



THE REPUBLIC OF CROATIA

**Air, Maritime and Railway Traffic Accident Investigation Agency**  
**Air Traffic Accident Investigation Department**

---

Class: 343-08/18-02/05  
No: 699-04/1-19-25  
Zagreb, 15 November 2019

## **FINAL REPORT**

**ON ACCIDENT OF THE AIRCRAFT  
CESSNA 182, registration OE-DDU**

**Dubrovnik Airport, 25 July 2018**



## **PUBLICATION OF REPORT AND COPYRIGHT**

This report has been made and published by the Air, Maritime and Railway Traffic Accident Investigation Agency (hereinafter: AIA) pursuant to Article 6 section 1 and 2 of the Act on Establishment of the Air, Maritime and Railway Traffic Accident Investigation Agency (Official Gazette no 54/13), Article 7 Section 1 and 2 of the Statute of the Air, Maritime and Railway Traffic Accident Investigation Agency, Article 16 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, provisions of the Air Traffic Act (Official Gazette no 69/09, 84/11, 54/13, 127/13 and 92/14), and pursuant Chapter 6 of the Annex 13 ICAO.

**This report or any part thereof shall not be produced, reproduced or transmitted in any form or in any manner, without the express written consent of AIA.**

**This report may be freely used for educational purposes only.**

**For all further information contact AIA.**

**The aim of the investigation relating to safety is in no case determination of guilt or liability.**

**Investigations are independent and separate from court or administrative proceedings and should not prejudice determination of guilt or liability of individuals.**

**The final report cannot be used as evidence in court proceedings whose aim is determining civil or criminal liability of individuals.**



## CONTENT

|  |           |
|--|-----------|
| INVESTIGATION .....  | 5         |
| SUMMARY .....  | 5         |
| <b>1. FACTS AND INFORMATION .....</b>  | <b>5</b>  |
| 1.1. FLIGHT INFORMATION .....  | 5         |
| 1.2. INJURIES .....  | 6         |
| 1.3. DAMAGE TO THE AIRCRAFT .....  | 6         |
| 1.4. OTHER DAMAGE .....  | 6         |
| 1.5. PERSONAL INFORMATION .....  | 6         |
| 1.5.1. Pilot .....   | 7         |
| 1.5.2. Passenger .....   | 7         |
| 1.5.3. Passenger .....   | 7         |
| 1.6. AIRCRAFT INFORMATION .....  | 7         |
| 1.6.1. General information .....   | 7         |
| 1.6.2. Description of the aircraft .....   | 7         |
| 1.7. METEOROLOGICAL INFORMATION .....  | 8         |
| 1.8. AIRPORT INFORMATION – DUBROVNIK AIRPORT (LDDU) .....  | 11        |
| 1.9. FLIGHT DATA RECORDERS .....   | 12        |
| 1.10. INFORMATION ON THE IMPACT AND REMAINS AFTER THE ACCIDENT .....                             | 12        |
| 1.11. MEDICAL INFORMATION .....  | 13        |
| 1.12. ADDITIONAL INFORMATION .....   | 13        |
| 1.12.1. Statement of the pilot .....   | 13        |
| 1.12.2. Communication between the pilot of the aircraft and the tower of Dubrovnik Airport ..... | 14        |
| 1.12.3. Statement of the passenger .....   | 14        |
| 1.12.4. Accidents and serious incidents at Dubrovnik Airport .....                               | 14        |
| <b>2. ANALYSIS .....</b>   | <b>14</b> |
| 2.1. CIRCUMSTANCES .....   | 14        |
| 2.1. DUBROVNIK AIRPORT .....   | 15        |
| 2.1. CRASH OF THE AIRCRAFT .....   | 15        |
| <b>3. CONCLUSION .....</b>   | <b>15</b> |
| 3.1. FINDINGS .....  | 15        |
| 3.2. CAUSE .....   | 16        |
| 3.2.1. Contributing factor .....   | 16        |
| <b>4. SAFETY RECOMMENDATIONS .....</b>   | <b>17</b> |





