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

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## **FINAL REPORT**

### **ON ACCIDENT OF THE AIRCRAFT SHARK UL, registration D-MMKV**

**Hvar Channel, 14 June 2019**



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## OCCURENCE INFORMATION

Type of the occurrence:	Accident
Date:	14 June 2019
Time:	14:36 LT
Place:	Hvar Channel
Type of the aircraft:	Aeroplane
Registration:	D-MMKV
Manufacturer / model:	Shark Aero s.r.o.
Operator:	Natural person
Number of persons on board:	1
Injuries:	No injuries
Damage to the aircraft	Destroyed

## INVESTIGATION

The Air, Maritime and Railway Traffic Accident Investigation Agency received an information about the accident immediately after the event from the Ministry of the Interior and the Croatia Control. Investigators went to the accident site and the investigation of the subject accident was opened.

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

## SUMMARY

On 14 June 2019, four ultralight aircrafts of foreign registrations departed from Dubrovnik Airport (LDDU) towards the planned destination of Mali Lošinj Airport (LDLO).

In the area of the Hvar Channel, one of the four mentioned aircrafts ended up in the sea. People from the boats which were nearby at the time of the crash came to the rescue, pulled the pilot out of the sea and called for help.

After the crash, the remains of the aircraft remained floating on the surface. They were towed and anchored in the bay of Livka on the island of Šolta by a vessel of the Harbour Master's Office Split, and the next day they were towed to the town of Milna on the island of Brač and pulled out of the sea.

There was one person on the aircraft - the pilot. In this accident the aircraft was destroyed while the pilot was not injured.

The investigation established that the most likely key factor in this accident was flying below the minimum allowed height, only a few meters above the sea surface. At one point, the aircraft touched the sea surface.

AIA issued no safety recommendation.



Picture 1 – The accident site is marked with a red circle, and it is located on the route Dubrovnik - Mali Lošinj (LDDU - LDLO, marked with green circles)

## 1. FACTS AND INFORMATION

### 1.1. FLIGHT INFORMATION

On 14 June 2019, the aircraft D-MMKV was flying in a formation with three other foreign ultralight aircrafts on the route Dubrovnik Airport (LDDU) - Mali Lošinj Airport (LDLO). There was one person on each aircraft - a pilot.

There was an approved flight plan for this flight. The formation leader was maintaining communication with the flight control, and his aircraft had a transponder turned on.

According to eyewitnesses' statements, in the area of the Hvar Channel, three of the four aircrafts from the said formation flew very low above sea surface, while one aircraft flew at a higher altitude.

At one point, one of the aircrafts that were flying low, touched the sea surface, after which it stopped significantly damaged and remained floating on the water surface.

People from two nearby vessels came to the rescue. They pulled the pilot out of the sea and helped keep the aircraft from sinking.

During that time, the other three aircrafts were circling over the accident site. When pilots saw that their colleague, the affected pilot, came out of the sea and climbed to the boat, they continued their flight and landed at Mali Lošinj Airport.

## 1.2. INJURIES

Injuries	Crew	Passengers	Others
fatal	0	0	0
serious	0	0	0
minor / none	1	0	0

## 1.3. DAMAGE TO THE AIRCRAFT

In this accident the aircraft was destroyed.



Picture 2 – Wreckage of the aircraft D-MMKV after being pulled out of the sea

## 1.4. PERSONAL INFORMATION

### 1.4.1. Pilot

Male person, German citizen, born in 1957. He possesses a sport pilot license issued by the aviation authorities of the Federal Republic of Germany and has a pilot experience of 5 years with a total of 200 flight hours. He was alone on the aircraft at the time of the accident.



#### 1.4.2. Eyewitness 1

A German citizen, he was in a boat near the accident site. Immediately after the accident he helped the pilot and pulled him onto his boat. He gave a statement for the purposes of the investigation.

#### 1.4.3. Eyewitness 2

A Slovenian citizen, he was with 6 other friends on a boat near the accident site. Prior to the accident, he and his friends visually followed the flight of the group of aircrafts in question and described the course of events for the purposes of the investigation.

