SAFETY INFORMATION 15/2022

9 November 2022

AWARENESS ON BIRD STRIKE THREAT

Purpose:

This Safety Information (SI) is to raise awareness among flight crew and operators of the bird strike threat and the required mitigation strategies. From January 2022 to date, CAAM has received a total of 117 reports on bird strike at multiple airports within Malaysia, which forms 15.5% of the total mandatory occurrence reports received.

Background:

In Malaysia, many airports are located near swamp areas or water where egrets, geese, gulls, and other birds reside.

Every spring, thousands of large birds called raptors fly up to 10,000km over 60 or 70 days, leaving their wintering sites in Indonesia and Australia to head north to their breeding sites in China, Japan, Korea, Mongolia and Siberia. This great highway in the sky is called the East Asian-Australasian Flyway. Malaysia becomes a stopover or transit location before these birds continue their journey to the destination. Due to the nature of this bird's movement, it will fly through the coastal route and most of the airports are located near the sea. Many of these birds depend on the coastal wetlands for food and shelter during their migration. Most birds migrate through Malaysia after the breeding season at the end of July. It would reach its peak around September to October. By November, they would reach their destination down south. Subsequently, during the Spring or North migration, they return to Malaysia around end-February right through the middle of May before heading back to their breeding grounds up north. *(source: Ornithologist Dave Bakewell)*

Bird strikes most often happen during take-off or landing, or during low altitude flight. However, bird strikes have also been reported at high altitudes, some as high as 6,000 to 9,000 m (20,000 to 30,000 ft) above ground. 90% of bird collisions occur near or at airports during take-off, landing and associated phases (*source: ICAO*). The point of impact is usually any forward-facing edge of the aircraft such as wing leading edge, nose cone, jet engine cowling or engine inlet.

Jet engine ingestion is extremely serious due to the rotation speed of the engine fan and engine design. As the bird strikes a fan blade, that blade can be displaced into another blade and so forth, causing a cascading failure. Jet engines are particularly vulnerable during the take-off phase when the engine is turning at a very high speed and the aircraft is at a low altitude where birds are more commonly found.

The force of the impact on an aircraft depends on the weight of the animal and the speed difference and direction at the point of impact. The energy of the impact increases with the square of the speed difference. High-speed impacts, as with jet aircraft, can cause considerable damage and even catastrophic failure to the aircraft.

Bird strikes can damage aircraft components, or injure passengers. Flocks of birds are especially dangerous and can lead to multiple strikes, with corresponding damage. Depending on the damage, aircraft at low altitudes or during take-off and landing often are not able to recover in time.

Recommendations:

a) Aerodrome Operators

Expelling and deterring birds at aerodrome

1. Birds deterring and expelling techniques should be appropriate to the birds situation on the aerodrome and its vicinity and should be based on:
    i. habitat modification;
    ii. birds/wildlife patrols;
    iii. acoustics, such as distress and alarm call simulators, specific signals, natural and synthetic cries;
    iv. pyrotechnics, such as medium- and long-range cartridges and shell crackers;
    v. optical and visual deterrents, such as laser devices, flags and streamers, lights, predator models, gull models, hawk kites, balloons; and
    vi. other techniques such as firearms, chemical repellents, lethal chemicals, trained predators (dogs and falcons), gas cannons, traps and relocation methods.
2. The effectiveness of the techniques and measures listed above may vary based on the species, location and their application.
3. Aerodrome should be equipped with devices for deterring, dispersing or removing birds appropriate to the species encountered, the numbers of birds present, and to the area that they need to control, or obtain the means of calling on expert support within short notice.
4. In case hazardous birds/wildlife are still attracted to the aerodrome after proactive measures have been implemented, it may be necessary to remove them by trapping or using lethal methods.
5. Best results may be obtained if aerodrome operators routinely adjust and vary the control and dispersal measures being used. An aerodrome operator should proactively seek different or new effective ways to reduce the birds' hazard, where or if existing methods prove ineffective.
6. Actions to manage birds should be prioritised on the movement area with particular attention given to the runways and approach/departure routes within the aerodrome vicinity.
7. All devices and methods should be used in compliance with national regulations or practices (e.g. in compliance with regulations on the use of firearms, environment and animal protection).

8. Effective birds/wildlife hazard management requires communication, cooperation and coordination with all relevant stakeholders. Aerodrome operators should identify which stakeholders on and off the aerodrome that need to be involved and consulted. The related stakeholders may include transportation officials (including government), aerodrome staff, the ATS unit, aircraft operator representatives (including pilots), nature conservation organisations (government and non-government), local municipalities/cities, and organisations responsible for land management and local planning and development approvals in the vicinity of the aerodrome.

b) Flight Operations

At Take-off

1. Do not take-off if there are presence of birds near the runway of departure path. Use a different runway or inform the airport authority to disperse the birds.
2. Switch on the aircraft lights to provide warning to the birds and help them localise the aircraft.
3. Flight crew must react immediately when a bird strike occurs during take-off. Flight crew should be mentally well prepared before take-off and include the possible actions during take-off briefings.
4. If a bird strike occurs during take-off roll, the decision to continue or abort the take-off should be based on the aircraft's flight manual abort take-off criteria.
5. Climb at a slower operating speed to reduce the impact force and probability of damage during collision.
6. Below 2,000 feet climb at a maximum rate to reduce the flight time exposure to strike hazard.
7. For below 10,000 feet, keep speed below 250 knots if operationally possible.

