

AI2015-5

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**Shin Nihon Helicopter Co., Ltd.
J A 6 7 4 1**

June 25, 2015

 **JTTSB** *Japan Transport Safety Board*

The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board (and with Annex 13 to the Convention on International Civil Aviation) is to prevent future accidents and incidents. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto
Chairman,
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

DROPPING OF OBJECT

DURING EXTERNAL CARGO SLING OPERATION

SHIN NIHON HELICOPTER CO., LTD.

AÉROSPATIALE AS332L1 (ROTORCRAFT), JA6741

IN KOMORO CITY, NAGANO PREFECTURE, JAPAN

AT 11:38 JST, OCTOBER 9, 2014

June 5, 2015

Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Keiji Tanaka

1. PROCESS AND PROGRESS OF THE INVESTIGATION

The Japan Transport Safety Board designated an investigator-in-charge and one other investigator on October 10, 2014 to investigate this serious incident. An accredited representative of France, as the State of Design and Manufacture of the rotorcraft involved in this serious incident, participated in the investigation. Comments were invited from parties relevant to the cause of the serious incident and relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight	<p>The history of the flight is summarized below, based on statements by the Captain, a person on board who is the mechanic of the company, and ground workers, as well as video footage recorded by the surveillance camera which was mounted at the bottom of the rotorcraft.</p> <p>At 11:38 JST (Japan Standard Time: UTC+9hrs) on Thursday, October 9, 2014, while an Aérospatiale AS332L1 registered JA6741 (hereinafter referred to as “the Rotorcraft”) operated by Shin Nihon Helicopter Co., Ltd. was performing sling transport operation of the toilet hut from the temporary helipad (hereinafter referred to as “the Helipad”) in Takamine Kogen to the site of Mount Asama Kazankan Lodge, the left door of the double swing doors got separately broken and dropped on the ground.</p>
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In the Rotorcraft, the Captain took the right seat, while the mechanic took the rear seat in order to observe the ongoing operation visually as well as through the surveillance camera. The Rotorcraft had repeatedly transported some loads from the Helipad, which needed to install the toilet at the site.

The flight route was as follows: the Rotorcraft needed to gain altitude soon after departing the Helipad to fly over a mountain ridge, then it flew descending along the mountain surface and flew around the southern ridge of Mount Kurofu in a wide circling manner and flew over the site. During the flight, stable condition was maintained in the air and the Rotorcraft did not shake during flight. The Rotorcraft flew at the speed of about 60 kt, where loads could be stayed in stabilized condition during sling transport operation. On the fourth unloaded operation at the site, some assistant ground workers found that one of the hut's doors was disappeared. Meanwhile, the Captain and the mechanic had not noticed of drop of the door during the flight.

The company confirmed by checking video footage of the surveillance camera after completing the operation that a piece of door dropped around the mid-way between the Helipad and the site at 11:38.

In this sling transport operation of the hut, the company staff members connected the 16 m long sling-rope fixed to the Rotorcraft with four ropes extended from the clasps mounted on the four corners of the hut's roof (see Photo 2.1).

For packing the loads to transport by sling operation, the company staff members secured fixtures and fittings inside the hut and locked all doors and windows. Moreover, since the hut had an aperture area in a part of the floor and the company had never performed sling transport operation of an object with an aperture area, they had made double-checks one after the other to ensure the packing status of the hut.

Although there were no securing ropes and protective nets around the outer package of the hut, the company judged that it was sufficient enough for safety to be secured to lock all the doors and windows by the Captain, the mechanic and other ground staff.

