Factual Report

The Investigation Report was written in accordance with para 18 of the 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: 28 August 2019
Location: Egelsbach
Aircraft: Airplane
Manufacturer / Model: Cessna Aircraft Company / Citation C525
Injuries to Persons: None
Damage: Aircraft substantially damaged
Other Damage: Airport fence and crop damage
State File Number: BFU19-1185-3X

Factual Information

During the landing on runway 26 at Egelsbach Airfield the aircraft overshot the end of the runway by about 110 m. The aircraft was substantially damaged. No one was injured.
History of the Flight

On 28 August 2019 at 1558 hrs\(^1\), the airplane took off at Hamburg Airport with one pilot and no passengers on board to a private flight to Egelsbach. Initially the flight was conducted under Instrument Flight rules (IFR) which should later change to Visual Flight Rules (VFR).

At 1646:06 hrs, the pilot established radio contact with Langen Radar. The radar controller transmitted the QNH of 1,014 hPa and requested the pilot to “[… ] later-on report able to cancel […]” IFR.

At 1647:57 hrs, the controller addressed the pilot: “[…] you may proceed direct CHARLIE.” The pilot acknowledged the clearance. At 1648:10 hrs, the radar controller informed the pilot that on request from Egelsbach he should later approach via reporting point YANKEE to runway 26. At 1649:36 hrs, the controller instructed the pilot to descend to 3,000 ft AMSL. The pilot acknowledged the instruction.

According to the radar recording, the change of flight rules from IFR to VFR was reported by the pilot at 1652:24 hrs, 5.5 NM north-east of the VOR CHA. At that time, the airplane was at about 3,000 ft AMSL. The radar controller said to the pilot: “[… ] you may proceed direct YANKEE." The pilot acknowledged this and at 1654:07 hrs, as the airplane passed VOR CHA, he initiated a right turn towards YANKEE.

At 1654:35 hrs, the airplane was at about 2,200 ft AMSL and approximately 14.3 NM east of the airfield, the pilot established radio contact with Egelsbach Info. The Flugleiter (A person required by German regulation at uncontrolled aerodromes to provide aerodrome information service to pilots) informed the pilot: "[…] runway two six via YANKEE-route, QNH one zero one four”. After the pilot had acknowledged the QNH with the addition "[…] direct […] to the field", the Flugleiter asked at 1655:33 hrs if the pilot was familiar with the YANKEE route. The pilot answered: “Not really familiar but […] I do yea.”

Until 1655:51 hrs the airplane had continuously descended to about 1,250 ft AMSL. Then the airplane began to climb again and at 1657:07 hrs was at approximately 2,000 ft AMSL.

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\(^1\) All times local, unless otherwise stated
The pilot stated that after the change of flight rules to VFR he had been confronted with different events, such as traffic advisory, information from Egelsbach Info (see below) and a warning of the Terrain Awareness and Warning System (TAWS).

At 1657:27 hrs the Flugleiter gave the pilot the information: “[…] watch your altitude, maximum one thousand five hundred feet”. At the time, altitude was about 1,700 ft AMSL.

The pilot continued with the descent and at 1657:30 hrs passed YANKEE at about 1,600 ft AMSL and with a heading which roughly corresponded with the direction of runway 26. The airplane descended further and at 1658:07 hrs reached an altitude of about 1,000 ft AMSL. Directly afterwards the airplane climbed to about 1,600 ft AMSL again and at 1700:04 hrs started the final approach. At that time, the airplane was 2.3 NM east of the threshold of runway 26.

During the final approach the airplane was up to 200 ft above the 4.4° glideslope (see Fig. 2) and had a ground speed of 130 kt to 140 kt. The glideslope of runway 26 is visualised by an Abbreviated Precision Approach Path Indicator (APAPI). The pilot
stated he had not paid attention to the lights of the APAPI. Approximately 0.45 NM prior to the threshold the airplane was roughly established on the glideslope.

The Flugleiter at Egelsbach observed the approach and described it as “oszillierend instabil (oscillating instable)”.  

According to the radar data, at 1701:07 hrs the aircraft touched down on runway 26 at Egelsbach with a ground speed of 140 kt. According to the observations of the Flugleiter and the statement of the pilot, the touch-down point was between taxiways C and D, i.e. about 300 m after the threshold.

