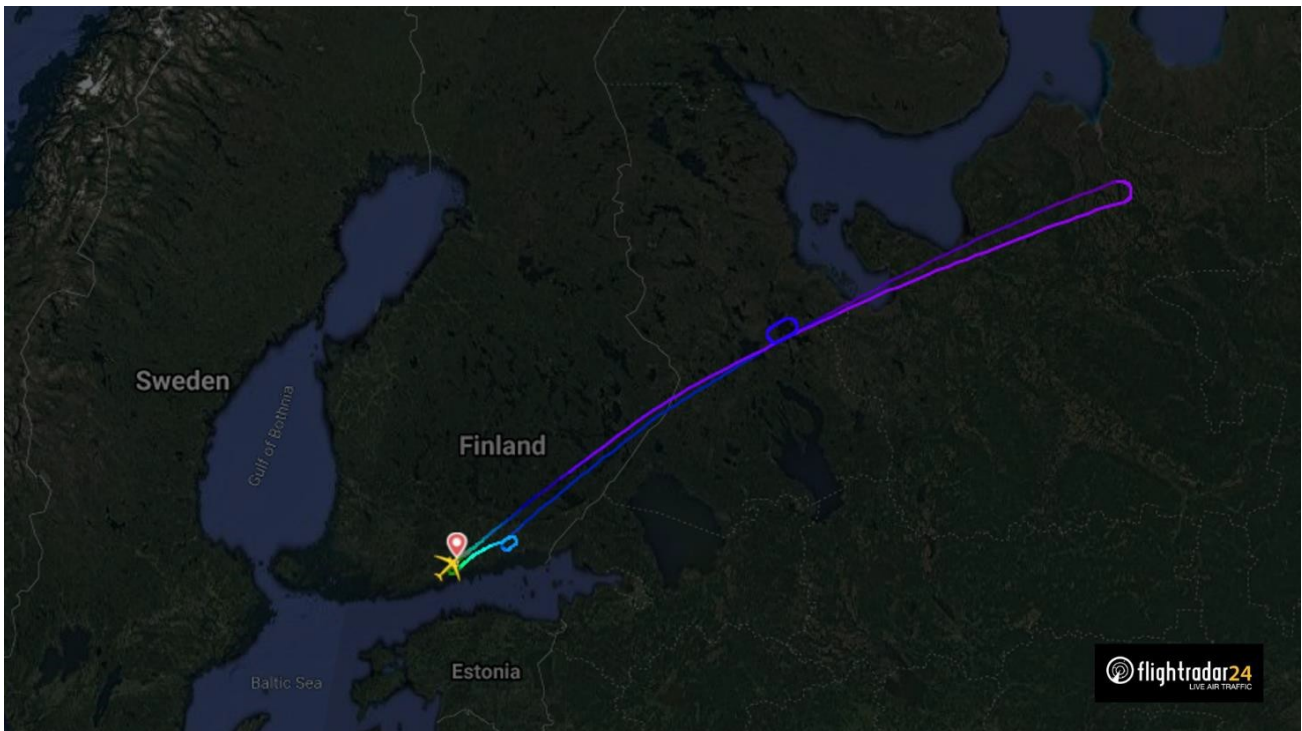




L2021-E1 The return of an airliner to the Helsinki Airport due to a technical reason on 21 February 2021



Report on the preliminary investigation
L2021-E1

FOREWORD

On 21 February 2021, the Safety Investigation Authority, Finland decided to initiate an investigation under section 2 of the Safety Investigation Act (525/2011) into an incident that occurred on the same day, in which an airliner turned back from its route due to a technical reason and returned to its place of departure. Based on the preliminary investigation, the assessment was made that there is no need for an actual investigation. The essential information gathered during the preliminary investigation has been collected in this report. The report was published on 9 March 2021.

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1 EVENTS

1.1 The course of events

A Japan Airlines flight (JL48) departed from the Helsinki Airport on 21 February 2021 at 6.21 p.m. towards the Haneda airport in Tokyo. Due to a vibration in the right engine that occurred during the flight, the captain of the aircraft made the decision to return to Helsinki, because there would have been a long flight in Russian airspace ahead and it would have been difficult to get help at the alternate airports specified. The aircraft turned back after flying for 1 h 20 min to return to its place of departure. The engine that had given an indication of vibration was not turned off, and according to standard procedure, the pilots significantly lowered the flying altitude and air speed. At the time of approaching Helsinki, all indications from both engines were normal. The flight landed on runway 04L at 10.02 p.m. The aircraft was inspected by the line maintenance organisation of Japan Airlines and stayed for repairs.

