Safety on the Runway

New Methods for Finding, Controlling Foreign Object Debris at Airports

By Jason Fuehne, PE

Foreign object debris (FOD) can be anything from wildlife and vegetation to scrap aircraft parts and litter that could be encountered by an aircraft within the airport environment. That definition creates a long list of potential debris to monitor in a large area to keep the flying public safe.

Danger Zones
One of the most significant sources of FOD can be environmental stresses that damage airfield pavements over consistent, long periods of weathering, such as freeze-thaw cycles. These stresses can produce loose aggregate, grass growing through pavement cracks, or, in the worst instances, sections of pavement that can suddenly disappear because of buckling of a concrete surface or underlying layer. This can be especially dangerous during takeoff and landing because of the velocity of the aircraft.

Technological Aids
Fortunately, technology, including everything from radar detection to lasers, has made FOD detection easier and more effective.

A stationary radar detection system can detect a metallic piece of FOD as small as 1.2 inches by 1.5 inches from as far away as 0.6 miles. Similarly, a stationary electro-optical detection system can detect slightly smaller debris at closer range, but with only ambient lighting. Either of these systems allows FOD detection personnel to sweep a large area without having to physically walk the runway, saving time and resources. In addition, there are hybrid systems available that can further aid in debris detection.

Arguably a more effective system is a mobile radar mounted on a vehicle that can scan the airport surfaces as the vehicle moves. Its detection ranges are comparable to the stationary radars and are effective at up to 30 mph.
Feasibility
The best prevention method for FOD created from pavement distresses is continual pavement maintenance in accordance with Federal Aviation Administration (FAA) recommendations.

Each airport has different needs and funding available, making government guidance a significant asset in determining the appropriate selection for a facility. Advisory Circular 150/5380-6B, “Guidelines and Procedures for Maintenance of Airfield Pavements” recommends appropriate materials for repairs as well as general specifications and details for repairs of both asphalt and concrete pavements. These details can guide an airport through most pavement repair projects.

Unfortunately, some airport owners do not have the budget or skilled labor to follow the pavement maintenance guidelines exactly. In these instances, it is recommended that visual checks of airfield pavements be done more frequently, with regular FOD checks, to understand and identify potential sources of FOD before a problem is evident. And all members of an airport staff, from operations and management to maintenance crews, can help keep FOD potential in check.

The FAA publishes a wealth of FOD resources, including FOD prevention programs, technical notes and papers, presentations, and information from the 32nd annual FOD Prevention Conference. These resources can be found at www.faa.gov/airports/airport_safety/fod/resources.

The FAA also provides related advisory circulars (ACs) and CertAlerts that give guidance on FOD management, detection equipment and checking for FOD. Links to these items are provided on the web as well at www.faa.gov/airports/airport_safety/fod/guidance.

Summary of FOD Detection Systems

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<tr>
<th>System</th>
<th>Detection Principles</th>
<th>Capability</th>
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<tr>
<td>Human/Visual</td>
<td>Fundamental baseline for the performance of FOD detection systems. Human observation provides detection and human judgment provides the hazard assessment capability to assure safety.</td>
<td>Supports regularly scheduled, periodic condition, and special inspections.*</td>
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<td>Radar</td>
<td>Uses radio transmission data as the primary means to detect FOD on runways and airport operations area (AOA) surfaces.</td>
<td>Fixed systems support continuous surveillance. Mobile systems supplement human/visual inspections.*</td>
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<tr>
<td>Electro-Optical</td>
<td>Uses video technology and image processing data as the primary means to detect FOD on runways and AOA surfaces.</td>
<td>Supports continuous surveillance.</td>
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<tr>
<td>Hybrid</td>
<td>Uses a combination of radar and electro-optical data as the primary means to detect FOD on runways.</td>
<td>Supports continuous surveillance.</td>
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Source: FAA AC 150/5220-24

* Per the inspection frequencies defined in AC 150/5200-18, Section 6.b.