

AA2010-3

**AIRCRAFT ACCIDENT
INVESTIGATION REPORT**

AERO ASAHI CORPORATION

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March 26, 2010

Japan Transport Safety Board

The investigation for this report was conducted by Japan Transport Safety Board, JTSB, about the aircraft accident of Aero Asahi Corporation, Aerospatiale AS332L registration JA9690 in accordance with the Act for the Establishment of the Japan Transport Safety Board and Annex 13 to the Convention on International Civil Aviation for the purpose of determining causes of the aircraft accident and contributing to the prevention of accidents/incidents and not for the purpose of blaming responsibility of the accident.

This English version of this report has been published and translated by JTSB to make its reading easier for English speaking people who are not familiar with Japanese. Although efforts are made to translate as accurately as possible, only the Japanese version is authentic. If there is any difference in the meaning of the texts between the Japanese and English versions, the text in the Japanese version prevails.

Norihiro Goto,
Chairman,
Japan Transport Safety Board

AIRCRAFT ACCIDENT INVESTIGATION REPORT

**AERO ASAHI CORPORATION
AEROSPATIALE AS332L (ROTARCRAFT), JA9690
AT ABOUT 500 M ELEVATION, IN THE MOUNTAIN,
IMAZU-CHO, TAKASHIMA CITY, SHIGA PREFECTURE, JAPAN
AT ABOUT 8:28 JST, AUGUST 3, 2009**

February 17, 2010

Adopted by the Japan Transport Safety Board (Aircraft Sub-committee)

Chairman	Norihiro Goto
Member	Yukio Kusuki
Member	Shinsuke Endo
Member	Noboru Toyooka
Member	Yuki Shuto
Member	Akiko Matsuo

1. PROCESS AND PROGRESS OF AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident

On August 3 (Mon), 2009, while the Aerospatiale AS332L, registered JA9690, operated by Aero Asahi Corporation was descending to sling materials at a workplace of Imazu-Cho, Takashima City, Shiga Prefecture, a tree broke off and hit a worker on the ground at about 8:28 Japan Standard Time (JST: UTC+9hr, unless otherwise stated, all times are indicated in JST). One worker was seriously injured.

There were 2 persons on board, consisting a captain and a mechanic, no one was dead or injured, and the aircraft was not damaged.

1.2 Outline of the Accident Investigation

1.2.1 Investigation Organization

On August 3, 2009, Japan Transport Safety Board designated an investigator-in-charge and another investigator to investigate this accident.

1.2.2 Representatives from Foreign Authorities

An accredited representative of France, as the State of Design and Manufacturer of the aircraft involved in the accident, participated in the investigation.

1.2.3 Implementation of the Investigation

August 4, 2009	On-site investigation, Aircraft examination and Interviews
September 1, 2009	Interviews

1.2.4 Comments from Parties Relevant to the Cause of the Accident

Comments were invited from parties relevant to the cause of the accident.

1.2.5 Comments from the Participating State

Comments were invited from the participating State.

2. FACTUAL INFORMATION

2.1 History of the Flight

On August 3, 2009, the Aerospatiale AS332L registered JA9690 (hereinafter referred to as “the Aircraft”) operated by Aero Asahi Corporation (hereinafter referred to as “the Company”) took off from the Ootaniyama Temporary Helipad in Fukui Prefecture (hereinafter referred to as “the Helipad”) for the purpose of transport of materials. Finishing some transport work at several points of Imazu-Cho, Takashima City, Shiga Prefecture, the Aircraft was descending to sling up a truck at the workplace near the *Otsu* No.33 power line tower (hereinafter referred to as “*Otsu* 33 Workplace”). At about 8:28, a tree (hereinafter referred to as “Tree A”) broke off and hit and injured a worker on the ground (hereinafter referred to as “Worker A”).

The history of the flight up to the time of the accident is summarized below, based on the statements of the Captain, the Mechanic, Worker A and the persons involved.

