～ Case Studies and Accident Analysis ～

JTSB Digests

JTSB (Japan Transport Safety Board)

(Issued in April, 2013)

Digest of Aircraft Accident Analyses

For Prevention of Small Aeroplane Accidents

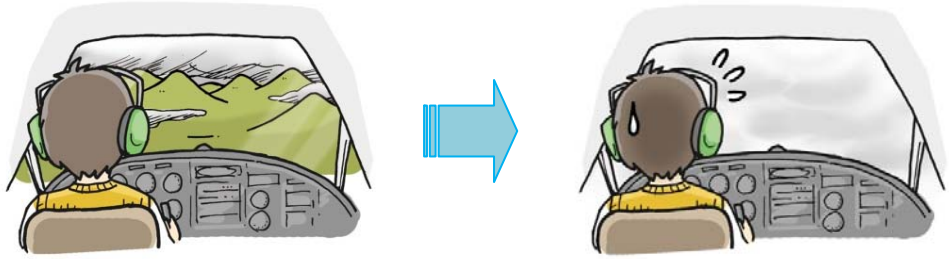
1. Preface

In September, 2012, the Board made an investigation report public about an accident involving a privately-owned small aeroplane which crashed into the south southeast slope of Mt. Yago, approximately 14km northeast of Kumamoto Airport in January, 2011, and recommended the Minister of Land, Infrastructure, Transport and Tourism (MLIT) that the fundamentals of VFR (visual flight rules) flights should be disseminated to all GA pilots in Japan in order to prevent accidents involving VFR flights flying into clouds. One example of the fundamentals to be disseminated is that the decision to take-off under VFR must be made only after ascertaining VMC (visual meteorological condition) be maintained throughout the intended route. We pointed out in this recommendation that in the past five years there were four cases where VFR flights of small aeroplanes or rotorcrafts ended up with accidents because they flew in clouds and that the most probable causes of these accidents were insufficient collection of weather information before flights and non-execution of returning to the departed airport upon encountering bad weather conditions, in other words, appropriate actions were not taken.

During the period of January, 2001 to December, 2011, five to ten accidents and serious incidents involving small aeroplanes occurred each year, and this accounts for approximately 1/4 of all the aircraft accidents and serious incidents for which the Board conducted investigations.

In view of these ongoing situations, we present some case studies of accidents involving small aeroplanes investigated by the Board and various statistical data for the prevention of similar accidents.

We hope that this digest will be used as teaching materials on various occasions such as safety seminars held by parties concerned, and will be able to contribute to the prevention of accidents involving small aeroplanes.



- **The definition in this digest of "Small aeroplane accidents and serious incidents"**
  Among the aircraft accidents and serious incidents for which the former Aircraft and Railway Accidents Investigation Commission and the Board conducted investigations, accidents and serious incidents involving small aeroplanes (aircrafts with a maximum take-off weight of 5,700 kg or less, excluding ultralight planes).

2. Statistics

In 2011, a total of 14 accidents and serious incidents, including an accident in January in which a small aeroplane crashed into a mountain slope and two occupants suffered fatal injuries, an accident in July in which a small aeroplane during a training crashed into a mountain slope and three occupants suffered fatal injuries, resulted in a total of 7 fatalities and the injured (fatalities 5, missing 1 and the injured 1).

In addition, among the aircraft accidents and serious incidents which occurred during the period of October 2001 to October 2012, and for which the Board conducted investigations, the number of accidents and serious incidents involving small aeroplanes was 81 (accidents 62 and serious incidents 19), and among these cases, we have made investigation reports public for 74 cases (accidents 55 and serious incidents 19).

The below is the statistics on the situations of these accidents and serious incidents involving small aeroplanes for which the Board conducted investigation.

* Figures 1 to 4 show data for a total of 81 cases including accidents and serious incidents. under investigation, and Figures 5 to 9 show data for 74 cases whose investigation reports of accidents and serious incidents. have been made public.
* Please note that some of the accidents and serious incidents referred to in this digest are under investigation, and the figures may change.

Breakdown by the type of accidents

By the accident type, the number of crashes was 20 (32.3%), damage to aircraft when landing 14 (22.6%), belly landing 9 (14.5%) and others. Also, the total number of damage to aircraft was 28 (45.2%). (See Figure 1)

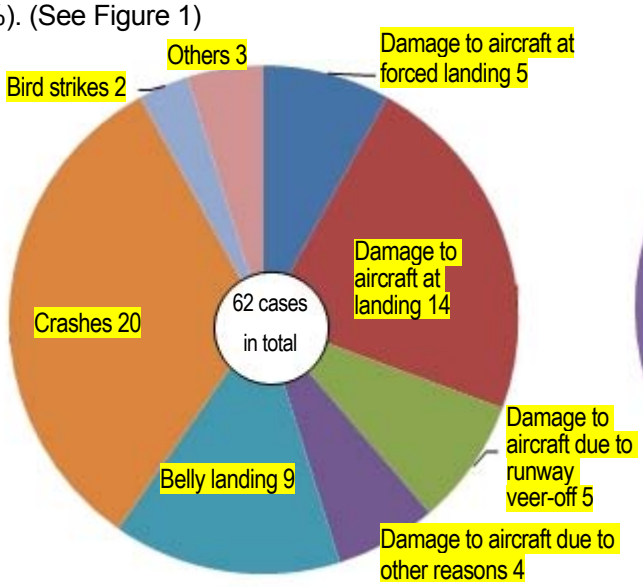


Figure 1: The number of cases by the type of accidents

Breakdown by the type of serious incidents

By the type of serious incidents, the numbers of runway excursions or runway incursions were 5 (26.3%) respectively, engine stopped 4 (21.1%) and others. (See Figure 2)