## OCCURRENCE INFORMATION

|                             |  |
|-----------------------------|--|
| Type of the occurrence:     | Accident   |
| Date:                       | 25 July 2018   |
| Time:                       | 16:37 LT   |
| Place:                      | Immediate vicinity of Dubrovnik Airport                              |
| Type of the aircraft:       | Aeroplane  |
| Registration:               | OE-DDU   |
| Manufacturer / model:       | Cessna 182 L   |
| Operator:                   | KSV Motor-Flugsportverein und Motor-Zivilluftfahrschule              |
| Number of persons on board: | 3  |
| Injuries:                   | One person with serious injuries and two persons with minor injuries |
| Damage to the aircraft:     | Destroyed  |

## INVESTIGATION

The Air, Maritime and Railway Traffic Accident Investigation Agency (AIA) received information on the accident from the Ministry of the Interior and National Protection and Rescue Directorate. The AIA investigators performed field investigation at the accident site and the investigation was opened.

Upon completion of the investigation, the Air, Maritime and Railway Traffic Accident Investigation Agency issued this Final Report.

## SUMMARY

On 6 June 2018, during the approach at the runway 12 of Dubrovnik Airport, the pilot of the aircraft OE-DDU decided to go-around after an unsuccessful attempt to maintain the runway centerline shortly prior touchdown, which was caused by a sudden and severe crosswind situation. He started to turn right, after which the aircraft lost its altitude and crashed outside the airport fence.

There were three persons onboard – the pilot and two passengers. The aircraft was destroyed in the accident. The pilot suffered severe bodily injuries and two passengers suffered minor bodily injuries.

By the investigation it is established that the cause of this accident was loss of lift during turning of the aircraft and a possible wind gust from behind, at a low aircraft speed.

AIA issued no safety recommendation.

## 1. FACTS AND INFORMATION

### 1.1. FLIGHT INFORMATION

On 25 July 2018 the aircraft OE-DDU was flying on the route Kapfenberg Airport (LOGK, Austria) – Dubrovnik (LDDU, Hrvatska). There were three persons onboard, a pilot and two passengers.

During the final approach to runway 12 of Dubrovnik Airport, shortly before touchdown, the pilot of the OE-DDU aircraft, after an unexpected strong wind gust, failed to maintain the aircraft at the optimal approach line. He decided to abort the approach and landing and go around. The right turn has begun. The aircraft then began to lose altitude and fell about 150 m to the right of runway 12 on the outside of the airport fence.

## 1.2. INJURIES

| Injuries     | Crew | Passengers | Others |
|--------------|------|------------|--------|
| fatal        | 0    | 0          | 0      |
| Serious      | 1    | 0          | 0      |
| minor / none | 0    | 2          | 0      |

## 1.3. DAMAGE TO THE AIRCRAFT

In this accident the aircraft was destroyed.



Picture 1 – Aircraft OE-DDU at the accident site

## 1.4. OTHER DAMAGE

At the accident site there were no other significant damages.

## 1.5. PERSONAL INFORMATION

There were three persons onboard, a pilot and two passengers.



#### **1.5.1. Pilot**

Male person, citizen of the Republic of Austria, born in 1955. He holds a PPL and has been flying for 15 years. He has flown total of 732 flight hours on the aircraft type Cessna 150, Cessna 172, Cessna 182 and Dynamic WT-9. He has flown around 100 flight hours on the aircraft type Cessna 182. In the year prior to the accident, he has flown 23 flight hours.

#### **1.5.2. Passenger**

Male adult person, Austrian citizen.

#### **1.5.3. Passenger**

Female adult person, Austrian citizen.

### **1.6. AIRCRAFT INFORMATION**

#### **1.6.1. General information**

|                      |   |
|----------------------|---|
| Registration:        | OE-DDU  |
| Manufacturer:        | Cessna, USA   |
| Type:                | 182 L   |
| Serial number:       | 182-58898   |
| Year of manufacture: | 1968  |
| Owner:               | KSV Motor-Flugsportverein und Motor Zivilluftfahrerschule |
| Operator:            | KSV Motor-Flugsportverein und Motor Zivilluftfahrerschule |
| Total flight hours:  | 5053  |
| MTOW:                | 1270 kg   |

#### **1.6.2. Description of the aircraft**

Cessna 182 is a single-engine high wing aircraft of metal construction. The aircraft has four seats and non retractable landing gear with nose gear. It is equipped with a piston engine type Continental O-470-R power of 172 kW.

