

SERIOUS INCIDENT

Aircraft Type and Registration:	Agusta AW139, G-MCSD	
No & Type of Engines:	2 Pratt & Whitney Canada PT6C-67C turboshaft engines	
Year of Manufacture:	2014 (Serial no: 41375)	
Date & Time (UTC):	6 May 2018 at 1634 hrs (UTC)	
Location:	Offshore from Aberdeen	
Type of Flight:	Commercial Air Transport (Non-Revenue)	
Persons on Board:	Crew - 4	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Tail rotor blades damaged and tail rotor gearbox required replacement	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	52 years	
Commander's Flying Experience:	8,000 hours (of which 854 were on type) Last 90 days - 48 hours Last 28 days - 23 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional information from the helicopter manufacturer	

Synopsis

As the helicopter climbed after departure, the crew noticed an unusual vibration. They returned to Aberdeen and it was found that a cable fairing and lightning protection bonding strip was missing from one of the tail rotor blades.

Investigation by the helicopter manufacturer established that the bonding strip had failed due to fatigue and loss of the fairing was a secondary effect.

The manufacturer concluded that the occurrence was not safety related and EASA classified the event as 'Not-Unsafe'. The requirement for a Detailed Visual Inspection of the bonding strip will be added to extant maintenance tasks and the manufacturer is reviewing the manufacturing process.

History of the flight

During the climb out of Aberdeen Airport, at approximately 2,500 feet and 135 kt, the crew felt an unusual vibration which remained after levelling off at 3,000 ft and reducing speed. With all other indications showing normal, the crew decided to return to Aberdeen and transmitted a PAN call. The vibration decreased as the speed was reduced through

60 kt for a run-on landing, but then increased markedly once the helicopter was on the ground.

Examination of the helicopter

Visual examination of the helicopter found that a bonding strip and cable fairing had detached from one of the tail rotor blades (Figure 1). The missing parts were not recovered.

Examination of the other three tail rotor blades found that two more bonding strips were cracked.



Figure 1

Tail rotor blade fairing and lightning protection bonding strip installation
(left image shows an undamaged blade;
right image shows the damaged blade on G-MCSD)

Analysis of the HUMS data showed no exceedances, but one of the tail rotor gearbox acceleration parameters had recorded unusually high values during the incident flight. Metallic debris was found on the tail rotor gearbox magnetic chip detector, but this was insufficient to generate a TGB CHIP caution in the cockpit.

The tail rotor blades and the tail rotor gearbox were returned to the manufacturer for detailed examination.

Tail rotor blades

The cable fairing and part of the lightning protection bonding strip were missing from one tail rotor blade. Examination of the other three blades confirmed that two of the bonding strips were cracked.

Microscopic examination established that all three bonding strips had cracked because of fatigue. The fatigue originated in the same location on all three items (Figure 2).

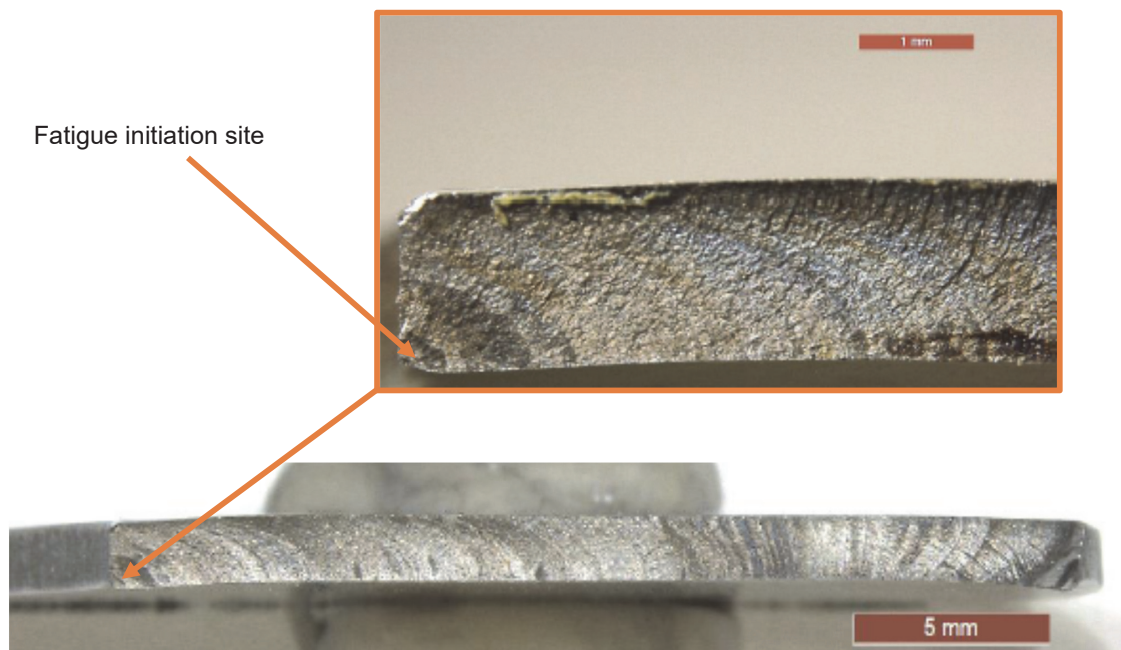


Figure 2

Fracture surface (fatigue originated from the lower left corner)

The manufacturer concluded that the loss of the root fairing was secondary to, and a direct consequence of the loss of the broken bonding strip.

Tail rotor gearbox

As part of the investigation, the gearbox underwent a 30-minute HUMS test prior to disassembly. No anomalies were reported, and no metallic debris was found on the magnetic chip detector after the test. The findings indicated that the increased acceleration recorded during the incident flight was probably induced by the loss of the rotor blade components.

Disassembly of the gearbox revealed early evidence of spalling on the output bearing, but the debris in the gearbox was insufficient to activate the TGB CHIP caution in the cockpit. Repair and overhaul records indicate that spalling has occasionally been observed, but the manufacturer does not consider it to be common. The spalling was not associated with the loss of the tail rotor blade bonding strip and fairing.

Previous occurrence

The manufacturer was aware of one previous similar event, which occurred in June 2017.

Conclusion

Investigation established that the bonding strips had cracked due to fatigue and loss of the root fairing was secondary to the loss of the bonding strip.

The helicopter manufacturer concluded that the occurrence was not safety related and EASA classified the event as 'Not-Unsafe'. However, a requirement for a Detailed Visual

Inspection of the bonding strip will be added to Maintenance Task 64-01, to be performed every 300 flying hours/1 year. The manufacturer is also reviewing the bonding strip manufacturing process.