Air Carrier Flight Crew Guide – Birdstrike Mitigation

Introduction

The risks presented by aircraft-bird/wildlife encounters, like other aviation environmental risks such as icing and volcanic ash, can be effectively managed by the flight crew. The following document provides guidance on managing the aircraft-bird/wildlife risk. This information is for guidance only and does not supersede any regulatory, manufacturer or aircraft operator policies or procedures.

General Information

- The formula describing collision impact force: F = [(1/2mass) X (*velocity squared)*] clearly indicates that speed is the prime determining factor in level of damage resulting from a collision. A 20% increase in speed results in a 44% increase in impact force.
- Velocity can refer either to the speed of the aircraft or the rotational speed of the engine – the higher the speed the more likely the impact will be damaging.
- Encounters with flocking birds, particularly large flocking birds, are very hazardous
- Modern jet engines and turboprop blades have technological limits which can be exceeded by impact with birds and other wildlife
- Airframe parts, such as windshields, radomes, slats, empennage, etc., are also vulnerable to bird and wildlife strikes
- Aircraft and engine certification standards do not adequately consider the cumulative effect of simultaneous damage to the aircraft structure, systems and multiple engines which may result from a flock encounter.
- ICAO standards require airport operators to mitigate bird and wildlife hazards on the airport. Airport personnel will use appropriate techniques to move birds or wildlife from your flight path. Report the presence of wildlife on the airport directly to airport personnel or via ATC.

Flight Planning

- Be aware that migratory bird seasons, species, flight routes and altitude are very location specific. The level of risk from migratory birds may vary widely between your departure airport and destination airport and may cause conflicts with your flight planned route.
- Review NOTAMS, airport briefing notes and the AIP for bird/wildlife warnings for your departure and arrival airports as well as climb and descent routes

Taxi & Takeoff

- If birds or other wildlife are noted on or near the runway or departure path –either use another runway not affected by the birds or delay takeoff until the birds have been dispersed by airport personnel

- Use of the aircraft's weather radar does not have any effect upon birds – they do not hear in the X-band frequency and the radar power output is too low
- Birds do not regard aircraft on a runway, either with or without illuminated lights, or the spooling of a jet engine, as a threat. They will be unlikely to move until you start your takeoff roll which will, in most cases, be too late to avoid collision
- If a birdstrike occurs during the takeoff roll the decision to continue or abort the takeoff should be based upon your aircraft's flight manual aborted takeoff criteria.

Initial Climb

- If departing from an airport with known bird problems or reported bird problems, climbing on the ICAO Noise Abatement Departure Profile 1 will minimize the time and reduce the distance traveled to reach 3,000' AGL; 95% of birdstrikes occur below 3,000'
- Birds tend to turn away or dive when confronted with an aircraft. If encountering birds pull up. This strategy will cause you to pass over the birds, reduce your speed to minimize impact damage and limit flight at lower, bird rich, altitudes
- Encounters with flocking birds can result in damage that affects multiple systems which may include engine/engines power loss, flight instrument/flight computer malfunction due to pitot tube damage, windshield damage, nose wheel steering loss, penetration of fuselage and flap/slat damage. Be aware that engine damage from bird ingestion can be difficult to detect with aircraft instrumentation alone.
- After a birdstrike carefully evaluate the condition of your aircraft and engines prior to deciding to continue your flight. A return for precautionary inspection may be in order.
- If operating in an area of known bird activity use safe operating speeds during climb. Slower aircraft speeds will reduce impact force and the probability of damage in a collision. Below 10,000' do not exceed 250 KIAS or minimum clean speed, whichever is greater.

Descent, Approach and Landing

- If operating in an area of known bird activity, slow down. Slowing the aircraft will reduce the impact force and probability of damage in a collision. Below 10,000' do not exceed 250 KIAS or minimum clean speed, whichever is greater.
- If landing at an airport with known bird problems try to remain at or above 3,000' AGL until necessary to descend on the normal 3° descent profile for landing.
- If birds are reported on or near your landing runway request a different runway not affected by the birds or delay landing until the birds are dispersed by airport personnel
- At approach thrust settings ingested birds may bypass the engine core via the fan, reducing the likelihood of serious damage. If birds are encountered at approach thrust settings and landing can be made with that thrust setting, continue through the flock and complete the landing - a go-around attempt (high engine rpm) which enters the flock is more likely to result in serious engine damage and loss of thrust. Be ready to transition to instrument flight if windshields become obscured.

- Upon landing after a birdstrike, minimize the use of reverse thrust to lower the risk of engine damage caused by bird ingestion.

Postflight

- Maintenance protocols are in place to inspect engines and airframes after a birdstrike. If a bird strike is suspected ensure a maintenance logbook entry is made describing the event in detail.
- If wildlife hazards are encountered ensure the appropriate safety and/or birdstrike report is completed and submitted. The collection and analysis of data from bird strike reports is a critical tool to identify and correct problems.

References

"Sharing the Skies". Transport Canada. Chapter 10.

United Kingdom CAA, Aeronautical Information Circular 28/2004

Airbus – Flight Operations Briefing Notes: Birdstrike Threat Awareness

ICAO Annex 14 – Aerodromes. Paragraph 9.5

ICAO Document 9137 Part 3. Airport Services Manual, Part 3. Chapter 5

Eurocontrol Skybrary: Operators Checklist for Birdstrike Hazard Management

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