### 1.5. AIRCRAFT INFORMATION

#### 1.5.1. General information

Registration:	D-MMKV
Manufacturer:	Shark Aero s.r.o., Slovakia
Type:	Shark UL
Serial number:	2012-005
Owner:	natural person
Operator:	natural person
Total flight time:	370
Total number of cycles:	690
Manufacturer and type of engine:	Rotax 912ULS
Manufacturer and type of propeller:	Neuform TXR2-V-70
Number of seats:	2
MTOW:	472,5 kg

#### 1.5.2. Aircraft description

Aircraft Shark UL is a single-engine low-wing aircraft with tandem seat configuration, of composite construction made of carbonfibre and glass-fibre and of sandwich construction, with retractable landing gear.

The Shark UL model is powered by a four-cylinder boxer engine cooled by air and coolant via an external cooler. During the take-off the engine develops power of 73.5 kW at 5800 RPM at which it can run for a maximum of 5 minutes. The aircraft is equipped with a two-blade constant speed composite propeller type Neuform TXR2-V-70. This plane is equipped with aircraft rescue parachute.

At the time of the accident the subject aircraft, registration D-MMKV, met all the prescribed requirements for use.

On 8 June 2018, the subject aircraft was involved in a serious incident which occurred in Germany, when during landing, the pilot forgot to extend the landing gear and the aircraft landed on the fuselage. The damage which occurred on that occasion was repaired and the aircraft met all the necessary requirements for reuse.

During this investigation, no connection between the subject accident and the consequences of the described serious incident was established.



Picture 3 – Aircraft type Shark

#### **1.6. METEOROLOGICAL INFORMATION**

Meteorological conditions had no impact on this accident.

#### **1.7. FLIGHT DATA RECORDERS**

The aircraft was equipped with the device 'Flymap XL', which, among other functions, registers and records flight data and the aircraft operation data and stores them in the internal memory. However, since the last flight resulted with the accident and the destruction of the aircraft, there was an unexpected power outage, due to which the flight data of the last flight were not stored.

Today's software version of the device 'Flymap XL' solved the mentioned problem of data storage in the event of a sudden power outage, however at the time of the accident this was not the case.

All flights before the last one remained recorded on the internal memory and were downloaded from it. A review of data from previous flights did not reveal any irregularities that would indicate possible problems in the operation of the engine.





Pictures 5 and 6 – Damage to the propeller and fuselage

## 1.9. MEDICAL INFORMATION

The pilot sustained minor injuries in form of minor scratches on his forehead, arms and legs. He was provided medical assistance by the Hvar Emergency Medicine Service team, after which it was established that no hospital treatment was required.

## 1.10. ADDITIONAL INFORMATION

### 1.10.1. Statement of the pilot

The pilot stated the following about the accident and the events that preceded the accident:

Every summer season since 2015, the pilot with his three friends has been performing tourist flights on various routes across Europe. In this regard, on 7 June 2019, he and his three mentioned friends, flew from Chemnitz Airport in Germany on a multi-day route. He was alone in the aircraft, as were his friends, each in his own aircraft. The planned multi-day route was carried out via Austria to Italy, then via Corsica back to Italy and then to Croatia to Dubrovnik.

On 14 June 2019 they took off from Dubrovnik Airport towards Mali Lošinj Airport. After about an hour and a half of flying, around 14:45, while they were above the sea area on the west side between the islands of Brač and Hvar, he felt his engine losing power and 'sputter'. He did not know the reason of this loss of engine power. The aircraft began to lose height, until it touched the sea surface.

He stated that he tried to land lightly, which he failed to do because he hit a large sea wave. He noticed that the sea was entering the cabin and that aircraft was about to sink, so he unstrapped his seat belt and got off the aircraft. Then he noticed a 'white yacht' coming towards him. He stated that he was in a state of distress and shock and that he did not remember further events, until his arrival in the port of Hvar.

### 1.10.2. Statement of the eyewitness 1

This eyewitness was with his wife on his yacht, sailing from Milna on the island of Brač towards the island Hvar and at the time of the accident he was close to the crash site.

He stated that he saw four sport aircrafts flying from the south to the north and that one aircraft began to slow behind and gradually crashed to the sea surface. He also stated that on that occasion he heard that something was wrong with the operation of the engine, i.e. that it was 'sputtering'.