At Landing

1. If landing is assured, continuing the approach to landing is the preferred option. If more birds are encountered, fly through the flock of birds and land.
2. Maintain a low thrust setting.
3. If engine ingestion is suspected, limit reverse thrust on landing to the amount needed to stop on the runway. Reverse thrust may increase engine damage, especially when engine vibration or high exhaust gas temperature is indicated.

c) Continuing Airworthiness of Aircraft

Aircraft Inspection Due to Bird Strike

1. The bird strike incidents should be reported by the flight crew and maintenance crew in the journey logbook and a report should be sent to CAAM by using Wildlife Strike Form – 001. After a bird strike, the aircraft should be inspected for possible damage to aircraft structure and aircraft systems. Based on the report, it will trigger the maintenance personnel to perform the appropriate action within the scope of the Aircraft Maintenance Manual (AMM) and if it is beyond the AMM limitations, aircraft manufacturers will be consulted on such repair or replacement action.

2. The operator should immediately liaise with the maintenance organisation for the repair action. Damage e.g. penetration may cause water ingestion into the inner structure especially when it involves the composite structure of the aircraft and it may lead to other scopes of damage which may incur additional costs to the organisation or possibly latent damage or failure which could endanger the aircraft's safety.

3. Aircraft are approved to operate within certain limits which are considered to constitute normal operation. If these limits are exceeded due to abnormal occurrences, or if the aircraft is exposed to some hazard or stress which was not catered for in the original design, the integrity of the structure or the performance of the powerplant(s) or systems could be impaired.

4. Inspection of aircraft after abnormal occurrences such as bird strikes is normally stated in Aircraft Maintenance Manual (AMM) Chapter 5. Operators are required to follow the detailed procedures in the AMM. If repairs are required refer to the Structural Repair Manual (SRM).

5. Common areas for damages to occur are wing leading edges, flat, slats, engine inlets, nacelles and fan blades. Below are some inspections that are required after the aircraft encounters a bird strike:

    i. Inspect wing, nacelle strut, horizontal and vertical stabiliser leading edge fairing for displacement, distortion, fastener hole elongation or tear-out, flaking paint, skins crack, and pulled or missing fasteners.

    ii. Inspect pylon panels, doors, structure for buckling, and pulled or missing fasteners.

    iii. Inspect wing leading edge and trailing edge structure, panels, and doors for displacement, distortion, flaking paint, cracks, and pulled or missing fasteners. Inspect both sides of honeycomb panels for cracks, delamination, soft spots, and core damage.

    iv. Inspect the leading edge and trailing edge flap mechanism and trailing edge track fairing for distortion, cracks, misalignment, or other evidence of distress.

    v. Inspect control surfaces for binding, excess free play, misalignment, distortion or displacement of skins, and pulled or missing fasteners.

    vi. Inspect nose and main landing gear doors and linkage for distortion, cracks, and other evidence of distress.

    vii. Inspect the pilot's window for delamination, spalling, or cracks and adjacent structure for distortion, cracks, and pulled or missing fasteners.

    viii. Inspect the pitot-static port hole for the intrusion of an object, and the surface around the pitot-static port for dent.

    ix. Inspect all antenna receiver panels or covers for dents or cracks.

    x. For the helicopter, inspect the blade surface and leading edge for cracks or dents. Inspect as well the linkage or pitch link for any abnormalities.

Bird strikes have always been a common issue in aviation which constitute a very real threat to aircraft safety. In relation to that, CAAM would like to remind the aviation industry the importance of maintaining high compliance to regulations and Civil Aviation Directives to ensure public safety and security while CAAM will continue to facilitate and provide the needed support to the industry.

Additionally, CAAM would like to remind the aviation industry to submit a Mandatory Occurrence Report (MOR), when an occurrence occurs within Malaysia or involving an aircraft operated by a Malaysian operator within 48 hours of the reportable comes to knowledge. This is in pursuant to Regulation 165 (2) of the Civil Aviation Regulation 2016 and CAD 1900: Safety Reporting System. MOR forms are to be completed and sent to CAAM by any means as follows:

MOR Forms : https://www.caam.gov.my/e-services-forms/safety-occurrence-report/ ;or

CAAM Official website: https://www.caam.gov.my/contact-us/feedback/

DATUK CAPTAIN CHESTER VOO CHEE SOON

Chief Executive Officer

for Civil Aviation Authority of Malaysia

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