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INVESTIGATION REPORT

Accident to the Airbus AS350-B3e registered F-HLXO

on 30 October 2020
at Thiézac (Cantal)

Time	Around 15:07[1]
Operator	Héliberté HJS
Type of flight	External load sling operation
Persons on board	Pilot
Consequences and damage	Helicopter substantially damaged

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in April 2021. As accurate as the translation may be, the original text in French is the work of reference.

[1] Except where otherwise indicated, the times in this report are in local time.

Interference of the sling with the tail boom and the tail rotor, emergency landing

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements, the accident report drawn up by the operator and recordings from the Helisafe and Vision 1000 computers.

Within the context of an external load sling operation, the pilot and two ground agents prepared the sling comprising a 10 metre-long metal cable and a two metre-long textile extender equipped with a hook. The mission involved transporting two 400 kg tanks and 10 "*big bags*" approximately 1,000 kg in weight to the set-down zone.

After this preparation phase and the briefing, the pilot took off and waited for the tank to be hooked on. This was his first slung load of the mission. A ground agent coupled the hook of the metal sling to the textile sling that was already hooked to the tank. The pilot lifted the load and headed towards the set-down zone, 1,700 m away and approximately 230 m higher up. Upon arrival at the set-down zone, the second ground agent was unable to open the hook[2] of the textile sling and to release the load. After several minutes and with no clear area nearby enabling the helicopter to land, the ground agent, in consultation with the pilot, decided to unhook the textile sling from the metal sling. Informed of the situation, the pilot left the set-down zone and headed towards the loading zone whilst keeping an eye on the sling using the exterior mirror. He started to descend and gained speed. The metal sling became wrapped around the helicopter tail boom and the tail rotor. The pilot, who was near the take-off zone, heard a grating sound and realised that his input on the pedals was no longer effective. He managed to land near the take-off zone.

[2] A safety device prevents the hook from opening if the straps remain taut.

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BEA2020-0484.en/**July 2021**

2 - ADDITIONAL INFORMATION

2.1 Read-out of computers

The helicopter is equipped with a Helisafe computer, which records flight and engine parameters, as well as a Vision 1000 computer, which records flight parameters, cockpit images and background noise in the cockpit. It was possible to synchronise the two systems. The read-out of the background noise in the cockpit enabled the time at which the sling interfered with the helicopter tail boom to be precisely determined.