He immediately steered the yacht toward the crash site of the aircraft from which the pilot was just getting out. He helped the pilot, who was visibly in a state of distress and shock, to get out of the sea onto the yacht. He then pulled a black backpack from the wreckage of the aircraft, which began to sink, to at least save some of the pilot's belongings.

After that, he took the pilot to the port of Hvar by this yacht. During this, the pilot gradually came to his senses and began to answer questions and recount the event.

### **1.10.3. Statement of the eyewitness 2**

At the time of the accident, this eyewitness with his six other friends was on a sailboat about 300 m away from the crash site. He stated that they watched the flight of the group of aircrafts from the sailboat.

He stated that three aircrafts, one after the other, were flying very low, at about 10 m above sea surface, while the fourth aircraft was flying at a higher altitude. Suddenly, the third (the last) aircraft touched the water surface and crashed.

They then sailed to the accident site. He and another sailboat crew member jumped into the sea and swam to the wreckage to help the pilot who got off the aircraft. The pilot was then taken by the previously described German yacht (point 1.10.3).

### **1.10.4. Statements of other pilots of the group**

Colleagues pilots stated that they flew with the affected pilot in a group of four aircrafts and that the flight took place at an altitude of about 1000 ft. Communication with the control was maintained by the leader of the group, whose aircraft was the only one with the transponder on. The pilots from the group communicated with each other via radio.

The pilots further stated that the affected pilot did not inform them of any technical difficulties and that they did not see the crash itself because they were in front of him. They also stated that, as far as they know, the subject aircraft was in good condition and met all the prescribed requirements for use.

### **1.10.5. Inspection of the remains of the aircraft**

For the purposes of this investigation, the remains of the aircraft were inspected by an authorized aircraft maintenance organization, with a particular emphasis on the propulsion system. The inspection did not establish any irregularities of the propulsion system that could have caused the engine to malfunction, nor did the aircraft run out of fuel.

### **1.10.6. Minimum flight height**

Minimum flight height is prescribed by the Ordinance of the Aircraft Flying (National Gazette 32/2018), as well as by the European regulation SERA.5001(f) (Standardised European Rules of the Air).

The said regulations prescribe that the minimum flight height above the ground or water in uninhabited areas, except when necessary for take-off or landing, or except by permission from the competent authority, is 150 m.



#### **1.10.7. Alcotest**

The pilot was alcohol tested for alcohol by police officers, and it was established that alcohol was not present in his body.

#### **1.10.8. Pilot comments on the draft Final Report**

In his comments, the pilot emphasizes that he did not fly low, but that the flight altitude was around 800 ft and that they all flew in formation, maintaining the necessary distance from each other. He further states that when the engine started to lose power, he tried to re-enable the engine to save the aircraft and during that time did not pay attention to the surroundings.

## **2. ANALYSIS**

### **2.1. THE FLIGHT OF THE AIRCRAFT IMMEDIATELY BEFORE THE ACCIDENT**

According to the statement of the eyewitness 2, three aircrafts, including the subject aircraft, were flying very low above sea surface, while the fourth aircraft was flying at a higher altitude. The subject aircraft at one point touched the water surface.

According to the statement of the pilot of the subject aircraft, problems with the operation of the engine occurred, i.e. the engine began to lose power. If this was correct, it would be expected that the pilot would configure the aircraft for emergency landing, unless if there was not enough time to perform this procedure, regarding if there was not enough height. As it was stated under point 1.8, at the moment of touchdown to the water surface, the flaps were retracted, which means that the aircraft was not configured for landing or for flight with reduced speed, but for flight with cruising speed.

The said findings lead to the conclusion that immediately before the accident the flight took place at a significantly lower height than the minimum flight height prescribed by the relevant regulations stated under point 1.10.6. Also, the aircraft rescue parachute was not activated.

These findings suggest that the flight immediately before the accident most likely took place at a low altitude above sea level.

### **2.2. AIRCRAFT'S TOUCHDOWN TO THE WATER SURFACE**

Considering the damage of the aircraft, it can be concluded that the aircraft touched the water surface at a low angle and at high speed, while the engine was running.