(1) The Captain

The meeting for operation was held at the Helipad at about 07:20 on that day. I sat in the right seat of the Aircraft and took off from the Helipad at about 8:03. After a check flight, we went back to the Helipad and started transport work using a 20m-long sling (hereinafter referred to as “the Sling”).

After several transport works, we approached from the north and arrived over *Otsu* 33 Workplace in order to sling up a truck from there. I could see the Sling and Worker A standing at the slinging point through the mirror attached to the forward bottom of the Aircraft. The trees nearby were swaying due to the downwash of the Aircraft. During the gradual descent confirming the height with the Mechanic calling, etc., Worker A was hidden behind a tree and was out of my sight. Then the Mechanic told me that Tree A had broken off and had hit Worker A on the ground. I immediately climbed the Aircraft up and moved away from the site. On the way back to the Helipad, I informed the persons at the Helipad of the accident situation by radio and landed on the Helipad at 8:31.

I think that the time of the accident was at about 8:28 as it takes about 3 minutes for us to fly from *Otsu* 33 Workplace to the Helipad.

(2) The Mechanic on Board of the Aircraft

As there are some blind spots for a pilot while approaching a workplace to sling up and unloading burdens (hereinafter referred to as “workplace”), a guide is necessary in an aircraft. I sat on the operator seat at the middle-left of the cabin and was guiding to the target point by calling the height, etc. keeping the left-side door open and watching the ground.

After the Aircraft arrived over *Otsu* 33 Workplace, it was gradually descending with my guide “right above” or “lower here”. The Aircraft descended further in order for Worker A to catch the hook at the end of the Sling. When I called “4” and “3”, the hook came down about 3~4m above the ground. It seemed that Tree A, swaying together with the other trees around there due to the downwash of the Aircraft, had broken off and had hit Worker A on the head trying to catch the hook on the ground. The broken tree suddenly came into my sight from the left rear. It seems that Tree A

was flying and bouncing.

(3) The Worker A (the injured)

I reached *Otsu* 33 Workplace at about 8:00 and was working alone wearing a helmet. After I got the radio message from the Helipad, the Aircraft flew over, slung some tools up and transported them to the next workplace near *Otsu* No.32 power line tower. There was no problem in this slinging work.

Then the Aircraft came back to *Otsu* 33 Workplace in order to transport the next material of a truck to the Helipad. The hook came down gradually within almost 2m of my hand. I was standing with my back against the slope on the mountainside with both arms extended. I was trying to catch the hook with my right hand while I had a rope of the cargo net wrapping the truck in my left hand.

An accident might have happened at that time but I couldn't see the falling tree from behind at all and had no memory of being hit by it.

I have been in the electrical work for about 20 years and have worked on the ground for material transport by helicopter, though not regularly. I have seen some twigs broken by the downwash of a helicopter but have never seen a trunk break before. I think *Otsu* 33 Workplace is well located and has good conditions.

(4) The Worker rushing to the Accident Site from Another Workplace

I got the instruction by radio from the Helipad to go and see the injured, and I arrived at the accident site at about 8:53. I found Worker A fell down with his face on the materials of power line tower and the broken Tree A on his right shoulder. He seemed to be groggy.

(5) Persons in charge of the Contractor and the Company.

We were at the parts repairing work of the power line (Wakasa trunk power line) towers. We had been transporting materials using a helicopter operated by the Company.

The person in charge of the Contractor was at the Helipad at the time of the accident. When he got the report from a worker who had confirmed the condition of the injured, he requested the rescue helicopter to call out via the Company as well as the rescue.

Field survey of selecting the location of *Otsu* 33 Workplace was conducted in December 2008. Usually a workplace is selected considering horizontal distance (more than 20m) from some obstruction (power line tower, etc.), transporting route and distance, flatness of the ground, and the number of trimmed trees, and so on. Though we need a large workplace to transport a lot of materials, trees cannot be trimmed in so large an area not only because of the arrangement with the owner of the mountain but because of the viewpoint of environmental protection. Even if there had been a tree rotted inside in the neighborhood, it could not have been found by appearance and might have been left.

