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Swiss Transportation Safety Investigation Board STSB

Summary report

A summary investigation, in accordance with article 45 of the Ordinance on the Safety Investigation of Transport Incidents from 17th December 2014 (OSITI), as of 1st September 2023 (SR *742.161*) was carried out with regards to the following serious incident. This report was prepared to ensure that lessons can be learned from the incident in question.

The German version of this report constitutes the original and is therefore definitive.

Aircraft	Fokker F28 MARK 0100 (F100)				HB-JVG
Operator	Helvetic Airways AG, Postfach 250, 8058 Zurich, Switzerland				
Owner	HB-JV Golf AG, Egglirain 24, 8832 Wilen b. Wollerau, Switzerland				
Pilot	Swiss citizen, born 1968				
Licence	Airline transport pilot licence aeroplane (ATPL(A)) according to the European Aviation Safety Agency (EASA), issued by the Federal Office of Civil Aviation (FOCA)				
Flying hours	**total**	8326 h	**during the last 90 days**		167 h
	on the type involved in the incident	2481 h	**during the last 90 days**		167 h
Co-pilot	Swiss citizen, born 1988				
Licence	Commercial pilot licence aeroplane (CPL(A)) according to EASA, issued by the FOCA				
Flying hours	**total**	302 h	**during the last 90 days**		89 h
	on the type involved in the incident	87 h	**during the last 90 days**		87 h
Location	Nuremberg region (Germany)				
Coordinates	-		**Altitude**		Flight level 340
Date and time	8 June 2015, 20:50 (LT[1] = UTC[2] + 1 hour) All information in this report is in local time.				
Type of operation	Scheduled flight				
Flight rules	Instrument flight rules (IFR)				
Departing from	Warsaw (EPWA)				
Destination	Zurich (LSZH)				
Flight phase	Cruise				
Type of incident	Engine failure				

Injuries to persons	**Crew**	**Passengers**	**Other**
Seriously injured	0	0	0
Slightly injured or uninjured	5	96	-

Damage to aircraft	Fuel flow regulator and starter of engine n° 1
Other damage	None

[1] LT: Local Time

[2] UTC: Universal Time Coordinated

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Factual information

History of the flight

While cruising at flight level 340 from Warsaw (EPWA) to Zurich (LSZH), the ENG#1 FAIL warning was triggered. All parameters of engine n° 1, as well as thrust, were reduced. The engine was shut down manually.

An initial attempt to restart the engine by applying the “windmilling” procedure was not successful. The airspeed was 200 kt, and the N2 speed 18 %.

A second attempt to start the engine by applying this procedure augmented by the starter was likewise unsuccessful. In the process, the starter was destroyed.

The crew decided to continue the flight to Zurich. The landing in Zurich was uneventful.

Technical investigation

The investigation produced the following results:

- When the engine housing was opened, fairly large quantities of metal shavings were found, originating from the broken starter.
- Traces of black engine oil were also found; this is attributable to prolonged operation of the shut-down engine (windmilling – absence of positive air pressure in the main bearings).
- No impurities were found in the engine fuel filter.

A further attempt to start the engine on the ground was unsuccessful.

For further trouble shooting, the fuel flow regulator (FFR), part no. CASC 509 and serial number L2159, was replaced.

During the subsequent static test, the engine behaved normally.

The fuel flow regulator was sent to the manufacturer for investigation. This investigation revealed that all the teeth of the drive gearwheel have been worn away such that there was no longer a drive to the planet carrier assembly and the drive shaft was broken. Progressive wear of the parts concerned was well-known to the manufacturer, which is why he recommended a mid-life inspection between 9000[3] and 12,000 hours of operation. However, there is not a requirement to remove units at or above mid-life unless the engine has been removed from the aircraft and is in the shop. In addition, it was recommended not to leave the fuel flow regulator installed for longer than 16,000 hours of operation without refurbishment.

At the time of the incident, the fuel flow regulator L2159 had 16,907 operating hours since the last overhaul. It is not known whether the drive shaft was replaced at the time of this overhaul. The total operating time of this shaft is likewise not known.

Conclusions

The STSB concludes that the engine failure is attributable to the defective fuel flow regulator.

The fuel flow regulator CASC 509, serial no. L2159, was operated for longer than the period of operation recommended by the manufacturer for overhaul or inspection. Inspections within the recommended period of operation increase the probability of detecting progressive wear at an early stage.

Bern, 22 November 2023 Swiss Transportation Safety Investigation Board

[3] Since 2019, the manufacturer recommends carrying out the check between 8000 and 12,000 hours of operation.