

AI2021-3

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**EASTAR JET CO., LTD.
HL 8052**

March 25, 2021



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.

TAKEDA Nobuo
Chairperson
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

**ATTEMPT OF LANDING ON A RUNWAY
WHERE A VEHICLE EXISTS
EASTAR JET CO., LTD.
BOEING 737-800, HL8052
ABOUT 0.2 NM SOUTHWEST FROM THE SOUTH END OF
RUNWAY 03R
AT HYAKURI AIRFIELD, IBARAKI PREFECTURE, JAPAN
AROUND 16:17 JST, AUGUST 22, 2019**

March 5, 2021

Adopted by the Japan Transport Safety Board

Chairperson TAKEDA Nobuo
Member MIYASHITA Toru
Member KAKISHIMA Yoshiko
Member MARUI Yuichi
Member NAKANISHI Miwa
Member TSUDA Hiroka

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Serious Incident	<p>On Thursday, August 22, 2019, a Boeing 737-800, registered HL8052, operated by Eastar Jet Co., Ltd., attempted to land on the runway different from the one cleared to land by a controller, on which an inspection vehicle was running, before landing at Hyakuri Airfield.</p>
1.2 Outline of the Serious Incident Investigation	<p>The occurrence covered by this report falls under the category of Article 166-4, Item (xvii) of the Ordinance for Enforcement of Civil Aeronautics Act (Ordinance of Ministry of Transport No. 56 of 1952) prior to revision by the Ministerial Ordinance on Partial Revision of the Ordinance for Enforcement of Civil Aeronautics Act (Ordinance of Ministry of Land, Infrastructure, Transport and Tourism No. 88 of 2020), as the case equivalent to “Landing on a closed runway or a runway being used by other aircraft or attempt of landing” as stipulated in Item (ii) of the same Article, and is classified as a serious incident.</p> <p>On December 6, 2019, upon receiving the notification about the serious incident occurrence, the Japan Transport Safety Board (JTSB) designated an investigator-in-charge and an investigator to investigate this serious incident.</p> <p>An accredited representative of the Republic of Korea, as the State of Operator of HL8052, participated in the investigation. Although this serious incident was notified to the United States of America, as the State of Design and Manufacture of the aircraft and its engine, the State did not designate its accredited representative.</p> <p>Comments were invited from parties relevant to the cause of this serious</p>

incident and the Relevant States.

2. FACTUAL INFORMATION

2.1 History of the Flight

According to the statements of the Captain of the Boeing 737-800 of Eastar Jet, registered HL8052, the First Officer (FO), the air traffic controller at aerodrome control position*¹ of Hyakuri Airfield traffic control tower (hereinafter referred to as “Hyakuri Tower”), and the air traffic controller at approach control position*² of Hyakuri Radar Approach Control Facility (hereinafter referred to as “Hyakuri Approach”), the Self-Defense Forces personnel, who were in the runway inspection vehicle, in the Bose Operations Squadron of the 7th Air Wing, Japan Air Self-Defense Force (JASDF) (hereinafter referred to as “the Bose Operations Squadron”, and the records of factual information on the serious incident created by the Hyakuri Air Traffic Service Squadron of JASDF, the history of the flight is summarized as follows.

On August 22, 2019 at 14:09 Japan Standard Time (JST: UTC+9 hours, unless otherwise stated, all times are indicated in JST in this report on a 24-hour clock), the Aircraft took off from Incheon International Airport in Republic of Korea as scheduled flight 681 of Eastar Jet for Hyakuri Airfield with the Captain in the left seat as the PF*³ and the FO in the right seat as the PM*³.

The flight crew held an approach briefing before starting to descend to Hyakuri Airfield and confirmed the expected landing runways (03L and 21R), the approach procedure, landing, and taxiing procedure up to the apron, remaining fuel, and go-around procedure.

In addition, the flight crew input the information such as an extended line of runway centerline on Hyakuri Airfield Runway 03L (hereinafter referred to as “the Westside runway”) into the flight management computer (hereinafter referred to as “FMC”) in order to refer to when flying on a visual approach path, and they displayed the information on ND*⁴ in the cockpit.