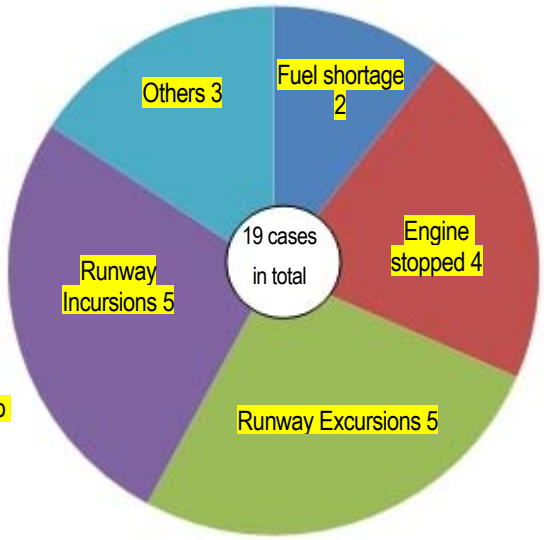


Figure 2: The number of cases by the type of serious incidents

Breakdown of fatalities and the injured

The total number of fatalities and the injured was 60. The breakdown is, fatalities 34 (56.7%), the seriously injured 14 (23.3%), the slightly injured 11 (18.3%) and others. (See Figure 3)

By the occupational category, the number of crew was 41 (68.3%), passengers 18 (30.0%) and others. (See Figure 4)

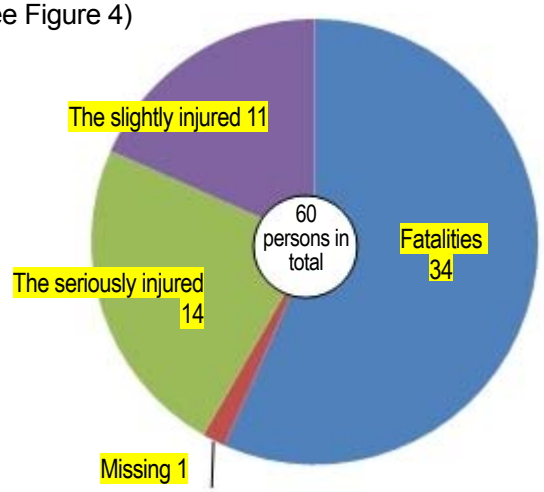


Figure 3: The number of fatalities and the injured

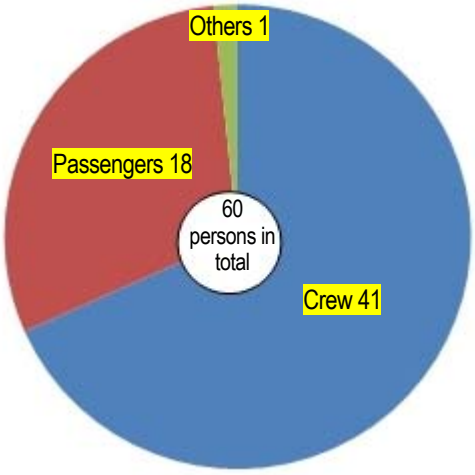


Figure 4: Breakdown of fatalities and the injured

Breakdown of aircraft damage categories

By the aircraft damage category, the number of destroyed aircrafts was 26 (35.1%), while substantially damaged aircrafts 28 (37.8%), slightly damaged aircrafts 9 (12.2%) and aircrafts with no damage 11 (14.9%). (See Figure 5)

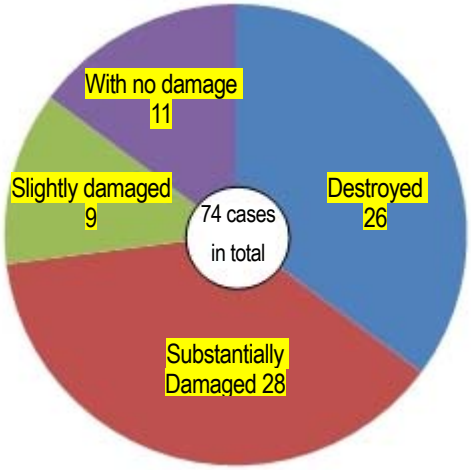


Figure 5: Breakdown of aircraft damage categories

Breakdown of accidents and serious incidents sites

By the accidents and serious incidents sites, the number of accidents and serious incidents that occurred at aerodromes/temporary aerodromes was 47 (63.5%), while mountains 8 (10.8%), flight routes 5 (6.8%), and others, and accidents and serious incidents at aerodromes/temporary aerodromes account for more than 60%. (See Figure 6)

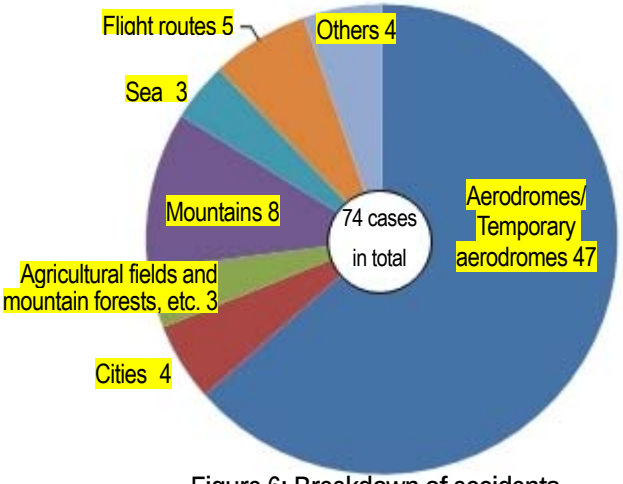


Figure 6: Breakdown of accidents and serious incidents sites

*** Definition of "Aircraft Damage Categories"**
Destroyed: It is extremely difficult to recover the aircraft's airworthiness due to the damage.
Substantially damaged: The aircraft needs a major repair to recover its airworthiness due to the damage.
Slightly damaged: The aircraft needs a minor repair or simple component replacement to recover its airworthiness due to the damage or failure.

