

ACCIDENT

Aircraft Type and Registration:	Eurocopter AS332L2 Super Puma, G-REDM	
No & Type of Engines:	2 Turbomeca Makila 1A2 turboshaft engines	
Year of Manufacture:	2004	
Date & Time (UTC):	22 February 2008 at 1330 hrs	
Location:	North Sea, approximately 165 nm north-east of Aberdeen	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 2	Passengers - 15
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to main rotor blades, bonding leads broken, evidence of high energy tracking on two pitch link ball joints and one main rotor servo upper ball joint	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	39 years	
Commander's Flying Experience:	3,800 hours (of which 2,300 were on type) Last 90 days - 100 hours Last 28 days - 50 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent enquiries by the AAIB	

Synopsis

The aircraft was flying through a line of showers whilst en route from an offshore rig in the North Sea to Aberdeen, when it was struck by lightning. There was no loss of systems nor any other adverse effects on aircraft behaviour and it continued to Aberdeen where it landed safely.

History of the flight

The aircraft was cruising at 2,000 ft, en route to Aberdeen, 15 minutes after take-off from the 'Bruce' offshore platform, when it encountered a line of rain showers. These were orientated approximately north-north-west/south-south-east and extended to the limits of the

helicopter's weather radar display. The crew selected a crossing point which appeared to be the shortest transit of the shower band where the weather radar showed no red returns. About 30 seconds after entering the line of showers, both pilots saw a bright flash at the rotor tip in the one o'clock position, accompanied by a 'bang' or 'pop' sound.

Although the lightning strike had not caused any noticeable effects on the aircraft's behaviour, the crew initially decided to head towards the nearest available platform which did not involve returning through the line of showers, in accordance with the checklist requirement

to land as soon as possible. A diversion to Sumburgh or Kirkwall was considered but the observed weather in those directions was judged to be unsuitable. It was then established that the nearest suitable platform had unfavourable weather conditions and all other suitable platforms reported winds in excess of 50 kt. The crew therefore elected to continue on to Aberdeen, where an uneventful landing was made.

Aircraft damage

Subsequent examination of the aircraft revealed damage to the main rotor blades which included arcing damage to the leading edge anti-erosion strips, broken bonding leads and damaged trim tabs. High energy tracking was also visible on two main rotor pitch link ball joints and one main rotor servo upper ball joint. The main rotor head and other components were removed and returned to the manufacturer for detailed investigation. Strip examination of these components did not reveal any evidence of pitting or other damage. Of the four rotor blades, one was damaged beyond repair limits, whilst the remaining three were repairable.

Recorded lightning data

The UK company EA Technology archives recorded data of air to ground discharges detected by their specialist lightning detection equipment. They noted significant electrical discharges in the North Sea occurring at 1325, 1328 and 1335 hrs on the day in question. On examining the recorded data, however, it was clear that none of these strikes were within 60 km of the helicopter's position. The detection equipment records only air-ground strikes, which are normally regarded as the most damaging type of lightning strike. Although more extensive analysis of the data may have revealed lower energy strikes closer to the aircraft location at the relevant time, it was judged

that further investigation of these would not be of value. The physics of lightning is far from perfectly understood but it would appear that the event involving this aircraft was probably an inter-cloud or an intra-cloud strike. Such an event is frequently triggered by the presence of an aircraft. The reported lightning data available to flight crews in forecasts is based on recent measurements of lightning activity occurring in the area. Thus, if there is no recent history of lightning strikes in the relevant area, the likelihood of a strike in that area cannot be predicted.

Additional information

A very large number of lightning strikes have been encountered by AS332-series helicopters operating over the northern North Sea, since the type's entry into service. These appear to have occurred predominantly during the winter months. The most severe of these occurred to G-TIGK in 1995, when a tail rotor blade received damage from a lightning strike which caused a tail rotor imbalance which led to the detachment of the tail-rotor gearbox. Slight main rotor blade damage also occurred on that occasion. Although the helicopter ditched safely and all the occupants survived, it subsequently sank and was damaged beyond economic repair. Following that event, a modified tail rotor blade was introduced which was adopted by operators as the standard fit on UK-registered North Sea-operated AS332 helicopters.

Although lightning strikes to helicopters continue to occur, no further UK-registered AS332-series helicopters have been lost due to such events. Numerous changes and modifications, many associated with lightning protection, have been made to the original AS332s which remain in service in the North Sea and newer, better-protected versions of the AS332-series have also entered service. Although varying degrees of lightning damage have been

experienced and in the case of the later 'glass cockpit' versions, some loss of instrument displays has resulted, the concerns raised following the G-TIGK accident about the robustness of the AS332-series helicopters in the North Sea lightning environment have not been borne out. The modifications to earlier aircraft and improvements incorporated at build on later examples appear to have contributed to this improved airframe survivability. Lightning strikes have led to considerable expense in repairs, component replacement and, occasionally, shipment of damaged aircraft by surface means from rigs and other remote locations. However, since the G-TIGK incident, they have not rendered any of the affected aircraft unable either to complete the flight safely, or successfully divert.

A previous major lightning strike to another operator's AS332-series helicopter (G-CHCG) occurred in March 2006 and was reported on in AAIB Bulletin 1/2007. The damage experienced by that aircraft was more severe than that seen on G-REDM, suggesting that the latter had suffered a lower intensity strike.

The checklist for G-REDM required the crew to land as soon as possible following a lightning strike to the helicopter. Although the flight was continued to the planned destination, this decision was made after consideration of the prevailing atmospheric conditions.