Chapter 4　Case studies

In this chapter, we look at specific accident cases based on the content of the preceding chapters.

As described in Chapter 3, most ARC accidents are attributable to pilot's operations. Therefore, by particularly focusing on:

(1) The case where problems with an assessment for solo flights, etc., were found
(2) The case caused by inappropriate response to strong wind (turbulence) during training flight
(3) The case caused by lack of knowledge about aircraft in general during flight

we will review their contributing factors, causes, and measures to prevent recurrence.

1. Case: Pilot seriously injured because of a hard landing

Date and time of occurrence:	At about 9:58 on March 21, 2022
Type:	Alexander Schleicher ASK13
Summary of the accident:	The glider was launched from Kisogawa Gliding Field, Kaizu City, Gifu Prefecture, with only a pilot trainee on board for solo flight training, and when landing at the gliding field, it made a hard landing, and the solo trainee was seriously injured.

First flight (flight instructor on board)

Flight status of the glider	Pilot trainee's operation	Flight instructor's instructions and decisions
Flight with a flight instructor on board	Flight skills were stable.	Granted solo flight permission.
	Proceeded to the 2nd flight.	**Skill confirmation standards for granting solo flight permission** The skills including the stability shall be confirmed in each flight with multiple instructors or in multiple flights with a single instructor. However, in this case one instructor granted permission after a single assessment. (The provision was forgotten.)

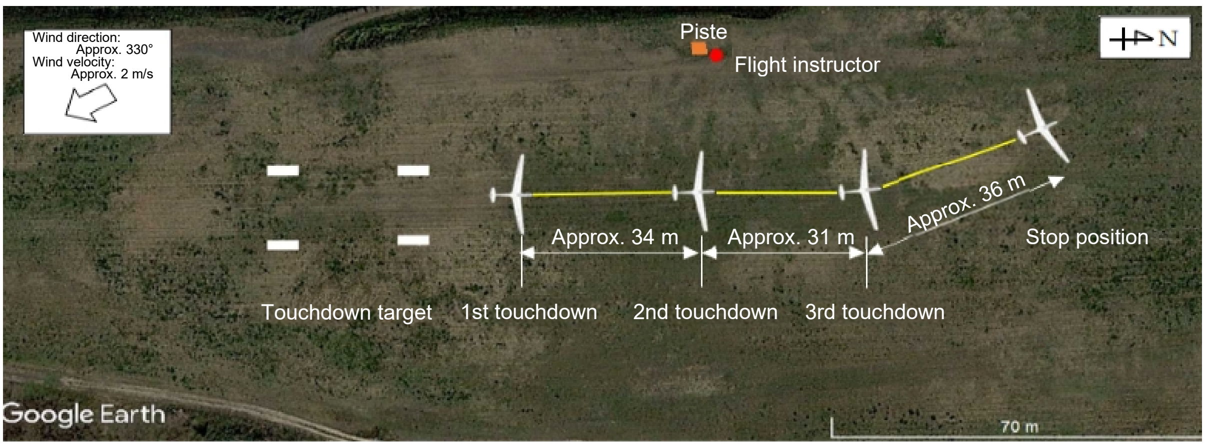
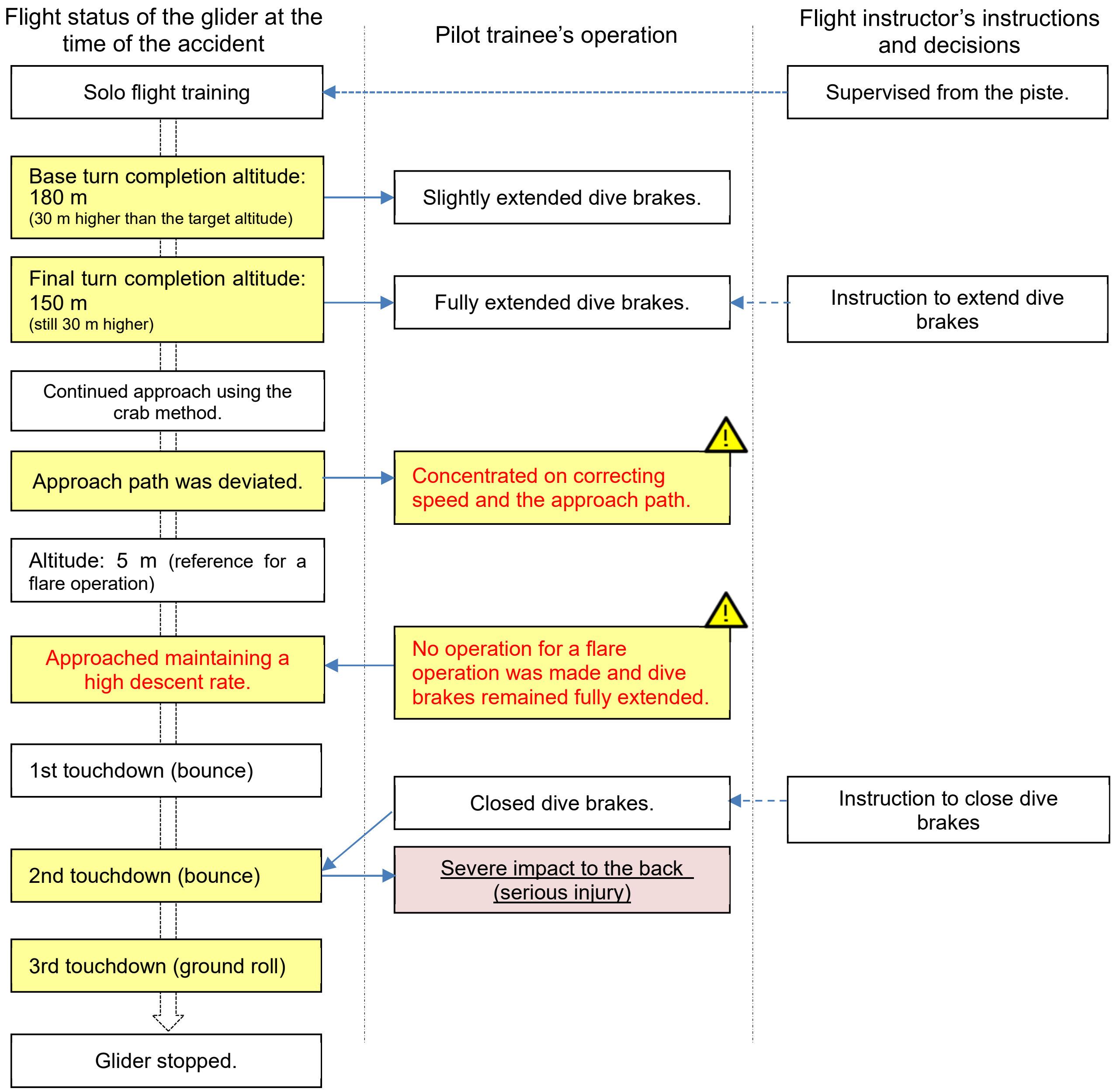


