ACCIDENT

Aircraft Type and Registration:	AgustaWestland AW109SP, G-TAAS
No & Type of Engines:	2 Pratt & Whitney Canada PW207C turboshaft engines
Year of Manufacture:	2013 (Serial no: 22305)
Date & Time (UTC):	22 April 2021 at 1247 hrs
Location:	Carsington Water, Derbyshire
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 2 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Shattered left windshield and a hole in one main rotor blade
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	54 years
Commander's Flying Experience:	4,212 hours (of which 2,944 were on type) Last 90 days - 43 hours Last 28 days - 16 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

At about 1,000 ft agl and 140 kt, as the helicopter was descending and turning towards East Midlands Airport on return from a HEMS mission, a bird struck the left windshield. The windshield shattered and the bird entered the cockpit striking the technical crew member (TCM) on the left side of their helmet. The TCM and pilot were unhurt. Debris from the windshield also entered the main rotor disk, making a hole in the trailing edge of one of the rotor blades.

The AgustaWestland AW109 windshield is not designed to withstand bird strikes and the design certification requirements do not require it to do so. Proposed amendments, specifically to the certification of Small Rotorcraft were published in EASA NPA 2021-02 to change this for newly designed rotorcraft. A rule making group is also considering the retrospective application to existing fleets and/or to future production of already type-certified rotorcraft.

History of the flight

The helicopter was returning from a HEMS mission and returning to East Midlands Airport. As it was descending through about 1,000 ft agl and 140 kt, the technical crew member (TCM), seated in the left seat, spotted and shouted "bird". The pilot pitched and rolled the helicopter to the right, but the bird, a type of crow whose remains were later found

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to weigh 1.32 kg, hit, and went through, the left windshield. It struck the TCM on the left side of their helmet and continued up into the top of the left cockpit door, before becoming wedged behind the pilot's seat. Following the bird strike, the crew reported that there was a "noticeable" vibration in the airframe.

The pilot immediately informed East Midlands ATC of the bird strike and that they were making a precautionary landing. The helicopter landed without incident and was shut down. The TCM was examined by the crew doctor and found to have sustained no injuries.

Damage to the helicopter

The left windshield, which was made of acrylic, had shattered into multiple pieces which were found throughout the cockpit and passenger area (Figure 1). Debris from the windshield also entered the main rotor disk, making a hole in the trailing edge of one of rotor blades (Figure 2).

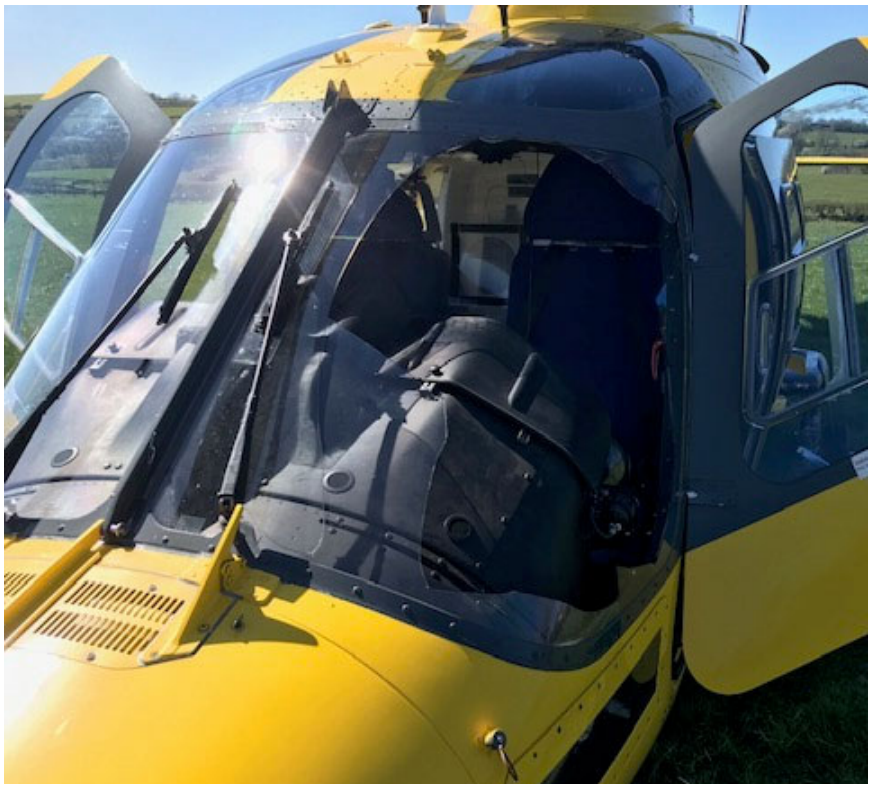

Figure 1

Damage to the left windshield

Previous bird strike incidents

The AAIB has issued four previous reports after similar events on helicopters certified to the Small Rotorcraft category requirement: N109TK (AAIB Bulletin 2/2012), G-ODAZ (AAIB Bulletin 6/2014), G-BZBO (AAIB Bulletin 11/2016) and M-MYCM (AAIB Bulletin 6/2019).

