Foreign Object Debris and Damage Prevention

Foreign object debris (FOD) at airports can cause damage that costs airlines, airports, and airport tenants millions of dollars every year.

FOD includes any object found in an inappropriate location that - as a result of being in that location - can damage equipment or injure aircraft or airport personnel. The resulting damage has been estimated to cost the aerospace industry $4 billion a year. Airports, airlines, and airport tenants can reduce both this cost and the risk to safe flight that can result, by taking steps to prevent airport FOD.

FOD includes a wide range of material, including loose hardware, pavement fragments, catering supplies, building materials, rocks, sand, pieces of luggage, and even wildlife, especially insects which can obstruct unprotected aircraft pitot tubes or static vents. FOD with potential to affect aircraft may be found at terminal gates, on cargo aprons, taxiways, runways, and in ground running areas. It can cause damage through direct contact with aircraft, such as by cutting aircraft tyres, by being ingested into aircraft engines, or as a result of being moved by jet blast or prop wash and impacting aircraft. Movement of FOD by jet blast or prop wash can also injure people.

A FOD-prevention programme involving training, facility inspection, maintenance and coordination between all affected parties can minimise FOD and its effects.

Responsibility

FOD-prevention and clearance is the responsibility of all all airport users; however, specific responsibility must be allocated to appropriate persons who must be suitably trained and supervised. Quality assurance is an essential tool to ensure that responsible organisations and personnel carry out their allotted tasks correctly.

While the airport authority are responsible for the runways, taxiways and general manoeuvring areas, airline representatives or handling agents are normally responsible for ensuring that the gate and its approaches are clear of FOD, including ground equipment, and are free of ice, snow or other contaminant capable of affecting braking action. Handling contracts must specify the extent of
agents' responsibilities and agents' procedures must specify how these responsibilities are to be exercised.

FOD Control

A program to control airport FOD is most effective when it addresses four main areas:

1. Training.
2. Inspection by airline, airport, and airplane handling agency personnel.
4. Coordination.

Training

All airport and airline personnel and airport tenants should receive training in the identification and elimination of FOD, including the potential consequences of ignoring it. This training can supplement the general FOD awareness incorporated into the airside driver-training curriculum at many airports. FOD training for flight crews includes following the recommended procedures identified in the Flight Crew Operating Manual and pre- and post-flight inspection procedures covered during line training.

Effective training should stress safety to personnel and passengers, the hazards to equipment, the direct costs associated with FOD damage, and the indirect costs associated with flight delays and rescheduling. It should also include procedures for removing and eliminating FOD at its source, and should be reinforced through the use of posters and signs. Recurrent training is necessary to help maintain an awareness of FOD.

Inspection

Airline personnel, when feasible, should join the airport staff in daily airside inspections. This practice helps increase familiarity with local airfield conditions, and promotes effective communication between the airport and airlines.

The International Civil Aviation Organization (ICAO) requires a daily, daylight inspection of aircraft maneuvering areas and removal of FOD. In addition to performing these inspections at the beginning of the day or shift, personnel on the airside should look for FOD during their normal shifts.

On-going construction requires more frequent inspections. It may even be necessary to assign dedicated personnel to continually inspect for FOD during
major construction activities. Flight crews should report to air traffic control and station operations any FOD they observe on runways and taxiways. Aircraft operators and handling agents should designate individuals to inspect aircraft parking stands prior to aircraft movement onto or off them.

**Maintenance**

Maintaining control of FOD includes using several methods:

- Sweeping
- Magnetic bars
- Rumble strips
- FOD containers

**Sweeping**

Sweeping may be done manually or with the airfield sweeper, which is the most effective equipment for removing FOD from airside. The sweeper removes debris from cracks and pavement joints, and should be used in all areas except for those that can be reached only with a hand broom. All airside areas, including aircraft manoeuvring areas, aprons and gates and the areas adjacent to them, should be swept routinely. The areas in which ground support equipment (GSE) is staged should be swept periodically.

**Magnetic bars**

These bars can be suspended beneath tugs and trucks to pick up metallic material. However, the bars should be cleaned regularly to prevent them from dropping the collected debris. Vehicles operating on the airside should be inspected periodically to ensure that they have no loose items that can fall off.

**Rumble strips**

Driving over rumble strips can dislodge FOD from the underside of vehicles. The strips, which are between 10 ft and 15 ft long, can be moved and used at transitions from the landside to the airside, or adjacent to airside construction areas.

**FOD containers**

These containers should be placed at all gates for the collection of debris. The containers should be emptied frequently to prevent them from overflowing and becoming a source of FOD themselves. In addition, airport personnel can wear waist pouches to collect debris. Evaluating the debris collected in containers and
pouches can identify its sources and indicate where personnel and equipment should be deployed for more effective control.

Other means for preventing FOD damage include wind barriers and netting to restrict the movement of airborne FOD, fencing to prevent animals from entering the airfield, and well-maintained paved surfaces. If damaged pavement cannot be repaired immediately, aircraft should use an alternate route.

Co-ordination

Airports with a FOD committee of airport tenant representatives tend to control FOD more successfully than those without such a committee because the representatives can address local conditions and specific problems. At airports served by multiple airlines, the airlines should have these representatives as well as an airport user's committee to coordinate FOD control efforts among themselves.

Both airside and landside construction activities, as well as scheduled maintenance, should be communicated to airport users as early as possible. Airport preconstruction planning should include a means for controlling and containing FOD generated by the construction. This is especially true in high-wind environments where debris is more likely to become airborne. Access to and from construction sites should avoid areas of aircraft operation. Contractors must fully understand the requirements and penalties incorporated in their contracts regarding the control and removal of FOD.