AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

DRAGGING DURING LANDING OF ANY OTHER PART OF THE LANDING GEARS OF THE AIRCRAFT,

ASAHI AIRLINES CO.,LTD.

TEXTRON AVIATION G58, JA58GC

YAO AIRPORT, YAO CITY, OSAKA PREFECTURE, JAPAN

AT ABOUT 10:19 JST, JULY 20, 2023

June 7, 2024
Adopted by the Japan Transport Safety Board
Chairperson TAKEDA Nobuo
Member SHIMAMURA Atsushi
Member MARUI Yuichi
Member SODA Hisako
Member NAKANISHI Miwa
Member TSUDA Hiroka

Company	Asahi Airlines Co., Ltd.
Type, **Registration Mark**	Textron Aviation G58 JA58GC
Incident Class	The occurrence covered by this report falls under the category of "Dragging during landing of any other part of the landing gears of the aircraft". Item (iii), Article 166-4 of the Regulation for Enforcement of the Civil Aeronautics Act of Japan
Date and Time of the Occurrence	At 10:19 Japan Standard Time (JST: UTC+9 hours), July 20, 2023
Site of the Serious Incident	Yao Airport, Yao City, Osaka Prefecture (34° 35' 46" N, 135° 35' 57" E)

1. PROCESS AND PROGRESS OF THE INVESTIGATION

Summary of the Serious Incident	On Thursday, July 20, 2023, when approaching and touching down on Runway 27 at Yao Airport as being operated by the trainee for touch-and-go training, the aircraft repeated

	bouncing*1, then executed a go-around controlled by the captain who was the instructor. The post-flight check made by the mechanics found each blade tip of left propeller was damaged, and then confirmed scratch marks on the runway. On board the aircraft were three persons in total with an instructor, a trainee, and a passenger, but no one was injured.
Outline of the Serious Incident Investigation	The Japan Transport Safety Board (JTSB) designated an investigator-in-charge and an investigator on July 21, 2023 to investigate this serious incident. Comments on the draft final report were invited from the parties relevant to the cause of the serious incident and the relevant state.

2. FACTUAL INFORMATION

Aircraft Information

(1) Aircraft type: Textron Aviation G58
Serial number: TH-2469 Date of manufacture: October 5, 2016
Airworthiness certificate: No.Dai-2022-584 Validity: January 13, 2024
Category of Airworthiness: Airplane, Normal N

(2) When the serious incident occurred, the aircraft's weight is estimated to have been 5,036 lbs and the position of the center of gravity is estimated to have been 81.91 in, both of which are estimated to have been within the allowable limits (i.e., maximum landing weight of 5,400 lbs, and center-of-gravity range of 74.0 to 86.0 in based on the estimated aircraft weight at the time of the serious incident).

(3) The display-type integrated avionics unit (Garmin G1000 avionics system) that was equipped with the aircraft retained records of the flight.

Personnel Information

(1) Captain (Instructor) Age 39

Commercial pilot certificate (Airplane)	January 26, 2010
Pilot competency assessment/confirmation	
Expiration date of piloting capable period:	August 27, 2024
Type rating for multiple engines (Land)	January 26, 2010
Instrument flight certificate (Airplane)	May 10, 2018
Class 1 aviation medical certificate	
Validity	August 27, 2024
Total flight time	1,785 hours 11 minutes
Flight time in the last 30 days	5 hours 08 minutes
Total flight time on the type of aircraft	154 hours 16 minutes
Flight time in the last 30 days	5 hours 08 minutes

(2) Trainee Age 22

Commercial pilot certificate (Airplane)	January 12, 2022

*1 A “bouncing” is a phenomenon where an aircraft bounces back into the air after the aircraft touched down during landing.

Pilot competency assessment/confirmation	
Expiration date of piloting capable period:	January 12, 2024
Type rating for multiple engines (Land)	August 25, 2021
Class 1 aviation medical certificate	
Validity	April 23, 2024
Total flight time	205 hours 24 minutes
Flight time in the last 30 days	0 hour 00 minutes

Meteorological Information

(1) The aerodrome routine meteorological reports (METAR) for the Airport as of 10:00 on the day of the serious incident were as follows:

Wind direction: VRB*2, Wind velocity: 6 kt, Prevailing visibility 10 km or more

Cloud: Amount 1/8, Type Cumulus, Cloud base 2,000 ft

Amount 6/8, Type Cumulus, Cloud base 3,000 ft

Temperature: 29 ºC, Dew point 20 ºC, Altimeter setting (QNH) 29.77inHg.

