



FOD Management Program



Introduction

The presence of FOD on an airport's air operations area (AOA) poses a significant threat to the safety of air travel. FOD has the potential to damage aircraft during critical phases of flight. FOD can lead to catastrophic loss of life, airframe, and at the very least increased maintenance and operating costs. FOD hazards can be reduced through the implementation of a FOD management program, and the effective use of FOD detection and removal equipment.

FOD Hazards

- FOD can severely injure airport or air carrier personnel or damage equipment. Types of potential damage include cutting aircraft tires; being ingested into engines; or becoming lodged in mechanisms affecting flight operations. Personnel injuries or even death can occur when jet blast propels FOD through the airport environment at high velocities.

Sources of FOD

- FOD comes from many sources including personnel, airport infrastructure, the environment, and equipment operating on the airfield.
- FOD can collect on and below ground support equipment, particularly in apron areas. Jet-blast can then blow FOD onto personnel or into an aircraft.
- Helicopters can also move FOD on to runways, taxiways, and ramps while maneuvering.
- FOD is more common when airports begin construction activities.
- FOD is also prevalent during winter conditions as surfaces influenced by weathering (freeze-thaw cycles) begin to crack or break apart.
- Sand used during winter operations should be used according to the specific guidance offered in FAA Advisory Circular (AC) 150/5200-30 (Airport Winter Safety and Operations) and removed accordingly.
- Weather including wind or rainwater may also be a source of FOD.

FOD Taxonomy

The exact nature of FOD is also varied. FOD can be composed of any material and can be of any color and size. Typical FOD includes the following:

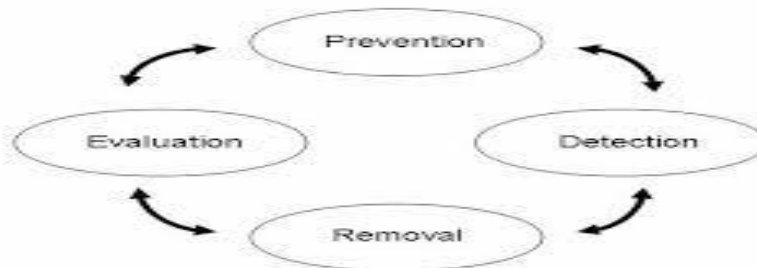
- Aircraft and engine fasteners (nuts, bolts, washers, safety wire, etc.)
- Aircraft parts (fuel caps, landing gear fragments, oil sticks, metal sheets, trapdoors, and tire fragments.)
- Mechanic's tools
- Catering supplies
- Flight line items (nails, personnel badges, pens, pencils, luggage tags, soda cans, etc.)
- Apron items (paper and plastic debris, luggage parts, and debris from ramp equipment)
- Runway and taxiway materials (concrete and asphalt chunks, rubber joint materials, and paint chips)
- Construction debris (pieces of wood, stones, fasteners, and miscellaneous metal objects)
- Plastic and/or polyethylene materials
- Natural materials (plant fragments, wildlife)
- Contaminants from winter conditions (snow, ice)



Airport FOD Management Program

- Regulatory requirements
 - 14 CFR Part 139, "Certification of Airports" details the following in §139.305. (a). (4), Paved Areas: "Except as provided in paragraph (b) of this section, mud, dirt, sand, loose aggregate, debris, foreign objects, rubber deposits, and other contaminants must be removed promptly and as completely as practical."

- Daily inspections are also required under § 139.327, “Self-Inspection Program.” This is the primary means of FOD detection and removal.
- FAA Advisory Circular (AC) 150/5200-18, “Airport Safety Self Inspection” states that “The inspector should continuously check for and remove and FOD in movement areas, aircraft parking areas and loading ramps.”
- Additional standards and practices are detailed in the International Civil Aeronautical Organization (ICAO) Annex 14, “Aerodrome Design and Operations.”
- Program Areas
 - A successful FOD management program typically contains four main areas, each with significant elements.
 - **PREVENTION**
 - Awareness
 - Training
 - Maintenance
 - **DETECTION**
 - Operations
 - Equipment
 - **REMOVAL**
 - Equipment
 - Operations
 - **EVALUATION**
 - Data collection and analysis
 - Continuous improvement



