

AI2015-3

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**J-AIR CORPORATION
J A 2 0 2 J**

April 23, 2015

 **JTTSB** *Japan Transport Safety Board*

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.

Norihiro Goto
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

RUNWAY EXCURSION DURING LANDING J-AIR CORPORATION BOMBARDIER CL600-2B19, JA202J AT HANAMAKI AIRPORT, IWATE PREFECTURE, JAPAN AT AROUND 17:20 JST, DECEMBER 25, 2012

April 10, 2015

Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Keiji Tanaka

1. PROCESS AND PROGRESS OF THE INVESTIGATION

The Japan Transport Safety Board (JTSB) designated an investigator-in-charge and two other investigators on December 25, 2012 to investigate this serious incident.

Comments were invited from parties relevant to the cause of the serious incident and from the relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight

According to the records of the digital flight data recorder (DFDR) and the cockpit voice recorder (CVR), communications records, and statements of the Captain and the First Officer, the history of the flight is summarized as below.

On December 25, 2012, at 16:26 Japan Standard Time (JST: UTC + 9hrs), a Bombardier CL600-2B19, registered JA202J, operated by J-AIR Corporation, took off from New Chitose Airport for Hanamaki Airport on scheduled flight 2837 of Japan Airlines Co., Ltd., which was joint operation for transportation. There were 45 people on board, consisting of the Captain, two crew members and 42 passengers.

In the cockpit, the Captain sat in the left seat as the PF (pilot flying: pilot mainly in charge of flying) and the First Officer sat in the right seat as the PM (pilot monitoring: pilot mainly in charge of duties other than flying).

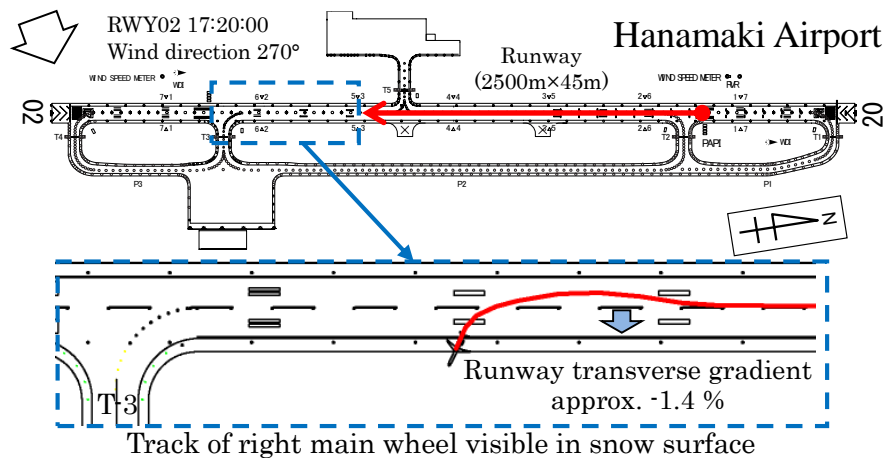
At about 16:44, the Captain obtained an aerodrome special meteorological report as of 16:40, together with the runway surface condition concerning snow and ice as of 16:18, from the company's flight operation staff at Hanamaki Airport. Then, at about 17:08, the Captain obtained the latest weather information, together with the runway

surface condition concerning snow and ice as of 16:18, from the Hanamaki Aerodrome Information Service Station (Hanamaki RADIO). At this time, the Captain and First Officer did not confirm the time of the runway condition check notified by Hanamaki RADIO, but assumed it to be newer information than that obtained from the company's flight operation staff during the flight, and continued their approach after confirming that the runway surface condition still permitted landing.

At about 17:20, the aircraft landed on Runway 20 at Hanamaki Airport.

After touching the aircraft down on the runway centerline abeam of the PAPI, the Captain reduced speed using full reverse and full brakes, but felt the effect of the brakes to be somewhat weaker than usual. After reducing speed to 80 kt, the Captain first changed from full reverse to idle reverse with the brakes applied as normal, then stopped using thrust reversers*1. From around the time the 60 kt call was heard, the Captain felt that the feeling of deceleration had been lost. DFDR records showed that from around the time the Captain stopped using the thrust reversers, the deceleration rate decreased and the nose started deflecting to the right, while the rudder pedals*2 were gradually operated to the left and were used up to maximum left.