The Aircraft had been flying to *Otsu* 33 Workplace a lot since the beginning of this work. It had slung some materials up at *Otsu* 33 Workplace on that day. Tree A must have been swayed by the downwash every time but I think it happened to be broken at this time of sling.

The Company delivers a manual concerning material transporting by helicopter to the contractor. If there is some obstruction at the level of hovering, we carry out an operation based on this manual. In case of slinging a material at the clearly higher level than the trees around (like a long sling), the distance between a material and the trees around would not be a serious problem.

This accident occurred at about 8:28 in the mountain of Imazu-Cho, Takashima City, Shiga Prefecture, at about 500m elevation. (Latitude 35°27'34" N, Longitude 135°55'28" E)

(See Figure1 Estimated Flight Route, Figure2 Accident Site Layout, Photo1 The Aircraft, Photo 2 *Otsu* 33 Workplace and Photo 3 Accident Site)

2.2 Injuries to Persons

The Worker A was seriously injured.

2.3 Personnel Information

Captain	Male, Age 48	
Commercial pilot certificate (Rotorcraft)		January 24, 1983
Type rating for Multi-turbine engine (land)		March 29, 1995
Class 1 aviation medical certificate		
Validity		February 5, 2010
Total flight time		11,872hrs 02min
Flight time in the last 30 days		48hrs 31min
Total flight time on the type of aircraft		2,396hrs 18min
Flight time on the type of aircraft in the last 30 days		20hrs 32min

2.4 Aircraft Information

2.4.1 Aircraft

Type		Aerospatiale AS332L
Serial number		2089
Date of manufacture		November 7, 1984
Certificate of airworthiness		TOH – 21 – 085
Validity		May 29, 2010
Category of airworthiness	Rotorcraft, Transport Category TA/TB or Special X	
Total flight time		11,393hrs 14min
Flight time since last periodical check (G check, April 9, 2009)		148hrs 47min

2.4.2 Weight and Balance

When the accident occurred, the Aircraft's weight is estimated to have been about 5,742kg and center of gravity is estimated to have been about 4,509mm aft of the reference point, both of which are estimated to have been within the allowable range (maximum takeoff weight of 8,600kg, and 4,492 to 4,517mm corresponding to the weight at the time of the accident).

(See Figure 3 Three Angle View of Aerospatiale AS332L)

2.5 Meteorological Information

According to the captain's statements, weather conditions around the accident site were as follows:

Weather Fine, Wind Almost Calm, Visibility Good

2.6 Accident Site Information

The accident site was a workplace for material transport by helicopters set up in the mountain at about 500m elevation of Imazu-Cho, Takashima City, Shiga Prefecture, and was a slope of high in the east and low in the west with the maximum slope angle about 20 degrees and with a flat part. Trees within about 11m square had been cut down and *Otsu* No.33 power line tower of 49m high was on the ground about 40m in the west from the accident site (about 486m elevation).

Tree A was about 9m high on the ground and was outside of cut down area in the mountainside. It broke down at about 1m high from the ground (about 20cm in diameter) and the broken tree fell down to the valley side. It broke at about 5.5m from the broken point again and the broken parts fell on the steel materials. Tree A had no leaves, and though there remained bark at around the broken part, the inside rotted and became a cave.

Not only Tree A but a broken part of the tree near the truck (hereinafter refer to as "Tree B") fell on the steel materials and the inside rotted.
(See Figure1 Estimated Flight Route, Figure2 Accident Site Layout, Photo2 *Otsu* 33 Workplace and Photo3 Accident Site)

2.7 Medical Information

(1) According to a medical certificate, the condition of the injured Worker A was bone fracture and right shoulder disjoints, and so on.