FOD Prevention

The first element of effective FOD prevention begins with **awareness** of the program's existence, and the development of an airport FOD Policy. RIC management is committed to FOD prevention as a critical safety initiative. FOD awareness is regularly highlighted at RIC's Joint Safety Meeting. The meeting is facilitated each month and is hosted to by the RIC Airport Operations department. Airport Operations also utilizes flyers, notices, bulletins, and promotes FOD awareness as a regular feature on the department website – the RIC AirPortal. RIC Public Safety sponsors an annual FOD Awareness Day event that is open to participation by airport tenants. This event features a "FOD walk" on the air carrier ramp that includes airport staff, and tenant-based employees.



Another important facet of RIC's FOD Program is the designation of a **"FOD Program Officer"**. This individual is typically a member of the Airport Operations team and is responsible for overseeing the program and addressing issues as they arise. The FOD Program Officer is assisted by a FOD Program Deputy. This individual is typically a member of the Airport's Utility and Grounds department. The FOD Program Officer has the ability to communicate the status of the program to employees at all levels of the organization. He or she plays an important role collecting data and information, analyzing trends, conducting hazardous occurrence investigations related to FOD, ensuring "lessons learned" are widely distributed, and promoting the program in general.

The FOD Committee at RIC includes members of Airport Public Safety, the Airport's Utility and Grounds department, air carrier representatives, and other tenant representatives. The most important function of the committee is to serve as a resource for the FOD Program Officer.

The committee may assist the FOD Program Officer by helping to determine potentially hazardous FOD situations and evaluating FOD data that may indicate problem areas or trends. The Committee meets regularly and is chaired by the FOD Program Officer.

Another crucial element of FOD Prevention is **training and education** of the airport community, particularly those with Air Operations Area (AOA) access. Many tenants whose business involves air operations provide company sponsored training in the prevention of FOD. The RIC FOD Program Officer oversees training for airport employees. He or she maintains a training and education program that includes the following:

- Overview of the FOD management program at RIC.
- Safety of personnel and air carrier passengers.
- Causes and principal contributing factors of FOD.
- The consequences of ignoring FOD.
- The practice of good housekeeping practices and a “clean as you go” approach to work.
- Proper use and stowage of materials, equipment, and supplies used around aircraft operation areas.
- Control of debris during the performance of duties.
- Control over personal items.
- Proper control, accountability and care of tools and hardware used by employees.
- Inspection of aircraft apron areas (FOD walks/inspections).
- How to report FOD incidents or potential incidents.
- Continued vigilance for potential sources of FOD and hazardous foreign objects.
- FOD removal methods and procedures

FOD training at RIC may be facilitated as an in-person, classroom setting or virtually using an online meeting platform. It may be requested as an on-demand session by both airport and tenant managers for their employees. The basic training program is publicly available on the Airport Operations website, the RIC AirPortal.

For airport employees whose duties include responsibilities outlined in 14 CFR Part 139, Certification of Airports, those training records are maintained by the Airport’s Public Safety departments.

The FOD Program Officer will maintain a training file for all other employees who receive FOD prevention training as it occurs.

The final element of FOD prevention includes a tailored **maintenance** approach to mitigating FOD hazards, specifically those activities that are prone to producing FOD. These activities include:

- Aircraft Servicing
 - Clean-up and housekeeping of lease areas, baggage make-up areas, and ground support equipment.
- Aircraft Maintenance
 - Accounting and control programs for tools, and prompt disposal of items like bolts, nuts, washers, safety wire, etc.
- Air Cargo
 - Means and methods to control the potential for debris blown by wind like cargo strapping, plastic, and cardboard.
- Construction
 - Establish FOD prevention procedures as a part of construction safety planning.
 - Daily clean-up and control of construction materials and stockpiles.
 - Designation and increased inspections of construction vehicle haul routes (provisions noted in Construction Safety and Phasing Plans).
 - Clearly detailing project specific provisions
 - Covering of all loads, debris receptacles and containers.
 - Securing loose items, and materials that can easily be blown.
 - Requirement for FOD removal devices like sweepers.
 - Specifications on how FOD hazards will be monitored.
 - Requirements for inspecting tires prior to traversing aircraft operation areas.
- Airfield Maintenance
 - Establish procedures to remove vegetation and soil that may have been disturbed and tracked on to movement areas.
 - Control and accountability of tools and equipment used for repairs and/or maintenance.
 - Inspections of work areas following the conclusion of maintenance activities.
 - Regular inspection and maintenance of paved areas.



