

FINAL REPORT



ACCIDENT 2019/2087

Państwowa Komisja Badania Wypadków Lotniczych

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FINAL REPORT

ACCIDENT

OCCURRENCE NO – 2087/19

AIRCRAFT – Diamond DA20-C1 airplane, SP-KWG

DATE AND PLACE OF OCCURRENCE – 10 June 2019, EPMO, Poland



This Report is a document presenting the position of the State Commission on Aircraft Accidents Investigation concerning circumstances of the air occurrence, its causes and safety recommendations. The Report was drawn up on the basis of information available on the date of its completion.

The investigation may be reopened if new information becomes available or new investigation techniques are applied, which may affect the wording related to the causes, circumstances and safety recommendations contained in the Report.

Investigation into air the occurrence was carried out in accordance with the applicable international, European Union and domestic legal provisions for prevention purposes only. The investigation was carried out without application of the legal evidential procedure, applicable for proceedings of other authorities required to take action in connection with an air occurrence.

The Commission does not apportion blame or liability.

In accordance with Article 5 paragraph 6 of the Regulation (EU) No 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation [...] and Article 134 of the Act – Aviation Law, the wording used in this Report may not be considered as an indication of the guilty or responsible for the occurrence.

For the above reasons, any use of this Report for any purpose other than air accidents and incidents prevention can lead to wrong conclusions and interpretations.

This Report was drawn up in the Polish language. Other language versions may be drawn up for information purposes only.

WARSAW 2021

TABLE OF CONTENTS

ABBREVIATIONS.....	3
GENERAL INFORMATION	4
SYNOPSIS	5
1. FACTUAL INFORMATION	6
1.1. History of the flight.....	6
1.2. Injuries to persons	8
1.3. Damage to aircraft	8
1.4. Other damage.....	9
1.5. Personnel information (crew data).....	9
1.6. Aircraft information.....	10
1.7. Meteorological information.....	10
1.8. Aids to navigation	11
1.9. Communications	11
1.10. Aerodrome information	11
1.11. Flight recorders.....	11
1.12. Wreckage and impact information	11
1.13. Medical and pathological information.....	13
1.14. Fire	13
1.15. Survival aspects.....	14
1.16. Tests and research	14
1.17. Organizational and management information	14
1.18. Additional information	14
1.19. Useful or effective investigation techniques.....	14
2. ANALYSIS	14
3. CONCLUSIONS	15
3.1. Findings	15
3.2. Causes of the accident	16
4. SAFETY RECOMMENDATIONS.....	16

ABBREVIATIONS

AGL	Above Ground Level
ATPL(A)	Airline Transport Pilot Licence (Aeroplane)
FI	Flight Instructor
FM	Flight Manual
ft	Foot (feet)
kt	Knot
LBS	pounds
LMT	Local Mean Time
MTOW	Maximum Take-off Weight
ULC	Civil Aviation Authority (Polish)
UTC	Universal Time Coordinated
VFR	Visual Flight Rules

GENERAL INFORMATION

Occurrence reference number:	2087/2019			
Type of occurrence :	ACCIDENT			
Date of occurrence:	10 June 2019			
Place of occurrence	EPMO, Poland			
Type and model of aircraft:	Diamond DA20-C1			
Aircraft registration marks:	SP-KWG			
Aircraft User/Operator:	Salt Aviation			
Aircraft Commander:	ATPL(A)			
Number of victims/injuries	Fatal	Serious	Minor	None
	–	–	–	2
Domestic and international authorities informed about the occurrence	ULC, EASA, TSB of Canada			
Investigator-in-Charge:	Krzysztof Miłkowski			
Investigating Authority:	State Commission on Aircraft Accidents Investigation (PKBWL)			
Accredited Representatives and their advisers:	None			
Document containing results:	FINAL REPORT			
Safety recommendations:	None			
Addressees of the recommendations:	Not applicable			
Date of completion of the investigation:	28 April 2021			

SYNOPSIS

The crew consisting of an instructor pilot and a student pilot performed circuits in the scope of a training for PPL(A). After the fourth circuit, the plane touched down on the left edge of the runway and after a bounce it fell outside the runway onto a grassy part, where another touchdown and bounce took place. During the next touchdown the landing gear was torn off. Then, after next bounce the plane touched down about 90 m from the runway. As a result, the plane was substantially damaged. The crew left the aircraft unaided without any injuries.