Cessna 182, in various forms, is a very popular aircraft type. Its production began in 1956 and continues until today.

The subject aircraft met all the prescribed requirements for use.



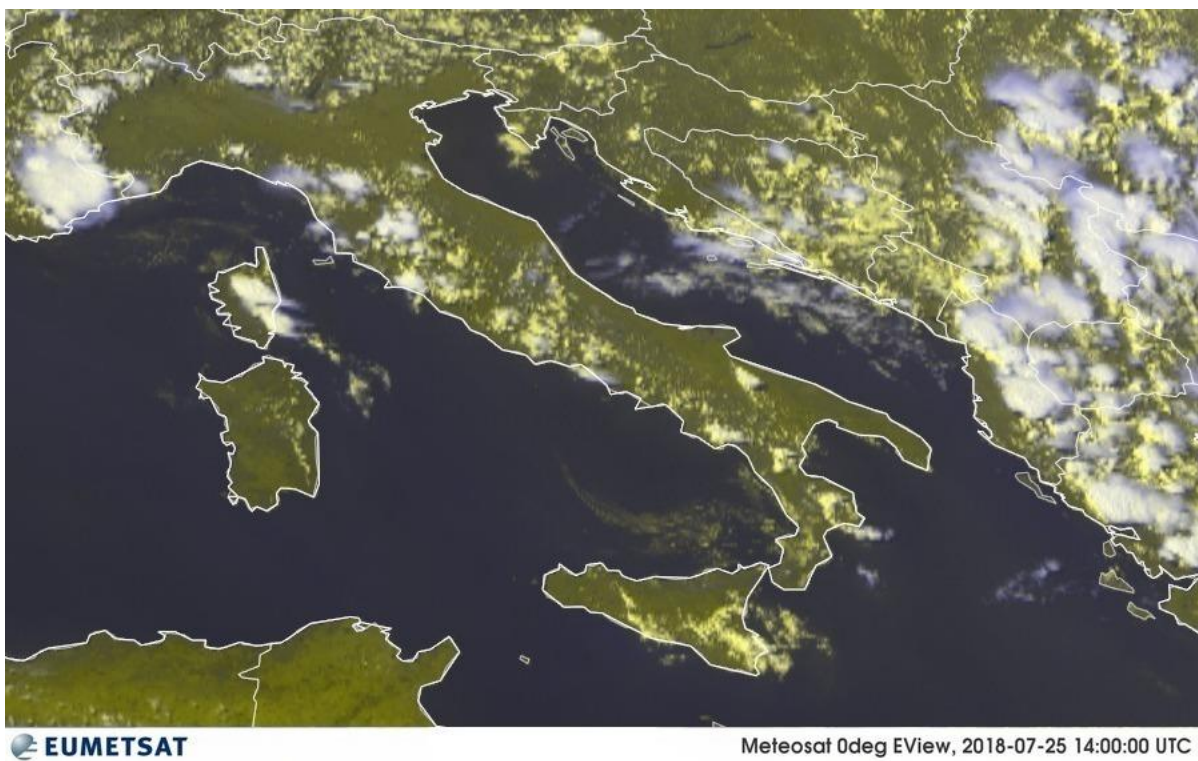
Picture 2 – Aircraft Cessna 182, registration OE-DDU

