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: 19 August 2018
Location: Gera-Leumritz Airfield
Aircraft: Airplane
Manufacturer / Model: PZL-Mielec / AN-2
Injuries to Persons: None
Damage: Aircraft substantially damaged
Other Damage: None
State File Number: BFU18-1255-3X

Factual Information

During engine start-up flames developed and subsequently the lining of both right wings of an AN-2 partially burnt.
History of the Flight
At the day of the accident, the pilot had conducted six flights dropping skydivers. At about 1745 hrs\(^1\) he tried to start the engine of the AN-2 on the apron of Gera-Leumitz Airfield for the last flight of the day. During engine start-up flames leapt from the exhaust manifold. Subsequently, the right lower wing lining caught fire. According to the pilot, he had asked the 8 sky divers on board the aircraft to disembark. After he had closed the engine fuel shut off valve, he also disembarked via the left fuselage door. Subsequently, the upper right wing lining also caught fire. Airfield aides applied extinguishing agent and the fire was extinguished after about 90 seconds.

A surveillance camera recorded the fire (Fig. 1).

![Fig. 1: The burning AN-2 and the fire being extinguished](Source: Surveillance video/Adaptation BFU)

Personnel Information
The 55-year-old pilot held a private pilot's license issued on 27 September 1994. He held the rating for Single Engine Piston land (SEP land) as pilot in command, valid until 31 July 2019. In addition, the aero tow flight rating and the rating to train private pilots were listed in his licence.

\(^1\)All times local, unless otherwise stated.
His class 2 medical certificate with the restriction VML, was valid until 23 September 2018.

According to his pilot log book, he had a total flying experience of 1,489 hours and 3,667 cycles. In the last 90 days prior to the occurrence he had flown about 12 hours and performed 25 cycles on type.

Aircraft Information

General

The Antonov AN-2 is a single-engine multi-purpose two-bay biplane in mixed construction with a fixed tricycle landing gear in tail wheel configuration. The wings have two spars and are covered with metal between the leading edge and the first spar, the rest with linen. They form a structural assemblage consisting of two vertical braces and transverse double struttings (Fig. 2).

The six fuel tanks in the upper wings have a maximum capacity of 1,200 l. The aircraft is equipped with a Schwezow ASch-62 IR nine-cylinder radial piston engine with 736 kW (1,000 hp) power. The engine power is transferred to an adjustable four-blade propeller. Maximum take-off mass was 5,500 kg. The empty weight was 3,387 kg.

The aircraft was built in 1967, registered in Germany and operated by a club. The last Airworthiness Review Certificate (ARC) was issued on 25 July 2018. Total operating time was 5,714 hours at 12,120 cycles.
Engine start-up

The Flight Manual (FM) of the aircraft involved describes the preparations and process for engine start-up:

6.2.1 Preparation for engine start-up:

[...]

2. Check if the required fire extinguishers were placed next to the wing in the area of the exhaust pipe.

[...]

17. If start-up occurs shortly after parking and the cylinder head temperature is still 40 to 80°C, then by 1 to 2 propeller revolutions 2 to 3 fuel injections have to be made.

Note: After fuel injection put the lever of the fuel injection pump to “Ausgeschaltet (off)”. 
Attention! Is the cylinder head temperature higher than 80°C it is not permitted to turn the propeller and inject fuel.

18. Start the engine with the electrical starter.

6.2.2 Engine start-up:

Check the preparations for engine start-up, give the command “Luftschraube frei (propeller free)”, and once the reply “Luftschraube frei (propeller free)” has come start engine start-up.

Switch on the automatic circuit breaker “Anlassen (Start-up)” and pull the lever with the label “Anlassen (start-up)” (in summer 8 to 12 s). During this time the sound of the accelerating flywheel can be heard. Then push the lever away. The dog clutch parts of electrical starter and engine shaft engage, the shaft begins to rotate, and the magneto generates ignition voltage.²

After 1 to 2 revolutions of the propeller turn on the ignition (put the lever for change of the magnetos in position “1 und 2”). After the injection, keep the fuel pressure in the carburettor with the hand pump at 0.25 to 0.35 kp/cm², if the engine does not run smoothly by then.

Take notice of:

1. When fuel is injected, but the engine has not switched to carburettor operations the gas lever has to be operated speedily and uniformly because then the fuel is added via the accelerating pump.

[2. / 3.]

4. If backfire into the carburettor occurs continue to work with the injection pump; that way the engine receives sufficient, rich mixture.

If during backfire fuel is ignited in the carburettor, turn off the ignition, pull back the throttle completely.

Attention! Once the engine is running, loosen the seal with the label “Feuer (fire)”, lift the cap, and push the button.

[5.]

² The information in the FM is not entirely correct. The sentence should read: The dog clutch engages the flywheel to the engine shaft, the engine shaft starts to rotate, and the magneto generates the ignition voltage.
6. If the engine received too much fuel during start-up (Ersaufen (flooding)) the butterfly damper has to be opened fully and turn the propeller three times counter clockwise.

Meteorological Information

According to the records of the Flugleiter (A person required by German regulation at uncontrolled aerodromes to provide aerodrome information service to pilots) summer weather prevailed at the day of the accident. Variable winds and a temperature of about 30°C.

Radio Communications

At the time of the accident, the pilot was not in radio contact with Gera-Info.

Aerodrome Information

Gera-Leumnitz Airfield (EDJA) is located approximately 1.6 NM east of Gera and, among other things, certified for aircraft up to 5,700 kg. Aerodrome elevation is 1,015 ft AMSL. The apron located south of the hangars has the dimensions: 50 x 150 m. It is connected with runway 06/24 via a taxiway.

Wreckage and Impact Information

The accident site was on the apron approximately 15 m south of the hangars (Fig. 3).
The entire lining of the right lower and upper wings was burnt (Fig. 4). On the ground below the right wing burnt residue of the lining was found. In the three left fuel tanks remained about 150 l and in the three right ones about 200 l fuel. The fuel tanks in the right wing were not damaged by fire. The rudders and flaps on the two right wings were deformed due to the heat.
Fire

During engine start-up flames erupted from the only exhaust manifold on the right side of the fuselage. Initially, the upper surface of the lower, right wing caught fire. The fire spread to the entire lining of the right lower and the right upper wings. Airfield aids used 5 fire extinguishers to extinguish the fire after about 90 seconds.

At the same time the airfield fire brigade arrived at the aircraft but was no longer needed. After about 9 minutes the municipal fire brigade the Flugleiter had notified arrived at the accident site but was no longer needed.
Additional Information

During engine start-up of the Asch 62 IR radial piston engine flames may develop if fuel, which leaked from the cylinders, is present in the exhaust manifold and ignites.
For this reason fire extinguishers should be placed close to the right fuselage in the vicinity of the exhaust manifold (refer to Flight Manual). The person assisting the start-up should not only stand left of the fuselage, in view of the pilot (Fig.6), but in a way that he/she can observe the exhaust manifold during engine start-up in case actions have to be initiated to prevent flames from spreading.

Fig. 6: Location of the person assisting engine start-up (red circle)  
Source: Surveillance video/Adaptation BFU  

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Braunschweig, 16.10.2019
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 - FlUUG) 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.

Published by:

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