(2) Table 1 shows the observation values of instantaneous wind direction and velocity around the time of the serious incident, which were measured by the anemometer installed in the vicinity of about 370 m to the west from the east side end of Runway A, about 60 m south from the runway centerline, and ground height about 10 m.

Table 1: Observation Values of Instantaneous Wind Direction and Velocity at Runway 27

Time	WD (°)	WV (kt)	Time	WD (°)	WV (kt)	Time	WD (°)	WV (kt)
10:18:06	050	5	10:18:24	060	6	10:18:42	050	4
10:18:12	080	5	10:18:30	080	4	10:18:48	070	6
10:18:18	070	7	10:18:36	080	5	10:18:54	070	7

Event Occurred and Relevant Information

(1) History of the Flight

At about 09:15, the aircraft took off from Yao Airport, being operated by the trainee, for training to obtain the qualification for the instrument flight certificate, with the trainee on the left pilot seat and the instructor on the right pilot seat. The instructor was on behalf of other instructor who was in charge of the trainee. The trainee had not flown an actual aircraft for about a year and seven months. And it was the first time for the trainee to receive the flight training using the actual Textron Aviation G58 airplane and make take-off and landing at the airport.

After conducting air operation training in the training areas, the aircraft returned back to the airport and conducted continuous touch-and-go training five times on Runway A (Runway 09/27, length 1,490 m, width 45 m) The first continuous touch-and-go was conducted on Runway 09 (PAPI at angle of 4.0°). Due to high landing approach angle (path angle) (the path was off above the original path when the aircraft was heading toward the runway) and larger inputs in aiming power, the aircraft executed a go-around. The second and subsequent rounds of continuous touch-and-go were conducted on Runway 27 (PAPI at angle of 4.5°). At the second round, the path angle was low (the path was off below the original path when the aircraft was heading toward the runway), therefore the aircraft executed a go-around. At the third round, despite of low path angle

*2 "VRB", which is an abbreviation for "variable", is used to indicate the following variable wind conditions: when the mean wind speed is less than 3 kt and the total variation is 60° or more, when the mean wind speed is 3 kt or more and the total variation is 180° or more, or when one wind direction cannot be specified.

and larger inputs in power, the aircraft landed because it was not such an approach that would require to execute a go-around. At the fourth round, the power inputs were somewhat larger, but the path angle was normal, thus, the aircraft landed.

At the fifth round of continuous touch-and-go, the aircraft bounced repeatedly after the touchdown, therefore, the aircraft executed a go-around, being controlled by the instructor. The situation from the final approach to the go-around were as follows:

a) At 10:16, when the aircraft was cleared for continuous touch-and-go from an air traffic controller at Yao Airport Traffic Control Tower, the surface wind notified to the aircraft was 050°/6 kt.

b) On the final approach, the power was somewhat large, but the path angle was normal. The elevator trim was set to the nose up direction.

c) When the aircraft passed the runway approach end, the speed was 102 kt, 7 kt faster than the performance value of 95 kt for the landing weight.

d) After the aircraft passed the runway approach end, the trainee reduced the power to Idle.

e) At the time of the first touchdown, the aircraft touched down with the pitch attitude lower than the original one, almost made the touchdown of three-points (nose landing gear and both main landing gears) (see Figure 1 a). The descent rate at touchdown was 600 ft/min.

f) After touchdown, the aircraft bounced. The instructor assisted the trainee in controlling to maintain the appropriate attitude. The instructor judged that the bounces would stop eventually by maintaining a proper aircraft attitude.

g) Although the instructor did not remember when the procedures were performed, but according to the statement of the trainee, after the first touchdown, the instructor performed the procedures required for continuous touch-and-go training (raise the flaps, set the elevator trim to take-off position (the nose down direction)).

h) After the aircraft bounced, its heading veered slightly to the right, the bank angle swung left and right, and before the second touchdown, the aircraft banked to the left.

i) The second touchdown was made on the nose landing gear while the aircraft was being tilted to the left (see Figure 1 b).

j) After touchdown, the aircraft bounced again. After the bounce, the instructor muttered, “This is not good.”

k) The third touchdown was also made on the nose landing gear (see Figure 1 c). After the touchdown, the aircraft bounced again.

l) While the aircraft bounced repeatedly, the power of the aircraft was idle.

m) The instructor said, “Go around”, took over the control of the aircraft, turned the power to the maximum and performed the go-around.