*¹ The main service of the “aerodrome control position” is to provide aircraft flying within the control zone (within a radius of 5 nm from the center of the aerodrome) with control service such as issuing take-off clearance to the departure aircraft and landing clearance to the arrival aircraft, and others.

*² The main service of the “Approach control position” is to vector aircraft flying in the approach control area (providing instruction on its course and altitude).

*³ PF and PM are terms used to identify pilots with their roles in aircraft operated by two persons. The PF (Pilot Flying) is mainly responsible for maneuvering the aircraft. The PM (Pilot Monitoring) mainly monitors the flight status of the aircraft, cross checks operations of the PF, and undertakes other non-operational works.

*⁴ “ND” refers to Navigation Display, which is an instrument installed at the instrument panel in the cockpit to display images created by integrating navigational data (aircraft’s orientation, position names and the estimated arrival time of each position on the flight routes as well as the information on the positions from aeronautical radio navigation facilities, etc.) , weather radar images and the information obtained from collision avoidance system (information on the position of aircraft flying around and geographical features).

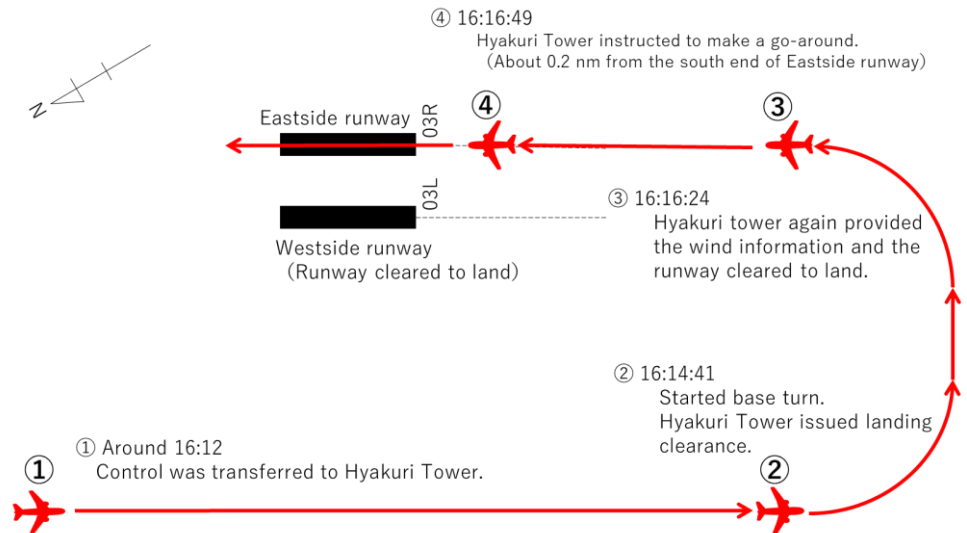


Figure 1: Flight status after control was transferred to Hyakuri Tower

The Aircraft started to descend from cruising flight. After entering the Hyakuri approach control area, the Aircraft was informed that a visual approach*⁵ for runway 03L would be expected at Hyakuri Airfield, and flew while receiving radar vectoring from Hyakuri Approach. Both of the Captain and the FO visually confirmed the Airfield and the two runways at the position of about 5 nm (about 9.3 km) north-northwest of the Airfield, and reported it to Hyakuri Approach accordingly. Upon receiving this report, Hyakuri Approach issued clearance to the Aircraft for a visual approach to the Westside runway, and instructed the Aircraft to change to the Hyakuri Tower frequency around 16:12 (position ① in Figure 1).

After the Aircraft was transferred to Hyakuri Tower, the flight crew reconfirmed visual approach procedure, and entered the downwind leg on the west side of the Airfield. At 16:14:41, when the Aircraft started a turn to the base leg (hereinafter referred to as “Base turn”), it was cleared to land on the Westside runway (position ② in Figure 1). During the Base turn, the aircraft was set its flaps to landing position in order to prepare to descend for the final approach, and after making pre-landing checks according to the landing check list, the Aircraft started a turn onto the final approach course (hereinafter referred to as “Final turn”).

