

Investigation Report

The Investigation Report was written in accordance with para 18 Law Relating to the Investigation into Accidents and Incidents Associated with the Operation of Civil Aircraft stating facts only.

Identification

Type of Occurrence:	Accident
Date:	25 March 2018
Location:	Near Koblenz-Winningen Airfield
Aircraft:	Helicopter
Manufacturer / Model:	Homebuilt / RotorWay Exec 162F
Injuries to Persons:	None
Damage:	Aircraft severely damaged
Other Damage:	None
State File Number:	BFU18-0292-3X

Factual Information

History of the Flight

On the day of the accident together with a flight instructor known to him, the pilot wanted to conduct a sightseeing flight with the homebuilt helicopter Exec 162F. It

was intended to also train emergency procedures during the sightseeing flight. Prior to the flight the helicopter had been refuelled completely.

At 1647 hrs¹ the helicopter took off at Koblenz-Winningen Airfield (EDRK).

Both, the pilot and the passenger, stated that the flight commenced to the helicopter landing area Ochtendung. There approaches, take-offs, emergency procedures, and autorotations were trained. At about 1817 hrs, on the return flight to Koblenz-Winningen, during the right base leg to runway 24 power loss and reduction of the main rotor rpm occurred, even though the engine sound remained unchanged. In spite of manually overtwisting the governor up to the stop of the twist grip the engine rpm did not increase again. The pilot made an emergency call to the Flugleiter (A person required by German regulation at uncontrolled aerodromes to provide aerodrome information service to pilots.) at Koblenz-Winningen. Then he initiated an autorotation at approximately 900 ft GND.

The helicopter touched down hard at a downward sloping meadow south-west of Bisholder in the vicinity of an overhead power line. Up until the helicopter rolled over the engine was running with decreased power.



Accident site overview: Power line, downward slope, ground traces, and damages

Source: BFU

¹ All times local, unless otherwise stated.

Both occupants were able to leave the severely damaged helicopter uninjured.

Personnel Information

Pilot

The 57-year-old pilot held a Light Aircraft Pilot's Licence Helicopter (LAPL(H)) issued by the Landesbetrieb Mobilität Rheinland-Pfalz in accordance with Part FCL. The licence listed the open-ended rating for pilot in command on HU269. His licence also included a national supplement listing him as pilot in command on EXEC162F.

He held a class 2 medical certificate issued in accordance with Part-MED with the restrictions VDL and VCL; valid until 9 September 2018.

The pilot stated that he had a total flying experience of 408 hours; approximately 92 hours of which were flown on the helicopter type involved.

Passenger

The 27-year-old passenger held a Commercial Helicopter Pilot's Licence (CPL(H)) issued by the Swedish civil aviation authority in accordance with Part FCL. The licence listed the ratings as pilot in command for Cabri G2 and HU269. In addition, he held the Flight Instructor rating for single engine helicopter (FI(H)SE).

He held a class 1 medical certificate issued in accordance with Part-MED without restrictions; valid until 2 April 2018.

According to his statement he had a total flying experience on helicopters of 927 hours; approximately 654 hours of which were flown on the helicopter type involved.

Aircraft Information

The helicopter Exec 162F of the kit manufacturer RotorWay is a two-seated helicopter with a fully articulated semi-rigid two-blade rotor system. The helicopter is equipped with a vertically installed water-cooled four-cylinder flat engine with redundant electrical motor control and 150 HP; a Rotorway RI 162F. The Exec 162F uses belts and chains instead of a main gear box and drive shafts for power transmission and rpm reduction. The tank had a fuel capacity of about 64 l. Maximum take-off mass is 680 kg.

The Construction Manual Section 20 -Fuel System- described the following in regard to the contamination of the fuel system: *[...] Before installing the fuel hoses, flush them thoroughly with solvent and blow them dry with compressed air. Carefully inspect the insides of the hoses for any dirt or debris. [...] The tanks are made from a cross-linked polyethylene plastic material noted for its durability. [...] Flush both tanks thoroughly with water to remove plastic chips and debris. Be sure the tanks are completely dry before connecting any hoses or fittings. [...] Keep the openings plugged until the hoses are installed to help keep out dirt.*

The kit manufacturer recommends in the Maintenance Manual an inspection interval of 25, 50, 100, 200, 250, 500, 1,000, 1,500, and 2,000 operating hours. The helicopter is equipped with two fuel filters. The check/cleaning of one filter and the replacement of the other fuel filter is scheduled to take place at 100 operating hours.