### **2.3. PILOT REACTION**

If the flight took place at an altitude of about 800 ft, as the pilot states in his comments, the time it would take for the aircraft to descend to sea level in planning, without propulsion, would be about 1 minute, and no less than 40 seconds.



The pilot did not perform the emergency landing procedure, nor did he activate the aircraft rescue parachute. He also did not inform the other pilots from the formation by radio about the situation in which, according to him, he found himself.

The above time needed to descent the aircraft by 800 ft should be sufficient to perform the emergency landing procedures or at least to perform any of the above actions.

Also, it is a known rule that in case of difficulties with the operation of the aircraft, the pilot should first allow the optimal flight of the aircraft in the situation, and then try to solve problems with the propulsion system, keeping in mind the flight status of the aircraft. The situational awareness of the pilot is of the utmost importance, which means that the pilot should be aware of the environment and the state of flight and the position of the aircraft in relation to the environment.

### **2.3. CONCLUSION OF THE ANALYSIS**

The findings obtained through this investigation point to the conclusion that the aircraft 'landed' on the sea surface in the configuration for cruising and was moving at cruise speed or at least approximately the cruise speed. The touchdown of the aircraft to the water surface could have occurred for the following reasons:

- During the flight at a very low height, the pilot at some point lost perception of the vertical distance from the water surface,
- During the flight at a very low height, the aircraft lost some height for some reason (e.g. turbulence caused by the aircraft in front), which, at a low-level flight was enough to descend to the water surface,
- During the flight at a very low height, indeed, according to the pilot's statement, there were some difficulties in the operation of the engine, wherein due to the low height, the pilot did not have time to take the necessary actions.
- During the flight at an altitude of about 800 ft (pilot's statement), there were difficulties in the operation of the engine, during which the pilot concentrated on fixing problems with the propulsion, without paying attention to the position of the aircraft in the vicinity.

## **3. CONCLUSION**

### **3.1. FINDINGS**

#### **Meteorological conditions**

- Meteorological conditions had no impact on this accident,

#### **Flight preparation**

- The flight took place in a formation of four ultralight aircrafts,
- The flight took place on the route Dubrovnik Airport - Mali Lošinj Airport,
- The flight was duly announced and approved,



### **The flight of the aircraft immediately before the accident**

- Immediately before the accident, the flight of the aircraft was most likely taking place at a very low altitude above the water surface,
- At one point, the aircraft touched the water surface for the reasons described under point 2.3.,
- At the time of touchdown to the water surface, the aircraft was configured for cruising,
- At the time of touchdown to the water surface, the speed of the aircraft was equal to or approximately equal to the cruising speed, i.e. it was not reduced to the landing speed,

### **Condition of the pilot and the aircraft after the accident**

- The pilot sustained minor injuries, no hospitalization was required,
- The aircraft was destroyed, while the engine remained in fairly good condition,

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

- The pilot met all the requirements prescribed by law,
- The aircraft met all the requirements prescribed by law,
- The investigation did not establish any technical malfunctions of the aircraft that could have contributed to the crash of the aircraft in question,
- There was sufficient fuel on the aircraft,
- If the flight altitude before the accident was in accordance with the pilot's claim, the pilot lost situational awareness and did not perform the necessary procedures for an emergency landing on the water,

### **Regulations**

- Regulations in force prescribe the minimum flight height, which, above uninhabited areas and water surface, is 150 m (500 ft) above the ground.

## **3.2. CAUSE AND CONTRIBUTING FACTOR**

The touchdown of the aircraft to the water surface occurred for one or more reasons described under point 2.3. The flight altitude above the water surface was most likely, despite the pilots' claims, low. If the flight height was in accordance with the prescribed flight height for flying above uninhabited areas, a possible minor height loss during the flight would not end with the touchdown to the water surface, and in case of problems with the propulsion the pilot would have had enough time to conduct the procedure for emergency landing, which would mitigate the consequences.

Therefore, we consider that the most likely key contributing factor to this accident is:

- Flying at low altitude.



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

Considering the findings of this investigation, as well as the fact that by adhering to the prescribed and established aircraft flying rules and procedures, this accident would very likely be avoided or at least its consequences would have been mitigated, AIA has no safety recommendation.

Investigator in charge

Danko Petrin