## 1.7. METEOROLOGICAL INFORMATION

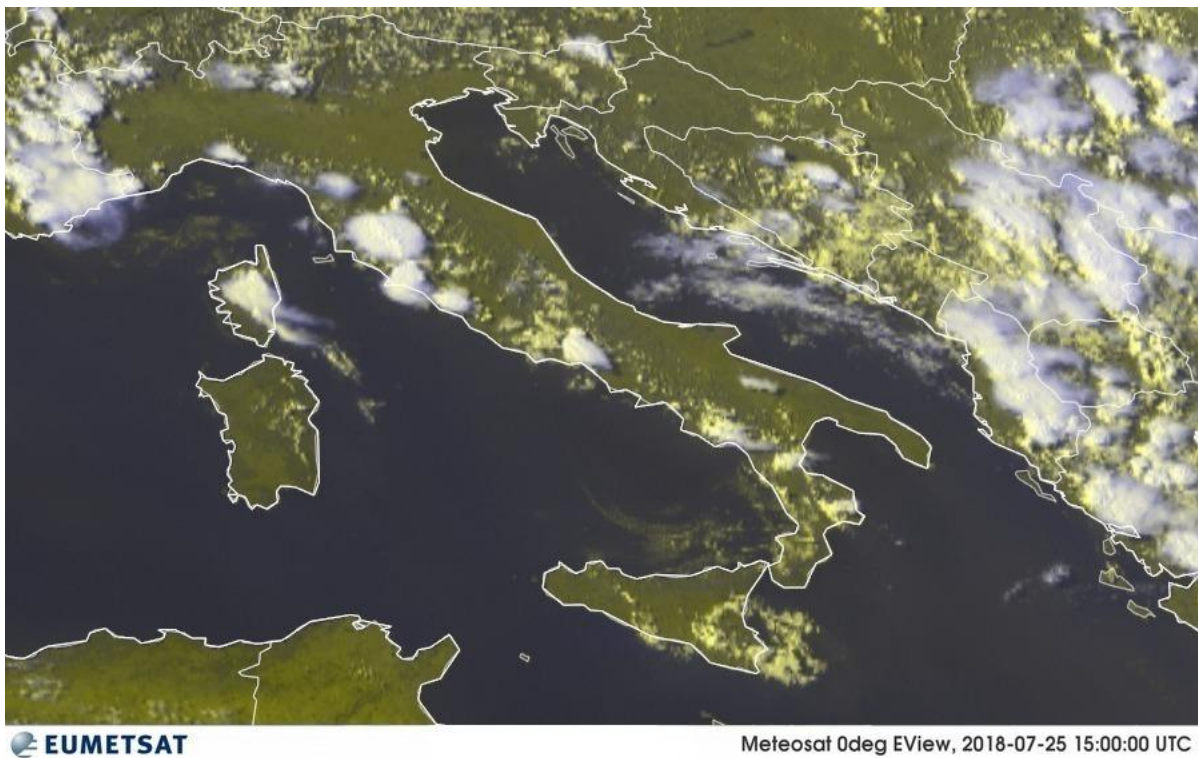
The development of the meteorological situation at Dubrovnik Airport had an impact on the subject accident. For the purposes of the investigation, METAR data was obtained from the meteorological service HKZP. Furthermore, an additional analysis of meteorological conditions at the time of the accident was obtained, within which a numerical re-analysis of the meteorological situation at the time of the accident was carried out.

### **Meteorological situation**

The area of Dubrovnik Airport was located on the edge of shallow cyclones with the centre in the Black Sea, whose small valley extended to the Adriatic, supporting an unstable weather. The unstable situation was confirmed by satellite images at 16:00 and 17:00 LT (Pictured 3 and 4) showing the intensive development of cumulus and cumulonimbus clouds.



Picture 3 – Satellite images of clouds at 16:00 LT



Picture 4 – Satellite images of clouds at 17:00 LT

### METAR data for Dubrovnik Airport:

For 14:30 UTC (16:30 LT):

201807251430 METAR LDDU 251430Z 31004KT 250V010 9999 FEW045 28/18 Q1008 NOSIG=

METAR data show that at 14:30 UTC (16:30 LT) the wind of speed of 4 knots was blowing from the direction 310° and the direction ranged from 250° to 010°. There were some clouds at 4500 ft above the airport and the visibility was good (10 km or more). No significant changes were expected in the near future.

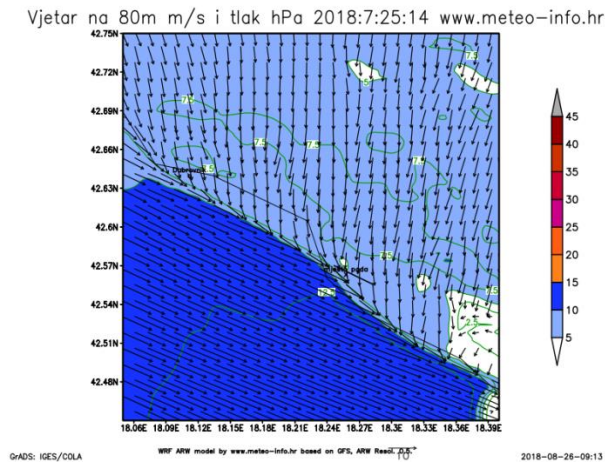
For 15:00 UTC (17:00 LT):

