

AI2018-3

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**AERO ASAHI CORPORATION
JA9678**

May 31, 2018

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.

Kazuhiro Nakahashi
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
TOTSUGAWA VILLAGE, YOSHINO-GUN
NARA PREFECTURE, JAPAN
AT AROUND 10:23, AUGUST 5, 2016

AERO ASAHI CORPORATION
AÉROSPATIALE AS332L1 (ROTORCRAFT),
JA9678

April 20, 2018

Adopted by the Japan Transport Safety Board

Chairman Kazuhiro Nakahashi

Member Toru Miyashita

Member Toshiyuki Ishikawa

Member Yuichi Marui

Member Keiji Tanaka

Member Miwa Nakanishi

1. PROCESS AND PROGRESS OF INVESTIGATION

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| 1.1 Summary of the Serious Incident | On Friday, August 5, 2016, an Aérospatiale AS332L1, registered JA9678, operated by AERO ASAHI Corporation, slung a steel plate at a temporary helipad in Oto Town, Gojo City, Nara Prefecture, and as heading to a construction site in Totsukawa Village, the same prefecture, dropped the steel plate slung from the rotorcraft during this flight into mountains of the same village. |
| 1.2 Outline of the Serious Incident Investigation | This event fell under the category of “Case where a slung load, external to an aircraft, dropped from the aircraft unintentionally” as stipulated Item (XV), Article 166-4 of Ordinance for |

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| | <p>Enforcement of Civil Aeronautics Act, which was classified as an aircraft serious incident.</p> <p>On August 5, 2016, the Japan Transport Safety Board (JTSB) designated an investigator-in-charge and an investigator to investigate this serious incident.</p> <p>An accredited representative and an advisor of French Republic as the State of Design and Manufacture of the rotorcraft involved in this serious incident, participated in this investigation.</p> <p>Comments were invited from the parties relevant to the cause of the serious incident and from the participating state.</p> |
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2. FACTUAL INFORMATION

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| <p>2.1 History of the Flight</p> | <p>According to the statements of a captain, a worker on board and a ground worker, the history of the flight was summarized as below:</p> <p>At around 9:20 Japan Standard Time (JST: UTC + 8 hours; unless otherwise stated, all times are indicated in JST using a 24-hour-clock) on August 5, 2016, an Aérospatiale AS332L1 (hereinafter referred to as “the rotorcraft”), registered JA9678, operated by AERO ASAHI CORPORATION (hereinafter referred to as “the Company”), operated cargo sling transportation repeatedly between Akatani Dam temporary helipad (hereinafter referred to as “the Helipad”) and a construction site in the Oto Town in Gojo City, Nara Prefecture to transport goods used for rebuilding project of a transmission line steel tower.</p> <p>When the rotorcraft was transporting the steel plate used to secure the footing of heavy machinery for 15th times, workers set the steel plate which was packed in advance with four lines of wire ropes(hereinafter referred to as “the wires”) for sling work¹, slung by a remote hook, executed a test try to sling the plate as being hovering and all workers confirmed that the steel plate was horizontally balanced.</p> <p>During the transportation, the captain was constantly</p> |
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¹ “Sling Work” means a work to hook cargo onto a hook to suspend or to unhook, the slinging wire rope used for the work has a ring at the end for hooking.

checking the steel plate status through external mirror. Because the steel plate was slung in the direction of longer side at the right angled to the traveling direction (hereinafter referred to as “the right angled”), and it was stable as slightly tilting

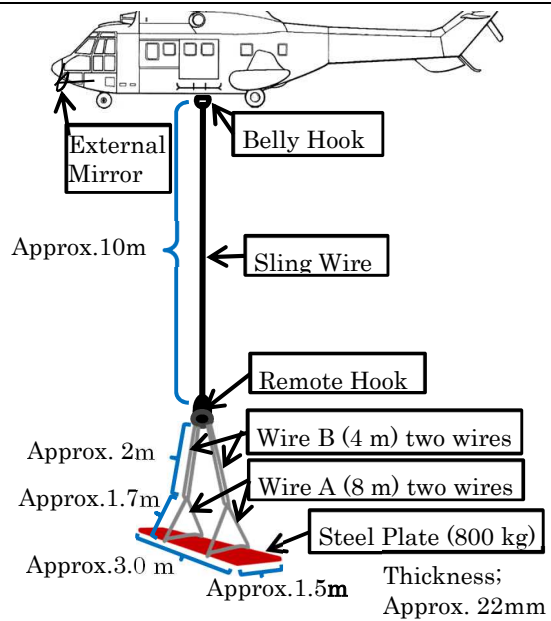
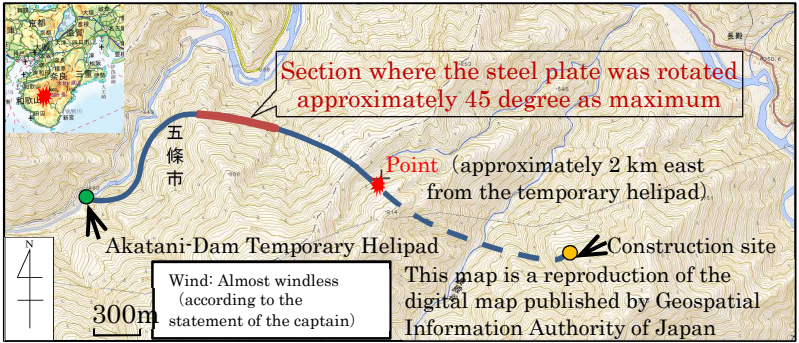