After this, the Captain again used idle reverse in an attempt to reduce speed, whereupon the deflection of the nose to the right stopped and it started deflecting significantly to the left. Then, from around the time the nose was aligned with the direction of the runway, the depression of the rudder pedals switched from maximum left to maximum right. However, the nose still continued to deflect to the left, the aircraft ran off the side of runway with the pitch angle of the aircraft decreased, and came to a halt in a state with the nose landing gear protruding approximately 7m outside the runway pavement surface. The nose wheel had sunk down; accordingly the aircraft was disabled to perform taxiing.



*1 “Thrust reversers” are devices for reverse propulsion, allowing reverse propulsion to be adjusted between idle reverse and full reverse.

*2 Rudder pedals are linked to the nose wheel, and make the nose wheel face in the direction of the rudder pedal applied.

2.2 Injuries to Persons	No
2.3 Damage	No
2.4 Personnel Information	<p>(1) Captain Male, Age 37 Airline transport pilot certificate (Airplane) May 19, 2010 Type rating for Canadair CL-65*³ February 20, 2004 Class 1 aviation medical certificate Valid until: May 13, 2013 Total flight time 7,247 hr 16 min Total flight time on the type of aircraft 6,204 hr 43 min</p> <p>(2) First Officer Male, Age 28 Commercial pilot certificate (Airplane) July 29, 2009 Type rating for Canadair CL-65 August 26, 2010 Instrument flight certificate December 1, 2009 Class 1 aviation medical certificate Valid until: August 17, 2013 Total flight time 1,710 hr 08 min Total flight time on the type of aircraft 1,360 hr 07 min</p>
2.5 Aircraft Information	<p>(1) Type: Bombardier CL-600-2B19 Serial number: 7484 Date of manufacture: November 22, 2002 Certificate of airworthiness No. Dai-2012-407 Valid until: November 28, 2013</p> <p>(2) At the time of occurrence of this serious incident, it is estimated that both the weight and the position of the center of gravity of the aircraft were within the allowable range.</p> <p>(3) The aircraft was equipped with a DFDR and CVR manufactured by L3 Communications Holdings, Inc. of the United States of America.</p> <div data-bbox="943 1122 1406 1361" style="text-align: right;"> <p>The serious incident aircraft</p> <p>←Approx.→ 7m Grass / Pavement surface (left) Runway edge light</p> </div>
2.6 Meteorological Information	<p>(1) Aeronautical weather observations at the airport Aeronautical weather observations at the airport around the time of this serious incident were as follows. 17:16 observations Wind direction variable; Wind velocity 5 kt; Visibility 1,500 m or more; Runway visual range: Runway 20 Above the measurement range of 1,800 m, No change; Prevailing weather Light snow showers Cloud: Amount 1/8-2/8, Type Stratus, Cloud base 500 ft Amount 3/8-4/8, Type Stratus, Cloud base 1,200 ft Amount 5/8-7/8, Type Cumulus, Cloud base 2,000 ft Temperature -0°C; Dew point -1°C Altimeter setting (QNH) 29.81 inHg</p> <p>(2) Observations of instantaneous wind direction and wind velocity at</p>

*³ “Canadair CL-65” is a type in the rating of competence certification, the corresponding aircraft type being CL-600-2B19.