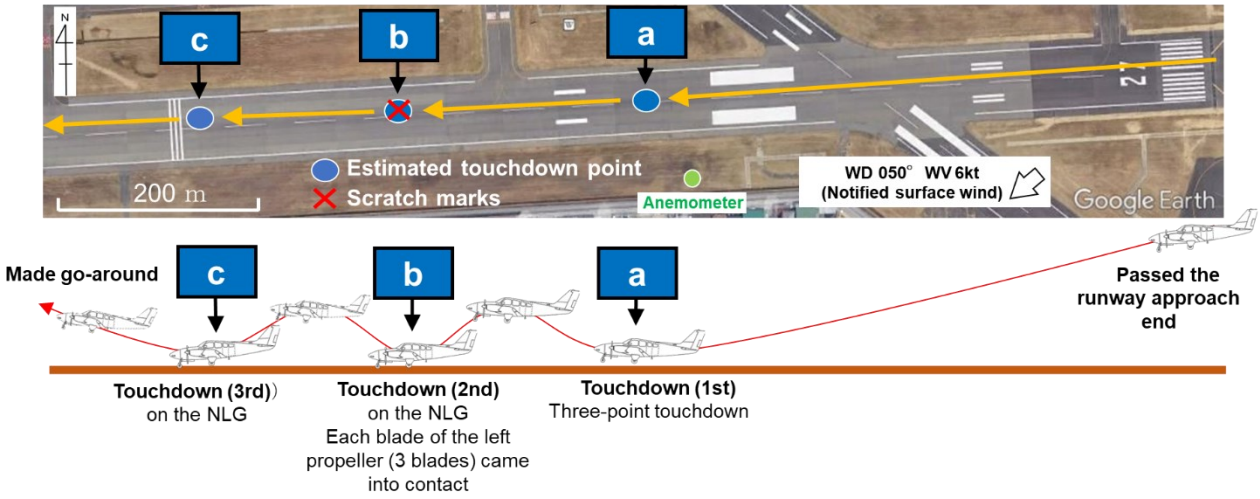

Figure 1: Estimated Flight Route

After the go-around, the instructor, the trainee and the passenger did not feel the abnormality in the aircraft while flying on the traffic pattern. The trainee took over the control of the aircraft, the aircraft landed on Runway 27 at 10:23, piloted by the trainee. The post-flight check was conducted by the instructor and the trainee. The instructor focused on checking around the landing gears because the aircraft had bounced hard, but it never occur to the instructor that its propeller blades had contacted with the runway surface.

In the afternoon of that day, the aircraft was used for training by another instructor and another trainee. During the pre-flight check on the aircraft, this instructor felt something wrong with the shape of the propeller blades but did not notice the damage to them because this instructor did not go so far as to compare and inspect the left and right propellers. In that training, there were no such take-offs and landings that caused the propellers to contact with the runway.

After the afternoon training was completed, the post-flight check was conducted by the mechanics, which confirmed damage to each blade tip of the left propeller.

(2) Damage to the Aircraft

Damage to each blade (3 blades) of the left propeller (approximately 7 mm)