(2) According to the agencies concerned, the rescue was performed as follows:

At about 09:22 Received a rescue request call at the fire station (other number than the emergency number 119), requested a call out of Air Rescue Team
At about 09:27 A rescue helicopter took off
At about 09:45 A rescue helicopter arrived at the accident site
At about 10:04 A rescue helicopter picked the injured up
At about 10:15 Arrived at a hospital

2.8 Additional Information

2.8.1 Following are written in the safety guideline at workplaces stipulated by the Contractor.
(Excerpt)

3-14 Prevention of Danger on Transport Work

3. Transport by Helicopter

A helicopter is mainly used for the following purposes at steel tower construction work, wiring work, power line repairing work, etc:

- Transport of materials, temporary materials, machineries

(5) An unloading site

An unloading site shall be chosen near the workplace and at the slow slope with little wind gust. If it is at a steep slope, a station shall be set. In both cases, the

trees obstructing the flight route shall be cut down.

Also, the following condition as an unloading site is included in this article.

Workplaces for unloading and for picking up shall be situated not less than 20m far from the trees around.

2.8.2 Following are written in the guideline of the material transport by helicopter stipulated by the Company. (Excerpt)

Make burdens at 20m far from obstructions.

2.8.3 According to the Contractor and the Company, the interpretation of the stipulations in 2.8.1 and 2.8.2 is as follows:

The safety guideline at the workplace stipulated by the Contractor is based on the content of the guideline of the material transport by helicopter provided by the Company.

Helicopters can hover at a higher position than the trees around the workplace when slinging or unloading by changing the length of a sling attached to the helicopter. So, the trees around the workplace will not obstruct the flight directly. As described in 2.1 (5), the reason why the burdens should be 20m far from the trees around is not for those lower than the helicopter hovering height when slinging or unloading but for the objects like power line towers which might obstruct the helicopter flight.

2.8.4 The Company had obtained the permission for flight at under minimum safety altitude based on the proviso of Article 81 of the Civil Aeronautics Act for this job.

3. ANALYSIS

3.1 Qualification of Personnel

The Captain held valid airman competence certificate and valid aviation medical certificate.

3.2 Airworthiness Certificate of the Aircraft

The Aircraft had a valid airworthiness certificate and had been maintained and inspected as prescribed.

3.3 Relation to Meteorological Phenomena

It is considered highly probable that meteorological phenomena at the time of the accident were not related to the occurrence of the accident.

3.4 Situation of the Accident

3.4.1 The Situation of the Aircraft

As described in 2.1 (1) and (2), the Aircraft approached *Otsu 33 Workplace* from the north with the Sling attached in order to transport the truck from *Otsu 33 Workplace* to the Helipad. This was the second approach to *Otsu 33 Workplace* on that day. It is considered highly probable that the Captain confirmed the workplace and Worker A through the mirror attached to the forward bottom of the Aircraft, the Mechanic on board as a guide confirming visually the workplace and Worker A standing just below with the left-side door kept open, and that the Aircraft gradually descended and lowered the hook at the end of the Sling.

When the hook was lowered to 3 ~ 4m from the ground, the Mechanic saw the tree around had broken off and had hit Worker A and told it to the Captain. The Captain immediately stopped descending and moved away from *Otsu 33 Workplace*.

As described in 2.1 (1) and (2), the Captain and the Mechanic had confirmed the trees nearby swaying with the downwash of the Aircraft. But it is considered highly probable that it was difficult to predict the tree to break off while on board the Aircraft.

3.4.2 The Situation of *Otsu 33 Workplace*

As described in 2.1 (3), when the hook of the Sling came down, Worker A at *Otsu 33 Workplace* tried to catch the hook with his right hand while he had a rope of the cargo net wrapping the truck in his left hand.