Breakdown of operation phase

Nearly 90% of accidents and incidents occur during landing or cruising phase

By the operation phase at the time of the accidents and serious incidents, the number of accidents and serious incidents during landing phase was 39 (52.7%), during cruising phase 25 (33.8%), take-off phase 5 (6.8%) and others. Accidents and serious incidents landing and cruising phase account for nearly 90%. (See Figure 7)

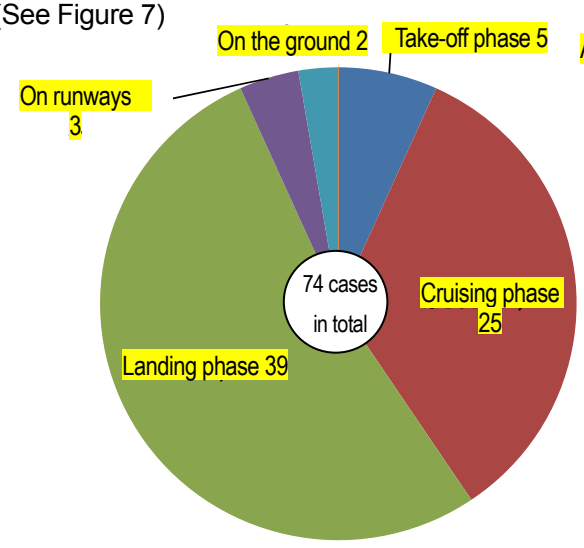


Figure 7: Breakdown of operation

Breakdown of flight purposes

Leisure, training and familiarity flight account for approx. 70%

By the flight purpose, the number of leisure flights was 21 (28.4%), familiarity flights 16 (21.6%), flight training 15 (20.3%) and others. These three categories account for approx. 70%. (See Figure 8)

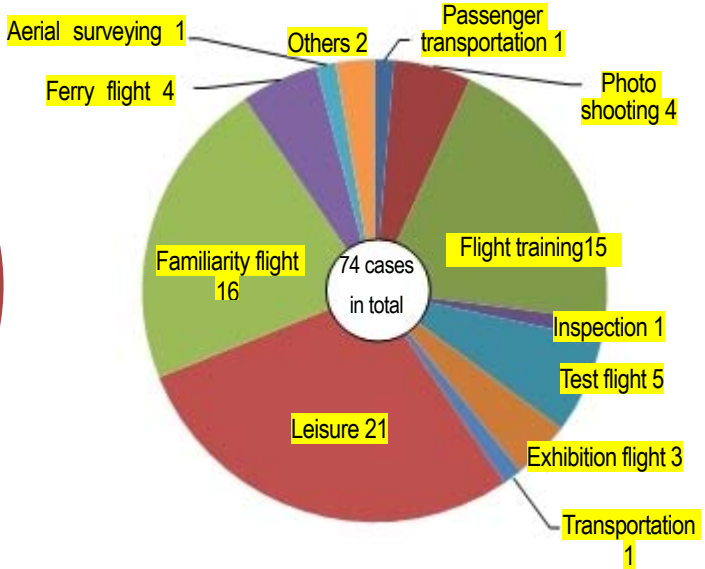


Figure 8: Breakdown of flight purposes

Breakdown of cause categories

Approx. 80% of accidents and incidents are caused by human factors

When the causes of accidents and serious incidents in the investigation reports are categorized into four categories; human, mechanical, environmental and organizational factors, the number of accidents and serious incidents caused by human factors is 38 (51.4%) while human and environmental factors 18 (24.3%), human and mechanical factors 5 (6.7%) and others. Approximately 80% accounts for "human factors or combination of multiple factors involving human factors". (See Figure 9)

Examples of human factors

Forgot
- ○ "Forgot" to extend the landing gears.
- ○ "Forgot" to retract the flaps to the take-off position.
- ○ The controller "forgot" to close the runway.

Assumed
- ○ "Assumed" that the aircraft could fly for more than approx. 6 hours when the fuel tank was full.
- ○ "Assumed" that he had retracted the flaps to 36° for landing.

Not confirmed
- ○ Did "not confirm" the meteorological information of the flight route.
- ○ Concentrated on the landing procedures and did "not confirm" the movements of the aircraft flying ahead.
- ○ Did "not confirm" the wind direction and velocity before landing.
- ○ Did "not check" the fuel amount before the flight.

Inappropriate/insufficient operation
- ○ "Inappropriate flight operation" for go-around
- ○ "Insufficient operation" of aircraft rotation
- ○ "Inappropriate" speed down
- ○ Over-run due to the "ground speed being too high"

Wrong judgements/belated decisions
- ○ "Wrong judgement" on returning to the departed airport or destination change
- ○ "Inappropriate judgement" on the night flight feasibility
- ○ "Belated decision" on go-around

Others
- ○ Confirmation activities having "lost substance"
- ○ Landing check "not performed"
- ○ "Carelessness" due to being accustomed to the activity too much
- ○ "Not sufficiently familiar" with terrain features of the mountainous area
- ○ "Too confident" due to abundant flight experiences
- ○ "Lack of experience" in crosswind landing
- ○ "Insufficiently prepared" in advance for selecting safe altitudes and routes based on terrain features
- ○ Landing "without sufficient space" between the outbound aircraft
- ○ "Misused" the flaps lever for the landing gear

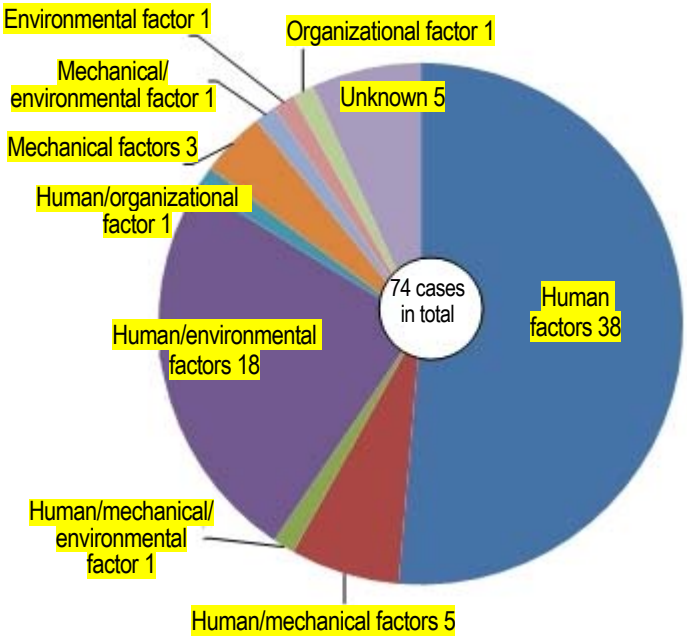


Figure 9: Breakdown of cause categories

Examples of mechanical factors

- ○ Cracks effected by corrosive action
- ○ Bumper rings deteriorated with age
- ○ Inaccurate fuel gauge
- ○ Bolts coming off due to engine vibration