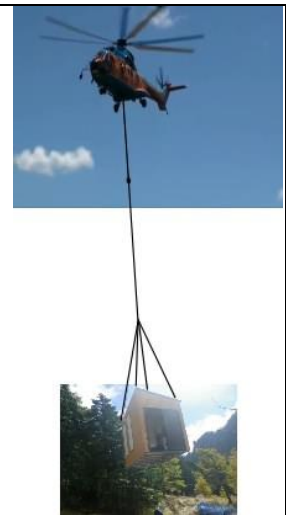
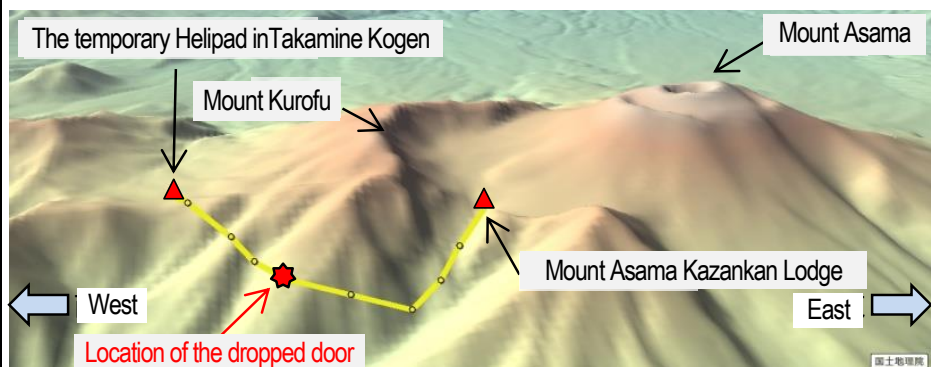



Photo 2.1 Sling Transport Operation (composite image)



Digital map 3D image of the Geospatial Information Authority of Japan (viewed from 3,500m above ground level)

Fig. 2.1-1 Estimated flight route (3D)

	<p style="text-align: center;">The temporary Helipad in Takamine Kogen</p>  <p style="text-align: center;">Fig. 2.1-2 Elevation along the estimated flight route</p>								
2.2 Injuries to Persons	None								
2.3 Damage to the Aircraft	Extent of damage: None								
2.4 Personnel Information	<p>Captain Male, Age 46</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 60%;">Commercial pilot certificate (Rotorcraft)</td> <td>April 26, 1989</td> </tr> <tr> <td>Type rating for Aérospatiale SA330</td> <td>June 16, 2011</td> </tr> <tr> <td>Class 1 aviation medical certificate Validity</td> <td>May 26, 2015</td> </tr> <tr> <td>Total flight time</td> <td>6,177 hr 27 min.</td> </tr> </table>	Commercial pilot certificate (Rotorcraft)	April 26, 1989	Type rating for Aérospatiale SA330	June 16, 2011	Class 1 aviation medical certificate Validity	May 26, 2015	Total flight time	6,177 hr 27 min.
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Type rating for Aérospatiale SA330	June 16, 2011								
Class 1 aviation medical certificate Validity	May 26, 2015								
Total flight time	6,177 hr 27 min.								
2.5 Aircraft Information	<p>Aircraft type: Aérospatiale AS332L1 (Serial number: 2413, Date of manufacture: November 3, 1994) Certificate of airworthiness No. Tou-25-546 Validity date: February 16, 2015</p>								
2.6 Meteorological Information	<p>According to the Captain's statement, it was good weather condition around the transportation route, with good visibility and some upper-layer clouds, while he noted that it was around 10 °C with southwesterly wind of around 10 kt at the Helipad.</p>								
2.7 Permission under Civil Aeronautics Act	<p>Permission regarding this flight, pursuant to in the proviso of Article 79 (Places for Landing and Takeoff) and the proviso of Article 81 (Minimum Safety Altitude) of the Civil Aeronautics Act, had been granted.</p>								
2.8 Other Necessary Information	<p>(1) The toilet hut</p> <p>The final form of the toilet hut is planned to be composed of symmetrical two huts (see Photo 2.8(1)). The door of the right-side hut dropped on the ground. The toilet in this hut utilizes biotechnology; Bio-toilet.</p> <p>The left-side hut had been transported to the site at the second flight on the day.</p> <p>Each hut weighs approximately 1.7 tons and has a pair of toilet cubicles and a maintenance cell where the apparatus of Bio-toilet set up. Four doorways are installed in each hut.: two single swing doors for toilet users at the front, another single swing door at the back and the other double swing doors at the side for the access to the apparatus of Bio-toilet.</p> <p>The dropped door was the left-side one of the double swing doors at the side. The dropped door was 2 m length by 70 cm width, and about 8 kg in weight.</p> <p>The maintenance cell had the aperture, which occupied approximately half area of bottom floor, and the apparatus of Bio-toilet and other accessory equipment are mounted right fit to the frame of the aperture area.</p>								