Judging from the description in 2.1 and 2.6, it is considered highly probable that Tree A, the inside of which rotted and became a cave, about 9m high on the ground and had been outside of cut down area on the mountainside of *Otsu 33 Workplace*, broke down at about 1m high from the ground because it had been swayed by the downwash of the Aircraft. It is considered highly probable that the broken Tree A fell down involving Tree B which also had been rotten inside and hit Worker A from his back. It is considered highly probable that Worker A could not notice the falling tree and could not avoid it because it occurred in the noise of the Aircraft and its downwash and also Tree A fell down from out of his view.

Judging from the description in 2.1 (2), it is considered highly probable that the swaying Tree A broke and flew to hit Worker A so that he was seriously injured in spite of wearing a helmet.

As described in 2.1 (3), Worker A had not experienced to see a trunk broken by the helicopter downwash before. Therefore it is considered highly probable that it might have been difficult for him to foresee the possibility of the tree to break down.

3.5 Stipulation

Judging from the description in 2.8.3, it is considered probable that the contents of the stipulation in 2.8.1 and 2.8.2 are not on the assumption of applying to a long slinging work.

3.6 Cutting Down the Trees at the Workplace

Judging from the description in 2.1(5), it is considered highly probable that the Contractor selected the location of *Otsu 33* Workplace in December 2008 considering the arrangement with the owner of the mountain, the viewpoint of environmental protection as well as horizontal distance from some obstruction (power line tower, etc.), amount of materials, transporting route and distance, flatness of the ground, and amount of trimmed trees, and so on. As described in 2.6, there remained bark at the bottom part of Tree A. Therefore it is considered probable that it was difficult to predict the inside to be rotten and to have become a cave by appearance.

To select a workplace, it is necessary to decide the cutting area properly not only by considering various factors above but also by paying sufficient attention to the condition of trees around which might be broken with the downwash of a helicopter.

4. PROBABLE CAUSE

It is considered highly probable that this accident occurred that the tree which had been standing around the workplace with its inside rotten was broken by the downwash of the Aircraft and hit, and injured the Worker A on the ground during the Aircraft was gradually descending to sling up materials at *Otsu 33* Workplace.