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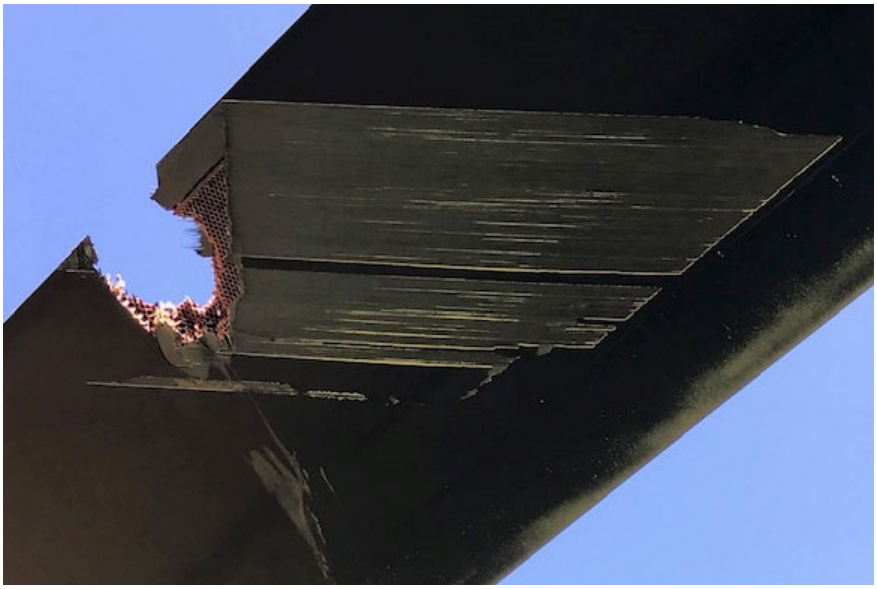

Figure 2
Main rotor blade trailing edge damage

Helicopter bird strike requirements

The AgustaWestland AW109SP was certified to the European Union Aviation Safety Agency (EASA) regulation CS-27 (Small Rotorcraft) in 2007. CS-27, which applies to rotorcraft with a maximum weight of 3,175 kg (7,000 lbs) or less and nine or less passenger seats, includes the following requirement for windshields:

> *'**CS 27.775 Windshields and windows***
>
> *Windshields and windows must be made of material that will not break into dangerous fragments.'*

The use of acrylic such as Plexiglas® or Perspex® for windshield material is accepted by industry for application where breakage into dangerous fragments is not permitted. There are no requirements in CS-27 relating to bird strike resistance.

In contrast, rotorcraft with a maximum weight greater than 3,175 kg or with more than nine passenger seats are certified to CS-29 (Large Rotorcraft), which includes the following bird strike resistance requirement:

> *'**CS 29.631 Birdstrike***
>
> *The rotorcraft must be designed to assure capability of continued safe flight and landing (for Category A) or safe landing (for Category B) after impact with a 1 kg bird, when the velocity of the rotorcraft (relative to the bird along the flight path of the rotorcraft) is equal to VNE or VH (whichever is the lesser) at altitudes up to 2438 m (8000 ft). Compliance must be shown by tests, or by analysis based on tests carried out on sufficiently representative structures of similar design.'*

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EASA Rule Making Task (RMT).0726

As discussed in the AAIB Bulletin 6/2019 on the bird strike incident to M-MYCM, the EASA RMT.0726 '*Rotorcraft occupant safety in event of a bird strike*' was, at the time, in the planning stage. The Terms of Reference for RMT.0276 have since been published (September 2020) and state:

> *'The specific objective of this rulemaking task is to improve rotorcraft occupant safety in the event of a bird strike. This objective can be achieved:*
>
> *by introducing a new risk-based certification specification to prevent windshield penetration on small rotorcraft (CS-27) with higher passenger capacities; the specification may be similar to CS 29.631 for safe landing, but would only be applicable to the windshield; (Subtask 1); and*
>
> *if assessed to be necessary, through a proportionate retroactive application of bird strike certification specifications to the existing rotorcraft fleets and/or to the future production of already type-certified rotorcraft (Subtask 2).'*

EASA Notice of Proposed Amendment (NPA) 2021-02

In February 2021, EASA published NPA 2021-02 for a one-month public consultation of the Subtask 1.[1] After considering the comments received, a decision on any amendments to CS-27, Acceptable Means of Compliance and Guidance Material is planned to be published in the second quarter of 2022.

EASA will consider and plan to publish a decision on Subtask 2 in the second half of 2022.

Conclusion

The helicopter suffered a bird strike which penetrated a windshield. The pilot, who was not hit by the bird remains, made an immediate uneventful precautionary landing. No injuries were sustained by the crew.

The helicopter, certified to CS-27 (Small Rotorcraft), was not required to demonstrate resistance against bird strikes.

Safety action

The EASA are considering amendments to CS-27 regarding windshield penetration by bird strikes and will publish a decision in 2022.

Footnote

[1] https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2021-02 [Accessed 4 June 2021]

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