According to his statements, the pilot compared the remaining runway length at Egelsbach with the landing distance available at Locarno (LSZL), Switzerland. On 17 August 2019 he had been at Locarno and landed on runway 26R which had a landing distance available of 750 m. There he had come to a stop prior to the end of the runway (with sufficient margin).
The pilot reported that after touch-down braking action was less than what he had been used to. The pilot had not checked whether the speed brakes had been extended. He stated that after he realised that the remaining landing distance would not be sufficient to bring the airplane to a stop he decided against a go-around procedure.

The airplane overshot the runway, broke through the airport fence, and came to a stop about 110 m behind the runway end on a grass field. The pilot remained uninjured.

**Personnel Information**

**Pilot in Command**

The 82-year-old pilot held an EU Private Pilot's License (PPL(A)) issued in accordance with Part FCL on 23 September 2015 by the Luftfahrt-Bundesamt (LBA, German civil aviation authority). The licence listed the rating as Pilot in Command (PIC) for Cessna C525 as Single Pilot operations (SP ops) and the instrument rating, both valid until 31 August 2020. In addition, English language proficiency level 4 valid until 30 April 2022 was listed.

His class 2 medical certificate, with the restrictions to wear glasses and hearing aid, was issued on 16 July 2019 and valid until 13 June 2020.

The pilot had a total flying experience of 8,943:12 hours, of which 2,146:18 hours were flown on C525 Citation CJ1+. In 2019 he had flown 60:12 hours on type.

According to his own statement, the pilot had last approached Egelsbach Airfield more than 20 years ago. He said, prior to departure he had familiarised himself with Frankfurt-Egelsbach Airfield using the “Compulsory briefing for NVFR approaches to EDFE with Jets and Turboprops for the season 2019/2020”.

**Aircraft Information**

The Cessna CitationJet CJ1+ is a twin-engine, low-wing business jet with T-tail, and two turbofan engines pylon-mounted on the rear fuselage. It is equipped with a pressurized cabin, and retractable landing gear in nose wheel configuration. Up to five passengers can be transported.
Manufacturer: Cessna Aircraft Company  
Manufacturer’s Serial Number (MSN): 525-0611  
Year of Manufacture: 2006  
MTOM: 4,853 kg / 10,700 lbs  
Total Operating Time: 2,434:24 hours and 1,953 cycles  
Engines Williams FJ44-1AP  
Length: 12.98 m  
Wing Span: 14.30 m

On 23 March 2006, the aircraft was registered in Germany. The Airworthiness Review Certificate was last issued on 25 March 2019 by a German maintenance organisation and valid until 25 March 2020.

On 18 July 2019 an aircraft certificate of release to service and maintenance status was issued by a German maintenance organisation, after the TAMARACK winglet system had been activated.

According to the weight & balance report of 10 January 2017, the Basic Empty Weight was about 3,131 kg / 6,902 lbs. According to the fuel indication, at the time of landing at Egelsbach approximately 635 kg / 1,400 lbs fuel were on board. Therefore, the landing weight of the airplane was approximately 3,870 kg / 8,532 lbs (with an estimated payload of 104 kg / 230 lbs, consisting of: pilot weight 77 kg / 170 lbs, chart case 9 kg / 20 lbs, and baggage 18 kg / 40 lbs). At this weight Vref (minimum final approach speed) with flaps 35° and the aerodrome elevation of 385 ft was 101 KIAS.

Braking System

Both main landing gears of the airplane are equipped with multiple disc brakes. Normally, an independent hydraulic system provides pressure to the brakes. If this hydraulic system fails, a pneumatic emergency system takes over. In this case a pressurised bottle filled with nitrogen supplies the pressure.
Anti-skid System

The touchdown protection as an additional feature of the anti-skid system was mentioned in the operating manual and explained in the maintenance training manual.

The touchdown protection system prevents the pressurisation of the brakes, until the main landing gear wheels have exceeded 59+/-2 kt (mean speed of both main landing gear wheels) after landing or until 3 s after weight-on-wheels has occurred.

Meteorological Information

At the time of the accident, visual meteorological conditions prevailed at Egelsbach.

According to the aviation routine weather report (METAR) of 1650 hrs at Frankfurt/Main Airport, located about 5 NM north-west of Frankfurt-Egelsbach Airfield, the following weather conditions were recorded:

Wind: 200°/9 kt
Visibility: More than 10 km
Clouds: 1-2 octas Cumulonimbus (CB) with a lower limit of 7,000 ft, showers in the vicinity and temporary rain showers
Temperature: 32°C
Dewpoint: 11 °C
QNH: 1,014 hPa

At the time of the accident, wind at Frankfurt-Egelsbach Airfield was 220°/3 kt. The pilot reported that during approach to Egelsbach there had been no rain showers.

