

ACCIDENT

Aircraft Type and Registration:	Enstrom F-28A, G-BRZG	
No & Type of Engines:	1 Lycoming HIO-360-C1A piston engine	
Year of Manufacture:	1973	
Date & Time (UTC):	10 May 2008 at 1022 hrs	
Location:	Beverley Airfield, East Yorkshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to tail rotor, tail rotor drive, and skids	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	63 years	
Commander's Flying Experience:	81 hours (of which 17 were on type) Last 90 days - 17 hours Last 28 days - 5 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and metallurgical examination	

Synopsis

Moments after becoming airborne the pilot experienced difficulty in yaw control. He landed the helicopter heavily a few feet from its takeoff position, but exited the aircraft uninjured. The yaw control system was inspected and several items were subjected to metallurgical examination, however no evidence was found of any pre-existing defects that could have accounted for the yaw control problem.

History of the flight

The pilot intended to make a local flight from Beverley Airfield. Having completed the pre-flight and power checks satisfactorily, he increased power and raised the collective lever. As the helicopter lifted from the ground,

it started to yaw to the left, so he immediately started to apply right pedal to compensate. As the helicopter rose slightly higher off the ground it began to yaw to the right. Application of left yaw pedal failed to correct the yaw and the helicopter rotated through 360° before the pilot, fearing a tail rotor malfunction, reduced power and lowered the collective lever fully. The helicopter landed heavily on its skids, in a level attitude. After shutting down the engine, the pilot, who was uninjured, exited via his own door.

The pilot reported that there was a light easterly wind, no cloud and 12 km visibility. This was consistent with the Met Office's aftercast for the airfield at that time.

Aircraft information

The Enstrom F-28A is a piston engine powered helicopter that has been out of production for over 30 years. The two-bladed tail rotor is driven via a driveshaft which has a flexible coupling located just forward of the tail rotor gearbox. A multi-stranded steel cable, which is part of the tail rotor pitch control system, runs external to the fuselage in the region of the tail rotor.

Engineering investigation

One of the tail rotor blades was severely bent inwards and backwards and exhibited a series of regular witness marks consistent with the blade having struck a multi-stranded control cable. The tail rotor could be turned independently of the main rotor and the skids had sustained significant damage in the heavy landing. Further inspection revealed that the tail rotor driveshaft had failed inside the hub of the flexible coupling. There was reportedly no evidence at the scene of any ground marks from the tailskid or tail rotor, and the tailskid was undamaged.

The flexible coupling assembly was examined by a materials specialist. The characteristics of the tail rotor driveshaft fracture were consistent with the shaft having failed in shear due to torsional overload. The material hardness, elemental analysis, and dimensions of the driveshaft and coupling components were found to be satisfactory.

Comment

The failure of the tail rotor driveshaft was consistent with it having failed in overload due to excessive torque, such as might be expected to occur if the tail rotor had struck a substantial object. The badly damaged tail rotor blade had witness marks apparently caused by contact with the tail rotor pitch control cable but it was not clear how the tail rotor blade had come to strike the cable. No pre-existing defects were found which could have accounted for the yaw control difficulties experienced by the pilot.