Figure 1 Estimated Flight Route

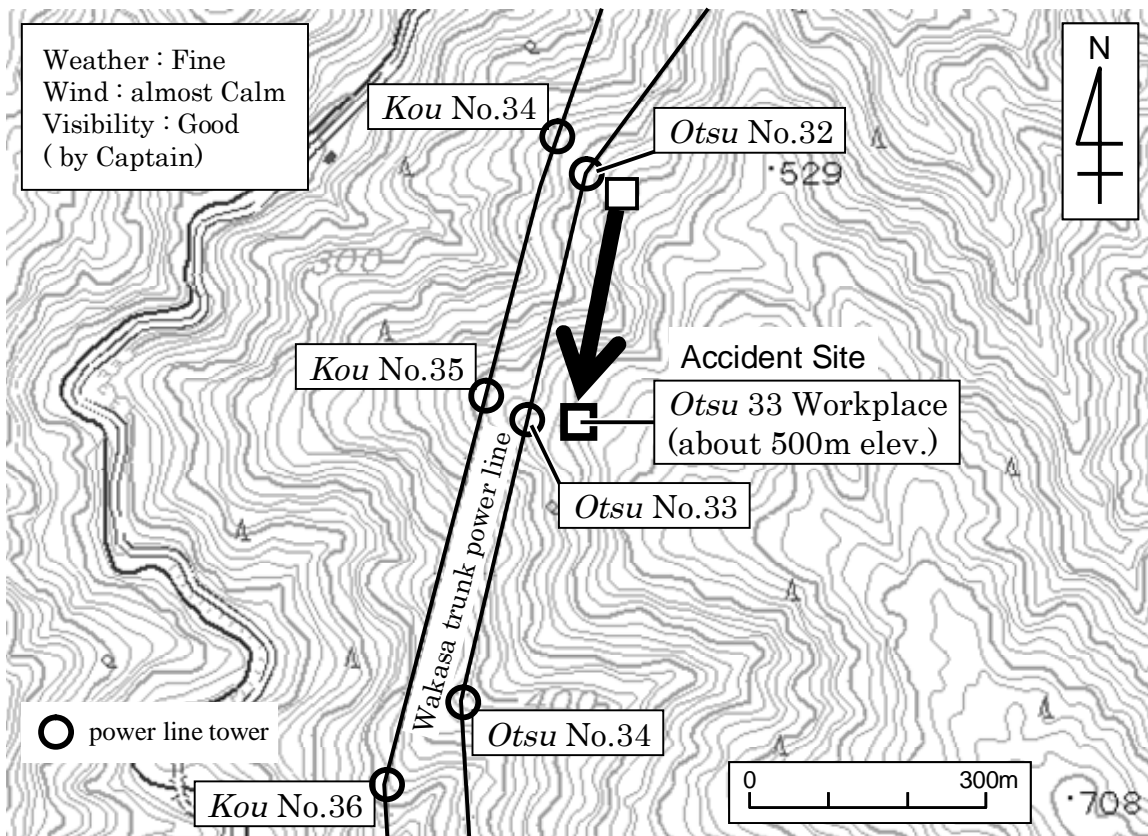
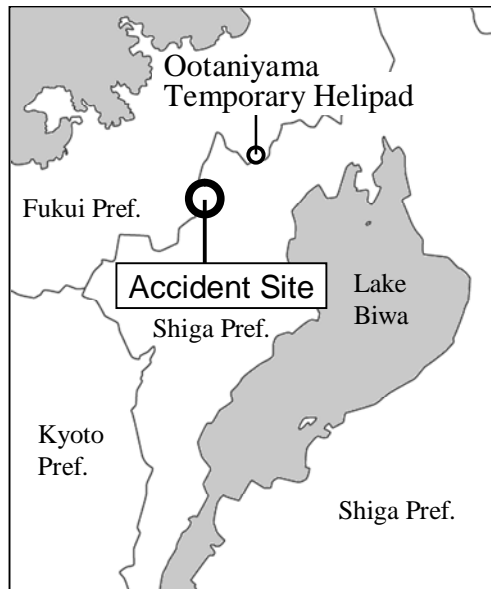