201807251500 METAR COR LDDU 251500Z VRB02KT 9999 -RA FEW045 24/17 Q1008 RETSRA TEMPO  
VRB15KT 4000 -TSRA FEW040CB=

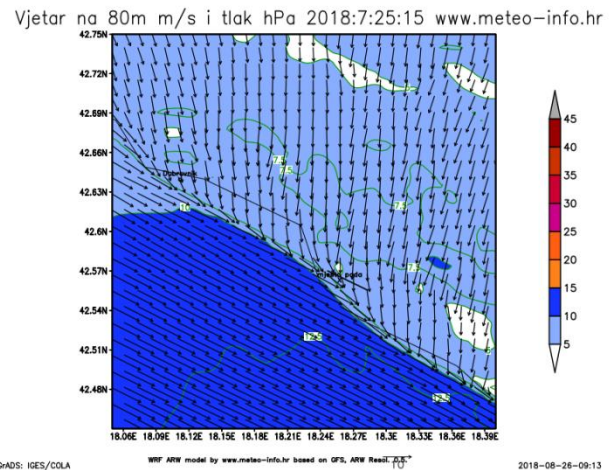
METAR data for 15:00 UTC (17:00 LT) show that wind of variable direction of speed of 2 knots was blowing. Above the airport there were some clouds at 4500 ft and the visibility was good (10 km or more). From the last observation (but not at the moment), a stormy rain was noticed. The following temporary occurrence was expected: wind of variable direction of speed of 15 knots; visibility 4 km; weak stormy rain; some clouds (Cb) above the airport at 4000 ft.

### Presentation of wind obtained by numeric model

On the following pictures calculations of the general wind at 80 m above ground at 16:00 LT and 17:00 LT are shown.



Picture 5 – Wind at 80m, 16:00 LT



Picture 6 – Wind at 80m, 17:00 LT

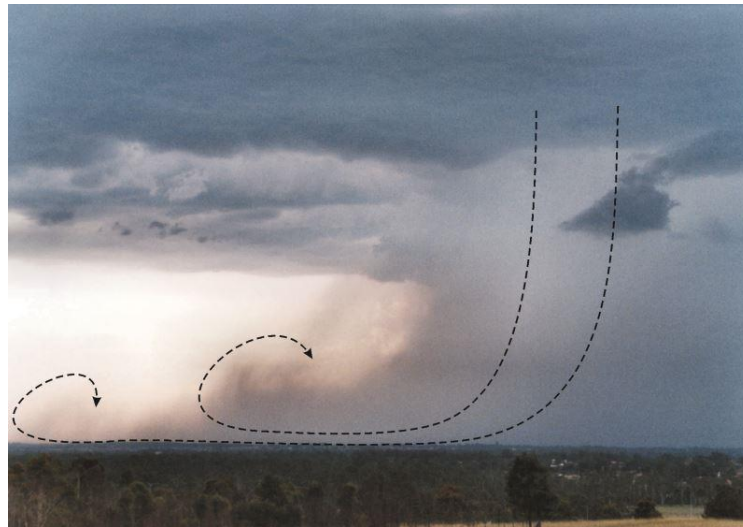
### The data from the tower of Dubrovnik Airport

At 16:34 LT the tower of Dubrovnik Airport provided to the aircraft OE-DDU which was on the approach, the following wind data: 'wind 360 degrees 7 knots'.

### Conclusion of meteorological information analysis

From the available weather information, the following can be concluded:

- As regards to clouds, there were smaller cumulonimbus clouds or highly developed cumulus congestus clouds, with the occurrence of local rain showers.
- related to the development of the aforementioned clouds, there was also a possibility of forming the so-called microbursts. These are much localized strong downstream airflows which develop beneath cumulonimbus and developed cumulus congestus clouds when they form precipitation in the form of intense local shower (Picture 7). Such a downstream airflow 'spreads' in the lower layer above the ground from the central area underneath the clouds toward out, and turbulence is expected in such situation.
- The general wind at 80 m above ground was from the west direction above the mainland and northwest direction above the sea (Pictures 5 and 6). The wind, however, was significantly influenced by local processes - development of clouds, thermal activity, occasional rain showers ...



