

AA2013-6

**AIRCRAFT ACCIDENT
INVESTIGATION REPORT**

NAKANIHON AIR SERVICE CO., LTD.

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August 30, 2013



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 determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. 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 ACCIDENT INVESTIGATION REPORT

INJURY TO A HANDLER DURING CARGO SLING WORK NAKANIHON AIR SERVICE CO., LTD. AÉROSPATIALE AS332L1 (ROTORCRAFT), JA9965 MT. SHAKA LOADING AND UNLOADING SITE IN KITAHIRA, OTSU CITY, SHIGA PREFECTURE AT ABOUT 13:50 LOCAL TIME, NOVEMBER 19, 2012

July 12, 2013

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 INVESTIGATION

The Japan Transport Safety Board (JTSB) designated an investigator-in-charge and an investigator on November 20, 2012 to investigate the accident. An accredited representative of France, the State of Design and Manufacture of the helicopter involved in the accident, participated in the investigation. Comments were invited from parties relevant to the cause of the accident and the relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight

The history of the flight is as outlined below, based on the statements of the crew members (the Captain; the Trainee Pilot (hereinafter referred to as “the TP”), who was under training in cargo sling work; and the On Board Mechanic) and the ground operators (a supervisor; a safety manager; a signalman [marshaller]; and a handler).

At about 13:50 local time(UTC+9hrs) on November 19, 2012, the handler dispatched from Industrial Service Sales Inc. (hereinafter referred to as “the ground work company”) was injured, when an Aérospatiale AS332L1 (registered JA9965, operated by Nakanihon Air Service Co., Ltd. (hereinafter referred to as “the aviation company”)) was lifting a box-shaped work shed (hereinafter referred to as “the shed”) from the Mt. Shaka Loading Site in Kitahira, Otsu City, Shiga Prefecture.

The following persons were on board the helicopter: the TP, who was in the right seat of the cockpit; the Captain, who as a

flight instructor was in the left seat of the cockpit; and the On Board Mechanic, who was in the left seat of the cabin. Under the guidance of the On Board Mechanic, the TP was lifting the shed as a training activity.

The following persons were assigned as ground operators: the supervisor, whose job was to supervise ground work; the signalman, whose job was to send hand signals to the helicopter during the work activity; the safety manager, whose job was to monitor work safety conditions; and the handler, whose job was to place the sling legs on the sling hook of the helicopter. Prior to starting work on the day in question, the supervisor provided safety education and work procedure education to all ground operators in accordance with the material prepared by the aviation company.

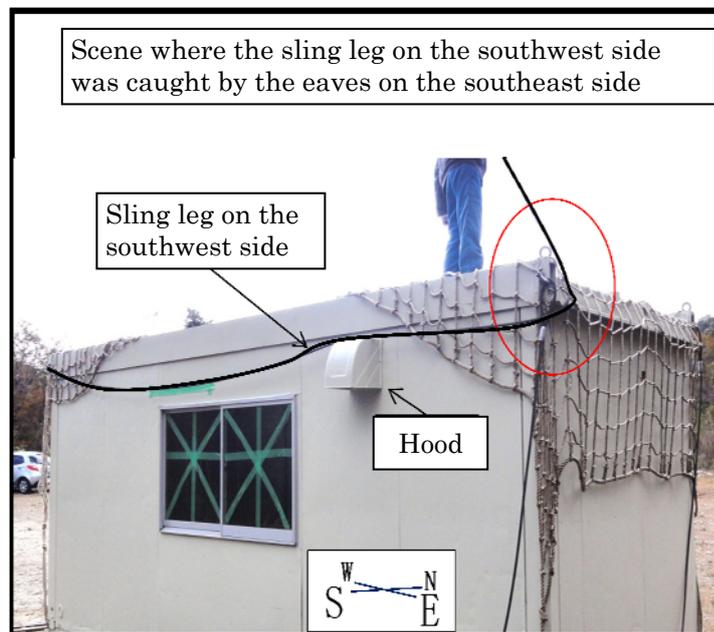
The TP brought a sling hook to the vicinity of the shed under the guidance of the signalman and the On Board Mechanic. The handler bundled together a total of four sling legs attached to the four corners of the roof, and placed the sling legs on the hook. Subsequently, he moved to the west of the shed.