The investigation into the occurrence was conducted by the PKBWL Investigation Team in the following composition:

Krzysztof Miłkowski	Investigator-in-Charge
Krzysztof Błasiak	Team member

After the investigation PKBWL determined the following causes of the accident:

- 1. The instructor's late response to the deviation of the airplane from the runway centre line in the final phase of landing.**
- 2. Late decision to abort landing and perform go-around.**
- 3. Incorrect actions during the go-around procedure.**

PKBWL did not propose any safety recommendations after the completion of the investigation.

1. FACTUAL INFORMATION

1.1. History of the flight

On 10 June 2019 a flight instructor and a student-pilot arrived at the aerodrome to perform training flights for PPL(A) on Diamond DA20 airplane. The plan was to perform perfecting circuits before the student's solo flight.

After pre-flight briefing and discussing the conditions for the planned flights, the crew checked the aircraft, filed the flight plan and started flying.

On the day of the accident the flights were performed from a concrete runway with take-off and landing direction 081°. The weather was as follows: cloud cover up to 3/8 with a base of about 5000 ft, visibility over 10 km, wind speed up to 13 kt, direction 120° varying from 90° to 150°.

The instructor and the student stated that the first three circuits and the fourth one up to the roundout phase were uneventful, but at a height of about 4-5 m at a speed of about 65 kt, when the student reduced the engine RPM to the minimum (idle) and commenced the roundout phase, the crew noticed that the plane was deviating to the left from the runway centre line. The instructor commanded: *"to the right"*.

During an interview the instructor stated that when the left bank seemed to him excessive and the plane seemed to be unresponsive, he decided to take control and make a go-around. He pushed the throttle forward up to stop, but in his opinion the plane was still flying with the left bank angle as if the student kept pressing the rudder pedal to the left. On the left side he saw that the wing was already hitting the grass, and immediately after that an impact occurred.

The plane came to rest approx. 90 m from the left edge of the runway on the grassy part of the aerodrome. Then the instructor opened the cabin fairing and ordered the student to leave the plane, declared "Mayday" via radio, turned off the power and left the cockpit himself.

A few minutes after the incident, emergency services arrived at the scene. The firefighters covered the plane with foam and disconnected the battery. The pilots were taken to hospital and released after examination. As a result of the accident the plane was substantially damaged, but the crew was not injured.

During visual inspection of the accident site and the analysis of recordings, it was found that the first touchdown took place on the left side of the concrete runway on its extreme part (Fig. 1), and then, after bouncing, the plane moved to the left, off the runway, onto the grassy part of the aerodrome. During the flight with the left bank, the left wing collided with the ground and the plane touched down probably with a negative pitch angle, which resulted in breaking the leg of the nose landing gear

(Fig. 2). Then the plane bounced again and moving further left, hit the ground, breaking the right leg of the main landing gear and damaging the propeller and the fuselage structure (Fig. 3).



Fig.1. Place of first touchdown [source: PKBWL]



Fig. 2. Broken leg of the nose landing gear [source: SCAAI]



Fig. 3. The plane after the accident [source: PKBWL]

1.2. Injuries to persons

Injuries	Crew	Passengers	Others	Total
Fatal	–	–	–	–
Serious	–	–	–	–
Minor	–	–	–	–
None	2	–	–	2

1.3. Damage to aircraft

As a result of the accident, the aeroplane sustained numerous, substantial damage. Due to composite structure of the aircraft, the collision with the ground damaged its structure in many places.

Cracks and delamination of the composite structure occurred on the upper and lower fairings of the engine, the lower part of the fuselage under and behind the cockpit, where the fuselage meets the tail part. The tail part, 0.5 m in front of the vertical stabilizer, broke and moved to the left.

The cockpit, including its transparent fairing, was not damaged, providing protection for the flight crew and allowing them to leave the aircraft after the occurrence.

The wooden two-blade propeller and the nose landing gear were damaged.

The nose leg together with the wheel separated from the airframe during the impact with the ground and was found at a considerable distance from the airframe. The right leg of the fixed main landing gear was detached from the fuselage, while the left leg was deformed and remained at the fuselage. On the lower part of the fuselage, protruding elements such as the steps to the cabin, antennas of aircraft avionics systems and drainage elements of the engine were deformed. The wings of composite structure did not detach from the fuselage, but sustained minor damage in many places. Cracks and delaminations of the wing structure were found, especially near the leading edge of both wings and the tip of the left wing. Similar damage was revealed in the tail area, in particular on the leading edge of vertical stabilizer and on the trailing edge of elevator.