Examples of environmental factors

- ○ Sudden changes in airflow
- ○ Strong crosswind and turbulence
- ○ Situation where it is difficult to fly VFR due to a fog
- ○ Local heavy rain
- ○ Bright sunrays
- ○ Wake turbulence

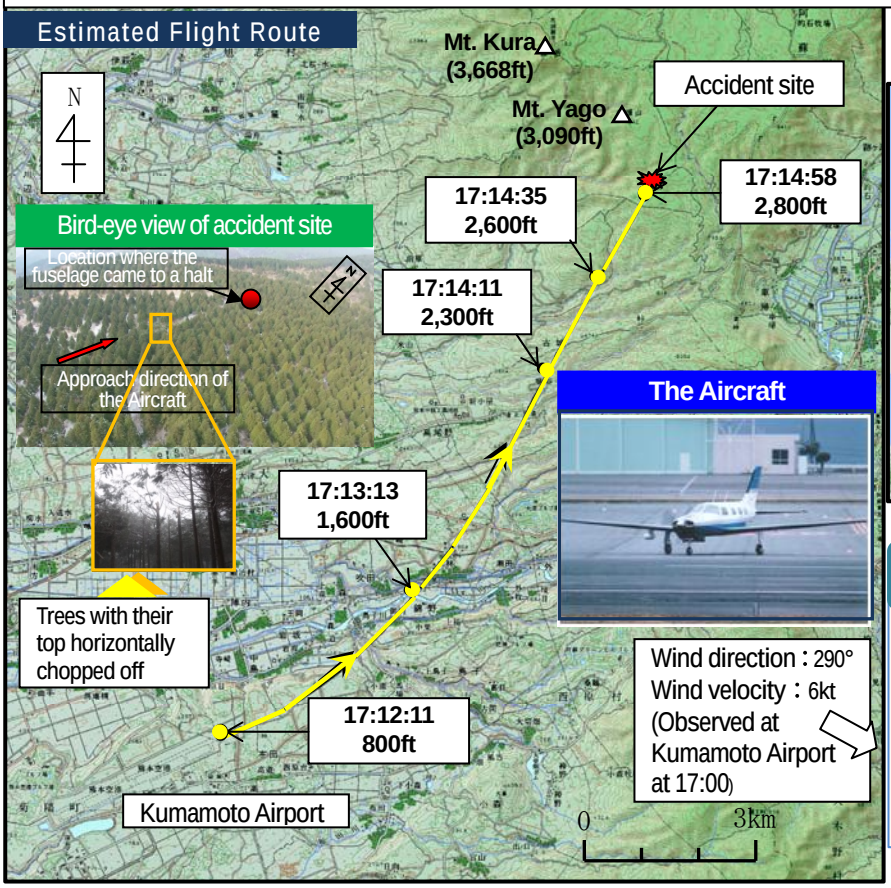
Examples of organizational factors

- ○ Training guidelines are not prepared
- ○ Education/training not thoroughly provided for the compliance with the operational standards, etc.

Case 1

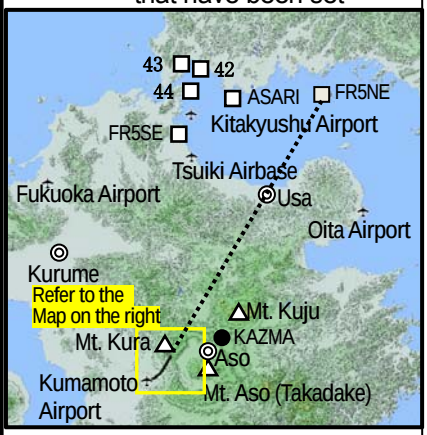
Flew into the mountain slope on the route during its in-cloud climb with a low climb rate

Summary: A privately owned Piper PA-46-350P (the Aircraft) took off from Kumamoto Airport at around 17:11 local time for Kitakyushu Airport for a leisure flight and went missing on Monday, January 3, 2011. Next day it was found on the south-south-east slope of Mt. Yago, 14km northeast of the airport, having been destroyed and a pilot in command (PIC) and a passenger having suffered fatal injuries next day.



Used the 1/50000 topographical map by The Geospatial Information Authority of Japan as the base

□ : User's way points (*1) that have been set



Weather conditions near the accident site around the time of the accident

The weather conditions near the accident site around the time of the accident were gloomy in clouds with snow fall under reduced ambient light. Therefore the Aircraft flew into clouds or through clouds with snow fall. These conditions very likely prevented the PIC from obtaining visual cues of the terrain under the conditions thereof.

* 1: Geographical points used to set a flight route are generally called "way point (WP)".

Events Leading to the Accident

Around 17:11
The Aircraft took off from Kumamoto Airport.

17:14:11
The PIC made a position report to the Kumamoto Airport Control Tower (hereinafter, "Kumamoto Tower") at 6nm north of the airport at 2,300ft.

17:14:25
The PIC reported to Kumamoto Tower saying, "climbing to 6,500 ft."

17:14:58
The Aircraft vanished from the radar system of Kumamoto Tower.

Around 17:19
An aircraft flying over KAZMA (way point) at 10,000 ft reported to Kumamoto Tower of a reception of emergency locator transmitter (ELT) signal.

Causal Factors of the Accident

Possible explanation for the hurried take-off from the airport for Kitakyushu Airport are the deteriorating weather near Kumamoto Airport and for maintaining VFR flight (Visual Flight Rules) (*2) under diminishing daylight conditions caused by the almost sunset time.