Figure 2 Accident Site Layout

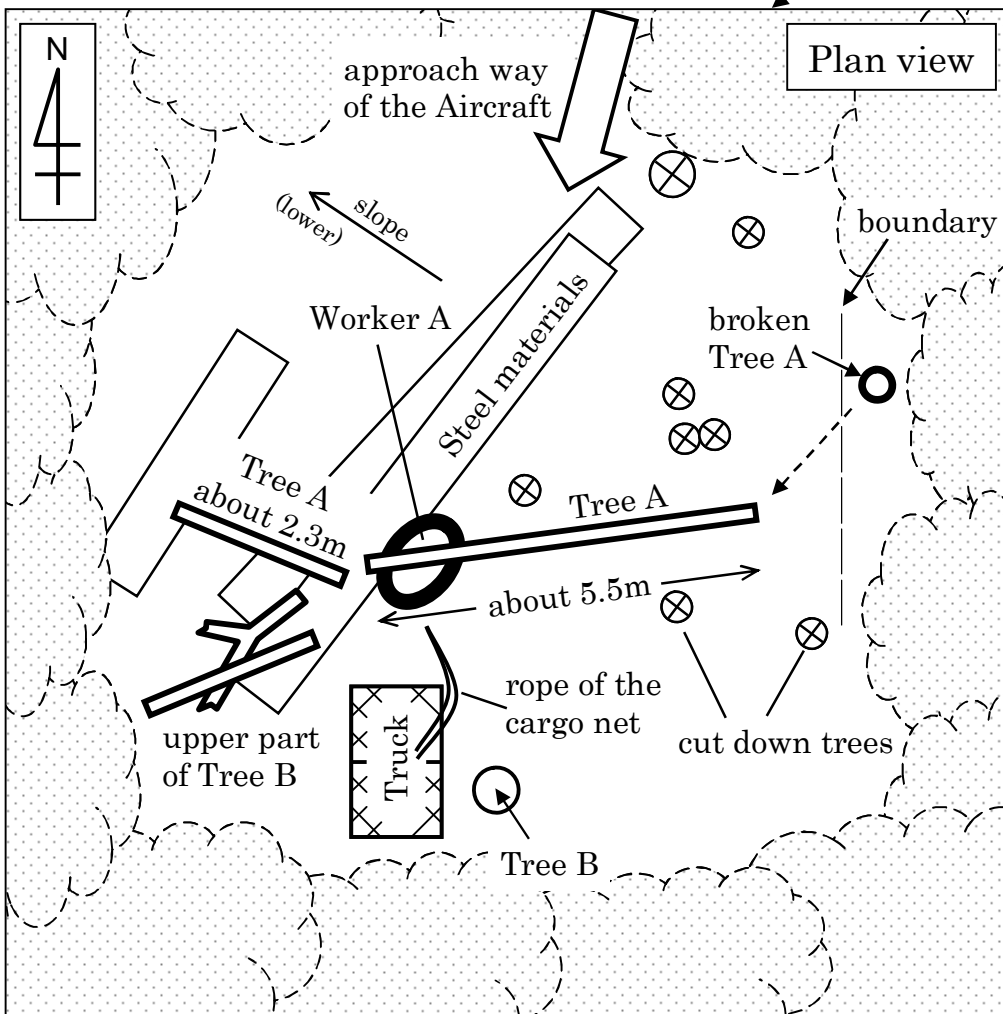
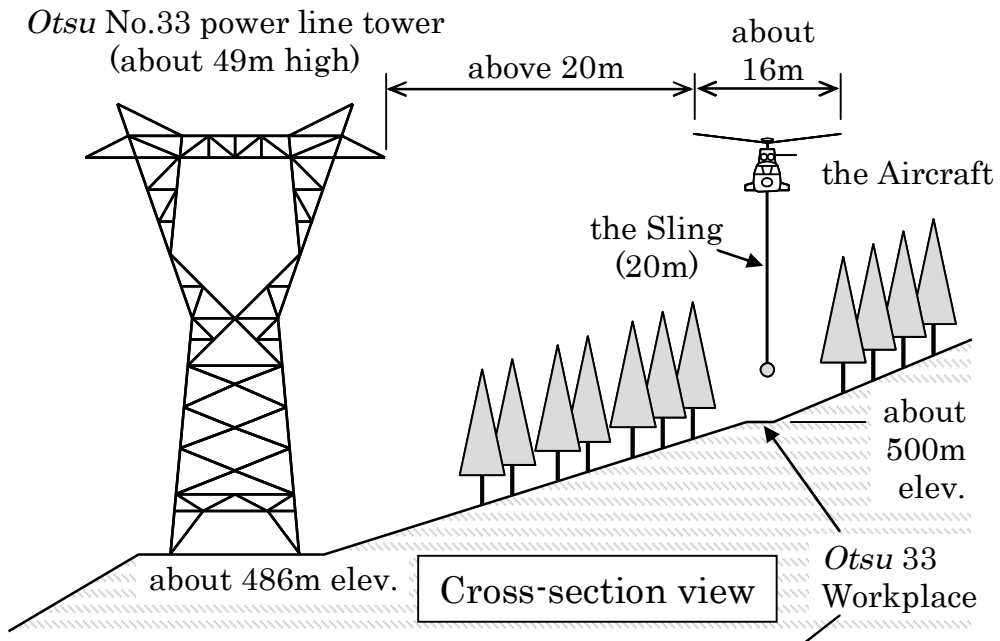