Aids to Navigation

The Aeronautical Information Publication (AIP) stipulated the following for approaches to and departures from the airfield with jet aircraft and turboprops:

Approaches with jet aircraft and turboprops are only permitted subject to the following provisions:

a) For runway 08:
Entry via DELTA along the A5 motorway onto right base of runway 08.

b) For runway 26:
Entry via YANKEE directly onto final approach.
The pilot stated that he had used a waypoint generated automatically by the flight management system as reference point for the approach. This waypoint was 5 NM ahead and in eastern extension of the threshold of runway 26.

Radio Communications

The pilot was in radio contact with Langen Radar and Egelsbach Info. Radio communications were held in English. The BFU was provided with the voice recordings between 1646 hrs and the time of the accident (1702 hrs) for investigation purposes.
Aerodrome Information

Frankfurt-Egelsbach Airfield (EDFE) is located 0.27 NM south-west of Egelsbach in the Rhine-Main Region south-east of Frankfurt/Main Airport in the triangle of the cities Frankfurt/Main, Offenbach and, Darmstadt. Airport elevation is 385 ft AMSL.

It had two parallel runways with the orientation 084° (08) and 264° (26). The asphalt runway was 1,400 m long and 25 m wide. The grass strip had a length of 670 m.

In the direction 264, the asphalt runway had a landing distance available of 1,166 m and a downhill slope of 0.4%.

Flight Recorders

The aircraft was not equipped with a cockpit voice recorder or flight data recorder. These recording devices were not required by relevant aviation regulations.

The BFU was provided with the radar data of the flight path recorded by the air navigation service provider.

Wreckage and Impact Information

The airplane came to a stop about 110 m beyond the end of the runway and approximately 170 m beyond the threshold of runway 08 outside the airport terrain on a grass field. It had turned south by 90° to the runway centre line and broke through the airport fence. The flaps were in position 15° as were the flap levers, and the flap position indicators in the cockpit.
Fig. 5: Accident site (viewed from above Egelsbach Airfield)  
Source: Google Earth / adapted: BFU

Fig. 6: Position of the airplane outside the airport fence  
Source: BFU
The right wing tip including winglet (TAMARACK system) had been torn off and was lying 20 m north of the airplane. The right pitot tube had been severed and was lying 1 m left of the right wing tip. The left pitot tube had been pushed into the fuselage structure. The right outer wing was destroyed on a length of about 1 m. The right lower wing surface was partially torn open which caused an opening in the outer area of the right fuel tank. According to the fuel indication in the cockpit, there was no significant difference between the left and the right fuel tank content, so that either no fuel at all or only a small amount had leaked at the accident site. There was also no difference between the amount of fuel during the landing the pilot had reported and the amount found at the accident site. The right side of the nose section and the door of the right baggage compartment were dented. The right wing leading edge was deformed in several places and there was a hole in one area. The left wing leading edge was also deformed in several places. The right aileron and the right flap were damaged. The right main landing gear door had partially been torn off.

After the accident the brake system was checked. It was fully functional. When the parking brake was set, the power brake accumulator of the normal brake system showed sufficient pressure. The pressure of the emergency brake system was also in
the normal range. The brake abrasive wear pins of the right brake showed a sufficient length of 10 mm and the left of 6 mm.

After the accident, the switch for the anti-skid system was found in the ON position.

Additional Information

The aircraft manufacturer defined a stabilised approach with two engines in the Operating Manual Chapter 18 Manoeuvres and Procedures as follows:

[…] Plan to reach the […] final approach fix (FAF) with the landing gear down, flaps set, and speed set. If flying a straight-in two-engine approach, plan to have flaps set at 35° by the FAF; this permits a stabilized approach throughout final. […]

[… ] Plan to arrive over the threshold at V REF […] at 50 feet above the runway […].

The Flight Safety Foundation recommended in the “Approach-and-landing Accident Reduction (ALAR) Briefing Note 7-1” […] that all flights must be stabilised by 1000 feet above airport elevation in IMC and 500 feet above airport elevation in VMC.

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Assistance: Holm Bielfeldt
Field Investigation: Martin Rulffs
Braunschweig, 28 January 2020
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.

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