ACCEPTABLE MEANS OF COMPLIANCE

AMC-43

FOREIGN OBJECT DEBRIS (FOD)

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Issue 01	Change of the type of the publication from CAAP to AMC
Issue 02	Editorial errors fixed

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Glossary

For the purpose of this document, the following definitions apply:

Air Service	An air service operation open to the public and performed by an aircraft for the public transport of passengers, mail or cargo for remuneration or hire.
Aerodrome Certificate – Low Capacity	A certificate issued to the operator of an aerodrome, for the operation of an aerodrome limited to air service operations by aircraft with either a maximum seating capacity of 10 passenger seats or a maximum take-off weight of 5,700 kilograms.
Aerodrome Operator	In relation to a Certified Aerodrome, the aerodrome certificate holder.
Apron	A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.
Certified Aerodrome	An aerodrome whose operator has been granted an aerodrome certificate by the authority under applicable regulations for the operation of an aerodrome.
Foreign Object Debris (FOD)	Any debris on the airfield that can cause damage to an aircraft.
Manoeuvring Area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
Movement Area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Safety Management System (SMS)	A system for the management of safety at aerodromes, including the organizational structure, responsibilities, procedures, processes and provisions for the implementation of aerodrome safety policies by an Aerodrome Operator, which provides for control of safety at, and the safe use of, the aerodrome.
Work Area	Means a part of an aerodrome in which maintenance or construction works are in progress.

Chapter 1 Introduction

1 General

1.1 As an integral part of an Aerodrome Operator's Safety Management System (SMS), effective monitoring of Foreign Object Debris (FOD) should be clearly set out together with a methodology for documenting and dealing with the results of such monitoring.

1.2 CAR Part IX, Chapter 4.15, Aerodrome Operation and Maintenance Programme outlines the requirement to undertake regular assessments of all operational areas at the aerodrome to ensure that FOD is reduced to an acceptable level.

1.3 The criteria, which are given in this AMC, reflect the GCAA's interpretation of Standards and Recommended Practices of Annex 14 to the Convention on International Civil Aviation, in so far as these have been adopted by the United Arab Emirates (UAE) in respect of the control of FOD.

2 Purpose

2.1 The objective of this document is to offer guidance to Aerodrome Operators as to what should be included in the policy and procedures to prevent unacceptable levels of FOD at their aerodrome.

2.2 This document also provides guidance to aerodrome users on how they may contribute to more effective FOD control to ensure a safe aircraft operating environment.

3 Scope

3.1 The criteria in this document apply to all Certified Aerodromes within the UAE.

Chapter 2 Foreign Object Debris

1. Introduction

1.1. At all times, debris on the Movement Area of an aerodrome is a potential hazard to aircraft safety. An aborted take-off brought about by an engine failure or a wheel/tyre failure is particularly likely to result in debris being left on the runway.

1.2. It is important in the interests of safety and economy to keep runways, taxiways and aprons clear of loose stones or other objects and debris that could cause damage to aircraft or engines, or impair the operation of aircraft systems. Turbine engines are extremely susceptible to damage as a result of foreign object ingestion. Propellers, aircraft skin and tyres have all been damaged as a result of loose stones or debris becoming dislodged by jet blast, slipstream or tyre action. Serious accidents have resulted from tyres being punctured by a metal object on a runway.

1.3. The introduction of new airplane types with the engines installed closer to the ground has aggravated the problem. The cleanliness of the entire airport surface should, therefore be a matter of ongoing concern requiring attention by aerodrome operators.

1.4. Apart from the safety aspect, unscheduled replacement of parts or components damaged by debris will result in economic penalties for an aircraft operator. Damage to tyres resulting from contact with sharp objects, untreated joints or deteriorating pavement edges are responsible for reduced tyre life. The cleanliness of the surface of the Movement Area should be a matter of continuous concern and attention to an aerodrome operator.

1.5. FOD typically falls into two main categories:

- that on the runway consists largely of aircraft parts, typically small metal panels or metallic honeycomb structures, and tools, torches and equipment, including wheel chocks; and
- that on the taxiways and aprons is usually associated with vehicles and smaller items associated with passenger baggage, catering and cargo handling equipment or is from adjacent Works in Progress.

1.6. All personnel involved in operations on the aerodrome Movement Area, maintenance hangars and aircraft turnarounds have equal responsibility to ensure that their particular operation does not give rise to FOD. Likewise, every member of staff should act when they detect FOD, either by removing it, should that be safe so to do, or reporting it immediately to the appropriate authority. Above all, FOD should be prevented.

1.7. Aerodrome and aircraft operators, maintenance and ground handling organizations should include FOD prevention in their induction and continuation training programmes, for all airside, maintenance and hangar staff. Specific procedures for the elimination of the risk of FOD should be implemented and working practices that pose a high risk of providing FOD should be reviewed.

1.8. Closer co-operation between Aerodrome Operators, aircraft operators and their service partners should be fostered. The topic of FOD should be a standing agenda item for all aerodrome users' committee meetings and internal safety meetings.

1.9. No proprietary system has yet been proven to be fully effective in the detection and identification of FOD on runways. However, whilst future developments of such systems

should not be discounted, the use of advanced technology should only supplement current methods of inspection.