Figure 9: Estimated flight route for the 2nd flight

Second flight (solo flight)



Probable causes:

The JTSB concludes that the probable cause of the accident was that the trainee made a landing approach on a path higher than usual with the dive brakes fully extended, thus the descent rate became higher than usual, and the flare operation was delayed because the trainee was concentrating on correcting the speed and approach path, which caused the glider to make a hard landing and bounce, and the trainee to be seriously injured because of the impact at the second touchdown.

For the prevention of recurrence

- It is necessary to make all concerned aware of the rules regarding skill confirmation for granting solo flight permission to trainees so that skill confirmation is carried out according to the procedures.
- It is desirable to consider the methods for flight instructors to give appropriate instructions depending on the situation.

The investigation report of this case is published on the website of the JTSB. (Published on January 27, 2023.)
https://jtsb.mlit.go.jp/aircraft/rep-acci/AA2023-1-2-JA2151.pdf

2. Case: Lower part of aft fuselage contacted the runway surface because of turbulence

Date and time of occurrence:	At about 11:30 on February 3, 2021
Type:	Textron Aviation 172S
Summary of the serious incident:	The aircraft executed a go-around maneuver because of unstable attitude when landing at Kitakyushu Airport during solo flight training, and the lower part of its aft fuselage contacted the runway surface.

Pilot trainee

Student pilot permit	Total flight time:	50 hours 10 minutes
	Total flight time on the type of aircraft:	50 hours 10 minutes
	Flight time in the last 30 days:	8 hours 15 minutes

Flight instructor (onboard the instructor aircraft)

Flight status (weather conditions)

At the start of the approach

(Limitation for the crosswind component of the runway exceeded.)

