often involve misunderstood instructions, simultaneous clearances, or poor coordination with ground vehicle operators due to language barriers or incompatible communication channels, all of which diminish situational awareness.

PREVENTIVE SOLUTIONS

Given the diversity of skills and the complex operational environment of aviation, addressing runway incursions requires the collective effort of all stakeholders. The GAPPRI report outlines several recommendations for mitigating these risks:

■ *Improved Communication Protocols:*

The report highlighted casual factors such as communication breakdowns, loss of situational awareness, and inadequate training. Many occurred at smaller airports, where a good portion of business aviation operates. The need for enhanced ATC, pilot, and vehicle operator communication — including clearer phraseology coupled with data-link systems — would vastly improve awareness and communication.

■ *Advancements in Technology:*

Existing runway safety systems are effective but expensive. To make runway safety more accessible, the aviation industry must embrace innovative, cost-effective technologies. For instance, smartphones and other mobile technologies have real-time tracking ability of persons and vehicles, are cost-effective, and are in the palm of your hand. Improving awareness for ATC, pilots, and ground personnel is key, but widespread adoption can only be achieved if the tools are cost effective and distributable across the wider airport network.

■ *Fostering a Safety-Oriented Organizational Culture:*

Encouraging personnel to speak up when they feel uncertain or when procedures are unclear is key to reducing communication-related errors. Establishing a strong SMS fosters a culture of safety in business aviation by empowering staff to raise concerns without fear of punitive consequences, significantly reducing the likelihood of miscommunication and human error.

STRENGTHENING SAFETY

With its diverse fleet and operations, business aviation faces unique runway safety challenges, and we all need to play our part in reducing the rising frequency of

runway incursions. Flight crews, air traffic controllers, and airport operators need to remain vigilant, invest in technology, enhance training, and cultivate a strong safety culture. Through these proactive measures, business aviation operators can reduce the risk of runway incursions, protecting aircraft and passengers who support a versatile aviation sector with unique capabilities and missions.

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