The hut (left) ← → The hut (right)



Photo 2.8 (1) Exterior of the toilet facility

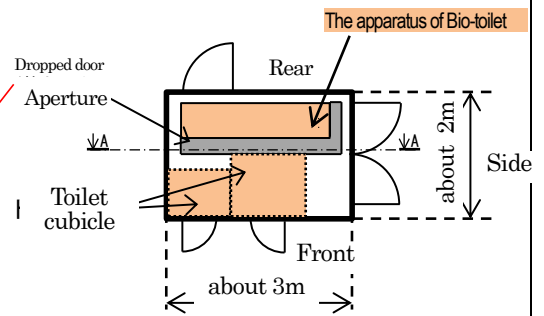


Fig. 2.8 (1) Plan of the toilet cabin (right)

(2) Situation of Dropping of the door

The video footage of the surveillance camera revealed dropping of a

piece of the door (see Photo 2.8 (2)). Since the hut was slung and transported in the air, it was rotating in a counterclockwise direction viewed from above when the Rotorcraft flew over the forest. At a point, the door was forced open when it rotated and the door faced to the opposite side of the direction of flight. After a while, it was once made closed though, when it rotated and the door faced to the perpendicular side of the direction of flight, the door was forced sharply reopen. As the result of this, it violently struck the sidewall of the hut and got separately broken and dropped on the ground.



Photo 2.8 (2) Scene where the door fell

(3) Air pressure durability of the door

Air pressure durability of the double swing doors was based on JIS standards and was not designed to be destructive against wind of around 36 m/s (approximately 70 kt).

The left-side door of the double swing doors, which had the door-knob, was fixed at three points: two hinges and a lock bolt, while the right-side one was fixed at four points: two hinges and two latches at the top and bottom of it.

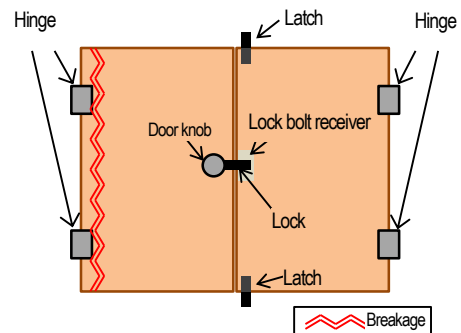


Fig. 2.8 (3) Fixed Condition and Damage of the Door

(4) Damage to the door

Regarding the right hut, the mounting portion of the left-side one of the double swing doors got separately broken. The lock bolt receiver on the right-side door got deformed by the stress of the lock bolt.

(5) Location of the dropped door

	<p>After reviewing the footage of the surveillance camera, the company could identify the estimated location of the dropped door. Then, they successfully found some parts of the broken door in the trees. In the surrounding area of that location, no specific damage was observed, caused by dropping of these parts, . The location where some parts of the door had dropped was the spot of N 36 °23 "40 ', E 138 °28 "47 '.</p> <p>(6) Flight route of the sling transport operation</p> <p>In normal cases, operators engage in sling transport operation make a point of arranging flight routes which do not cause safety issues to persons and objects on the ground.</p> <p>The Rotorcraft flew following the company’s operational standards, along the line with a company’s predetermined flight route which was arranged in the light of safety issues to persons and objects on the ground the sling operation might cause.</p>
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Photo 2.8 (5) Location of the dropped door

3 ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilot	None
3.3 Involvement of Equipment	None
3.4 Involvement of Others	It is probable that the effect of the airstream and air pressure induced by flying contributed to the drop of the door.
3.5 Analysis of Findings	<p>(1) Damage on the ground caused by this serious incident</p> <p>It is highly probable that this serious incident did not cause any damage to persons, objects and others on the ground. It is highly probable that this was because the company’s predetermined flight route took a consideration for the safety on the ground and the Rotorcraft followed it.</p> <p>(2) Process of dropping of the door</p> <p>The airstream and air pressure fairly affect the loads which are slung and transported in the air. In this serious incident, it is probable that the airstream, at the time when the double swing doors of the hut rotated and</p>