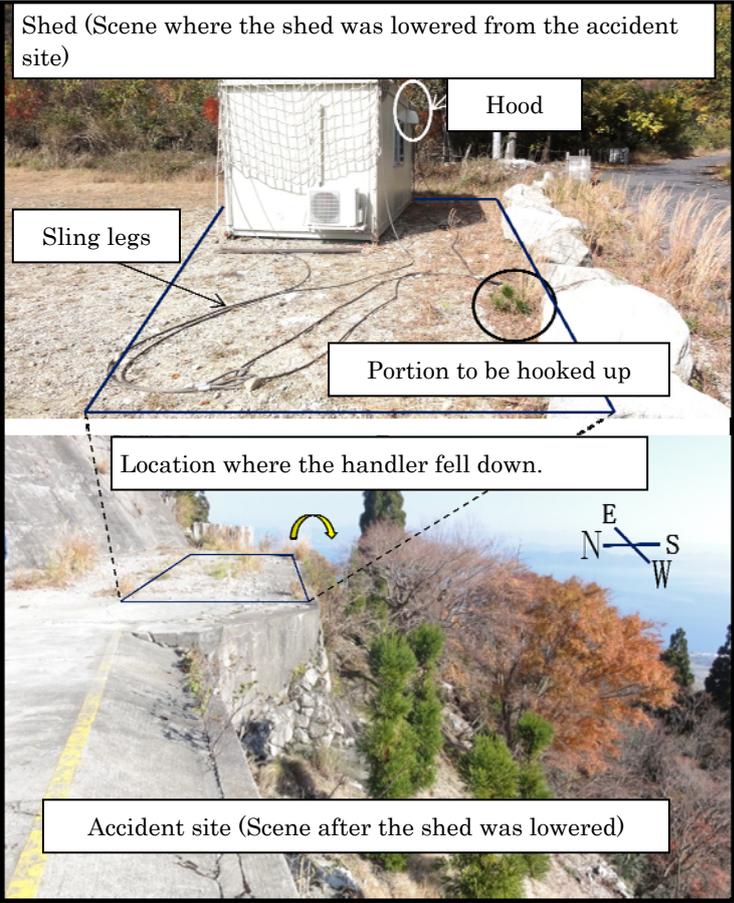
The On Board Mechanic, who was able to directly confirm the on-site situation by visual inspection, confirmed receipt of an “OK” signal and a “Wind up” signal from the signalman. Subsequently, the On Board Mechanic began providing sling work guidance to the TP to begin slowly lifting the sling legs. At this time, a sling leg on the southwest side was about to be caught by a ventilation fan hood attached on the south side of the shed. Therefore, the On Board Mechanic gave successive instructions to shift the helicopter’s position little by little so as to prevent the sling leg from being caught.

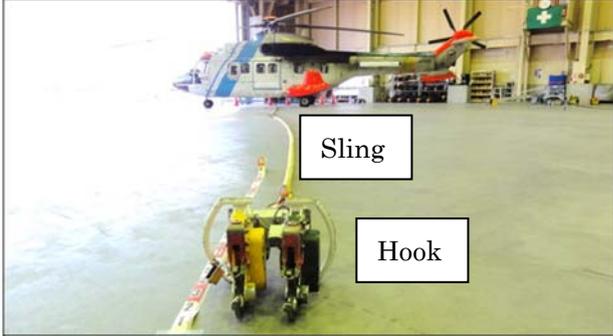
At the same time, when the sling legs began lifting, one of them was about to be caught by the eaves on the west side. The supervisor therefore signaled “No” to the helicopter, and manually removed the sling leg away from the eaves. After confirming that the supervisor positioned the sling leg away from the eaves, the signalman and the safety manager moved east side via the area to the north of the shed (that is, via the uphill side), and removed the sling leg away from the eaves on the east side, which came close to being caught by the eaves. Additionally, a sling leg had also nearly been caught by the ventilation fan hood attached on the south side of the shed. Therefore, after confirming that the supervisor removed the sling leg away from the eaves, the handler confirmed that the shed was grounded and that the sling leg in question was not taut. He then dashed to the area south side of the shed (to the valley side) to prevent the sling leg from being caught.

As mentioned above, the On Board Mechanic provided the helicopter guidance instructions to the TP. As a result, the southwest side sling leg, which had previously come close to being caught by the hood, was able to clear the hood. Subsequently, the On Board Mechanic then saw that the sling leg had been caught by the eaves on the southeast side of the shed. In response, the On Board Mechanic gave instructions to “Hold” (that is, to “maintain the current position”). However, the shed’s southeast side portion, where the sling leg had been caught by the eaves, became slightly lifted from the ground and had shifted toward the valley side. At this time, the Captain and the On Board Mechanic witnessed the lifted portion of the shed come into contact with the handler who had just dashed to the location, and then saw him fall down to the valley side.