The wing flap mounts on both sides were deformed, and in the case of the right wing, the mount of the flap control pusher was broken, and the flap fell under the wing.

As a result of breaking the tail part of the aircraft, the control system components such as pull rods and pusher of elevator and rudder were damaged.

Numerous scattered parts (washers, sleeves, screws, skin elements) were found in the area of the wreck.

1.4. Other damage

None.

1.5. Personnel information (crew data)

Commander of the aircraft (PIC) – male, holder of ATPL(A) with the following ratings:

- SEP (L), valid until 31 Aug 2019;
- DHC8/IR valid until 31 Mar 2020;
- FI Restricted valid until 31 Mar 2020;
- BE 90/99/100/100 IR, valid until 23 May 2019;
- IR, SE, ME, C-SET, valid until 30 Apr 2019;
- MEP(L), valid until 23 Apr 2019;
- Flight experience:
 - total – 1652 h 21 min;
 - on DA20 – 86 h 03 min;
 - as instructor – 30 h 41 min;
 - over the last month as instructor – 15 h 51 min;
 - over 24 h prior to the accident as instructor – 3 h 35 min;
- Aero-Medical Certificate – Class I valid until 7 Aug 2019.

Student pilot commenced flight training on 21 May 2019 and until the accident date performed 62 dual flights during 11 h 2 min.

The student had Aero-Medical Certificate Class II/LAPL valid until 7 May 2024. ¹

¹ Crew data as of 10 Jun 2019

1.6. Aircraft information

Diamond DA20 Katana is a two-seat general aviation light aeroplane. It has a composite low wing structure with a single two-bladed tractor propeller. The plane has a tricycle fixed landing gear with nose wheel and a T-shaped tail empennage. The cabin has two seats arranged next to each other and is equipped with dual controls enabling the use of the aircraft for flight training.

Model	DA20-C1
Manufacturer	Diamond Aircraft Industries - Canada
Registration marks	SP-KWG
Serial Number	C0046
Year of manufacture	1999
Category	Normal, MTOW≤ 5700 kg
Engine	Continental IO 240, four-cylinder, four-stroke, fuel injected, horizontally opposed, air cooled. Direct propeller drive from engine crankshaft. Displacement: 239.8 cu. in. (3.9 liters) Shaft power: 125 hp (93.2 kW) at 2800 RPM
Propeller	Two-bladed fixed pitch Model W69EK7-63, Diameter: 5 ft 8.9 in (1.752 m)
Registration date	23 Aug 2016
Certificate of Airworthiness issued	23 Mar 2008
Airframe Total Flight Time Since New	5516.5 h
Maintenance planned after Flight Time	5519 h
Scheduled maintenance not later than	20 Jul 2019
Span:	35 ft 8 in (10.87 m)
Length:	23 ft 6 in (7.17 m)
Height:	7 ft 2 in (2.19 m)
Approved fuel:	Avgas 100LL
Max. cruise speed at 75% RPM	(8 500 ft) - 234 km/h (126 kts) TAS
Cruise speed at 55%	(13 000 ft) - 216 km/h (117 kts) TAS
Stall speed, landing configuration	83 km/h, (45 kts) CAS
Maximum Rate of climb	4,2 m/s (827 ft/min)
Ceiling	4 000 m (13123 ft)
Maximum Take-Off Mass	750 kg
Empty mass	554 kg

1.7. Meteorological information

On the day of the accident the weather was as follows: cloud cover 1/8-3/8 with a base 4800 ft, wind speed 13 kt, direction 120°, varying from 90° to 150°, visibility over 10 km, air temperature 29°C, dew point temperature 16°C.

METAR/SPECI FOR EPMO

METAR EPMO 101200Z 12013KT 090V150 9999FE048 29/16 Q1018=

In the Commission's opinion, at this stage of the training, the weather conditions, in particular the variable wind direction and high air temperature, could have had an impact on the occurrence.

1.8. Aids to navigation

Not applicable.

1.9. Communications

The plane was equipped with standard radio and navigation equipment. During the flight the crew maintained communication with EPMO Tower.

1.10. Aerodrome information

EPMO – controlled aerodrome

Coordinates: N52°27'04.4"; E20°39'06.8"

Radio: Modlin Tower- 123.925 Mhz, Modlin Information - 120.325 Mhz

Elevation - 341 ft

RWY - 081/261 (08/26), 2500m x 45m concrete, N52°27'04.4"; E20°39'06.8"

1.11. Flight recorders

The plane was not equipped with any flight recorder.