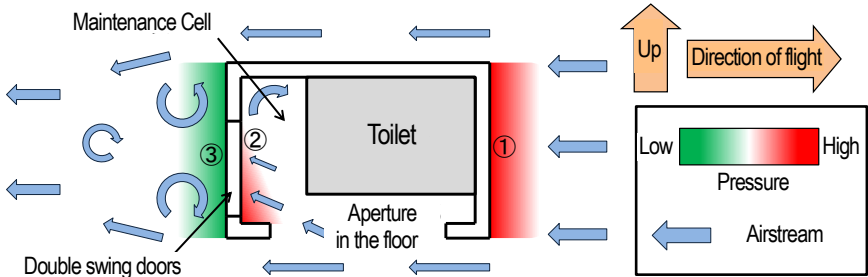


Fig. 3.5 (2) Flow of airstream and distribution of pressure (image view of cross section by A-A in Fig. 2.8 (1))

faced to the opposite side of the direction of flight was as shown in Fig. 3.5(2).

It is probable that since the lower parts of surface ① and surface ② were subject to air pressure in parallel with airspeed. Regarding surface ③, since it was faced to the opposite side of the direction of the flight and corresponded to separation region accompanied by slipstream vortex, it is probable that surface ③ was in negative pressure region. It is probable that, under these circumstances, the air pressure applied to the door exceeded the design strength (air pressure durability) and caused the lock bolt receiver to get deformed and then the door was forced open.

It is highly probable that, since the door was remained open while the hut rotatng, when the door turned to face toward airstream, it violently struck the sidewall and the door's mounting portion got separately broken and it dropped.

(3) Packing the loads

In this serious incident, there were no securing ropes and protective nets around the outer package of the hut when performing sling transport operation. It was probable because the company judged that it was sufficient enough for safety to be secured to lock all the doors and windows by the Captain, the mechanic and other ground staff.

In this case, if the company secured the hut using securing ropes and protective nets and others, it is highly probable that it could have prevented the door from dropping.

Meanwhile, since the company had never performed the sling transport operation of loads with the aperture area, it is probable that it would have been difficult for the company to properly assume the effect of airstream and air pressure that the aperture might cause.

(4) Airspeed

It is highly probable that the airspeed of the Rotorcraft affected airstream and air pressure associated with the flight which caused dropping of the door.

Since the effect of airstream and air pressure associated with the flight could be alleviated by reducing airspeed, it is highly probable that the flying at lower airspeed could decrease the possibility of dropping of the door.

(5) Safety on the ground

Since there were various shape, materials and characteristic loads in the sling transport operation by Rotorcrafts, it is highly probable that it would be difficult to prepare each manuals for all loads in advance. However, since the company should be careful that dropping of the slung loads might have affect the safety of persons and objects on the ground, it is probable that attentive risk assessment for the following three issues were considered important.

- ① The company should arrange flight routes in advance taking into consideration the safety on the ground and those route should be observed to fly when performing the sling transport operation.
- ② The company should consider the effect of airstream and air pressure associated with a flight, and the specific feature of the transported loads. Then it should carefully prepare for securing and clamping the loads to prevent from dropping during sling transport operation.
- ③ The company should operate Rotorcrafts at lower airspeed than usual, in the case that it might perform the particular transporting such as slinging loads with aperture or slinging unfamiliar loads that it has not experienced to transport in the past operation.

4 PROBABLE CAUSES

It is highly probable that this serious incident occurred because the door of the toilet hut dropped on the ground during sling transport operation as the door was forced open with the effect of airstream and air pressure associate with the flight then the mounting portion of the door got separately broken.

It is probable that the fact that the company did not provide for securing ropes and protective nets and others contributed to dropping of the door.

5 SAFETY ACTIONS TAKEN

Immediately after the occurrence of this serious incident, the company examined the criteria and procedure of sling operation in the case of transporting loads with unusual shapes or strength, such as having the aperture and the prescribed measures to prevent from dropping with securing loads using ropes and protective nets and others as necessary.