Picture 7 – Example of microburst

#### 1.8. AIRPORT INFORMATION – DUBROVNIK AIRPORT (LDDU)

Dubrovnik Airport is located near the town Čilipi, 22 km southeast of the city of Dubrovnik, at an altitude of 161 m. It started operating in 1962. Today Dubrovnik Airport is the third busiest airport in Croatia. The annual traffic of this airport is about 2,000,000 passengers and increases each year. It can accept wide-body aircrafts such as B747 and A350.

The runway is asphalted, with length of 3300 m, width of 45 m and orientation 12/30.

At the time of the subject accident, certain construction works were carried out in the area of Dubrovnik Airport for the purpose of expanding the capacity of the airport. These works did not affect the operation of the airport nor did they affect the subject accident.



Picture 5 – Dubrovnik Airport

#### **1.9. FLIGHT DATA RECORDERS**

The aircraft was not equipped with the flight data recorder or the cockpit voice recorder.

#### **1.10. INFORMATION ON THE IMPACT AND REMAINS AFTER THE ACCIDENT**

Before the impact, the aircraft rased the treetops of the lower trees and immediately thereafter crashed to the ground and turned to the back. The position of the crash was located to the right of the runway 12, about 350 m from its axis and 900 m from the threshold in the direction of 139°.



Picture 6 – Dubrovnik Airport, the crash site of the aircraft OE-DDU is marked yellow

### 1.11. MEDICAL INFORMATION

The pilot suffered severe bodily injuries. He was not in life danger. From the accident site he was transferred to a hospital in Dubrovnik where he was provided with the necessary medical care. A few days later the pilot was transferred to Austria, where he continued the treatment.

Two passengers suffered minor bodily injuries in the form of scratches. After medical examination, they were released from hospital on the same day.

### 1.12. ADDITIONAL INFORMATION

#### 1.12.1. Statement of the pilot

Regarding the accident and the events that preceded the accident, the pilot stated the following:

He was of the opinion that the accident occurred due to wind shear. He stated that there was enough fuel in the tanks to continue the flight to another landing site. The flight from Kapfenberg in Austria to Dubrovnik passed without difficulties. In the approach to Dubrovnik Airport, he received information about a weak wind of 4 kt. During the approach to Dubrovnik Airport they passed through light rain and in the distance he saw lightnings. He stated that in the approach he hadn't noticed any signs of storm on the runway. The final approach took place in still air. At about 50 ft above the threshold 12



the aircraft was hit by a very strong gust of wind, probably from north direction. After that it was not possible to keep the aircraft on the centre line of the runway. Due to the dynamic nature of the wind, the possibility of controlling the direction as well as achieving a climbing speed were very limited, even at maximum engine power. He stated that, in order to avoid collision with buildings on the terminal, the direction of flight had to be changed to about 200°. According to the pilot's statement, it is likely that, due to the increased downstream wind, the aircraft hit a group of trees near the runway. After that, the control was lost and the aircraft crashed to an uneven surface southwest from the airport.

#### **1.12.2. Communication between the pilot of the aircraft OE-DDU and the tower of Dubrovnik Airport**

At 14:29:50 UTC (16:29:50 LT) the pilot of the aircraft OE-DDU established contact with the tower of Dubrovnik Airport and received information about the wind (320°, 2 kt) and the runway for landing.

At 14:31:27 the pilot requested and obtained permission for flying over the old town of Dubrovnik.

At 14:34:13 the pilot informed that he is in the long final and again received instruction about the runway for landing and information about the wind – 360°, 7 kt.

At 14:36:26 the pilot reported 'turn around, turn right side out', and the controller responded 'approved'.

After that the aircraft OE-DDU no longer responded to the controller's calls.

#### **1.12.3. Statement of the passenger**

For the purposes of the investigation, the passenger also described the subject accident. He stated that he felt that at the time of the go-around and turning the aircraft to the right, the speed of the aircraft was fairly low.

#### **1.12.4. Accidents and serious incidents at Dubrovnik Airport**

A serious incident of a similar character occurred in July 2009. At that time, in the conditions of strong side winds with gusts, during landing, a single-engine aircraft Maule MX7-235 (gross weight 1134 kg) exit the runway. The said aircraft was damaged, while there were no injured persons.