The handler fell about three meters along the vertical wall, he slid down a slope a short distance in a seated position and came to a stop. After confirming his state of injury, the handler waited nearby until the work was completed. He walked down the mountain together with other ground operators and was taken to a hospital by an ambulance that had arrived there. He was diagnosed with a right wrist fracture and a bruised chest.



	 <p>Shed (Scene where the shed was lowered from the accident site)</p> <p>Hood</p> <p>Sling legs</p> <p>Portion to be hooked up</p> <p>Location where the handler fell down.</p> <p>Accident site (Scene after the shed was lowered)</p>
<p>2.2 Injuries to Persons</p>	<p>One handler suffered a bone fracture, which was classified as a serious injury.</p>
<p>2.3 Damage to Aircraft</p>	<p>None</p>
<p>2.4 Personnel Information</p>	<p>Captain: male, age 48</p> <p>Commercial pilot certificate (Rotorcraft): February 13, 1990</p> <p>Type rating for Aérospatiale SA330: September 1, 2008</p> <p>Class 1 aviation medical certificate:</p> <p>Validity: February 16, 2013</p> <p>Total flight time: 7,729 hours 18 minutes</p> <p>Total flight time on the type of aircraft: 1,009 hours 8 minutes</p> <p>Training Pilot: male, age 47</p> <p>Commercial pilot certificate (Rotorcraft): February 1, 1988</p> <p>Type rating for Aérospatiale SA330: June 5, 2012</p> <p>Class 1 aviation medical certificate:</p> <p>Validity: December 7, 2012</p>

	<p>Total flight time: 7,024 hours 40 minutes</p> <p>Total flight time on the type of aircraft: 215 hours 18 minutes</p>
2.5 Aircraft Information	<p>(1) Aircraft type: Aérospatiale AS332L1</p> <p>Serial number: 2174</p> <p>Date of manufacture: July 18, 1989</p> <p>Certificate of airworthiness: No. Dai-2012-089</p> <p>Expiration date: June 6, 2013</p> <p>(2) It is estimated that the helicopters weight and the center of gravity were each within the allowable range when the accident occurred.</p> <div style="text-align: center;">  </div>
2.6 Meteorological Information	<p>(Statements by the Captain and the ground operators)</p> <p>Weather: fair; Wind: virtually calm; Visibility: good</p>
2.7 Other Necessary Issues	<p>(1) Aviation company's regulations concerning cargo transportation</p> <p>The aviation company had established the "Cargo Transportation Implementation Procedures" for the purpose of standardizing cargo transportation work.</p> <p>(Excerpt)</p> <p><i>Safety education and work procedures education shall be provided to on-site workers, with no exceptions.</i></p> <p><i>In particular, the following shall be implemented.</i></p> <ol style="list-style-type: none"> <i>1) Neither the signalman nor the cargo sling worker shall be forced to enter the space under the cargo or the space between cargoes.</i> <i>2) The cargo shall be carefully observed and the nature of its movement shall be fully monitored.</i> <i>3) Guidance shall be given such that after the cargo has been hooked up, the worker shall move away without straining himself/herself, shall secure safety, and thereafter shall send cargo transportation signals to lift or lower the cargo.</i> <p><i>* It is advisable to provide education through the use of</i></p>

	<p><i>the following: this document; pamphlets on cargo sling work; [Signalman's Signaling Methods] for helicopter cargo sling work; and various guidebooks. Explanations must be given for hand signals, moving away methods, prevention of the scattering of objects, and helicopter work flow.</i></p> <p>(2) Aviation company's safety education material</p> <p>The aviation company had prepared educational material (Information on Cargo Transport by Helicopter, and a Message to People located at Work Sites) for the purpose of providing safety education and work procedures education to on-site workers.</p> <p>(Excerpt)</p> <p><i>When a sling cargo has been caught by something or when a cargo collapse threatens to occur, descend the helicopter and release the cargo. Then confirm safety, and subsequently, perform the work task again.</i></p> <p>(3) Ground work company's regulations</p> <p>The ground work company had established the "Helicopter Transportation Work Regulations."</p> <p>(Excerpt)</p> <p><i>1) The person concerned with the work shall receive safety education prior to the work implementation date.</i></p> <p><i>2) The supervisor shall not perform the work.</i></p> <p><i>3) If the safety manager judges the situation to be such that the work cannot be performed safely, he/she shall immediately suspend such work.</i></p> <p><i>4) The worker shall obey the instructions of the supervisor.</i></p> <p>(4) Safety education</p> <p>On September 3, 2012, the aviation company conducted safety education for the supervisor and the safety manager of the ground work company.</p>
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3. ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilots	None
3.3 Involvement of Aircraft	None
3.4 Analysis of Findings	<p>(1) Situation at the time of occurrence of the accident</p> <p>In accordance with the provisions of the aviation company's "Cargo Transportation Implementation Procedures" (Guidance shall be given such that after the cargo has been hooked up, the worker shall move away without straining himself/herself, shall secure safety, and</p>