Figure 1 Image of Slings

backward due to the wind pressure, the captain increased the speed up to 80 kt which is the upper limit speed for the sling transportation. After turning to right as crossing over the small ridge, since the steel plate was rotated up to approximately 45° without showing any signs of load collapse, then returned to the original sideways slinging position and became stable, so the captain continued the flight with the same speed. Later on, as transiting almost to a level flight, when the captain turned his gaze from the external mirror of the downward to the ridge in front, he felt strong impacts as “bang” so he returned his gaze to the external mirror and confirmed as seeing the steel plate dropping. At the time of dropping, the flight height was approximately 2,900 ft, there were no air turbulence and the rotorcraft was maintaining the stable flight.

The on-board worker was monitoring the slung cargo condition through the opened sliding door at the left side of cabin, and he was witnessing the dropping of the steel plate occurred at the moment that the separation between two wires of lashing the plate became narrow.

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| | <p>This serious incident occurred in the mountain of Nagatono, Totsukawa Town, Yoshino-gun, Nara Prefecture (N34°07'44", E135°44'17") and at around 10:23 on August 5, 2016.</p>  <p>Figure 2 Estimated Flight Route and Point where the steel plate dropped</p> |
| <p>2.2 Injuries to persons</p> | <p>None</p> |
| <p>2.3 Damage to Aircraft</p> | <p>None</p> |
| <p>2.4 Personnel information</p> | <p>Captain Male, Age 36 Commercial pilot certificate (Rotorcraft) January 8, 2005 Type Rating for Aérospatiale SA330 April 9, 2015 Class 1 aviation medical certificate Validity: November 11, 2016 Specific Pilot competency Assessment Expiration date of piloting capable period June 9, 2018 Total flight time 4,210 hours 54 minutes Total flight time on the type of aircraft 320 hours 23 minutes</p> |
| <p>2.5 Aircraft information</p> | <p>Aircraft type: Aérospatiale AS332L1 Serial Number: 2231, Date of manufacture: February 18, 1988 Certificate of airworthiness: No.Tou-28-087 Validity: May 26, 2017</p> |
| <p>2.6 Meteorological information</p> | <p>According to the statements of the captain, the weather during the flight of the cargo transportation was clear, the visibility was 10 km or more, wind was almost windless and there was no air turbulence along the route.</p> |
| <p>2.7 Additional information</p> | <p>(1) Thorough Inspection of the sling cargo and meetings by the work relating parties prior to start of the work; The 56 times of sling cargo transportation that were</p> |

planned on that day was including the cargo susceptible to the wind pressure like a steel plate, a temporary shed and likes. Once these slung cargo started to rotate horizontally, it could not be controlled to stop from the cockpit and it could cause a threat to ground workers. Because of this, prior to the flight, a thorough inspection on the packing was carried out, as considering possible twist of wires and rotation of cargo due to the various forces which could be affecting the cargo. In addition, at the meeting by the work relating parties including the captain, they agreed on that if the style of packing and likes shows any suspicious situation, the transportation should be terminated and started over from packing.

(2) Packing method and Hanging method of the Steel Plate;

As the results of implementing thorough inspection on the packing, the steel plate was slung by two lines of 8 m long wire A for each from two points where wrapping wire twice around the plate to stay in horizontal position, and these two wire were hung at each end by a double folding wire B which was slung from the

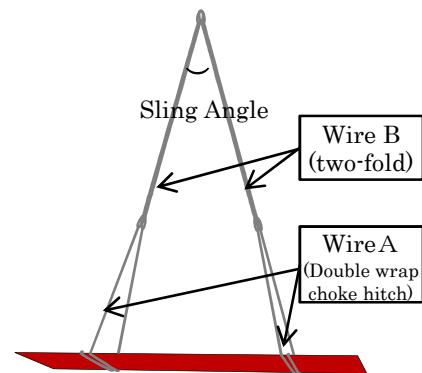


Figure 3 Lashing Status of Steel Plate

remote hook by slinging. Furthermore, a double wrap slinging is the slinging method to wrap a cargo once and the lashing method that tightens the lashing wires with its cargo weight. The sling angle of this slinging was within 60 degrees which meets the regulation required to prevent damages on wires due to an excessive tensile force and a side slip of wires. (See Figure 3.)