When passing the airport island end

(Airflow disturbance (aircraft unstable))

Approximately 30 ft above ground level

Approximately 10 ft above ground level

(The aircraft was shaken by the winds and sunk.)

Pilot trainee's operation

Continued approach judging that landing was practicable from the experience of landings with an instructor on board.

Passed runway threshold with flaps extended to full down and at a specified approach speed and approach angle according to the landing procedures.

Took the landing attitude with power set at idle position.

Performed a nose-up operation by pulling the control column.

<u>The aircraft did not stop sinking, and the trainee performed further nose-up</u>

Decided to perform a go-around maneuver and set the throttle to maximum.

An abnormal noise and impact as if the main landing gears and the tail section contacted the ground simultaneously

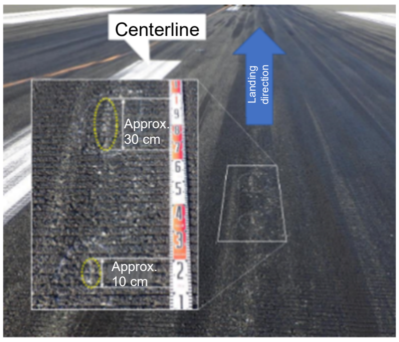
Flight instructor's response

The instructor was on board the instructor aircraft and was flying behind the trainee so as to land following the trainee after supervising the flight of the trainee in the air.

Interdependency

Judged that landing at Kitakyushu Airport, where the trainee had experienced the same level of crosswind landing, was more appropriate than diverting to another airport, etc.

- In the post-flight inspection, scratch marks, etc., were found on the aft fuselage.
- Scratch marks were found on the runway surface.



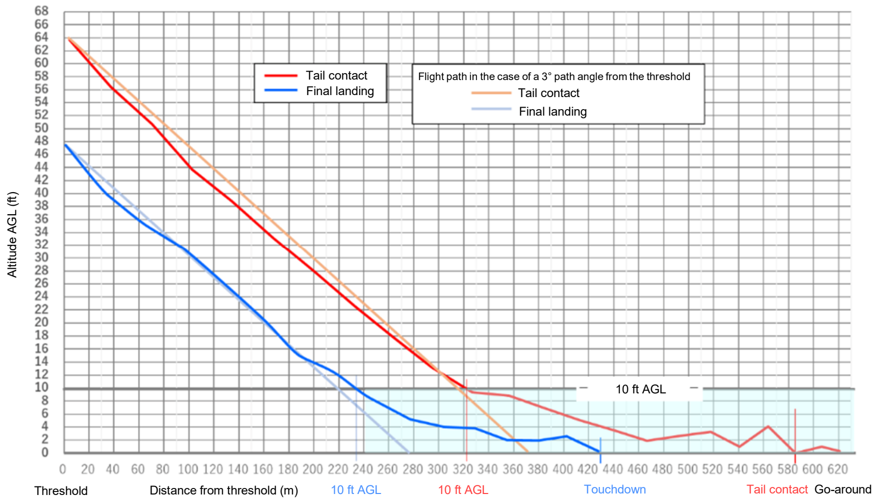


Figure 10: Comparison of flight paths from the threshold to contact (touchdown)

Probable causes:

The JTSB concludes that the highly probable cause of the serious incident was that the aircraft executed a go-around maneuver because of unstable attitude at a low altitude when performing a landing approach, and the lower part of its aft fuselage contacted the runway surface before turning to climb. As for the unstable attitude of the aircraft at the low altitude, it is probable that the following factors were involved: the aircraft encountered turbulence immediately before touchdown; and a significant nose-up operation was performed under such an influence.

For the prevention of recurrence (measures taken by the operator)

- It was decided, when crosswinds are expected during a solo flight, to calculate the crosswind component by using a virtual wind velocity that takes into account a safety margin, and to carry out a prior weather conditions survey by a monitoring aircraft (with an instructor other than the supervisor on board), as needed, to decide whether to conduct the solo flight.
- The response was clarified so that, when the crosswind component exceeds the safety standard and a landing approach is judged to be impracticable, the monitoring aircraft instructs the solo flight aircraft to hold in the air or divert to an alternate aerodrome for landing.