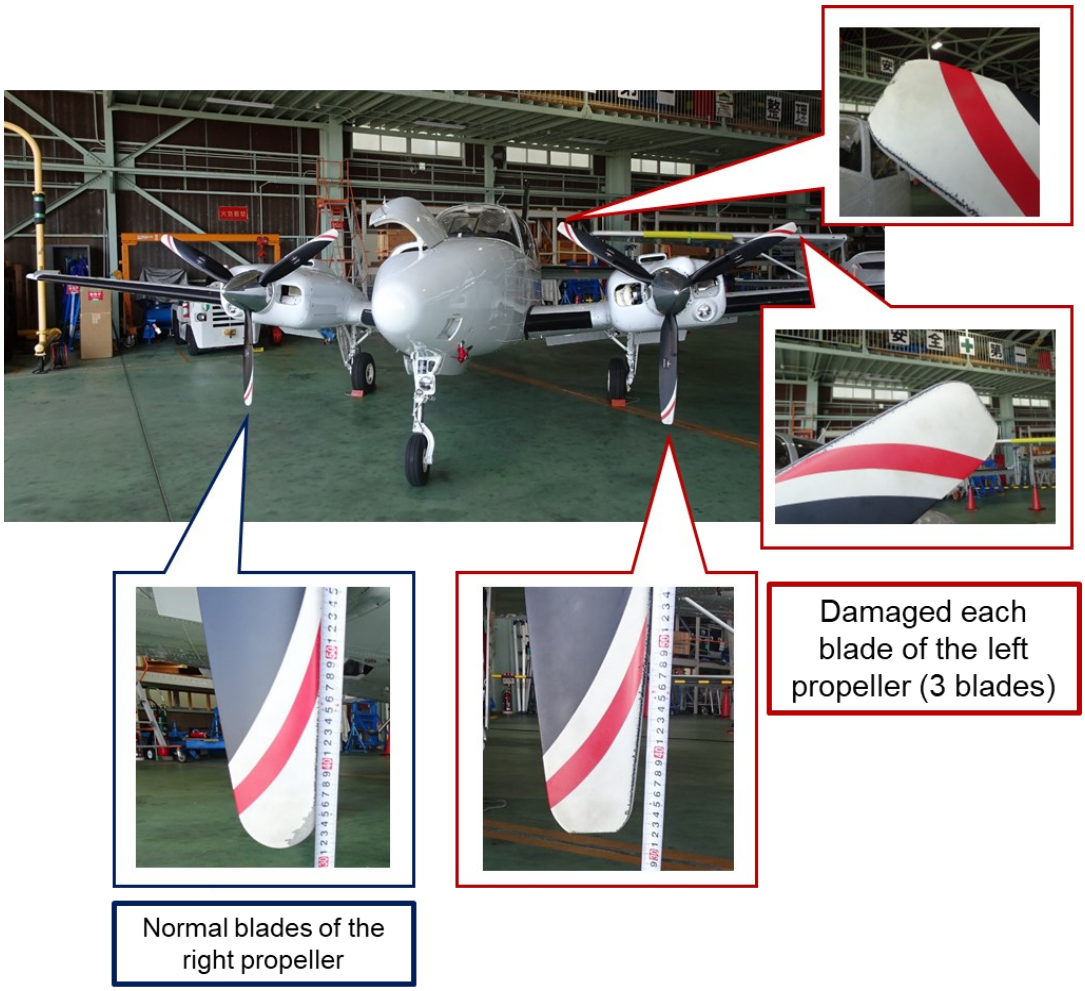

Figure 2: Status of the Propellers

(3) Scratch Marks on the Runway

An Air Traffic Services Flight Information Officer conducted a runway check and confirmed four scratch marks approximately 580 m west of the Runway 27 threshold, which is located near the second touchdown point, and approximately 10 cm north of the runway centerline (see Figure 1). The scratch marks were found at intervals of approximately 1.2 m with approximately 20 cm long and approximately 1 mm deep. There were no scratch marks near the first and third touchdown point.

(4) Company policy on Go-around

As to the criteria for executing a go-around, the company's training manual contains the following descriptions. (Excerpt)

6-1-6 GO AROUND POLICY

In the following cases, a go-around shall be executed,

(Omitted)

7. If there is any doubt about the approach and touchdown operation, and in case of improper situation for safety. In case that the airplane is in such conditions as follows:

(Omitted)

- *High flare, ballooning, floating, bouncing and porpoising*[*3]

*3 "Porpoising" refers to a motion of aircraft to repeat the grounding and lifting of the aircraft by the bounce like a dolphin jumping on the sea surface, which is observed if the corrective action taken by a pilot is not appropriate when the aircraft touches down at a higher descent rate and with shallower nose-up attitude than usual, and then bounces.

(Omitted)

- *In case that the axis of airplane deviates the centerline on the runway.*

(5) Inspection and Maintenance Procedures for the Textron Aviation G58 Airplane

The manual that describes the inspection and maintenance procedures for the Textron Aviation G58 Airplane contains the description that if the propeller hit the ground or cart, the propellers, engines and other auxiliary equipment shall be inspected by overhaul inspection (special inspection) before continuing the flight.

