

AI2020-3

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**JAPAN AIRLINES CO., LTD.
J A 8 9 8 0**

July 30, 2020



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
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

THE CASE EQUIVALENT TO DAMAGE TO ENGINE (LIMITED TO SUCH A CASE WHERE FRAGMENTS PENETRATED THE CASING OF SUBJECT ENGINE)

JAPAN AIRLINES CO., LTD.

BOEING 767-300, JA8980

AT ALTITUDE OF ABOUT 7,500 FT

ABOUT 6 KM SOUTHWEST OF KUMAMOTO AIRPORT

AT AROUND 15:55 JST, MAY 24, 2018

June 19, 2020

Adopted by the Japan Transport Safety Board

Chairman	TAKEDA Nobuo
Member	MIYASHITA Toru
Member	KAKISHIMA Yoshiko
Member	MARUI Yuichi
Member	MIYAZAWA Yoshikazu
Member	NAKANISHI Miwa

1. PROCESS AND PROGRESS OF THE AIRCRAFT SERIOUS INCIDENT INVESTIGATION

1.1 Summary of the Serious Incident	<p>On Thursday, May 24, 2018, a Boeing 767-300, registered JA8980, operated by Japan Airlines Co., Ltd. had noise accompanied by vibration as well as reduced rpm of No. 1 engine (left side) indicated on instrument panel during the climb after the take-off from Kumamoto Airport. The Aircraft therefore set engine thrust idle and returned to the Airport for landing after air traffic control priority was granted.</p> <p>The post-flight inspection revealed that high-pressure and low-pressure turbines of the engine were damaged in several stages and a hole was generated in the engine casing. Besides, fragments of inner parts exhausted from the engine damaged windows and roofs of buildings and windshield of vehicles on the ground.</p>
1.2 Outline of the Serious Incident Investigation	<p>The occurrence covered by this report falls under the category of Item 17, Article 166-4 of the Ordinance for Enforcement of the Civil Aeronautics Act of Japan (Ordinance of Ministry of Transport No. 56 of 1952), as the case equivalent to “Damage of engine (limited to such a case where fragments penetrated the casing of subject engine)” as stipulated in Item 6 of the same Article, and is classified as a serious incident. Besides, the engine was damaged and a hole was confirmed in the engine casing; however, penetration of fragments was not confirmed.</p> <p>The Japan Transport Safety Board (JTSB) designated an investigator-in-charge and two investigators on May 24, 2018 to investigate this serious incident. Another investigator was additionally designated on May 28, 2018.</p>

An accredited representative and an adviser of the United States of America, as the State of Design and Manufacture of the Aircraft involved in this serious incident, participated in the investigation.

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

2. FACTUAL INFORMATION

2.1 History of the Flight

On Thursday, May 24, 2018, at 15:52 JST (UTC+9 hours; unless otherwise noted, all times are indicated in JST in this report on a 24-hour clock), a Boeing 767-300, registered JA8980, operated by Japan Airlines Co., Ltd. (hereinafter referred to as “the Company”) as a scheduled flight 632, took off from Kumamoto Airport for Tokyo International Airport with 217 persons on board, consisting of a captain, seven crew members and 209 passengers.

In the Aircraft, the captain sat in the left pilot’s seat as PM (mainly responsible for monitoring flight status of aircraft, cross-checking PF’s maneuvering and other non-operational tasks of aircraft) and the FO (First Officer) on the right pilot’s seat as PF (mainly responsible for maneuvering of aircraft).

During the climb at an altitude of about 7,500 ft at an airspeed of about 250 kt after the take-off from Runway 07 at the Airport, an abnormal noise accompanied by vibration occurred, and the instrument panel indicated reduced rpm of No. 1 engine (left side) and the increases in exhaust gas temperature (EGT) and engine vibration; therefore, the captain switched over to the PF from the PM and conducted the items to deal with Engine Limit or Surge or Stall on the non-normal check list after setting engine thrust idle.

When doing this, the captain and the FO confirmed that the engine’s instrument panel indicated that figures were reduced to the normal, and the vibration and abnormal noise became lower after reducing engine thrust.

As the captain slowly increased engine thrust according to the procedure in the check list, the vibration and noise were increased, therefore, he immediately returned engine thrust to idle.

Although the vibration and abnormal noise from the engine became lower, the vibration still continued; and besides, as there was an available departure aerodrome for landing, the Aircraft returned to the Airport after air traffic control priority was granted, and landed at the Airport at 16:17.