thereafter shall send cargo transportation signals to lift or lower the cargo. Neither the signalman nor the cargo sling worker shall be forced to enter the space under the cargo or the space between cargos.), it is probable that the crew members tried to resolve the matter by shifting the aircraft's position without depending on the support of the ground operators, even when one of the sling legs came close to being caught by the hood after the shed began being lifted.

At the same time, it is highly probable that the ground operators, including the supervisor, tried to avoid the possibility of a sling leg catching through the following: sending a "No" signal to the helicopter to have the helicopter maintain its position by means of hovering; they intended to enter the area underneath the helicopter, thereby correcting the precarious sling leg position.

On the basis of the above, it is probable that on the day of the accident, there was a difference between the crew members and the ground operators regarding recognition of the sling work implementation method.

Work was performed in this situation. It is probable that the shed in a partially lifted state with only its southeast portion off the ground due to the sling leg that had been caught by the eaves, moved to the valley side, and the handler who dashed to the affected area came into contact with the shed, resulting in his fall on the valley side of the area and subsequent injury.

(2) Safety education for ground operators

Pursuant to company regulations, the aviation company had conducted safety education for ground operators of the ground work company such as the supervisor and the safety manager. However, based on the behavior displayed by the ground operators on this occasion, it is probable that they did not have a solid understanding of the following point stated in the safety education material: "When a sling cargo has been caught by something or when a cargo collapse threatens to occur, descend the helicopter and release the cargo. Then confirm safety, and subsequently, perform the work task again."

When lifting cargo by a helicopter, it is difficult to stop midway in the course of lifting by completely maintaining a given position—a distinct difference compared to when using a crane. Moreover, due to the effects of noise and downwash flow generated by the rotors, it is difficult to establish effective communications between crew members and ground operators. Prior to engaging in such work, it is necessary that

	appropriate features be sufficiently explained to ground operators and that they are confirmed to have a solid understanding of the issues that are important for securing safety.
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4. PROBABLE CAUSES

It is highly probable that as the helicopter was about to lift the shed, a sling leg was caught by the eaves, bringing the shed into a partially lifted state, and that the shed moved in this state to come into contact with the handler, who had dashed to the area, resulting in the handler's fall on the valley side of the area and subsequent injury.

Regarding the situation that the shed, which had attained a partially lifted state, came into contact with the handler, it is probable that this was caused by the fact that there was a difference between the crew members and the ground operators regarding recognition of the sling work implementation method. It is probable that this difference was caused by the fact that in the safety education conducted in advance by the aviation company, the ground operators did not have a solid understanding of issues that were important for securing safety.

5. REFERENCE INFORMATION

(1) Safety Action Taken by the Ground Work Company

The ground work company and related companies involved, including the aviation company, held a study meeting, which resulted in the following issues that were specified as safety measures to be implemented going forward.

- 1) Regarding risk prediction activities prior to starting work, not only will work contents be thoroughly defined, but safety education based on safety education material prepared by the aviation company will be repeated.
- 2) Work area will be firmly established. No one other than signalman and handler hooking cargo shall enter work area.
- 3) After cargo is hooked up, all persons shall move to outside of the work area. Under no circumstances shall anyone touch a cargo after it has been hooked up.

If cargo-hooking work or the like needs to be performed again, it will be carried out after a signal is received from the signalman following unhooking of the cargo.

(2) Safety Action Taken by the Aviation Company

The aviation company prepared the safety education material that reflects the safety measures specified in a study meeting conducted with the ground work company. In addition, the aviation company conducted in-house safety education on the following issues, thereby ensuring their compliance on an ongoing basis.

- 1) Safety education procedures for ground operators will be reconfirmed.
- 2) Prior to the starting work, it will be confirmed that ground operators who have received the safety education have been sent out.
- 3) During the implementing work, it will be confirmed that no ground operators will approach cargoes that have already been slung.