*2 : A method of a flight in a visual meteorological condition (VMC), which is a climate condition where a sufficient vision can be maintained for flight.

It is possible that the PIC decided to resume the flight to Kitakyushu Airport without receiving the weather briefing at the weather station at Kumamoto Airport, as he had judged, from the clouds to the north of the airport during the descent, that the flight to Kitakyushu Airport would be possible by climbing to 6,500 ft in order to fly above the clouds to the north of Kumamoto Airport with the help of onboard weather radar after the take-off from Kumamoto Airport.

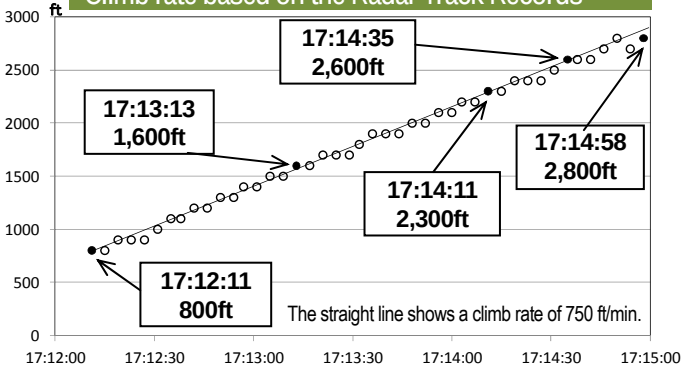
PIC's Familiarization to Terrain Features Near Kumamoto Airport

The Aircraft's flight logbook did not contain PIC's flight records for landing at and taking off from Kumamoto Airport; however, his logbook contained records for landing at and taking off from Kumamoto Airport on different small aeroplanes. These records suggest a possibility that he was not sufficiently familiar with the terrain features near Kumamoto Airport.

The Aircraft's Flight Route

The PIC's possible intention was to take the course which would enable him to fly over mountains of moderate height at 6,500 ft, without flying over mountains of comparably high height and reach Kitakyushu Airport by turning to the left during its after-takeoff climb and flying directly to WP positioned on the extension of the Aircraft's flight path, as shown in the Estimated Flight Route.

Climb rate based on the Radar Track Records



It is possible that the low climb rate after taking off from Kumamoto Airport suggests that the PIC expected icing conditions and kept the climb rate low in order to maintain climb speed activating the ice protection.

It is possible that as he was not sufficiently familiar with mountain terrain features near Kumamoto Airport, he shifted into a straight ascent with a low climb rate, giving priority to a climb speed.

Selection of Flight Rule

Kumamoto Airport was in the visual meteorological condition (VMC).

Generally an IFR (Instrument Flight Rule) (*3) travel distance to Kitakyushu Airport is longer than that of VFR, leading to a longer flight time, and IFR radio transmissions with ATC organizations are more complicated.

It is possible that the PIC chose to fly VFR at the time of takeoff.

* 3: A flight method while receiving instructions from air-traffic controls all the time regarding the aircraft's flight route and flight methods.

PIC's Departure Judgment

The following possibilities are summarized:

- The PIC had an outlook for an en-route flight rule change to IFR depending on the weather even though he chose to fly under VFR upon taking off from Kumamoto Airport.
- He depended on the onboard weather radar and navigation device.
- He reduced the climb rate in order to secure a climb speed anticipating icing conditions.
- He was not familiar with mountain terrain features near Kumamoto Airport; however, he believed that he could climb through the clouds without crashing into terrain even with the reduced climb rate.

In order to Prevent Recurrence (Recommendation)

In light of the investigation results of this accident, the JTSB in accordance with the Paragraph 1, Article 26, the Act of JTSB establishment, recommends the Minister of Land, Infrastructure, Transport and Tourism as below.

In order to prevent accidents in which an aircraft end up with accident after it flew in clouds under VFR, following directions should be disseminated to all the members of pilot associations and individual pilots, also using opportunity by the newly introduced "Review System on Specific Pilot Competence" (Heisei 24 MLIT Ordinance No.22).
(1) Commence flying only when VMC is maintained all across the en-route based on the latest weather information.
(2) Prepare alternative plans in case where deteriorating weather while collecting weather information on en-route.
(3) Decide well in advance on returning to the departed airport or landing at a proper place.

We would like all small aeroplane pilots to understand the purpose of these recommendations and ensure safe flights.

The investigation report of this case is published on the Board's website (issued on September 28, 2012)
http://www.mlit.go.jp/jtsb/eng-air_report/JA701M.pdf

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

Case 2

Loss of visual contacts with the ground and following failure to maintain minimum safe altitude during a VFR flight led to the aircraft's crash into the tree canopies on the ridge

Summary: On July 28 (Wednesday), 2010, a Cessna TU206G operated by Company A took off from Niigata Airport at 08:49 local time for a ferry flight to Sapporo Airfield, but it did not arrive there even after the estimated arrival time of 12:49 and went missing.
Search and rescue (SAR) activities found the crashed aircraft in the east of Mt. Iwabe-dake in Fukushima-town, Matsumae-gun, Hokkaido Prefecture, and having been destroyed and the pilot in command (PIC) and one passenger having suffered fatal injuries on July 30 (Friday), 2010.

Events Leading to the Accident

Around 08:49

The aircraft took off from Niigata Airport and flew visual flight rules (VFR) to Sapporo Airfield.

Around 09:07

The company's Niigata office provided the aircraft with aeronautical weather data for Sapporo Airfield and Okushiri Airport as of 09:00.

It is highly probable that the aircraft was flying almost in line with its planned flight route from Niigata Airport to an area over Tappizaki at an altitude of about 3,500 ft.

10:37:32

The aircraft continued to fly northward over the Tsugaru Straits at an altitude of about 3,500 ft and started a descent just in front of Hokkaido.

