



NTSB

SAFETY ALERT

National Transportation Safety Board



Helicopter Landing Sites: Free from Debris



Foreign object debris can foul rotor systems and cause damage

The problem

- Unsecured or improperly secured foreign object debris (FOD) at helicopter landing sites can migrate due to the effects of main rotor system downwash and upwash and foul the main or tail rotor systems.
- Examples of FOD that are light enough to migrate and affect the helicopter include towels, ropes, tarps, bags, tents, equipment covers, loose tree branches, tumbleweeds, and hats worn by ground personnel.
- Contact with FOD at a landing site can lead to a loss of helicopter control and accidents.

Related accidents

The National Transportation Safety Board (NTSB) has investigated several accidents in recent years involving FOD at helicopter landing sites:

- The pilot of an Airbus (formerly Eurocopter) EC135 P2+ helicopter reported that, while landing at a public safety training center, he felt the helicopter shudder unexpectedly. The pilot immediately landed the helicopter without further incident. A postflight examination revealed that a towel had been ingested into the fenestron (see figures 1 and 2). The towel ingestion resulted in separation of the fenestron hub cover, which was subsequently ingested, substantially damaging the helicopter. The pilot reported that the towel came from an unsecured storage container near the landing site. ([GAA16LA056](#))

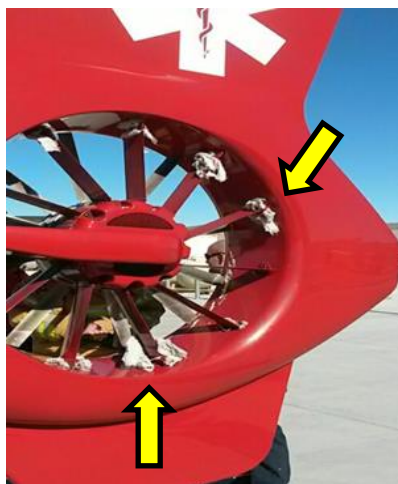


Figure 1. Fenestron with towel pieces.



Figure 2. Lower fenestron housing.

- The pilot of an Airbus (formerly Eurocopter) AS350 B3 helicopter was conducting a remote, high-altitude landing on a mountain during a rescue mission when the main rotor system was fouled by a rope that was not properly secured by ground personnel during the loading process. The helicopter abruptly rotated to the left, began to shake violently, and impacted terrain before the pilot regained control of it and made an emergency landing. A postflight examination revealed substantial damage to the main rotor system, tail boom, and empennage (see figures 3 and 4). ([GAA15CA258](#))



Figure 3. Main rotor system (Starflex assembly).



Figure 4. Empennage (horizontal stabilizer and vertical fin).

- After the pilot landed an MD Helicopters MD 500D (formerly Hughes 369D) helicopter at a remote landing site near secured bundles of trash, the helicopter started to shake abruptly. The pilot maintained control of the helicopter until the shaking subsided and shut down the engine. A witness reported that a tarp from a nearby trash bundle had migrated up into the main rotor blades. As a result of the entanglement, one of the main rotor blades separated from the helicopter. ([WPR13CA406](#))
- The pilot of a Robinson R22 Beta helicopter landed the helicopter on a private landing pad in a position that placed the tail rotor system near tarps that were held on the ground by boards and stones. As the pilot was preparing to shut down the helicopter, the tarps were lifted into the tail rotor system. The helicopter rotated several revolutions on the ground, struck a parked trailer, and caught fire. ([CEN13LA115](#))

What can you do?

- When choosing a landing site, avoid areas close to construction activities and trash storage. Consider the effects of main rotor system downwash and upwash on FOD migration when selecting a landing site, based on the site conditions and the size of the helicopter.
- Keep in mind that wind speed and direction can aid in the migration of FOD to landing sites. Rain water and drainage can also stream FOD along the path of least resistance.
- Ask available personnel to conduct a sweep of the landing site for FOD that could affect the helicopter. If personnel are not available, visually scan for FOD on the landing site while conducting your high and low reconnaissance before you land. If the conditions permit, check for FOD while conducting your ground reconnaissance before you take off.
- Have personnel at the landing site remove or secure any headgear (such as helmets, hats, and knit caps). Ensure any additional clothing, gear, and equipment items are secured and kept clear of the main and tail rotor systems.

- Incorporate the Perceive, Process, Perform (3P) risk management model for selecting an appropriate landing site. This model (resources for which are provided below) can help you develop the aeronautical decision-making and risk management skills to help identify the potential for FOD, evaluate its potential impact on flight safety, and implement the best course of action to mitigate the risk.
- Educate and train flight crews who routinely work with ground personnel at landing sites (such as helicopter air ambulance companies, law enforcement organizations, and military units that coordinate with first responders on the ground) about how to identify, secure, or remove FOD that could affect the helicopter.

Interested in more information?

The following Federal Aviation Administration (FAA) resources are accessible via www.faa.gov:

- Advisory Circular (AC) 00-59, "[Integrating Helicopter and Tiltrotor Assets into Disaster Relief Planning](#)," provides guidance about helicopter landing site planning and usage during disaster relief operations.
- FAA-H-8083-21A, "[Helicopter Flying Handbook](#)," provides guidance about how to conduct a high, low, and ground reconnaissance.
- FAA-H-8083-25B, "[Pilot's Handbook of Aeronautical Knowledge](#)," provides guidance in chapter 2-15 about how to incorporate the 3P risk management model during all phases of flight.
- AC 135-14B, "[Helicopter Air Ambulance Operations](#)," provides guidance in section 3-8 for establishing procedures for conducting airborne and ground reconnaissance of landing sites and heliports, with particular emphasis on off-airport landing sites or heliports not used on a routine basis.

The FAA Safety Team (FAASafetyTeam) provides access to online training courses, seminars, and webinars to provide education that focuses on accident and incident causal factors, special emphasis items, and regulatory issues. Course ALC-28, "[The Art of Aeronautical Decision-Making](#)," provides information about the 3P risk management model. This course (and many others), as well as seminar and webinar information, can be accessed from the FAASafetyTeam website at www.faasafety.gov. (Course access requires login through an existing or new free FAASafetyTeam account.)-

The NTSB's Aviation Information Resources web page, www.nts.gov/air, provides convenient access to NTSB aviation safety products. The reports for the accidents referenced in this safety alert are accessible by NTSB accident number from the [Aviation Accident Database](#) link, and each accident's public docket is accessible from the [Accident Dockets](#) link for the Docket Management System. This safety alert and others, such as SA-026, "[All Secure, All Clear](#)," (which emphasizes securing items inside an aircraft) and SA-054, "[Control Foreign Object Debris](#)," (which emphasizes keeping track of tools and objects during aircraft maintenance) can be accessed from the [Aviation Safety Alerts](#) link.