1.12. Wreckage and impact information

The plane came to rest about 90 meters from the north edge of a concrete runway on the grassy part of the aerodrome. During an inspection of the scene, it was found that the first contact of the plane with the concrete runway was approx. 800 m from the threshold of RWY 08, near aircraft parking stands on the southern side of the aerodrome. The airplane touched down on the left edge of the runway deviating approx. 30° from the runway centre line (Fig. 4).

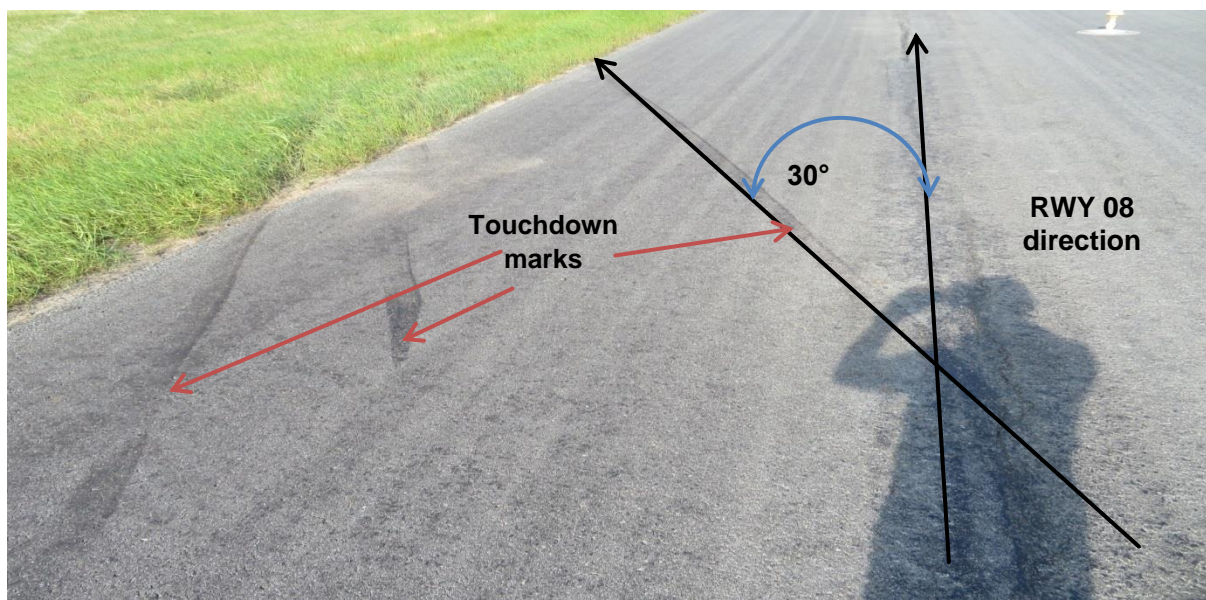


Fig. 4. Touchdown marks left by the airplane [source: PKBWL]

The next marks of the touchdown were found approximately 60 m from the runway edge, on the grassy part of the aerodrome. It was the second touchdown, as evidenced by traces on the grass, detached nose landing gear and parts of its

mounting (metal and rubber discs), propeller fragments and small fragments of the aircraft skin (Fig. 5 and 6).



Fig. 5. Parts of damaged propeller [source: PKBWL]



Fig. 6. Detached nose landing gear [source: PKBWL]

Between the first and second touchdown, the plane rolled on the left wing and its tip collided with the grassy surface (Fig.7), which led to the damage described above. In the Commission's opinion, after the second impact with the ground the plane bounced and moved to the left by about 30 meters, where it finally came to rest. The

third touchdown resulted in the tearing off the right main landing gear leg, breaking the tail with empennage, damage to the fuselage and wings skins, and to the overall destruction of the aircraft (Fig. 8).



Fig. 7. Damaged tip of the left wing [source: PKBWL]



Fig. 8. Destroyed aircraft [source: PKBWL]

1.13. Medical and pathological information

In the course of the accident the crew did not suffer any injuries.

1.14. Fire

In the course of the accident the fuel system was not unsealed and the fire did not occur.

1.15. Survival aspects

The crew had their belts properly fastened, which protected them against injuries.