When completing the Final turn (at an altitude of about 700 ft), the Captain thought the white runway (Eastside runway) in front of him was the runway cleared to land, then he disconnected autopilot (HDG SEL mode*⁶ and V/S mode*⁷) and manually controlled the aircraft, and focused on stabilizing the Aircraft’s attitude, the flight speed and the descent rate in order to maintain a stabilized approach*⁸ while continuing to approach the white runway. During this time, the FO was concentrating on

*⁵ “Visual approach” is an approach by an IFR aircraft (aircraft usually flying according to instructions from air traffic controls) under radar control using ground based visual references as opposed to an instrument approach procedure.

*⁶ “HDG SEL mode” is a function of the autopilot system to maintain the heading input by the pilot.

*⁷ “V/S mode” is a function of the autopilot system to maintain the descent rate and the climb rate input by the pilot.

*⁸ “Stabilized approach” is an approach made by establishing landing mode and stabilizing the approach course to the runway, the flight speed and the descent rate in order to make a safe landing. For details on the regulations of the Company, see 2.7(2)①.

	<p>confirming the indication of instruments in the cockpit.</p> <p>On the other hand, when the Aircraft completed the Final turn, one vehicle (navy-blue color) with two members of the Base Operations Squadron on board was running from the south end to the north end on the Eastside runway in order to make a visual inspection on the Eastside runway. Due to this inspection, the Eastside runway was suspended temporarily.</p> <p>Hyakuri Tower recognized that the Aircraft overshot upon completion of the Final turn, but was observing for a while how the Aircraft was doing. However, from a concern over the fact that the Aircraft was approaching the Eastside runway, at 16:16:24, Hyakuri Tower reconfirmed with the Aircraft that it was the Westside runway that the Aircraft was cleared to land, and provided the wind information, then the Aircraft read it back (position ③ in Figure 1).</p> <p>After the FO called “Five hundred” at the height of 500 ft and the Captain called “Stabilized” (to report that the flight speed and descent rate, and bank angle were confirmed stable), the Captain looked outside. At that moment, he found to the left side the letters of “03L” on the Westside runway which the Aircraft should land on, and also found a black point (the vehicle running on the runway for the runway inspection) around the center of the runway in front of him.</p> <p>The Captain, who realized that the Aircraft was approaching the runway different from the one instructed to land, wondered for a moment whether to correct drastically the flight path toward the Westside runway for continuing the landing, or to make a go-around. Ultimately, he decided to make a go-around and started the procedures (at about 200 ft AGL).</p> <p>At 16:16:49, when moving up by go-around (at about 100 ft AGL), the Aircraft received the instruction to make a go-around (position ④ in Figure 1) from Hyakuri Tower who was sure that the Aircraft continued approaching the Eastside runway. As the Aircraft did not report to Hyakuri Tower that it was going to make a go-around until receiving this instruction, Hyakuri Tower did not recognize that the Aircraft started to make a self-initiated go-around.</p> <p>After starting to make a go-around, the Aircraft entered the traffic pattern on the west side of the Airfield and landed on the Westside runway around 16:26.</p> <p>This serious incident occurred about 0.2 nm southwest from the south end of Runway 03R at Hyakuri Airfield (36°09’ 59” N, 140°24’ 32” E) around 16:17 on August 22, 2019.</p>
2.2 Injuries to Persons	None
2.3 Damage to the Aircraft	None
2.4 Personnel Information	(1) Captain: age 38 Airline transport pilot certificate (Airplane) October 30, 2018