Figure 3 Three Angle View of Aerospatiale AS332L

Unit : m

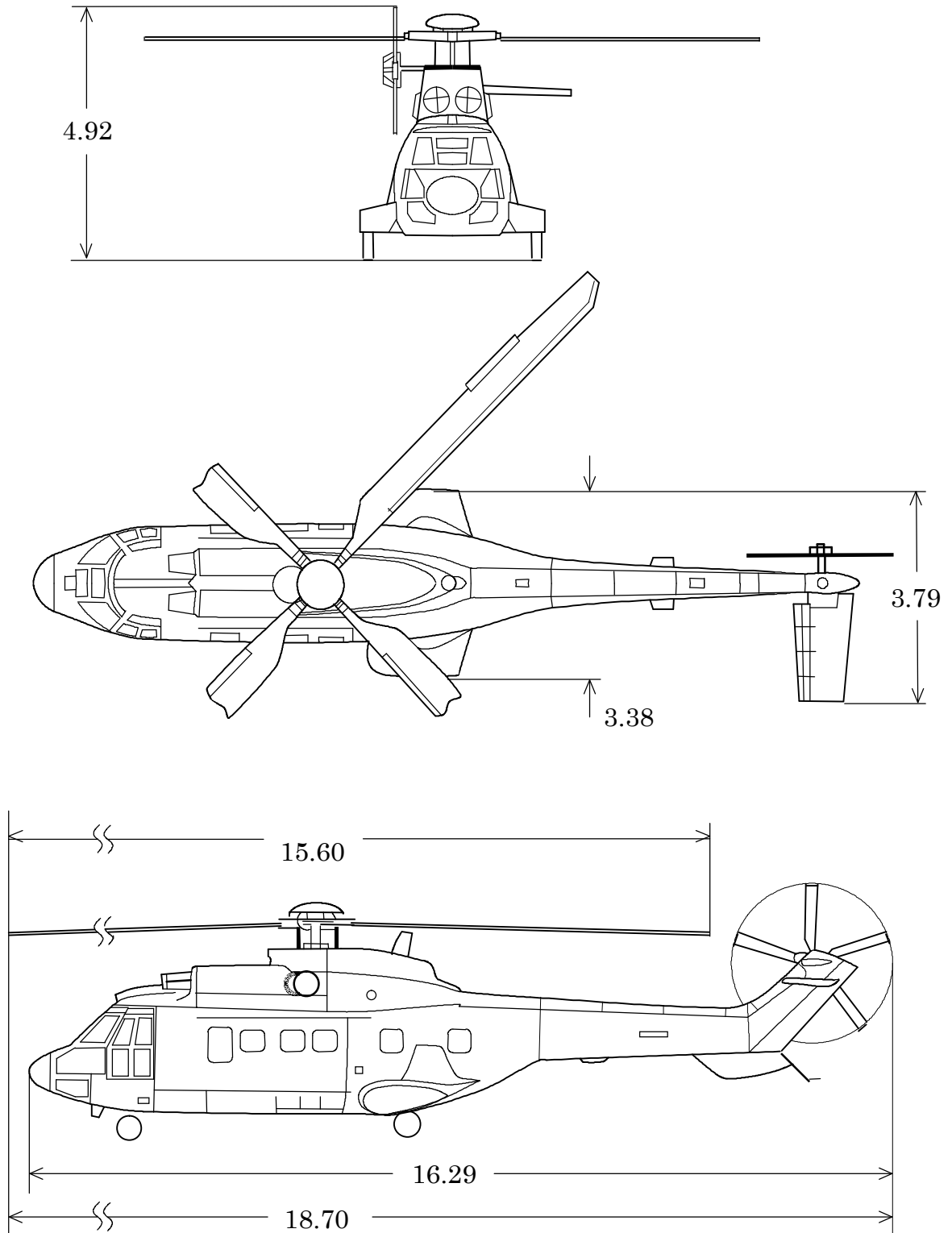


Photo 1 The Aircraft



Photo 2 *Otsu 33* Workplace



Photo 3 Accident Site