1.16. Tests and research

In the course of the investigation, the Investigation Team secured records of the aircraft and recordings from the aerodrome video cameras, interviewed the crew and collected statements from witnesses. Photographic documentation of the plane and the accident site were made, and the meteorological conditions were analyzed.

1.17. Organizational and management information

The training organization had the required certificate. The training was carried out in accordance with the program approved by the Civil Aviation Authority.

1.18. Additional information

The instructor pilot has got acquainted with the Draft Final Report and made two comments that were not taken into account.

1.19. Useful or effective investigation techniques

Standard investigation techniques were used.

2. ANALYSIS

On 10 June 2019, according to the training program, training flights were planned for PPL(A). As part of the training, perfecting circuits before the student's solo flight were planned. After analysis of the weather conditions and discussing the planned flights, the crew began flying.

The weather was adequate for the planned flights, wind speed 13 kt, direction 120°, varying from 90° to 150°, which was within the limit for the aircraft. According to the DA-20 Flight Manual, item 2.16, ***the maximum demonstrated crosswind component is 20 kts. (37 km/h)***. It should also be noted that the accident took place in the middle of the day and at the temperature of 29°C, which could cause fatigue and distraction of the student.

In the fourth circuit, during roundout phase over a concrete runway, the plane began to deviate to the left, and according to the instructor's statement, he commanded *“aileron right and pull”*. Seeing that the plane was not responding and was rolling on the left wing, he took control of the plane and decided to go around. To do this, he increased the engine RPM to maximum and pulled the control stick towards himself. As a result, the plane touched down on the left edge of the runway, beyond the line of runway edge lights, with a deviation to the left of approximately 30°.

Due to the instructor's reaction, i.e. increasing engine RPM and pulling the stick back, the plane took off, but its speed was close to the minimum, therefore the plane reached too high angle of attack and stalled (in the Commission opinion). The plane,

flying with a deviation to the left, being over the grassy part of the aerodrome, rolled to the left and in the “nose down” attitude its left wing tip collided with the ground, breaking the nose landing gear and damaging the propeller.

Then the plane lifted off again and traveled about 30 meters to the left, hitting the ground again. Analysis of the traces on the ground showed that the last touchdown was with the side movement to the left, the right main landing gear was torn off and the tail beam was broken about 1.5 meters behind the cockpit. The plane came to rest and the crew left it uninjured.

Go around is one of the methods of correcting errors during the landing approach. However, when making the decision to go around, the instructor should have ensured the appropriate speed of the aircraft to make the maneuver effective.

In the investigated case, analysis of traces and cameras recordings as well as the instructor's and student's statements has led the Commission to the conclusion that when increasing the engine RPM to maximum, the pilot simultaneously pulled the control stick back, which caused increase in the angle of attack and drag force. At that time the aircraft speed was within the touchdown speed limits (very low). Therefore, it was not possible to increase the speed to a safe value which would have allowed the “go around” maneuver to be performed correctly.

It should be noted that the instructor was operating in a deficit of time, the occurrence (from the first touchdown to the stopping of the plane) lasted about 6 seconds. Probably the instructor was surprised by the situation and the delayed reaction to the student's error and instinctive actions led to the occurrence.

In this context the Commission reminds that the instructor should be constantly focused on the student pilot's actions and react quickly to his errors. In this particular case the student pilot made three circuits correctly, which could, in a sense, lull the instructor's vigilance and cause his late reaction to the situation.

3. CONCLUSIONS

3.1. Findings

- 1) The airplane was technically sound, airworthy and all maintenance was properly documented.
- 2) The instructor pilot had a valid license, ratings and aero-medical certificate.
- 3) The instructor pilot had proper qualifications and experience in performing that type of flights.
- 4) The instructor and student had their seat belts fastened.
- 5) The weather conditions may have affected the occurrence.
- 6) The mass and the centre of gravity of the aircraft were within the prescribed limits.
- 7) The instructor and student were not under the influence of alcohol.

3.2. Causes of the accident

The cause of the air incident was:

- 1) The instructor's delayed reaction to the deviation of the plane from the runway axis in the final phase of landing.
- 2) Late decision to abort landing and go-around.
- 3) Incorrect operation during the go-around procedure.

Circumstances favorable to the incident:

- 1) The weather conditions may have influenced the occurrence of the event.

4. SAFETY RECOMMENDATIONS

PKBWL did not make any safety recommendations.

END

Investigator-in-Charge

Signature on original