The investigation report of this case is published on the website of the JTSB. (Published on January 20, 2022.)
https://jtsb.mlit.go.jp/aircraft/rep-inci/AI2022-1-2-JA393A.pdf

3. Case: Propeller blade tips contacted the runway surface when the aircraft touched down again after bouncing

Date and time of occurrence:	At about 18:06 on March 6, 2022
Type:	SOCATA TBM700
Summary of the serious incident:	While the aircraft repeated bouncing on Runway A at Yao Airport, its propeller blade tips contacted the runway.

Flight status	Captain's operation	Related matters
Encountered airflow disturbances at an altitude of around 500 ft when approaching the runway. (Continued until landing.)	Indicated airspeed: 85 kt PAPI: 4.5° Approached using the aiming point marking as the aiming point.	Flight experience on the type of aircraft: • It was the first solo flight on the aircraft type after completing the education and training for those who intend to fly the aircraft for which they have no flight experience, specified in the guideline of the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism. • The captain had engaged in Airbus A320 scheduled flights as a pilot for about one month from the day following completion of the training to the day prior to the occurrence of the serious incident.
The descent rate was not reduced, and the aircraft touched down with a large impact and lifted off again.	Reduced the engine thrust to idle and performed a flare operation.	
Repeated bouncing three times at an interval of two to three seconds, and its attitude became unstable when it lifted off the last time.	The captain judged that it was possible to land without performing a go-around maneuver and proceeded with the landing with idle engine thrust maintained.	
(Touched down from its nose gear while it was bouncing.)	The captain judged that it would be dangerous to continue landing, and commenced a go-around maneuver in the vicinity of Taxiway A2.	

In the post-landing check, damage to the propeller blade tips was found. Scratch marks were also found on the runway surface.

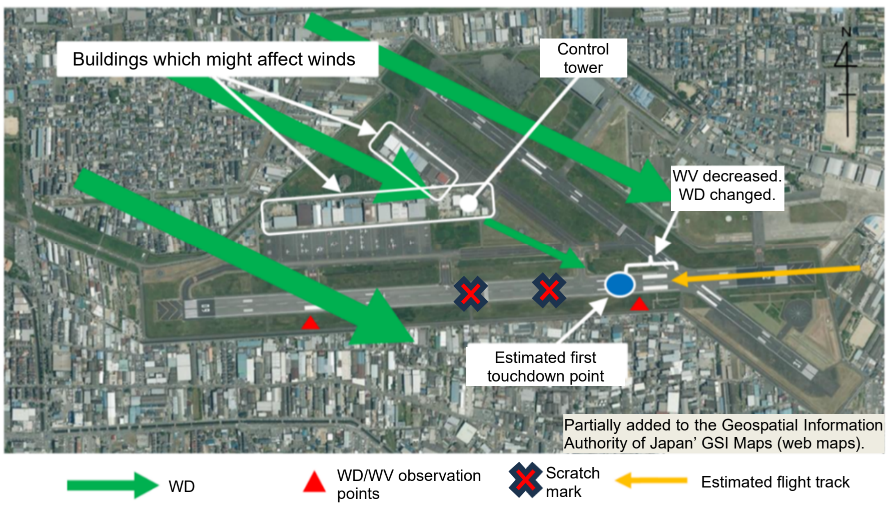


Figure 11: Wind conditions at the airport and scratch marks

Characteristics of Yao Airport:

- The approach angle indicated by PAPIs installed at Yao Airport is 4.5° for Runway 27, which is steeper than that of typical airports.
- When a strong wind blows from the northwest, a phenomenon where an aircraft sinks significantly sometimes occurs after passing the threshold of Runway 27 until touching down.

Probable causes:

The JTSB concludes that it is probable that the serious incident occurred as the aircraft, which had not been able to reduce its descent rate in the strong wind blowing from northwest, touched down with an impact larger than usual and bounced, and touched down again in a nose-low attitude because it could not maintain proper attitude. As for the aircraft's second touchdown in a nose-low attitude, it is probable that the change in the aircraft's attitude after bouncing was not properly recognized.

For the prevention of recurrence

- It is necessary to perform a go-around maneuver without hesitation when a bounce occurs after touching down with an impact larger than usual while the descent rate has not been reduced.

The investigation report of this case is published on the website of the JTSB. (Published on February 16, 2023.)
https://jtsb.mlit.go.jp/aircraft/rep-inci/AI2023-2-2-JA007Z.pdf