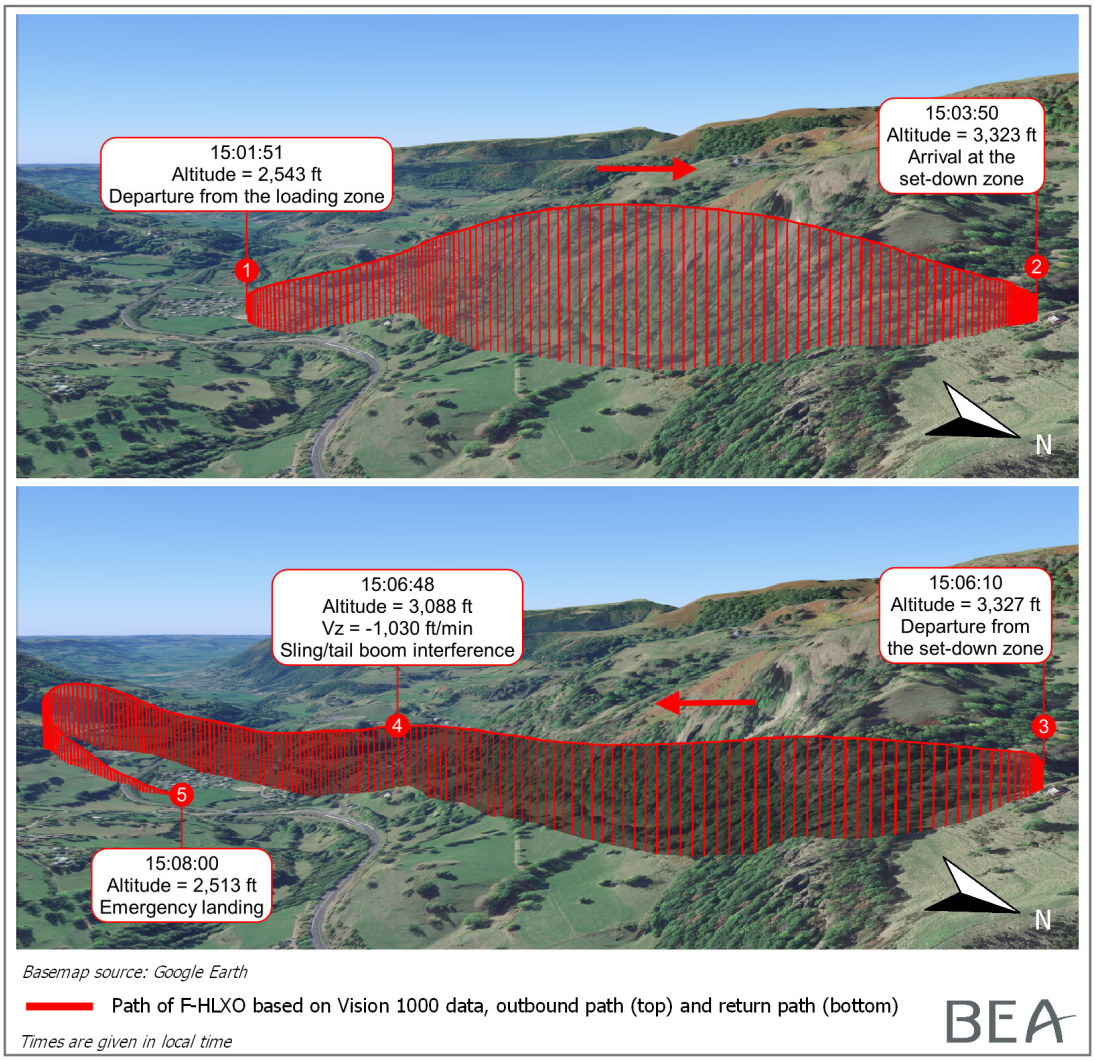
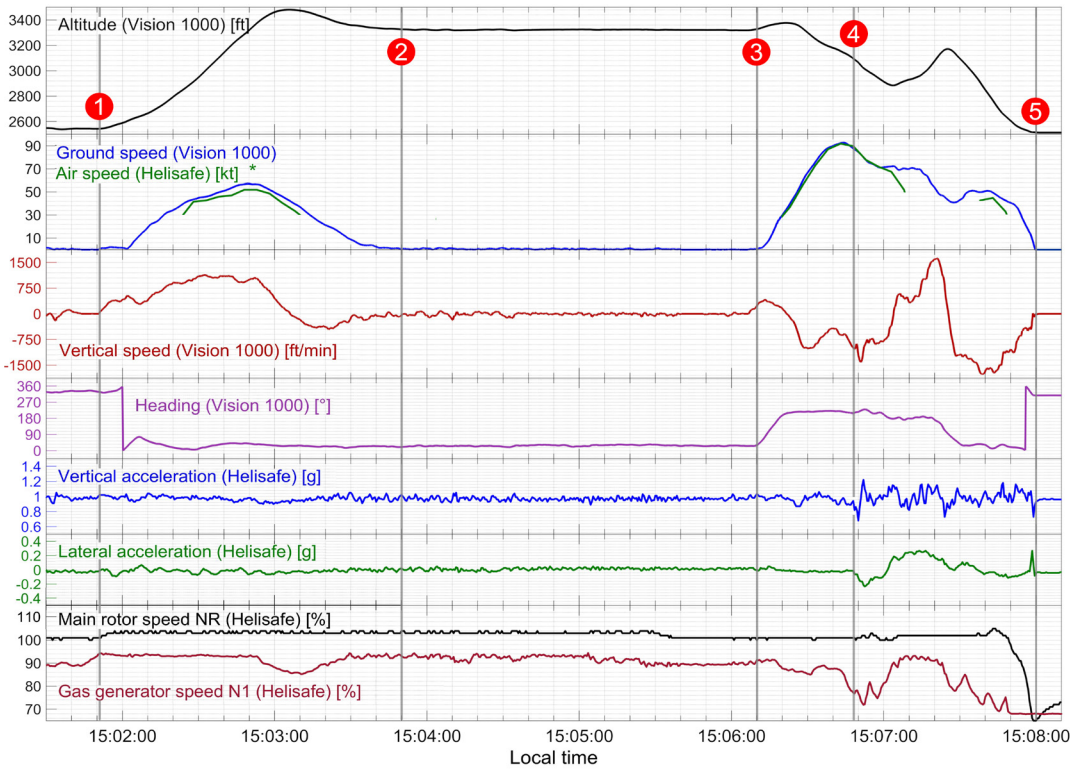


Figure 1: Path followed by the helicopter



** At low speed, the estimated air speed based on the Pitot tube no longer reflects the actual speed. Values below 30 kt are therefore not shown.*

Figure 2: Extract of saved parameters

The parameters extracted from the Helisafe and Vision 1000 computers showed that at the time of the sling interference (point ❹), the helicopter was flying at an indicated airspeed of 87 kt for a vertical speed of -1,030 ft/min.

