



# **Aviation Investigation Final Report**

Location:	Gulf of Mexico,	Accident Number:	CEN15LA156
Date & Time:	February 20, 2015, 07:50 Local	Registration:	N802SM
Aircraft:	AGUSTA AEROSPACE CORP AW119 MKII	Aircraft Damage:	Substantial
Defining Event:	Flight control sys malf/fail	Injuries:	2 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

### Analysis

The commercial pilot was conducting an on-demand air taxi helicopter flight. The pilot reported that, while in cruise flight over water, the helicopter experienced an abrupt, uncommanded left yaw. The pilot returned to the departure airport and performed a run-on landing. A postflight examination of the helicopter revealed that one of the tail rotor pitch change links (PCL) was fractured.

A review of maintenance records revealed that the fractured PCL had recently been overhauled and installed on the helicopter and that it failed 14.8 flight hours since overhaul. Examination of the PCL revealed that it had fractured due to undetected fatigue cracking that appeared to be the result of bending loads caused by stiff bearings. The stiffness was likely the result of the lack of control of the bearing replacement process.

The PCL bearing replacement procedures, which incorporated rotational torque inspection and bearing staking procedures, were contained in the overhaul manual; these procedures were revised about 3 months before the accident, and the overhaul facility used the revised procedures during the replacement of the PCL. Examination of the PCL revealed that both of the bearings exceeded the maximum allowable rotational torque by at least two times the maximum allowed. Based on the findings of this investigation, the PCL manufacturer corrected the figure in the PCL replacement procedures to display the correct method of inspecting spherical bearing rotational torque.

#### **Probable Cause and Findings**

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The fracture of the tail rotor pitch change link due to excessive bearing rotational friction, which resulted from the bearings being installed in exceedance of the maximum allowable torque during the last overhaul of the pitch change link.

Findings	
Aircraft	(general) - Incorrect service/maintenance
Aircraft	(general) - Failure
Personnel issues	Repair - Other
Organizational issues	Maintenance records - Manufacturer

### **Factual Information**

History	of	Fli	ight	į,
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Enroute-cruise

Flight control sys malf/fail (Defining event)

On February 20, 2015, about 0750 central standard time, an Agusta A119 Mk II helicopter, N802SM, experienced an abrupt, uncommanded left yaw during cruise flight over the Gulf of Mexico. The pilot and passenger were not injured. The helicopter sustained substantial damage. The helicopter was registered to and operated by Era Helicopters LLC., under the provisions of 14 Code of Federal Regulations Part 135 as an on-demand air taxi flight. Visual meteorological conditions prevailed for the flight which operated on a company visual flight rules flight plan. The flight departed the Houma-Terrebonne Airport (HUM), Houma, Louisiana, at 0720 and was en route to an off-shore platform.

After the uncommanded left yaw, the pilot returned to HUM and performed a run-on landing. A postflight inspection of the helicopter revealed one of the tail rotor pitch change links (PCL) was fractured. While no further damage was sustained to any helicopter components, the fractured pitch change link had an adverse effect on the helicopter's flight characteristics and required replacement meeting the definition of substantial damage.

The tail rotor pitch change link (PCL) assembly comprises a single-piece cast aluminum body with two circular ends, each end containing a spherical bearing. The PCL end connected to the tail rotor blade contains the larger of the two spherical bearings, and is identified as the "large bearing" in this report. The PCL end connected to the tail rotor pitch change mechanism is identified as the "small bearing" in this report. A review of maintenance documentation found that the fractured PCL was overhauled by Precision Heliparts (PHP) and issued an authorized release certificate on December 8, 2014. It was installed on N802SM on February 13, 2015. The fractured pitch link failed at 14.8 flight hours since overhaul and 1,129.8 of total flight hours.

Representatives from the National Transportation Safety Board (NTSB), AgustaWestland, PHP, Era Helicopters, and the Federal Aviation Administration convened at Agusta Westland facilities in Philadelphia, Pennsylvania to evaluate the bearing friction for the tail rotor PCLs. The method of inspecting PCL bearing rotational torque was found in the maintenance manual (MM) and overhaul manual (OM). The earlier version of the OM, dated November 25, 2012, differed from the more recent version of the OM, dated November 10, 2014. The 2012 version of the OM required rotational torque inspection by rotating the inspection tool, a 100 millimeter (mm) lever arm, about the axis of the bearing bolt hole, while the 2014 version of the OM required the inspection tool to be rotated away from the axis of the bearing bolt hole. This revision changed the bearing staking procedure. The bearing replacement procedures between the 2012 and 2014 versions of the OM remained the same. AgustaWestland identified the 2012 version of the OM contained the correct bearing rotational torque inspection method.

