



**Accident** to Robinson R44 Raven II helicopter  
registered **F-GPGV**  
on 28 August 2017  
at Rouen Vallée de Seine (Seine-Maritime)

<sup>(1)</sup>Unless otherwise stated, all times given in this report are in local time.

<b>Time</b>	15:39 <sup>(1)</sup>
<b>Operator</b>	Private
<b>Type of flight</b>	General aviation
<b>Persons on board</b>	Pilot and passenger
<b>Consequences and damage</b>	Helicopter destroyed

*This is a courtesy translation by the BEA of the Safety Investigation Report. As accurate as the translation may be, the original text in French is the work of reference.*

<sup>(2)</sup>Tail Rotor.

**Birdstrike with TR<sup>(2)</sup> during forward flight  
to parking area, loss of yaw control,  
collision with ground**

**1 - HISTORY OF THE FLIGHT**

The pilot, accompanied by a passenger, took off from Rouen Vallée de Seine airport around 14:30 for a local flight. On returning to the airport, during forward flight on heading 060° to the usual parking area, the helicopter started yawing to the right, made more than two complete turns, then collided with the ground and rolled onto its right side close to the control tower. The passenger<sup>(3)</sup> shut down the engine.

<sup>(3)</sup>The passenger holds a private pilot's licence (aeroplane) and an aircraft mechanic's licence.

**2 - ADDITIONAL INFORMATION**

**2.1 Meteorological information**

The weather conditions at the airport at the time of the event were:

- Rouen airport METAR on 28 August 2017 at 15:30  
METAR LFOP 281330Z AUTO 11005KT 020V150 CAVOK 30/16 Q1017 NOSIG=
- the last wind information given to the pilot by the controller was 140°/5kt.

**2.2 Pilot's experience**

The pilot, co-owner of the helicopter and holder of a private pilot's licence (helicopter), had logged 398 flight hours of which eight in the previous three months, all on type, and performed on average 50 flight hours per year.

## 2.3 Recording

A surveillance camera installed on the roof of an airport hangar filmed the accident sequence:

- forward flight by helicopter towards the parking area;
- yaw movement to right side;
- collision with ground.

The resolution of this type of equipment is such that it was not possible to identify the reason why the helicopter started yawing.

In this video, the behaviour of the helicopter seemed to show that the cyclic and collective pitch controls of the main rotor remained effective and that the engine was producing power up to the impact with the ground.

## 2.4 Examination of wreckage

The main rotor flight controls were continuous, the TR flight controls had ruptured suddenly following the event. One of the two TR blades had ruptured. Impact marks were visible on its leading edge. The largest mark was located at an 8th of the length from the blade root.

## 2.5 Additional information

The UV light examinations and the spectrometric analyses carried out on the TR broken blade revealed the presence of organic material, the spectrum of which is characteristic of that usually encountered when there is a birdstrike. These organic material marks are associated with runs. The latter are orientated from the leading edge to the trailing edge and to the blade tips which suggests that the deposits occurred while the blades were rotating.

In addition, the size of the impact seems to confirm that the organic material comes from a bird, the type and size of which it was not possible to identify.

Bird scaring had been carried out by the airport fire service in the morning, around 11:00, following a request made by a pilot who had reported the presence of crows and pigeons.

Besides the F-GPGV accident, since 1995, eight accidents and one serious incident to helicopters following a birdstrike have been recorded in the BEA database<sup>(4)</sup>. All these collisions seem to have occurred on a frontal surface of the helicopter, such as the windshield or the main rotor shaft, during a flight phase where the speed was still high. Two of these accidents were fatal and three others led to serious injuries.

<sup>(4)</sup>The BEA may be involved as State of Occurrence, State of Manufacturer, State of the Operator or State of Registry.

<sup>(5)</sup>See reference **BFU 3X078-14** mentioned on p16 of this bulletin: <https://www.bfu-web.de/DE/Publikationen/Bulletins/2014/Bulletin2014-07.pdf?blob=publicationFile>

<sup>(6)</sup>[https://www.nts.gov/layouts/nts.aviation/brief.aspx?ev\\_id=20001211X12016](https://www.nts.gov/layouts/nts.aviation/brief.aspx?ev_id=20001211X12016)

<sup>(7)</sup>The equivalent regulation in the United States is the FAR27 (*Federal Aviation Regulations*).

<sup>(8)</sup>The maximum take-off weight of a Robinson R44 Raven II is 1,133 kg.

<sup>(9)</sup>For purposes of comparison, CS 29 which governs helicopters with a weight of more than 9,072 kg, includes paragraph CS 29.631 which stipulates that "The rotorcraft must be designed to assure capability of continued safe flight and landing (for category A) or safe landing (for Category B) after impact with a 1 kg bird, when the velocity of the rotorcraft (relative to the bird along the flight path of the rotorcraft) is equal to VNE or VH (whichever is the lesser). Furthermore, Airbus Helicopters carried out positive tests with a 2.2 kg bird, without loss of material, on the blades of heavy helicopters in this category.

Birdstrikes to the TR seem to be rarer:

- ❑ In the European database, four incidents and one accident of this type have been recorded. The latter was reported by the German aircraft accident investigation authority (BFU)<sup>(5)</sup>. It involved a R44 in the approach phase. The helicopter was substantially damaged during the emergency landing following the collision; there were no injuries.
- ❑ The American aircraft accident investigation authority (NTSB) published<sup>(6)</sup> on its website the summary of an accident to a Bell 47 during a fish spotting mission. The TR was struck by a sea bird thought to be of a large size. The passenger was fatally injured after having jumped from the helicopter despite the pilot's instructions. The pilot was able to land on the water and exit the helicopter unharmed.

The Certification Specifications (CS) are generally based on an assessment of the risk level, in terms of probability, seriousness and taking into account the technical feasibility. CS 27<sup>(7)</sup> applies to helicopters which weigh less than 9,072 kg<sup>(8)</sup>. In this document, no paragraph covers birdstrike<sup>(9)</sup> or corresponding standards.

### 3 - LESSONS LEARNED AND CONCLUSION

The helicopter probably started yawing due to damage to the TR caused by a bird striking one of the blades while in low-speed forward flight to the parking area.

The birdstrike deformed the TR blade which generated a loss of rotor aerodynamic efficiency, causing the pilot to lose yaw control of the helicopter.

The low height and low speed of the helicopter and the suddenness of the event left little choice to the pilot for carrying out the emergency landing.