2.2 Damage to the helicopter

The accident was not reported to the BEA straight away and the helicopter was removed by the operator from the accident area. As a consequence, no examination was carried out.

The extent of damage to the helicopter was established based on photographs sent to the BEA by the operator.

The sling became wrapped around the tail boom and the tail rotor. The tail rotor blades, the tail gearbox (TGB), the horizontal stabilizer and the tail fin were damaged. The TGB was partially torn, the drive shaft was fractured, the tail boom was distorted.

All of these observations confirmed that the tail rotor blades were prevented from turning by the metal sling wrapping around them during the flight and the failure of the tail rotor drive.

2.3 Personnel experience

2.3.1 Pilot

The pilot held a Commercial Pilot Licence - Helicopters (CPL(H)), had logged 1,340 flight hours and 1,675 external load sling operations, 15 hours and 225 external load sling operations of which in the last 30 days.

2.3.2 Ground personnel

The two ground agents were approved to perform external load sling operations.

2.4 Statements

The operator stated that the mission involved transporting two 400 kg empty plastic tanks and 10 "*big bags*" (six weighing approximately 800 kg and four weighing approximately 1,000 kg). The operator had indicated to the customer that, taking into account the conditions on the day, the maximum load should not exceed 1,000 kg.

The ground agent in the loading zone stated that the textile sling was already hooked onto the tank strap and that he had only needed to couple the metal sling and the textile strap. He did not observe any anomaly when hooking the tank straps to the textile sling hook.

The second ground agent stated that he had discussed the necessity of leaving the 15 kg ballast on the sling cable with the pilot. He specified that the joint decision with the pilot to remove the ballast had been made taking into consideration the weights of the "*big bags*" that seemed to be slightly too heavy and having estimated that the textile sling hook would be of a weight equivalent to that of the ballast. He stated that he had then gone to the set-down zone to receive the loads. When the tank was set down in the zone, he stated that he had not been able to open the hook due to the straps being too short and therefore remaining taut. The only solution had been to uncouple the textile sling from the metal sling.

The pilot stated that during the flight to the loading zone, he had flown slowly whilst monitoring the behaviour of the unballasted sling using the external mirror. He was unable to explain why the sling had interfered with the helicopter tail boom.

2.5 External load sling operations

During external load sling operations, the choice of sling components, the preparation of the load and the implementation procedures are the subject of a specific guide[3] issued by the INRS[4] to guarantee the safety of load lifting operations.

[3] Slinger's bulletin ED 6178.

[4] French National Research and Safety Institute for the prevention of occupational accidents and diseases

