

ACCIDENT

Aircraft Type and Registration:	Cessna F172M, D-EESE	
No & Type of Engines:	1 Thielert TAE 125-01	
Year of Manufacture:	1975 (Serial no: F17201297)	
Date & Time (UTC):	15 November 2013 at 1630 hrs	
Location:	Lower Lough Erne, Co Fermanagh, Northern Ireland	
Type of Flight:	Aerial Work	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Commercial Pilot's Licence	
Commander's Age:	32 years	
Commander's Flying Experience:	809 hours (of which 783 were on type) Last 90 days - 205 hours Last 28 days - 43 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

The aircraft had concluded a photographic task and was climbing back to cruise altitude with full power selected. The pilot noted that the 'engine load' gauge was registering 74-79% instead of the expected 100%, and shortly afterwards he noticed that the engine oil pressure was dropping and that altitude and airspeed were also decreasing. He decided that a ditching on Lough Erne was preferable to any terrestrial forced-landing options, and a successful ditching was carried out.

Subsequent examination found a broken seal and a loose bolt attaching the oil pump to the oil gallery in the block. This had probably led to oil starvation of the turbocharger which then caused the turbocharger main bearing to degrade to an extent that precluded the turbocharger from attaining its demanded rotational speed.

History of the flight

The aircraft was engaged on a photographic sortie commencing in the Lough Shellin area of County Westmeath. The pre-flight checks had not revealed anything abnormal and, after normal engine power checks, the aircraft took off at 1030 hrs and climbed to its initial operating height of approximately 2,000 ft. At about 1625 hrs, on completion of his task in the Belturbet area of County Cavan, the pilot selected climb power (100% load and 2,300 rpm) to cruise-climb back to 2,000 ft.

However, he observed that the load display on the combined engine instrument display was reading only 74-79%, despite there being no other warnings or cautions and engine oil pressure was still indicating in the green. The pilot was concerned at this, so he discontinued the climb and levelled off at about 1,200 ft agl, reducing the engine load to 60% as he did so. After a few minutes, as he attempted to assess the situation further, he saw that the engine oil pressure had dropped from green into the amber sector; he transmitted a PAN call. This was soon followed by a MAYDAY call as the oil pressure dropped into the red and he saw that both airspeed and altitude were decreasing.

After conferring with his passenger, he decided that, in the absence of suitable fields, he would ditch the aircraft in Lower Lough Erne. Having selected an area of the lough, the occupants noticed blue smoke passing both doors but they could not recall whether the propeller was still turning. The ditching was carried out successfully and the aircraft remained upright. The pilot and passenger could not open the doors due to water pressure, so they evacuated via the left window. As they swam ashore, they were met by local passers-by who walked with them to a nearby house where the emergency services attended.



Photograph via Airclaims

Figure 1

Cessna 172, D-EESE after recovery from Lower Lough Erne

Description of the engine

D-EESE was originally delivered with a Lycoming O-320 petrol engine but had been retrofitted with a Thielert (now Technify Motors GmbH) diesel engine. The AAIB were unable to determine the date of the modification or the organisation that carried out the work. The engine had flown 694 hours since new and 91 hours since a 'last shop visit', the nature of which is also not known.

The TAE 125-01 engine, also known as the Centurion 1.7, is a 4-cylinder turbocharged diesel engine based on an automotive engine. It is liquid cooled and has a wet sump oil system. The constant speed propeller is driven by an integrated reduction gearbox and an electronic FADEC (Full Authority Digital Engine Control) system monitors and

controls engine and propeller operation. The turbocharger boosts engine power output by compressing ambient air, which is then cooled by an intercooler, before the compressed air passes into the cylinders. The turbocharger is driven by the engine's exhaust gases.

Examination of the engine

The FADEC was removed and its non-volatile memory downloaded. Several parameters, including engine load, rpm and fuel and oil pressures were recorded continuously and it was observed that the engine oil pressure started to reduce some 15 minutes before ditching. The pressure was almost zero at the point of ditching and the rate of reduction was roughly linear.

The remainder of the engine was shipped to the manufacturer for a tear-down inspection. They have reported that the turbocharger main bearing was found badly degraded. In addition they found that one of the bolts securing the oil pump in the engine sump to the integrated oil pressure gallery was found backed off to a noticeable degree whilst its adjacent bolt was found to have very little torque remaining. In addition, the 'o' ring seal associated with the loose bolt was found to be broken. Either or both of these defects could result in a loss of oil delivery and pressure to the turbocharger. The manufacturer is not certain whether the broken 'o' ring caused the bolt to lose torque or vice-versa.