	<p>the airport</p> <p>Instantaneous wind direction and wind velocity around the time of this serious incident were as follows.</p> <table border="1" data-bbox="557 280 1311 696"> <tr> <td data-bbox="557 280 799 416" rowspan="2">17:19 :30 – 17:20:00</td> <td data-bbox="799 280 1038 322"></td> <td data-bbox="1038 280 1174 322">RWY20</td> <td data-bbox="1174 280 1311 322">RWY02</td> </tr> <tr> <td data-bbox="799 322 1038 365">Wind direction</td> <td data-bbox="1038 322 1174 365">240°-310°</td> <td data-bbox="1174 322 1311 365">240°-280°</td> </tr> <tr> <td data-bbox="557 365 799 416"></td> <td data-bbox="799 365 1038 416">Wind velocity</td> <td data-bbox="1038 365 1174 416">3-5 kt</td> <td data-bbox="1174 365 1311 416">4-7 kt</td> </tr> <tr> <td data-bbox="557 416 799 553" rowspan="2">17:20:00 –17:20:30</td> <td data-bbox="799 416 1038 459"></td> <td data-bbox="1038 416 1174 459">RWY20</td> <td data-bbox="1174 416 1311 459">RWY02</td> </tr> <tr> <td data-bbox="799 459 1038 501">Wind direction</td> <td data-bbox="1038 459 1174 501">240°-310°</td> <td data-bbox="1174 459 1311 501">240°-290°</td> </tr> <tr> <td data-bbox="557 501 799 553"></td> <td data-bbox="799 501 1038 553">Wind velocity</td> <td data-bbox="1038 501 1174 553">3-5 kt</td> <td data-bbox="1174 501 1311 553">7-10 kt</td> </tr> <tr> <td data-bbox="557 553 799 696" rowspan="2">17:20:30 –17:21:00</td> <td data-bbox="799 553 1038 595"></td> <td data-bbox="1038 553 1174 595">RWY20</td> <td data-bbox="1174 553 1311 595">RWY02</td> </tr> <tr> <td data-bbox="799 595 1038 638">Wind direction</td> <td data-bbox="1038 595 1174 638">280°-310°</td> <td data-bbox="1174 595 1311 638">260°-300°</td> </tr> <tr> <td data-bbox="557 638 799 696"></td> <td data-bbox="799 638 1038 696">Wind velocity</td> <td data-bbox="1038 638 1174 696">5-6 kt</td> <td data-bbox="1174 638 1311 696">10-14 kt</td> </tr> </table> <p>(3) Situation of snowfall at the airport</p> <p>Light snow showers were continuing to fall at the airport from 16:18, when the runway condition check was carried out, until the aircraft landed at 17:20.</p>	17:19 :30 – 17:20:00		RWY20	RWY02	Wind direction	240°-310°	240°-280°		Wind velocity	3-5 kt	4-7 kt	17:20:00 –17:20:30		RWY20	RWY02	Wind direction	240°-310°	240°-290°		Wind velocity	3-5 kt	7-10 kt	17:20:30 –17:21:00		RWY20	RWY02	Wind direction	280°-310°	260°-300°		Wind velocity	5-6 kt	10-14 kt
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<p>2.7 Additional Information</p>	<p>(1) Runway surface condition concerning snow and ice</p> <p>(i) The result of a runway condition check carried out after the completion of snow removal was as follows.</p> <p>Time of the runway condition check 16:18, all runway areas</p> <p>Snow depth 10 mm, coverage 100 %,</p> <p>Type of snow: Wet snow, Braking action: POOR</p> <p>On the CVR, it was recorded that the company's flight operation staff had indicated dry snow, a different type of snow to that noted above.</p> <p>(ii) No reports indicating a deterioration of the runway surface condition had been received from two aircraft that took off and landed in the time between 16:18, when the runway condition check was carried out, and the time the aircraft landed.</p> <p>(2) Runway gradient</p> <p>In the location where this serious incident occurred, there was a downward transverse gradient of approximately 1.4 % from the runway centerline.</p>																																	

3. ANALYSIS

<p>3.1 Involvement of Weather</p>	<p>Yes</p>
<p>3.2 Involvement of Pilots</p>	<p>Yes</p>
<p>3.3 Involvement of Equipment</p>	<p>No</p>
<p>3.4 Analysis of Findings</p>	<p>(1) Runway surface condition upon landing</p> <p>It is probable that the runway surface condition concerning snow and ice when the aircraft landed was worse than when the runway condition</p>

check was carried out, because light snow showers continued to fall between 16:18, when the runway condition check was carried out, and 17:20, when the aircraft landed, in addition that the temperature had been low during this time.

(2) Judgment concerning landing

The Captain stated that he obtained weather information together with runway surface condition concerning snow and ice during the flight and before landing, and then judged landing to be possible. Pilots need to make a comprehensive judgment as to whether landing is possible, by taking account of the obtained weather condition in addition to the runway surface condition concerning snow and ice. However, the Captain and First Officer, when obtaining runway surface condition concerning snow and ice from Hanamaki RADIO before landing, did not confirm the time of the runway condition check notified by Hanamaki RADIO, but mistakenly assumed that this runway surface condition concerning snow and ice notified by Hanamaki RADIO was newer than the information obtained from the company's flight operation staff during the flight. From this, it is probable that, when judging whether landing was possible, a comprehensive judgment was not made by taking account of the weather condition after 16:18, when the runway condition check was carried out.