(3) The Condition of the Rotorcraft after the Steel Plate was Dropped;

After landing at the Helipad, as untying the wires entangled to each other for an inspection, the rotorcraft, remote hook and each wire were connecting as the same style as the time of transporting, and there was no anomaly excluding the two wire A which were tying the steel plate with the double wrap.

Damages and deformations like cut of element wires, abrasions and losing shapes were found on the wire A, at the parts which was near the center of the steel plate, not the parts where had direct contacts with the edges of steel plate in order to sling and keep the plate horizontal. (See Photo 1 and 2)

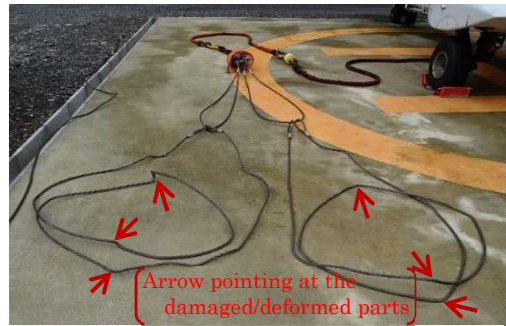


Photo 1 Remote Hook and each wire

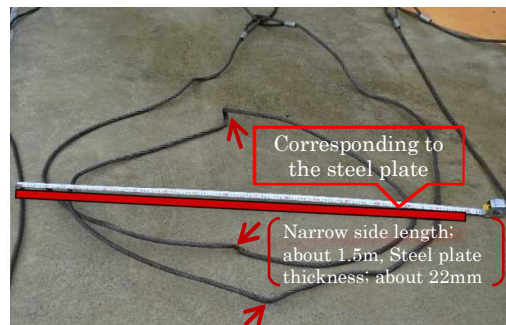


Photo 2 Damages and deformation of the Wire A

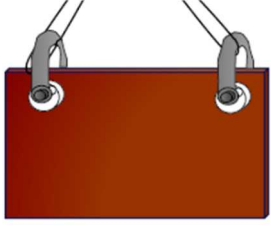
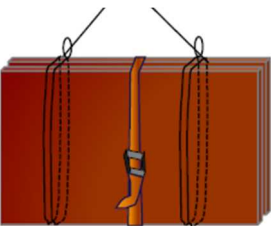
(4) Speed Limit to transport the sling cargo

According to the limitations specified in the supplemental flight manual “Transport of External Loads 4,500 kg (9,920 lb)” of the rotorcraft, for the cargo which is not bulky, the maximum speed shall be limited between 80 to 100 kt depending on the weight of a cargo and for the case of bulky cargo, the speed shall be decreased depending on the shape of the cargo. On the other hand, the work operating manual which specifies the items to be complied for the Company to transport goods, specifies 80 kt as the speed limits for the same type of rotorcraft as the speed of having no threats to shake or scatter as the stable speed to suspend cargo.

(5) Why this lashing method was used for this steel plate:

The Company had been transporting steel plates vertically suspended by using slinging methods of tying tools named “shackle” or double wrap choke hitch², however, the Company had been experiencing problems like shaking of steel plates generated by downwash from rotor blades, instabilities of suspended cargos

² “Choke Hitch” is slinging method like squeezing the cargo as putting one slinging wire end ring through the ring of other wire end to hook.

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| | <p>because of rotations, or damaging of wires. (See Figure 4 and 5)</p> <p>Sometime later, due to on-site working experiences, it become accepted by the Company that it could be stable for a steel plate to be slung in horizontal position. The Company revised the method to slinging a steel plate in horizontal position since half year ago and the cargo transportation at this time by slinging in horizontal position was the fifth one.</p> <p>(6) Flight Route for Cargo Transportation:</p> <p>The route where could cause no harm to persons or objects on the ground were selected in advance for the rotorcraft, and also, an inspection by flying was conducted prior to the cargo transportation.</p> |  <p>Figure 4 Two-points slinging with shackle</p>  <p>Figure 5 Double Wrap with Choker Hook</p> |
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3. ANALYSIS