PHP identified they had used the 2014 version of the bearing rotational torque inspection method. During the postaccident examination of the accident PCL, the 2012 and the 2014 inspection procedures were used to measure rotational torque. Both the large and small bearings of fractured PCL exceeded the maximum allowable bearing rotational torque either measured with 2012 and 2014 procedure. For the fractured PCL, the 2012 inspection method consistently returned a higher rotational torque value than the 2014 inspection method.

The fractured PCL was examined by the NTSB Material Laboratory. The fracture surface exhibited evidence of fatigue that originated at a raised dash that was part of the part number marking on the PCL. The materials laboratory characterized fatigue cracking across 60% to 70% of the fracture cross section. For additional details on the materials laboratory examination see the Materials Laboratory Factual Report in the docket for this investigation.

On March 4, 2015, the FAA issued emergency airworthiness directive (EAD) No. 2015-05-52 for owners and operators of certain A109-series and AW119-series helicopters to inspect PCL part number 109-0130-05-117 for freedom of movement, corrosion, excessive friction of the spherical bearings, and cracks. FAA EAD No. 2015-05-52 was prompted by European Aviation Safety Agency (EASA) issuance of EASA EAD No. 2015-0035-E on February 27, 2015. According to AgustaWestland and the FAA, there have been no reports to date of tail rotor PCL spherical bearings exhibiting excessive friction after inspection directed via the aforementioned FAA and EASA EADs.

Based on the findings of this investigation, AgustaWestland had corrected the figure in the replacement procedures to display the correct method of inspecting spherical bearing rotational torque. Additionally, the PCL bearing replacement procedures were removed from the MM and are now found only within the OM.

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Certificate:	Commercial	Age:	43,Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Helicopter	Toxicology Performed:	No
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	October 15, 2014
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:			

#### **Pilot Information**

### Aircraft and Owner/Operator Information

Aircraft Make:	AGUSTA AEROSPACE CORP	Registration:	N802SM
Model/Series:	AW119 MKII NO SERIES	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	14711
Landing Gear Type:	Tricycle; Skid	Seats:	
Date/Type of Last Inspection:		Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Turbo shaft
Airframe Total Time:		Engine Manufacturer:	PWC
ELT:		Engine Model/Series:	PT6B-37A
Registered Owner:	ERA HELICOPTERS LLC	Rated Power:	917 Horsepower
Operator:	ERA HELICOPTERS LLC	Operating Certificate(s) Held:	On-demand air taxi (135)

# Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
<b>Observation Facility, Elevation:</b>	KHUM,10 ft msl	Distance from Accident Site:	72 Nautical Miles
Observation Time:	07:50 Local	Direction from Accident Site:	28°
Lowest Cloud Condition:	Scattered / 5000 ft AGL	Visibility	7 miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	50°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.28 inches Hg	Temperature/Dew Point:	8°C / 4°C
Precipitation and Obscuration:			
Departure Point:	Houma, LA (HUM )	Type of Flight Plan Filed:	Company VFR
Destination:	Gulf of Mexico, GM	Type of Clearance:	VFR
Departure Time:	07:20 Local	Type of Airspace:	

### **Airport Information**

Airport:	HOUMA-TERREBONNE HUM	Runway Surface Type:	
Airport Elevation:	9 ft msl	Runway Surface Condition:	
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Full stop

# Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	28.5,-91.300003(est)

#### **Administrative Information**

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Hollis Wynne; FAA FSDO; Baton Rouge, LA Alessandro Cometa; Agenzia Nazionale per la Sicurezza del Volo; Roma Cory Theriot; Era Helicopters; Houston, TX James Scarbrough; Precision Aviation Group d/b/a Precision Heliparts; Atlanta, GA
Original Publish Date:	November 29, 2016
Last Revision Date:	
Investigation Class:	<u>Class</u>
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=90780

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available <u>here</u>.