It is probable that the assumption by the Captain and First Officer that the runway surface condition concerning snow and ice obtained from Hanamaki RADIO was new was affected by the fact that this information differed partially in content from the runway condition check obtained from the company's flight operation staff.

(3) Decrease in the deceleration rate

The Captain stated that the feeling of deceleration was lost from around the time the 60 kt call was heard, and it was also recorded in the DFDR that the deceleration rate decreased from around the time the Captain stopped using the thrust reversers. It is probable that the decrease in the deceleration rate occurred because the runway was more slippery than the Captain had anticipated, and he stopped using the thrust reversers in a situation where the brakes were not sufficiently effective.

It is probable that the deceleration rate would not have decreased if the Captain had taken the deterioration of the runway surface condition into account and used the thrust reversers for longer than usual while confirming the effect of the brakes.

(4) On the aircraft deflection to the right

The DFDR recorded that the nose deflected to the right as the deceleration rate decreased. It is probable that, with the runway in a slippery condition, the nose deflected to the right as a result of the weathercock effect, whereby the nose turns to windward, because a wind from the right direction of the aircraft blew stronger as the aircraft

	<p>moved ahead the runway.</p> <p>(5) Subsequent aircraft deflection to the left and veered off the runway</p> <p>The DFDR recorded that after the nose deflected to the right, the rudder pedals were operated to maximum left and the nose deflected to the left. It is probable that the Captain operated the left rudder pedal in order to return the aircraft to the runway centerline after it had deflected to the right, but because the nose did not react, operated the rudder pedal to maximum left in the end. However, it is probable that a large deflection to the left started because the rudder pedal input was too large.</p> <p>The DFDR recorded that the operation of the rudder pedals changed from maximum left to maximum right from around the time when the nose deflected significantly to the left and the nose was aligned with the runway direction, and it is probable that the Captain suddenly operated the rudder pedals to the opposite direction in order to stop the large deflection to the left. It is probable that, because the Captain suddenly operated the rudder pedals to the opposite direction, the nose wheel slipped and the deflection of the aircraft did not stop, resulted in veering off the runway. In addition, it is probable that the decrease in the aircraft pitch angle was due to the effect of the runway's transverse gradient, and it is somewhat likely that the runway's downward transverse gradient towards the direction of movement of the aircraft also contributed to the aircraft veering off the runway.</p> <p>Concerning the operation of rudder pedals to maintain the direction on a slippery runway surface, it is probable that it would be effective to control the nose wheel while avoiding sudden operation, within a range in which the reaction of the nose direction can be confirmed, utilizing the width of the runway.</p> <p>(6) Provision of runway surface condition concerning snow and ice</p> <p>It is probable that the runway surface condition when the aircraft landed was worse than when the runway condition check was carried out. Therefore, it is desirable that airport administrators and operators should endeavor to grasp the runway surface condition at all times, while also conveying information closer to the actual runway surface condition to pilots, in order that they can achieve appropriate judgments and operation.</p>
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4. PROBABLE CAUSES

It is probable that this serious incident occurred, when the aircraft landed, it was unable to maintain the direction of movement on the runway after touching down, resulted in veering off the runway to the left side.

It is probable that the aircraft was unable to maintain the direction of movement because the Captain suddenly operated the rudder pedals to the opposite direction under the runway in a more slippery condition than when the runway condition check was carried out, owing to snowfall at temperatures close to freezing point.

5. ACTIONS TAKEN

The company made the outline of this serious incident known in the company and issued notifications with the following content.

(1) All flight crew members

- (i) Endeavor to obtain the latest information, because the runway surface condition can change in a short time.
- (ii) Avoid sudden operation of rudders when responding to nose deflection as best they can.
- (iii) When the braking action of the runway surface condition is poor, make positive use of idle reverse even below 60 kt, and use it until deceleration can be definitely confirmed.

(2) Flight operation staff

- (i) Confirm the latest runway surface condition concerning snow and ice, and convey reliable information to flight crew members.
- (ii) Rigorously enforce close communication and coordination with airport administrators.

(3) All employees

- (i) Cautions against winter flights.
- (ii) Efforts to maintain safe operation.

Figure DFDR Records