## **2. ANALYSIS**

### **2.1. CIRCUMSTANCES**

In the final stage of the approach, when the aircraft was already above the runway and before the touchdown, the pilot decided to go-around. According to his own statement, the reason for such decision was the gust of wind that swayed the aircraft and turned it from the optimal trajectory. The analysis of the meteorological situation points to the possibility of short-term gusts of wind which at that time could have made it difficult to operate aircrafts at Dubrovnik Airport.



## **2.1. DUBROVNIK AIRPORT**

The location and orientation of the runway on Dubrovnik Airport are determined by the terrain of the surrounding area, and the wind blowing sideways to the runway is a common occurrence there. The traffic at this airport has been operating continuously for years, mostly during the summer months. By the amount of traffic, Dubrovnik Airport is the third busiest airport in Croatia.

The only case of a character similar to the subject accident occurred nine years earlier. It was a serious incident, in which during landing in the conditions of strong side wind with gusts, the general aviation aircraft exit the runway.

## **2.1. CRASH OF THE AIRCRAFT**

There is no exact information on the speed of the subject aircraft at the time of aborting the approach just before landing, however it can be realistically assumed that the speed of the aircraft during landing was reduced. From the statement of the pilot and the passenger and according to the position of the wreckage of the subject aircraft, it can be concluded that after the decision to go-around, the pilot immediately started turning to the right, without previously accelerating the aircraft in the flight direction.

If the flight speed was reduced and was near the minimum speed, the aircraft could have crashed due to the following reasons:

- Entering in the turn without previously accelerating in a straight flight, due to the inclination of the aircraft and the wings around the longitudinal axis, the lift generated on the wings was no longer sufficient to maintain the height,
- Additional airspeed reduction, due to gust of wind from behind. In such case, the airflow around the wings may become inadequate for maintaining the required lift and the aircraft will begin to sink.

In both mentioned cases, the recovery of the aircraft from stalling is only possible at the expense of additional loss of height. If the aircraft is at low altitude above the ground, there is not enough height to recover and return to normal flight condition. In such case, the impact of the aircraft to the ground is inevitable.

## **3. CONCLUSION**

### **3.1. FINDINGS**

#### **Meteorological conditions**

- The meteorological conditions were probably a factor in the subject accident,
- At the time of landing of the subject aircraft, meteorological conditions in the airport area were unstable, with clouds of vertical development occurring and occasional short-term rain showers accompanied by wind,

#### **Approach**

- During the approach, the pilot received from the Dubrovnik Airport tower information on wind



direction and speed,

- During the approach the pilot noticed certain rain and lightning,
- There was enough fuel in the aircraft for flight to another alternative airport,
- The pilot decided to land to Dubrovnik Airport,

#### **Go-around**

- In the final approach, the pilot decided to abort the approach and landing. By then the aircraft was already above the runway, at an altitude of about 50 ft,
- The reason for the go-around was, according to the statement of the pilot, the strong gust of side wind from the left that swayed the aircraft to the right and turned it from the optimal trajectory for landing,

#### **Crash of the aircraft**

- The aircraft began to lose altitude after the right turn,
- The loss of altitude most probably occurred due to both or one of the following two reasons:
  - o Performing the turn at too low flight speed,
  - o Wind gust in the back of the aircraft, also at a low flight speed,

#### **The pilot and the aircraft**

- The pilot met all prescribed requirements,
- The aircraft met all prescribed requirements,
- The investigation did not find any technical failure of the aircraft that could have contributed to the crash of the subject aircraft.

### **3.2. CAUSE**

The cause of this accident was loss of lift at a low altitude which occurred due to one of the following two reasons or a combination of both:

- Entering in the turn with too low speed (near the minimum flight speed),
- The gust of wind hit the back of the aircraft in a situation where the speed was low (near the minimum flight speed).

#### **3.2.1. Contributing factor**

The factor which contributed to the crash of the subject aircraft was the meteorological situation - the rapid development of clouds, rain and wind, which, according to the statement of the pilot, due to the gust of wind, caused swaying of the aircraft in the final approach and further a rapid decision of the pilot on go-around and perform the turn to the right.



#### **4. SAFETY RECOMMENDATIONS**

Considering the findings in this investigation, AIA has no safety recommendation in this case.

Investigator in charge  
Danko Petrin