	<p>Type rating for Boeing 737 November 1, 2016</p> <p>Class 1 aviation medical certificate Validity: April 30, 2020</p> <p>Total flight time 3,708 hours 18 minutes</p> <p>Total flight time on the type of aircraft 1,616 hours 49 minutes</p> <p>(2) FO: age 32</p> <p>Commercial pilot certificate (airplane) February 8, 2019</p> <p>Type rating for Boeing 737 January 13, 2010</p> <p>Class 1 aviation medical certificate Validity: May 31, 2020</p> <p>Total flight time 2,942 hours 57 minutes</p> <p>Total flight time on the type of aircraft 2,652 hours 15 minutes</p>
2.5 Aircraft Information	<p>(1) Aircraft type: Boeing 737-800</p> <p>Serial number: 37761</p> <p>Date of manufacture: December 30, 2011</p> <p>Airworthiness Certificate: IS16006</p> <p>Category of aircraft Airplane, Transport category</p> <p>Total flight time 27,893 hours</p>
2.6 Meteorological Information	<p>The Aviation Routine Weather Report (METAR) for Hyakuri Airfield around the time of the serious incident was as follows:</p> <p>15:58 Wind direction Variable; Wind velocity 1 kt;</p> <p>Prevailing Visibility 10 km or more</p> <p>Cloud: Amount FEW 2/8; Type Cumulus; Cloud base 2,000 ft;</p> <p>Cloud: Amount BKN 5/8; Type Altocumulus; Cloud base 15,000 ft;</p> <p>Cloud: Amount BKN 7/8; Type Cirrus; Cloud base 23,000 ft;</p> <p>Temperature 28°C; Dew point 22°C;</p> <p>Altimeter setting (QNH): 1,009hPa</p>
2.7 Additional Information	<p>(1) Experience in landing at Hyakuri Airfield</p> <p>After formally qualified as the Captain by the Company on August 20, 2019, it was his first flight to Hyakuri Airfield. The Captain had experience in flying to Hyakuri Airfield as a first officer, but no experience in making a visual approach to the Westside runway as the PF or the PM.</p> <p>Besides, the FO had ever flown to Hyakuri Airfield, but no experience in making a visual approach to the Westside runway as with the Captain.</p> <p>(2) The Company's manuals related to the aircraft flight operation</p> <p>① Stabilized approach</p> <p>In 5.4 Stabilized Approach Recommendations, Chapter 5 Approach and Missed Approach of the "Flight Crew Training Manual", the stabilized approach is defined as "the status where stable flight speed, descent rate and flight path (descent route and route on the map) are maintained in the landing configuration".</p> <p>In addition, if this requirement cannot be met in visual meteorological conditions at an altitude of 500 ft or below (height above aerodrome elevation), it is required to immediately make a go-around. The Company fully instructed their flight crew to maintain the stabilized approach.</p> <p>② PIC's experience required to fly to Hyakuri Airfield</p>

	<p>There were no conditions, such as flight experience and others, attached to the PIC*⁹ flying to Hyakuri Airfield.</p> <p>(3) Hyakuri Airfield runways</p> <p>The two runways at Hyakuri Airfield are paved with different materials, the runway paved with concrete is the white colored Eastside runway which is for the self-defense force aircraft.</p> <p>On the other hand, the other runway paved with asphalt is the charcoal colored Westside runway which is for civil aircraft (See Figure 2).</p> <p>(4) Cases of Misidentification of runways occurred at Hyakuri Airfield</p> <p>As the cases where the pilots of civil aircraft misidentified the runways at Hyakuri Airfield, the case was occurred on April 22, 2012, in which a scheduled flight landed on the runway different from the one instructed by air traffic controller. The other was a serious incident occurred on September 20, 2014, in which a pilot of a small aircraft conducting a sightseeing flight misidentified the Eastside runway as a permitted runway and attempted a landing.</p>
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Figure 2: Hyakuri Airfield Runways
(Source: Eastar Jet Co., Ltd.)

3. ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilots	Yes
3.3 Involvement of Aircraft	None
3.4 Analysis of Findings	<p>(1) Misidentification of runways</p> <p>① Insufficient visual confirmation</p> <p>In the process of visual approach, an aircraft should appropriately make an approach using ground based visual references including runway, etc., however, it is somewhat likely that the Captain judged the timing to maintain the flight path for visual approach only by referring to the information displayed on ND and performed a visual approach procedure in the same manner. Especially, after passing abeam of the Westside runway end until completing the Final turn, it is probable that</p>

*⁹ “PIC” stands for Pilot in Command who is the pilot responsible for the operation and safety of an aircraft. In aircraft operated by several pilots qualified as PIC, from whom one PIC is appointed.

while it was flying on the base leg, the Captain should have carefully scanned outside the Aircraft on its left side in order to visually confirm the Westside runway from his seat on the base leg, however, during this time he was performing the items on the check list and reducing the speed, thus not paying enough attention to the outside of the Aircraft, and did not clearly identify the Westside runway which it ought to have landed.

It is somewhat likely that when completing the Final turn made by referring to the information displayed on ND, the Captain assumed that the Eastside runway, which looked white ahead, was the runway cleared to land.