10:39:16

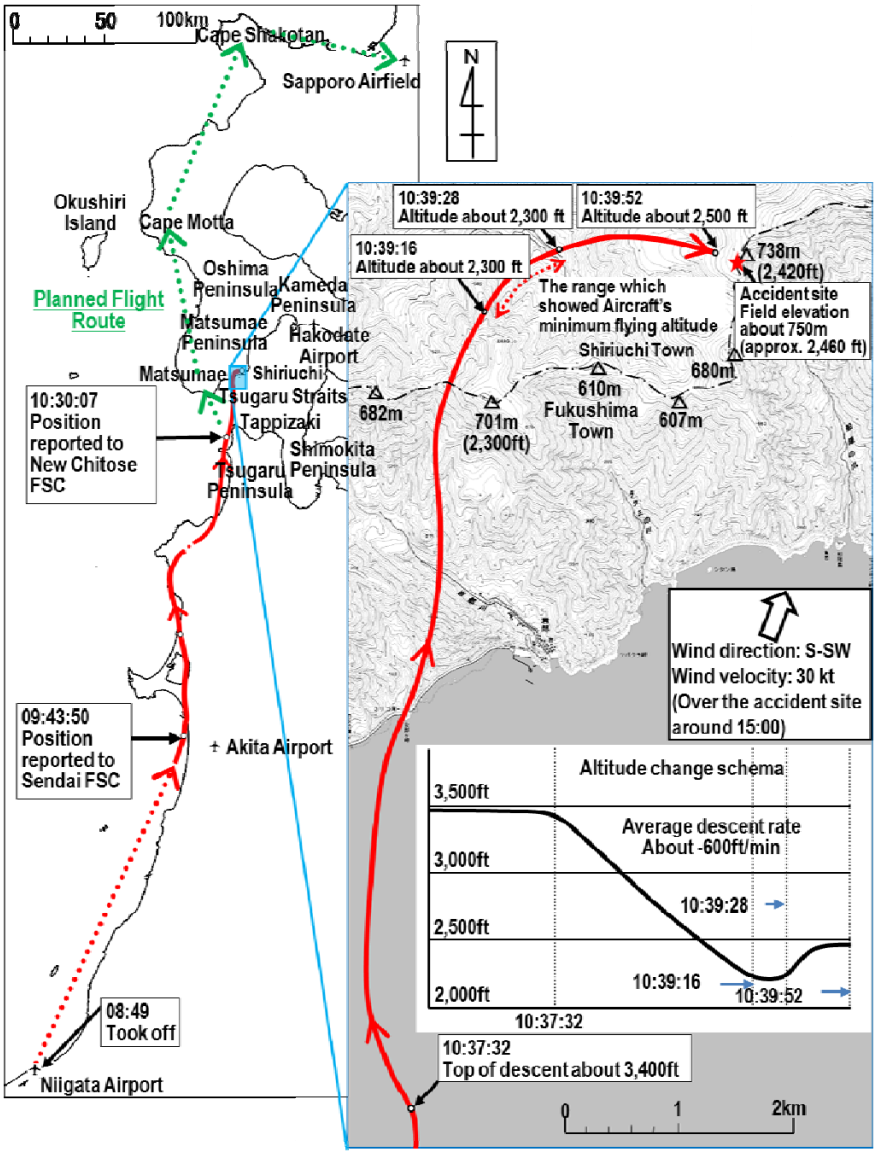
After changing its course to north-northeast the aircraft descended to about 2,300 ft, subsequently climbed to about 2,500 ft in a right turn and headed for east-southeast.

10:39:52

The aircraft disappeared from the ATC radar at an altitude of about 2,500 ft while flying east-southeastward over the mountains which border Shiriuchi-town, Kamiiso-gun and Fukushima-town, Matsumae-gun, Hokkaido Prefecture.

The aircraft

Estimated Flight Route



FSC : Flight Service Center

Causal Factors of the Accident

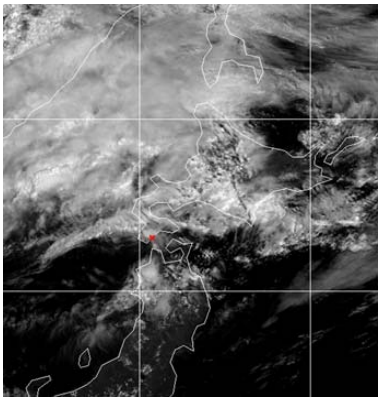
Relations with Meteorological Phenomena

Confirmation of weather condition before departure by PIC

It is possible that the PIC probably judged before departure that weather in the Hokkaido region would worsen as time goes by.

It is possible that the company's dispatcher had no consultation with the PIC about meteorological information on the day of the accident.

It is possible that judging from the meteorological conditions on the day of the accident, the PIC should not have decided to have a VFR flight for Sapporo Airfield.



Meteorological Satellite Japan Area Visible Imagery (at 10:30 on July 28)

○A pilot needs to confirm meteorological information before the flight in cooperation with an operation dispatcher and they should discuss for common understanding about the weather.

Operation Monitoring and Operation Support

The aircraft was probably able to continue its VFR flight up to the Tsugaru Strait, just in front of the Oshima Peninsula, after taking off from Niigata Airport and flying past the Tohoku region.

The PIC's post departure confirmation of the latest aeronautical weather observations for Sapporo Airfield and Okushiri Airport probably made him think that it would be difficult to fly on the planned route as via the western coast of Hokkaido recognizing bad weather at Okushiri Airport whereas the weather at Sapporo Airfield – the destination was good.

It is probable that the Operation Control Department of Company A did not do operation monitoring, collection of en-route meteorological information and forwarding necessary information to the aircraft.

○It is possible that limited radio coverage from the local office of Company A causes certain limitation to operation monitoring and supply of meteorological information by the Operation Control Department, however, the Company should carefully and sufficiently confirm meteorological information obtained from weather forecasts and meteorological observations and provide necessary information to pilots involved.
○Effective use of information possessed by the employees across the country, by the whole company via the HQ Operation Control Department will ensure assured operating against changes of the weather.

Continued VFR flight under reduced visibility condition

It is probable that the PIC was aware of the option of a flight rule change from VFR to IFR, upon considering the onboard equipment and aircraft performance, in case he expects to encounter an IMC during the VFR flight.