FOD Detection

While FOD awareness is essential, having methods in place to detect FOD is critical to maintaining a safe environment. Regular and in some cases increased inspections of aircraft

service and movement areas is the fundamental method for identifying FOD hazards and their sources.

Inspections are largely the responsibility of RIC's Public Safety department, primarily the Airport Operations division. Detecting and identifying FOD is a part of RIC's self-inspection program and checklist.

Detection may also occur when other parties like flight crews, maintenance workers, or Air Traffic control report the presence of FOD on a surface.

In instances where FOD poses an immediate or substantial safety hazard on a runway surface, it may be necessary to suspend aircraft operations or close the runway. For example, during take-off or landing an aircraft tire explodes strewn chunks of rubber over a large portion of the runway.

Certain areas or **operations** are more prone to FOD issues and should be the primary focus of inspection efforts:

- Movement Areas (runways and taxiways)
 - Portion of runways used for take-off.
 - Locations of known deteriorating pavement conditions like cracks or spalling.
 - Service roads that cross or lead to taxiways or runways.
 - Paved or unpaved shoulders.
 - Turf areas adjacent to movement areas that collect and hold debris.
 - Fence-lines near movement areas that collect and hold debris.
 - Areas prone to wildlife activity.
- Airport aprons and ramps
- Aircraft servicing operations (gates and hardstand parking locations)
 - Broken materials or pieces from aircraft servicing activities.
 - Pieces of luggage, especially in those areas that aircraft cargo doors are located.
 - Conveyor belt areas.
- Air Cargo operations
- Construction operations
 - Sites or locations that are in close proximity to aircraft operations areas.
 - Construction lay down and stockpile areas.
- Aircraft maintenance areas
 - Maintenance performed outside hangars on apron areas or at gates.

Currently RIC does not employ the use of any FOD detection technology. Inspections are performed manually in compliance with 14 CFR Part 139 self-inspection requirements. Supplemental inspections are conducted as a result of a variety of circumstances:

- A weather event like heavy rain, lightning, snow, and wind.
- Following airfield maintenance activities.
- Following the declared emergency landing of an aircraft, or the operation of large Group V / VI aircraft.
- Report from a pilot or Air Traffic Control

RIC Airport Operations coordinates “FOD Walks” in areas where foreign object debris is known to collect or accumulate. FOD walks include members of the airport’s Public Safety and Maintenance departments to detect the presence of and remove FOD.

FOD Removal

RIC employ the use of mechanical means to remove FOD from the AOA, this is in the form of a Power Sweeper truck that is couple with a Vacuum System that uses air flow as its main means of removing FOD. The Power Sweeper has two bristle brushes that can remove debris from cracks on the pavement and transfer it to the vacuum system on the truck.

There are no non-mechanical means currently to remove FOD.

FOD Storage

There are designated FOD containers placed at each boarding gate, the containers are marked and secured. These containers are emptied regularly to avoid overflow which in turn becomes FOD. Containers vary from bins to sacks placed at the gate and on the bridge respectively.

Even though there are other means of containing FOD, they are not employed at this time.

FOD Evaluation

To better understand the types of FOD, you need to link them to the source and collect and store data for future reference. Smaller items like plastic wrappers or baggage tags, may just need to be collected and disposed of. However, if there is a consistent trend of small items coming from a particular operation or stakeholder, and those that are large or hazardous FOD, they may need to detailed documentation for effective analysis so that it can beef up the preventive efforts.

The following information needs to be collected when FOD is retrieved:

- How the FOD object was detected
- Date and time of FOD detection and retrieval
- Description of FOD retrieved (category, size, color), and if possible, the image.

- Location of FOD object (reference on the grid map)
- Possible source
- Name of personnel detecting/ investigating FOD item
- Airport operations (north or south) and weather data during the FOD detection event