The pilot assembled the accident helicopter with the manufacturer's serial number 3003572 himself. On 30 November 2017 the Luftfahrt-Bundesamt (German civil aviation authority, LBA) issued the temporary airworthiness certificate as single piece experimental. According to the weight report of 27 March 2017 the empty mass was about 437 kg. The helicopter, including ground test runs, had a total operating time of 30:24 hours.

On 24 March 2018 the pilot conducted the first 25-hour inspection. The check included the replacement of the oil filter and a visual inspection of the engine, the air filter, the rotor blades, the safety pin of the trim weight, the lower bearing in the drive shaft, and the so-called grease fittings. After the inspection the helicopter was operated for about 5 hours on 24 and 25 March 2018.

Meteorological Information

At Koblenz-Winningen Airfield the following weather conditions were observed:

Wind from 290° with 11 km/h, ground visibility more than 10 km, few clouds, temperature 13°C, dewpoint at -1°C, air Pressure (QNH) 1,007 hPa.

Radio Communications

The pilot had radio contact with the Flugleiter at EDRK. Radio communications were not recorded. On enquiry by the BFU the Flugleiter confirmed the emergency call of the pilot.

Aerodrome Information

Koblenz-Winningen Airfield (EDRK) is located south-west of Koblenz city and north-east of Winningen city. Aerodrome elevation is 640 ft AMSL.

The airport has one asphalt runway with the orientation 056°/236°. It has a length of 1,175 m and a width of 20 m. North of the runway a grass strip is used for glider operation.

Depending on the instruction of Koblenz INFO the traffic circuit for powered airplanes is either flown north or south of the airfield at 1,600 ft AMSL.