The PIC had a tendency to avoid clouds by lowering the altitude and fly visually confirming the ground under bad weather conditions.

As the company's regulation stipulates that "In principle, no VMC ON TOP flight is authorized," the PIC probably chose descend to avoid clouds and to fly low below the clouds maintaining visual contacts with the ground.

The aircraft was flying over the Tsugaru Strait and then, it was flying at a low altitude for a period of 2 minutes 20 second from its start of descent to the time when its target disappeared from the ATC radar display. It is probable that the PIC, without changing flight rules from VFR to IFR by climbing, continued to fly VFR at low altitude and without requesting for a radar vector by an ATC facility and the aircraft consequently crashed into the tree top near the ridge.

○ When a pilot flying VFR expects to encounter a condition where it is difficult to fly maintaining minimum safe altitude, he/she should bear in mind that he/she has an option of changing the flight rule to IFR at an appropriate time upon considering the onboard equipment and airplane performance, and requesting for a radar vector by an ATC facility.

Maintaining minimum safe altitudes

While flying over the Tsugaru Straits, the PIC decided to advance to mountainous area in Oshima Peninsula where parts of the ridges were visible through patches of clouds and then, in order to avoid in-cloud flight, descended below the clouds.

After advancing to the mountainous area in the Oshima Peninsula, the PIC maintaining visual contact with the ground adjusting the altitude to avoid the clouds, flew in the direction of fewer clouds avoiding ground contact.

The PIC tried to continue north-bound flight over the mountainous area; however, low hanging clouds prohibited his visual recognition of mountain features over the wide area. The PIC judged that his attempt would be difficult and he decided to turn to the right to fly over the sea. His trial was done under low visibility condition with degraded visual recognition of mountain ridges. The belated decision making lead to a flight into a tree top on the mountain ridge.

○When a pilot flies under VFR while maintaining VMC and visual ground contact under reduced visibility condition, the pilot needs to maintain a minimum flyable safe altitude, recognizing the position of aircraft, the geographical features and objects on the ground in the area and confirming mountain elevations on the flight route.
○In order to fly through an area where the weather is bad and low visibility is expected, a pilot who flies under VFR has to check elevations of mountains and other objects in the area where he may fly over before flying.
○When a pilot flying under VFR expects to encounter a condition where it is difficult to fly maintaining minimum safe altitude, the pilot needs to change the flight route while avoiding clouds or change the destination aerodrome without delay.

In order to Prevent Recurrence

Company A needs to implement a thorough safety education for its pilots again regarding the following matters:

○ A PIC should make the final decision that the weather in the airspace he is going to fly is appropriate for a flight in a cautious manner based on the weather forecasts and meteorological observations.

○ When a pilot flying under VFR expects to encounter bad weather conditions, the pilot do not try too hard operation and needs to make a decision to turn back without delay.

○ When a pilot, who has a valid instrument flight certificate, flies an aircraft authorized for IFR flight and expects to encounter bad weather conditions during its VFR flight, the pilot should bear in mind that he/she has an option of changing the flight rule to IFR at an appropriate time upon considering the onboard equipment and airplane performance, and requesting for radar vector by an ATC facility.
For an aircraft without an anti-icing system and is prohibited from flying in an icing meteorological condition like this aircraft, attention should be paid to avoid airspace where icing conditions are expected.

The investigation report of this case is published on the Board's website (issued on July 27, 2012)
http://www.mlit.go.jp/jtsb/eng-air_report/JA3902.pdf

Case 3

The aircraft bounced during the landing at the airport, which led to the damage of propellers and fuselage structure.

Summary: On March 24, 2011, a Cessna 172S operated by Company A took off from Kumamoto Airport for a solo training flight. The aircraft was damaged when it bounced during the landing at the airport. A student pilot on board the aircraft suffered no injury.

The aircraft

Events Leading to the Accident

The student pilot took off from Kumamoto Airport for solo training flight for air maneuvers at 12:24, he entered the base leg (*) for runway 07 south traffic pattern.

* A flight path before an aircraft turns and enters the final approach course (final leg) for landing.

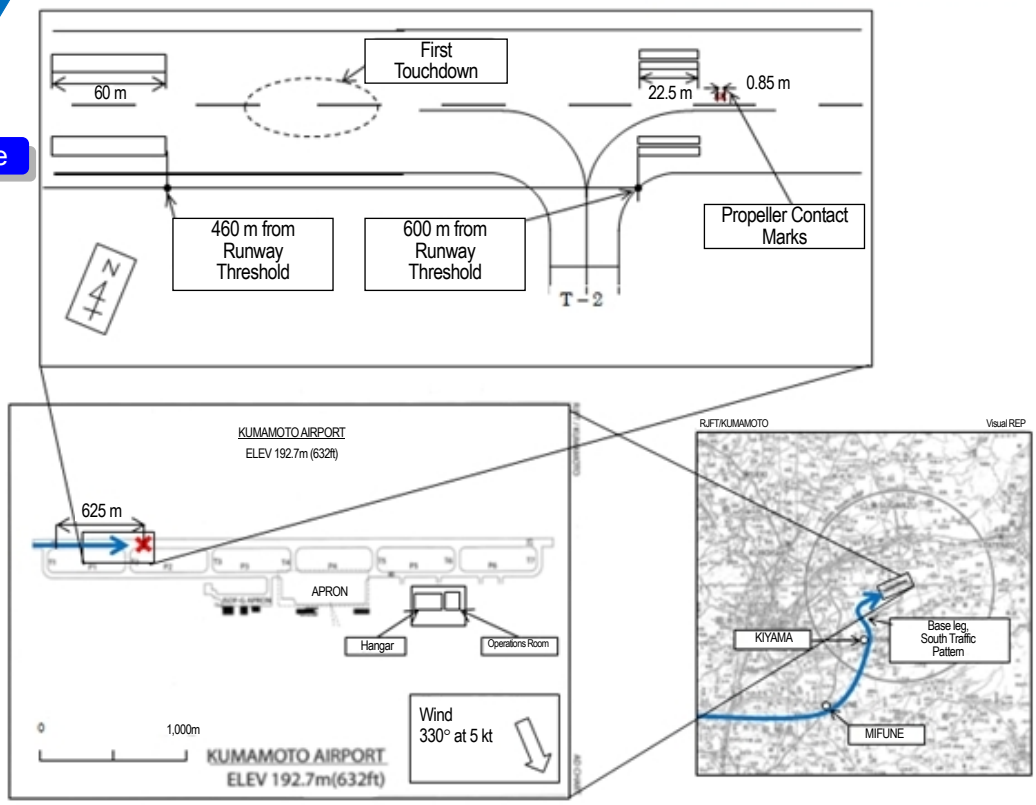
He set the flaps at FULL DOWN on the mid-final at about 75 kt. The runway threshold airspeed was about 71 kt.