3. ANALYSIS

(1) First Touchdown

The JTSB concludes that due to larger inputs in power on the approach, the aircraft probably passed the runway approach end at the airspeed of 7 kt faster performance value. Besides, due to insufficient flare[*4], the aircraft more likely made the touchdown of three-points keeping an excessive rate of descent and bounced.

Regarding larger inputs in power and insufficient flare maneuver on the final approach, the trainee's maneuvering operation more likely failed to properly control the aircraft's attitude and power to set the speed required when the aircraft passed the runway approach end. The maneuvering operation failed to properly control its attitude and power was likely because the trainee was not familiar with the flight operation for the actual airplane from the fact that the trainee failed to make safe approach from the first to fourth rounds of the continuous touch-and-go training.

The instructor needs to properly provide education and training on how to control the power situationally and the attitude at touchdown as well as to provide appropriate assistance depending on the trainee's skill level.

(2) Second Touchdown

The JTSB concludes that after the first touchdown, as judging that the bounces would stop eventually, the instructor likely performed the procedures required for the continuous touch-and-go raise the flaps, set the elevator trim to take-off position (the nose down direction). After the bounce, the instructor tried to assist the trainee in controlling the aircraft to maintain the appropriate attitude. However, as sinking due to the decrease in lift resulting from raising the flaps caused the aircraft to sink and pitch down moments were generated by setting the elevator trim to take-off position (the nose down direction), the aircraft probably made a hard touchdown on the nose landing gear again in a state of nose down. And after the first bounce, as the nose heading more likely veered to the right due to the weathercock effect[*5] associated with the crosswind components from the right, the instructor likely assisted in the flight operation by banking the aircraft left and right to maintain the travel direction of the aircraft. As the aircraft had banked to the left before the touchdown, the aircraft possibly touched down while being tilted to the left.

After the touchdown, the aircraft bounced again. The instructor and the trainee judged the landing possible and continued landing, however, In the light of the go around policy, the judgment was probably inappropriate. The company probably needs to have the company's pilots comply

*4 A "flare" maneuver is made immediately before the touchdown on the runway in which the aircraft's nose is pulled up to reduce the airspeed and the rate of descent to help minimize landing impact.

*5 "Weathercock effect" refers to the characteristics of aircraft to weathervane into the wind under the influence of the vertical stabilizer.

with the go around policy.

(3) Contact with the Runway

The JTSB concludes that from the fact that scratch marks were confirmed near the second touchdown point, the aircraft made a hard touchdown on the nose landing gear while being tilted to the left at the time of the second touchdown after the first bounce, which more likely caused each blade tip of left side propeller to come to contact with the runway.

(4) Post-flight Check

The JTSB concludes as follows:

If the propeller comes into contact with the runway surface, the aircraft will not be able to continue flight. It is important for pilots to check and ensure that there are no abnormalities in each blade of the propeller, and to request inspection by a mechanic if necessary.

4. PROBABLE CAUSES

The JTSB concludes that the probable cause of this serious incident was that during the continuous touch-and-go training, the aircraft bounced at the time of the first touchdown and made a hard touchdown on the nose landing gear while being tilted to the left at the time of the second touchdown, which more likely caused each blade tip of left side propeller to come to contact with the runway.

It is probable that the aircraft made a hard touchdown on the nose landing gear was because the maneuvering operation failed to properly control the aircraft's attitude and power to set the speed required when the aircraft passed the runway approach end, in addition, despite such a condition that the aircraft would bounce at touchdown, they continued landing without executing a go-around.

5. SAFETY ACTIONS

(1) Safety Actions Required

The company should manage that the company's pilots thorough to comply with the go around policy and to conduct in ensuring exterior inspections during pre- and post-flight checks.

(2) Safety Actions Taken by the Company after the Serious Incident

a) Actions taken for the company's pilots

- Instructed to compliance with go-around policy
- Instructed to implement strict exterior inspections
- Conducted the training with FTD*6 that simulates porpoising

b) Revision of the company's training manual regarding the procedures to properly conduct external inspections

c) Re-education for the instructor

*6 "FTD (Flight Training Device)" refers to a flight training device other than the Full Flight Simulator (FFS) and is suitable for flight crew trainings, tests, examinations, and others, simulating the specific type of aircraft's cockpit environment or part of it.