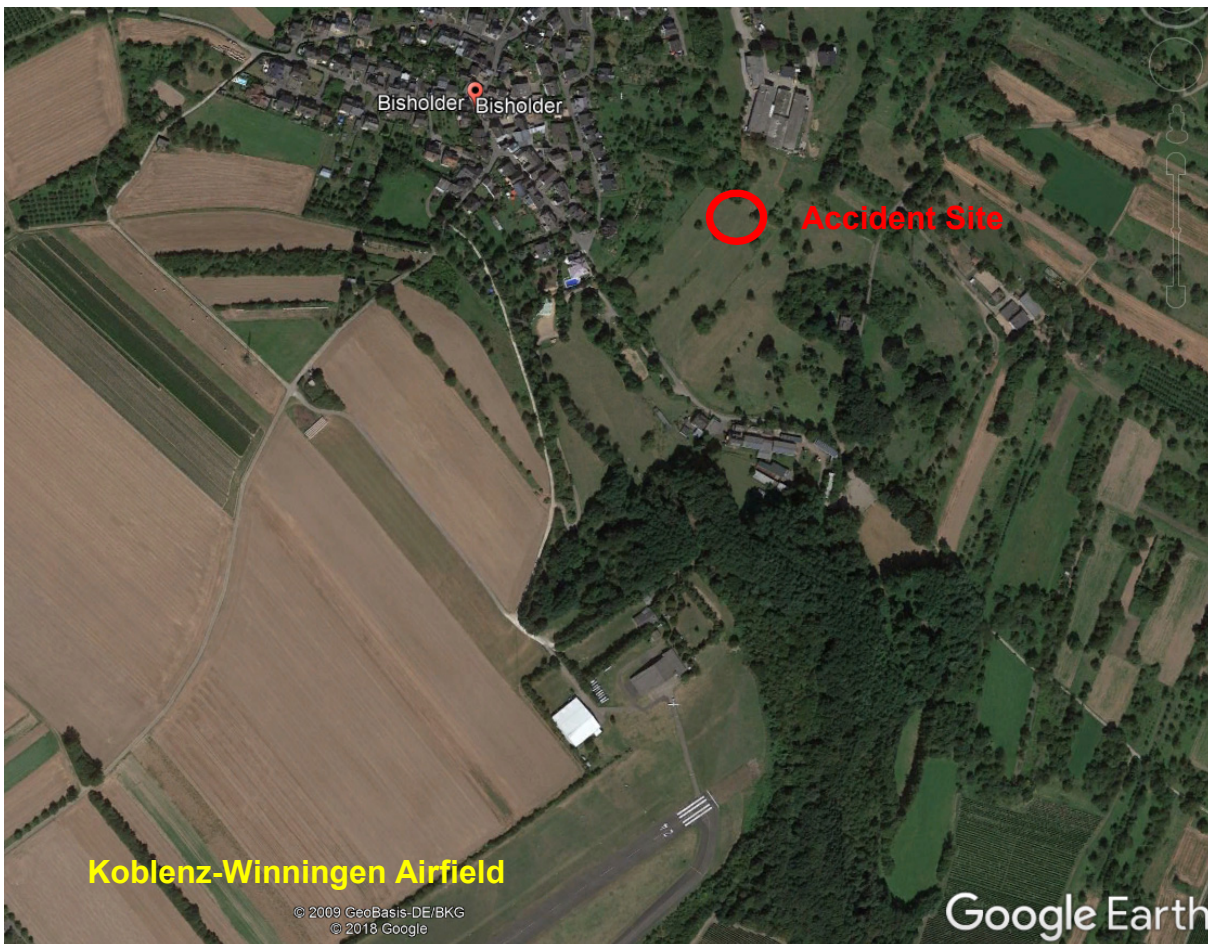
Flight Recorder

The helicopter was not equipped with a Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR). These recording devices were not mandatory.

Wreckage and Impact Information

The accident site was located south-east of the small town Bisholder and approximately 560 m north of Koblenz-Winningen Airfield.

The helicopter was laying on its left side on a downward sloping meadow, the nose pointed west. North of the helicopter a skid mark in the ground was found. The left skid indentation was deepest in the front.



Location of the accident site in relation to the airfield

Source: Google Earth™ / BFU



Accident site and helicopter damages

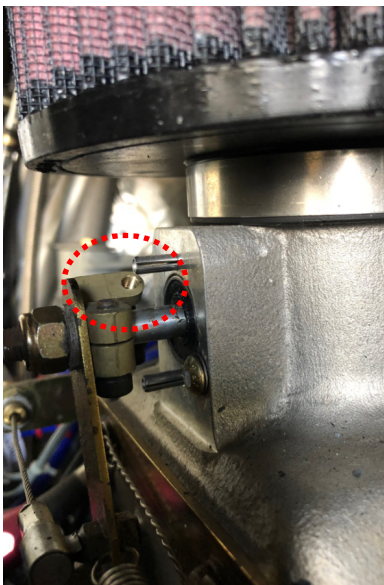
Source: BFU

The main rotor blades were bent and the tail boom was twisted. At the site fuel leaked. At the accident site no evidence was found that the controls had been impaired. The engine and the respective aggregates did not show any leakages or loose connections.

After the salvage operation the BFU examined the piston engine together with the pilot. The spark plugs showed a lightish to light grey combustion pattern. The valves and the toggles did not show any damage indication. A boroscopy of the combustion chambers did not reveal any damages or running marks of the pistons on the cylinder walls.

The two fuel filters were opened. They showed severe contamination. Part of the contamination seemed to be black plastic which showed similarities with the tank material.

On the linkage of the throttle a stop bolt was missing. It could not be determined as to how long the stop bolt had been missing. The pilot stated that the bolt had been part of the construction kit. In case such a stop bolt loosens by vibration it would restrict the maximum deflection of the throttle more and more.



Missing stop bolt at the throttle and contaminated fuel filter

Source: BFU

Fire

There was no evidence of in-flight fire.

Additional Information

Due to the accident the BFU contacted the helicopter kit manufacturer. The manufacturer was not aware of any other similarly severe contamination events with engine

failure. The manufacturer stated that contrary to the technical drawings the stop bolt for the maximum position of the throttle is not installed.

Investigator in charge: Axel Rokohl
Field Investigation: Alfred Jung
Braunschweig 19. June 2018

This investigation was conducted in accordance with the regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft (*Flugunfall-Untersuchungs-Gesetz - FIUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

This document is a translation of the German Investigation Report. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

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Bundesstelle für
Flugunfalluntersuchung
Hermann-Blenk-Str. 16
38108 Braunschweig

Phone +49 531 35 48 - 0
Fax +49 531 35 48 - 246

Mail box@bfu-web.de
Internet www.bfu-web.de