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| <p>3.1 Involvement of weather</p> | <p>None</p> |
| <p>3.2 Involvement of pilot</p> | <p>None</p> |
| <p>3.3 Involvement of equipment</p> | <p>None</p> |
| <p>3.4 Analysis of known items</p> | <p>(1) Dropping of the Steel Plate</p> <p>It is probable that the sling cargo was swaying due to the turning or acceleration of the rotorcraft after leaving the Helipad and also the steel plate was rotated temporarily up to approximately 45° horizontally, however, because there were no sign of load collapse and no change in slung condition, it is probable that the lashing condition of the steel plate was not changed until immediately before dropping.</p> |

Because the damages and deformation of the wire A, were found at where the wire was near the center of the steel plate if it was horizontal, the steel plate became the vertical position at the time of dropping, and the edge of the steel plate scratched the damaged and

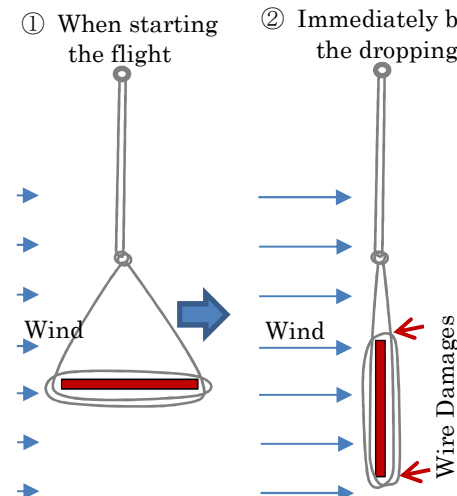


Figure 6 Transition of suspended condition of the steel plate due to an increase of the speed (Viewing the steel plate from the narrow side)

deformed parts, and dropped. Furthermore, it is probable that because the captain and on-board worker did not see the steel plate in vertical hanging position, the steel plate being held horizontally was turned up vertically in a quite short time and simultaneously dropped.

There were no air turbulence prior to dropping, from the situation that it had dropped suddenly from the stable horizontal position which was leaning slightly to back due to 80 kt wind pressure, it is probable that why the steel plate was turned up vertically, turning force caused by wind pressure, acted on the plate, suppressed the tightening force by the weight of steel plate itself and caused the steel plate to turn. It is probable that because the wind pressure onto the steel plate would be increased at once due to turning of the steel plate, the off-balanced steel plate dropped in a flash. In general, a flat board placed parallel to an airflow could generate the lift due to an attitude angel, as the result, since an unexpected motion of the flat board could occur, so it is necessary to pay attention.

(2) Speed to transport a sling cargo

The Company manual to be complied when transporting sling cargo specifies 80 kt, regardless of weight, shape or size of cargo, but the flight manual of the Rotorcraft specifies to decrease speed

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| | <p>depending on the shape of the cargo when transporting a bulky cargo by slinging. Because the steel plate is susceptible to wind pressure due to increase in speed while being transported, regarding special shaped cargos including the steel plate as same as the bulky cargo, it is probable that it is necessary to decrease speed depending on shape of cargos or characteristics of baggage.</p> <p>(3) Why this lashing method of the steel plate of this incident was adopted;</p> <p>Because the Company has experienced this transport method in the past and had an experience of resolving the rotation or the shaking occurred on a steel plate which was hanging vertically by transporting a horizontal positioned cargo, it is probable that without considering sufficient preparation how to prevent load collapse, this lashing method was adopted.</p> <p>However, it is probable that at the process to adopt new transporting method, without depending solely on the on-site work experiences, if the sufficient technical examination was executed, the Company could foresee the possibilities that steel plate might be transited into vertical position due to the increased speed, when transporting the steel plate in horizontal position.</p> <p>It is important to take measure to prevent cargo collapse for prevention of dropping as judging not only by the stabilities when hovering or flying at low speed, but also investigating in details about a wind pressure during flight or about the changing tendency of the position of gravity center when reviewing appropriate technical correctness of the methods of packaging, lashing and slinging work, corresponding to the characteristic of a cargo to be suspended.</p> |
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4. PROBABLE CAUSES

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| <p>It is probable that the steel plate of being held horizontally was turned up vertically due to effects of wind pressure and others, resulted in the balance loss and dropped.</p> <p>It is probable that the lashing method of this steel plate was adopted because of insufficient technical examination and overlooking the possibility of suspended load collapse.</p> |
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5. SAFETY ACTION

After the occurrence of this serious incident, the company revised whole of the packing guide to improve the method of packing like the way to attach shackles to holes made in all four corners of steel plate and connect to the wire, as prohibiting the transporting the cargo by lashing with only wire of double wrap regarding the packing to transport a steel plate by slinging. In addition, the company established a standing organization to conduct sufficient technical examination when adopting new transportation method.