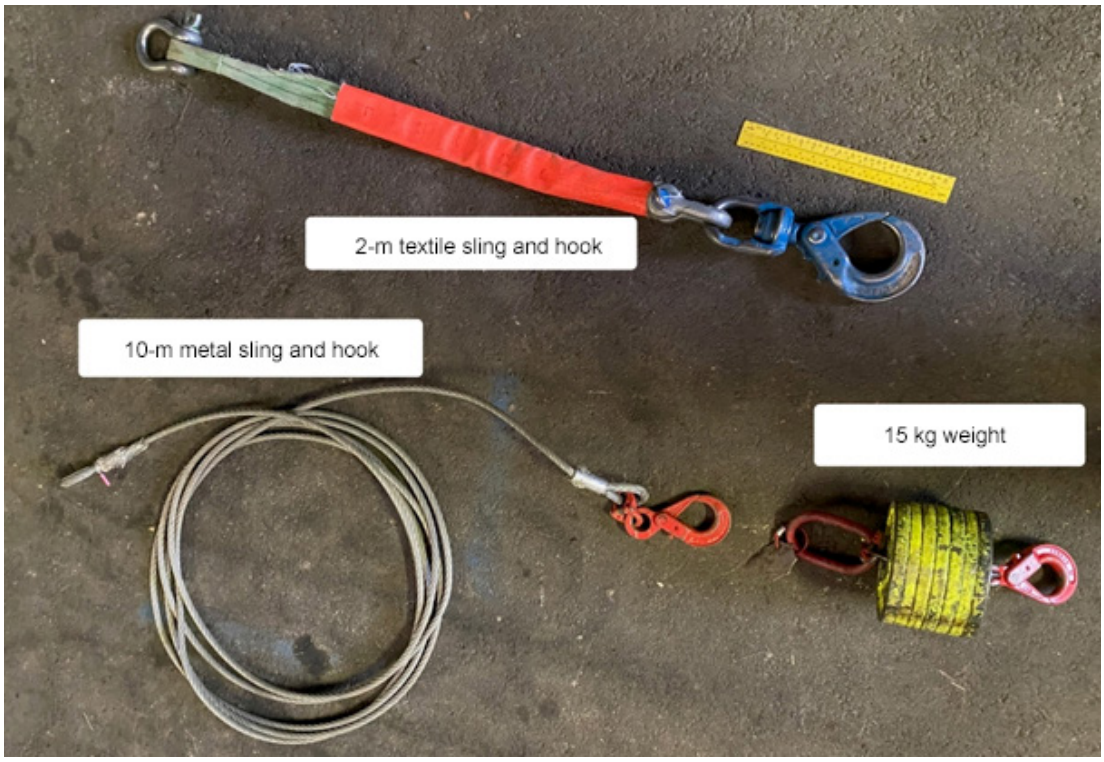


Figure 3: Sling components

One of the principles when sizing the load suspension straps is for the top angle of the straps to be at around 45° to the vertical axis at the sling hooking point for lifting.

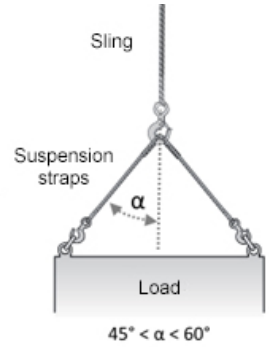


Figure 4: Suspension of a load

In 2017, Airbus issued a Safety Information Notice[5] concerning the risks associated with sling transportation. This notice specifies in particular the increased risk associated with unloaded slings that can rise up and interfere with the helicopter tail boom, and recommends the use of a ballast of at least 15 kg to reduce the risk. It specifies that in the case of a flight with an unballasted sling, it is important to keep to a speed below Vy[6] and that the pilot must monitor the behaviour of the sling during the flight.

[5] No. 3170-S-00 Rev 1 of 3 October 2017.

[6] For the AS350, the Vy is 65 kt (best rate of climb airspeed, but also safety speed during a tail rotor failure or an autorotation)

2.6 Measures put in place by the company following the accident

Following the accident, the company conducted a safety study that brought to light several shortcomings:

- The decision to remove the 15 kg ballast against the indications of the company's operating manual procedures.
- The incorrect supposition that the weight of the hook of the textile sling was equivalent to the weight of the ballast (the actual weight is 10 kg).
- Insufficient checking of the conformity of the load to be transported (straps too short, angle of straps non-conforming to the lifting rules) when longer straps were available.

The company put in place preventive and/or corrective measures:

- Systematic use of the 15 kg ballast regardless of the flight circumstances and phase.
- During external load sling operation training, focus on the conformity of the strap angles when preparing loads to be lifted.
- For personnel who already hold the rating, reminder of the procedures in force.

3 - CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.

Scenario

During an external load sling operation, at the time of set-down of the load, the use of suspension straps of an unsuitable length led a ground agent to uncouple the textile sling from the metal sling (attached to the helicopter). The helicopter pilot was informed of this operation and was warned that, due to this uncoupling, the metal sling was no longer ballasted. During the return flight to the loading zone, the helicopter's speed increased beyond the speed recommended by the manufacturer (Vy). Due to excessive speed during descent, the metal sling became wound around the tail boom and in the tail rotor of the helicopter preventing rotation of the blades. The pilot managed to land in the take-off zone.

Contributing factors

The following factors may have contributed to the interference of the sling with the tail boom and the tail rotor:

- Excessive speed during the descent on the return flight, even though the sling was not ballasted.
- The pilot's decision not to use ballast on the end of the sling thinking that the textile sling and its hook could be used for this purpose.
- The insufficient checking of the load during the preparation that resulted in part of the sling having to be uncoupled during the set-down.