② Flight crew's experience

It is somewhat likely that because it was the first time for the flight crew to make a visual approach to the Westside runway at Hyakuri Airfield and, in addition, they concentrated on engaging in flight operations during the approach and following accurately the flight pattern too much to give enough attention to visually confirming the runway, thus, they misidentified the Eastside runway that was first seen on the final approach as the runway cleared to land.

Besides, it is probable that after the Aircraft completed the Final turn, the Captain misidentified the Eastside runway seen ahead as the Westside runway cleared to land, concentrated on stabilizing the aircraft attitude and maintaining the speed and the descent rate in order to establish the stabilized approach, and as a result, being not able to sufficiently scan outside the Aircraft, he was late in realizing the misidentification of runways.

③ Difference appearance between the two runways

As the Eastside and Westside runways at Hyakuri Airfield are paved with different materials, it is certain that the Eastside runway paved with white colored concrete has more noticeable than the Westside runway when seen from distance. As a result, it is probable that the Captain assumed that the Eastside runway, which has the more noticeable than the Westside runway, was the runway instructed to land until checking the completion of stabilized approach, because the Captain was affected by the attractiveness*¹⁰ to the Eastside runway which were closely installed and the two runways came within sight of him, together.

It is required that when making an approach to the Airfield, flight crew should mutually confirm the noticeability of the runway carefully in the approach briefing.

④ Coordination between flight crew

It is probable that after the Captain and the FO reported each other that the two runways were in sight, there was no communication

*¹⁰ "attractiveness" means to be attracted by things that have more noticeable subconsciously.

	<p>between them regarding the situation whether the runways were visible or not. It is probable that between the base leg and the completion of the Final turn, the Captain had not visually recognized the runways thoroughly, while the FO thought that the Captain had a sight of the runway cleared to land, and was concentrating on confirming the indication on the instruments in the cockpit. Therefore, it is probable that the FO was not able to advise the Captain until the Aircraft started to make a go-around as he was not aware of the Captain's misidentification of runways.</p> <p>It is probable that the PM should have monitored the flight status of the Aircraft, cross-check operations of the PF properly, then need to be aware of the runway misidentification made by the Captain much earlier, and to advise him.</p> <p>(2) Classification of Severity</p> <p>It is highly probable that the distance between the Aircraft and the vehicle running on the Eastside runway, when the Captain started to perform a go-around, was approximately 0.8 nm.</p> <p>The serious incident falls under the severity classification of Category C (An incident characterized by ample time and/or distance to avoid a collision) of "the Manual on the Prevention of Runway Incursions" of ICAO with classification tools provided by ICAO. (See Attachment "Severity Classifications of Runway Incursions").</p>
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4. PROBABLE CAUSES

<p>In this serious incident, it is highly probable that because the Captain of the Aircraft misidentified the runway cleared to land, he made an approach for the different runway where an inspection vehicle was running on.</p> <p>It is somewhat likely that the Captain as the PF did not thoroughly perform the visual recognition of runway, and in addition, the FO as the PM did not adequately monitor the flight status of the Aircraft, which may be involved in the runway misidentification made by the Captain of the Aircraft.</p>
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5. SAFETY ACTIONS

<p>In the wake of this serious incident, the Company took following preventive actions</p> <ol style="list-style-type: none"> (1) Made known the serious incident in details to flight crew. (2) Added the condition in which the PIC flying to Hyakuri Airfield is required to have flight experience with the flight time of 500 hours or more as the PIC.
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Severity Classifications of Runway Incursions

Severity classifications described in ICAO “the Manual on the Prevention of Runway Incursions” (Doc 9870) are as described in the table below.

Table 6-1 Severity classification scheme

<i>Severity classification</i>	<i>Description**1</i>
<i>A</i>	<i>A serious incident in which a collision is narrowly avoided.</i>
<i>B</i>	<i>An incident in which separation decreases and there is significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.</i>
<i>C**2</i>	<i>An incident characterized by ample time and/or distance to avoid a collision.</i>
<i>D</i>	<i>An incident that meets the definition of runway incursion such as the incorrect presence of a single vehicle, person or aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.</i>
<i>E</i>	<i>Insufficient information or inconclusive or conflicting evidence precludes a severity assessment.</i>

**1 See the definition of “incident” of Annex 13.

**2 Shaded to show the pertinent classification of the serious incident.