Analysis

It is possible that he established faster final speed - approx. 75kt against 70 kt, and threshold speed – approx. 71 kt against 65 kt, as the flight instructor in charge had pointed out premature airspeed reduction deriving from the student pilot's tendency to rotate more than necessary during roundout.

To next page

Estimated Flight Route



From previous page

1st touchdown

The student pilot retarded the throttle to IDLE for touchdown, but the aircraft sank suddenly immediately before the touchdown, landed harder and bounced high.

It is possible that the fact that he probably established faster final speed - approx. 75kt against 70 kt and then could not establish a landing attitude, a possibility of effects of winds, and a touchdown with a larger touchdown speed and sink rate, resulted in a bounce.

The height of bounce was as high as that of his past experience so that he judged that he could land as usual and continued landing procedures.

He had been giving instructions to execute a go-around upon the first bouncing when an aircraft bounced during landing. It is possible that if he had done as instructed, the accident could have been avoided.

2nd touchdown

It is very likely that the aircraft bounced upon landing, followed by a nose-low hard contact with the runway, resulting in damage of propeller blades and fuselage structure.

He had possibly pushed the control wheel or failed to apply back elevator pressure to hold the pitch down attitude, resulting in the nose-low contact with the runway. It is highly probable that hard strikes of propeller blades very likely lead to the damage of fuselage structure.

Damage of the propeller blades

The aircraft bounced again, this time higher. He executed a go around to avoid follow-on nose low attitude.

In order to Prevent Recurrence

- ○ It is necessary to develop teaching techniques to have students pilots acquire proper flareheight and touch-down attitude, and share them among instructors.
- ○ As it is possible that student pilots in early phase may not have sufficient landing techniques, granting them solo flight needs to be done with further cautious considering weather conditions and their preparedness.
- ○ Appropriate training including in-flight training should be given to student pilots so that they could execute a go-around without hesitation in order to address the unexpected sink after passing over the runway threshold or bouncing after the touchdown.

The investigation report of this case is published on the Board's website (issued on September 28, 2012)
http://www.mlit.go.jp/jtsb/eng-air_report/JA33UK.pdf

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

4. Conclusion

Based on our investigation reports on accidents (three cases) mentioned in this digest and other small aeroplane accidents investigated/made public, we summarized how these accidents and serious incidents occurred, and what are the lessons which will help prevent recurrence are as follows.

How "small aeroplane accidents and serious incidents" occurred

◆ Breakdown of operation phase

Nearly 90% of accidents and incidents occur during landing or cruising phase

By the operation phase at the time of the accidents and serious incidents, the number of accidents during landing phase was 39 (52.7%), during cruising phase 25 (33.8%), take-off phase 5 (6.8%) and others. Accidents and serious incidents landing and cruising phase account for nearly 90%.

◆ Breakdown of flight purposes

Leisure, training and familiarity flights account for approx. 70%

By the flight purpose, the number of leisure flights was 21 (28.4%), familiarity flights 16 (21.6%), flight training 15 (20.3%) and others. These three categories account for approx. 70%.

◆ Breakdown of cause categories

Approx. 80% of accidents and incidents are caused by human factors

The number of accidents and serious incidents caused by human factors was 38 (51.4%) while human and environmental factors 18 (24.3%), human and mechanical factors 5 (6.7%) and others. Approximately 80% accounts for "human factors or combination of multiple factors involving human factors".

Lessons from accident investigation

◆ **About meteorological information and VFR**

Lesson (1) Whether a PIC will commence flying should be carefully decided based on meteorological information before flying VFR.

Lesson (2) A PIC even with onboard GPS or other navigation devices, should not fly into clouds on its path under VFR. Under the situation where continued VFR flight is impossible, he should take actions such as returning to the departed airport at an early stage or changing flight rules to IFR.

◆ **About flight training**

Lesson (3) For flight training, it is necessary to develop teaching techniques to have students pilots acquire proper flare height and touchdown attitude, and share them among instructors.

Lesson (4) Appropriate training should be given to student pilots to give them decisiveness to execute a go-around without delay through classroom and in flight training to counter the unexpected sink after passing over the runway threshold or bouncing after the touchdown.

A word from Director for Analysis, Recommendation and Opinion

A lot of accidents involving small aeroplanes are caused by human factors, such as not sufficiently confirming necessary information, etc., inappropriate flight operation, misjudgments, forgetting or assuming something. In addition, it can be said that because a lot of PICs choose to fly VFR without depending on instruments, they are always required to try not to fly into an airspace with a bad visibility condition and to prepare measures for that.

Whether you fly a small aeroplane for leisure and do not routinely fly one or you routinely fly one for business, please go back to basics each time you fly, and continuously develop yourself for improved safety awareness through training and seminars. I believe if each one of you will do these it will lead to the prevention of a lot of accidents and serious incidents.

Your comments are most welcome

Japan Transport Safety Board (JTSB)
2-1-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918 Japan
JTSB Secretariat
(Staff in charge: **Director for Analysis, Recommendation and Opinion**)
TEL: +81-3-5253-8824 FAX: +81-3-5253-1680
URL: http://www.mlit.go.jp/jtsb/index.html
e-mail: jtsb_analysis@mlit.go.jp