1.2 Alarms and rescue activities

The Central Uusimaa Rescue Department was informed about the risk of an air traffic accident by the air traffic control at 9.15 p.m. The first rescue unit arrived on site at 9.26 p.m. The danger was cancelled at 10.05 p.m.

1.3 Consequences

The incident did not cause any personal damage or other rescue activities. In the technical inspection after landing, it was discovered that a piece of the plating had chipped off the engine fan blade (Figure 1), and it was found in the bypass duct, bent and stuck to the fan's first stage stator blade¹. The assessment of the engine's airworthiness, occurrence reports, investigating the cause of the chipping and possible repairs were carried out by the maintenance organisation of Japan Airlines in accordance with the approved methods and standards.

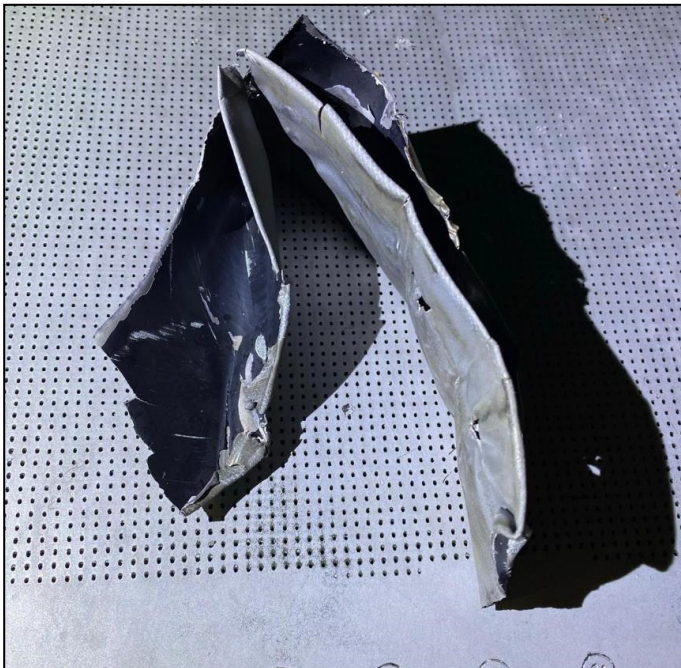


Figure 1. Metal strip fallen off the fan, size: approx. 5 x 20 cm (Photo: SIA).

¹ The purpose of the fan's stationary stator blades is to make the air mass flow both by the engine core and into the engine core's compressor itself. The bypass flow generates a large amount of the engine's propulsion; depending on the type of engine, it may be as much as 85%.

2 BACKGROUND INFORMATION

2.1 Operating environment, equipment and systems

2.1.1 Boeing 787-9 Dreamliner

Japan Airlines' Boeing 787-9 Dreamliner is a twin engine wide-body airliner with 195 seats. The aircraft is operated with a crew with two pilots. The aircraft is equipped with General Electric GEnx-1B type turbofan engines². The fan blades and case are made out of composite carbon fibre to reduce weight and fuel consumption. The aircraft's manual has specified limit values for engine vibration during take-off. No limit values have been set for other flight conditions.

2.2 Conditions

At the time of departure, the weather at the Helsinki Airport on 21 February 2021 at 6.20 p.m. was cloudy with a freezing drizzle. The air temperature was $-3\text{ }^{\circ}\text{C}$. The direction of the wind was 120° from south-east and the wind force was 6 m/s. The cloud layer was at an altitude of approx. 180 m with a visibility of 5,000 m.

At the time of arrival, the weather at the Helsinki Airport on 21 February 2021 at 9.50 p.m. was cloudy with a freezing drizzle. The air temperature was $-6\text{ }^{\circ}\text{C}$. The direction of the wind was 100° from east and the wind force was 5 m/s. The cloud layer was at an altitude of approx. 180 m with a visibility of 7,000 m.

² A turbofan engine is a gas turbine engine with a rotating fan in front of the compressor.

3 CONCLUSIONS

The conclusions include the causes of the accident or incident. A cause means the various factors behind the incident and the direct and indirect circumstances affecting it.

1. The aircraft turned back from the flight route due to a technical reason, even though it would have been possible to continue the flight in accordance with the flight manual despite the engine vibration.

***Conclusion:** Changes in the flight plan due to technical disturbances represent proactive safety thinking and taking the financial effects into account.*

2. A piece of the plating came loose from the fan blade. This caused an imbalance in the engine, which was detected by the vibration sensors.

***Conclusion:** The aircraft systems noticed a deviation in the flight situation, for which the engine manufacturer had not specified any limit values. Acceptable vibration limit values have only been specified for the engine during take-off.*

4 SAFETY RECOMMENDATIONS

No new recommendations are issued in the preliminary investigation.