1.10. Aerodrome Operators should regularly review their FOD policy and assure themselves that it remains effective. They should also ensure that any third party operation on the aerodrome can demonstrate a satisfactory level of FOD awareness and that their working procedures do not increase the likelihood of FOD.

2. Pavement Surfaces

2.1. Particular care is needed in the maintenance of the surfaces of Manoeuvring Areas, especially where the pavement shows any signs of deterioration or damage. All joint sealants, crack repairs, patching and maintenance works should be stable and permanent even under the influence of aircraft movements, slipstream or jet efflux.

2.2. Pavements should be adequately sealed and joints properly filled to permit effective sweeping without forming a trap for debris. Runway and taxiway shoulders should also be adequately sealed and care exercised to minimise the risk of ingestion into turbine engines of vegetation and debris that can result from erosion of the surface by overhanging turbine engines. It is possible for stones to be thrown onto runways and taxiways during runway/taxiway strip work and on other areas adjacent to paved surfaces, and the potential hazard to aircraft that this presents should be minimised by frequent inspections during such activities, sweeping as necessary.

2.3. Newly surfaced areas can also be sources of hazard from engine ingestion. These areas should not be used by aircraft until the material is no longer susceptible to being picked up by the aircraft wheels or spattered on any part of the aircraft.

3. Grit and Spoil

3.1. Sand used to clean fuel and oil spillage from aprons is a potential cause of turbine engine and propeller damage and should be removed immediately after use.

3.2. Where construction is in progress on aerodromes, authorities should, if practicable, prohibit use of the Movement Area by contractors' vehicles or at least minimise such use by restricting them to marked lanes, particularly when the vehicles are engaged in transporting the types of load from which spillage frequently occurs, e.g. building waste, gravel and fill. Earth and stones adhering to the wheels of such vehicles can also become dislodged and subsequently create a hazard to aircraft using the same areas. Where building construction is in close proximity to the Movement Area, it is important that some form of screening be provided to prevent sand and small stones being blown onto the Movement Area by high winds or jet blast. Following the completion of construction, the contractor should be required to remove all debris from the surrounding areas and not leave piles of dirt, or rubble, on the aerodrome surface.

4. Packages and Wrappings

4.1. The widespread use of polythene bags and sheets on aprons is another potential source of damage to engines through ingestion. Suitably covered receptacles for such litter should be provided in sufficient numbers by Aerodrome Operators. Similar receptacles should also be provided on all vehicles that use the Movement Areas on a routine basis.

4.2. Cargo areas are particularly liable to contamination from loose strappings, nails, wire, paper and wood etc. from crates or containers discarded in the course of handling, in addition to the polythene sheets mentioned above.

5. Inspection and Standards of Cleanliness

5.1. Regular inspection by an airport official together with a nominated representative of the operators is already a recognised procedure at many US and European airports and can form the basis for regular airport inspection reports testifying to the effectiveness of the cleaning program. Such a procedure could be used to establish a sweeping priority/frequency program, which includes analysis of the debris to establish its origin. In connection with this program, a plan of the paved area is divided into conveniently sized areas to assist in pinpointing the location of any debris found.

5.2. For guidance related to inspection frequency, see GCAA CAR IX, Aerodrome Operation and Maintenance Program and AMC 36.

5.3. Aerodrome Operators should impress the need for apron cleanliness upon those in control of such staff as airline ground handlers, aircraft caterers, fuel suppliers, cleaners and freight agents who have access to the Movement Area in the course of their duties.

5.4. Analysis of any debris on the Movement Area should be undertaken to determine its origin, and the frequency of cleaning operations increased in those areas where contamination is highest. Remedial measures should be taken with those responsible.

6. Aircraft Debris

6.1. Flight crews are expected to report at once through the Air Traffic Control Occurrence Reporting scheme to Air Traffic Services (ATS) any incident during take-off or landing which might result in a part of the aircraft's structure becoming detached and left behind on runways or taxiways. Ground engineering staff should also be asked to collaborate by reporting to ATS minor damage to aircraft which may have left debris on runways. Failure to make these reports to ATS could mean that debris remains on the runway for longer than would otherwise be the case, and thus, particularly at night, constitute an avoidable hazard to other aircraft taking off and landing.

6.2. Whenever debris is reported on the Movement Area, whenever a take-off is abandoned due to engine, tyre or wheel failure, or whenever an incident occurs that is likely to result in debris being left in a hazardous position, the runway, taxiway or apron as appropriate shall be thoroughly inspected and any debris removed before any other aircraft is allowed to use it.

7. Equipment for the Removal of Debris

7.1. Guidance on suitable equipment for providing clean aerodrome pavement is given in the ICAO Doc 9137, Airport Services Manual, Pavement Surface Conditions, Part 2, Chapter 10, Section 10.2.

8. Records

8.1. As with all elements of the Aerodrome Operator's SMS, procedures should ensure all appropriate records of all FOD assessments are kept for a period of time to allow for trend analysis and remedial action.

8.2. The following items should be recorded for each assessment, and made available upon request to the GCAA:

- Date and time of assessment;
- Location of FOD; and
- Action taken.

8.3. Furthermore, should maintenance intervention be indicated, the location, extent, methods employed and results should be recorded.

9. Evaluation of Assessment Results

9.1. Aerodrome Operators should make effective use of the assessment data and conduct regular reviews coupled with planned maintenance activities driven by trend analysis will ensure that operational areas are consistently acceptable in regard to FOD contamination.