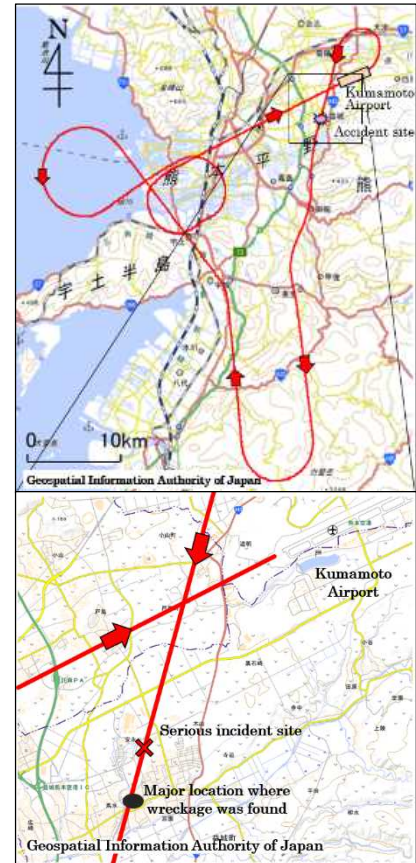


Figure 1: Estimated flight route

At the time of the occurrence of this serious incident, the Aircraft was climbing at an altitude of about 7,500 ft about 6 km southwest of the Airport (32°47'59" N, 130°48' 41" E) and the time of the occurrence was at around 15:55 on May 24, 2018.

2.2 Injuries to Persons

None

2.3 Damage to Aircraft

(1) Extent of Damage: Slightly damaged

Marks of rubs and dents were generated on inboard flap, outboard flap, horizontal stabilizer and fairing located at No. 1 engine aft.

(2) Damage to the Engine

The Aircraft was equipped with a two-spool turbofan engine that consists of a fan, 4-staged low-pressure compressor (LPC), 14-staged high-pressure compressor (HPC), combustion chamber (CC), 2-staged high-pressure turbine (HPT) and 5-staged low-pressure turbine (LPT). HPT stage 2 and aft of No. 1 engine were fractured, condition of which is as shown in Figure 2.

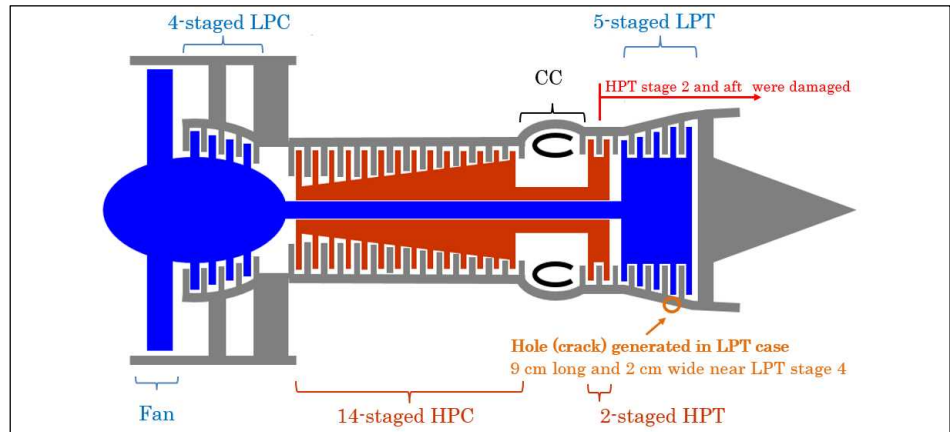


Figure 2: Structure and fractured sections of Engine

i) HPT

Among total 74 blades on HPT stage 2, blade #13 was fractured at the shank. Besides, blade #12 was fractured at the position of about half of the airfoil. Furthermore, the blade #11 and #10 were fractured near the tip of the blades. Other blades had tips chipped along the entire circle (see Figure 3).

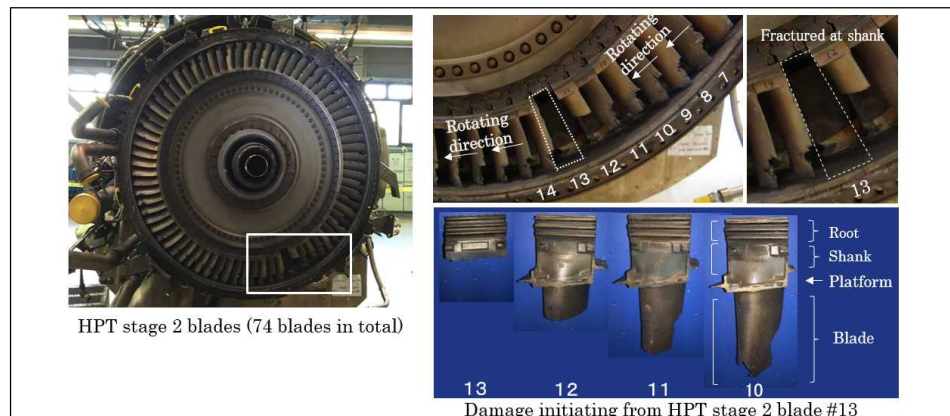


Figure 3: Condition of damaged blades of HPT stage 2

	<p>ii) LPT A great portion of blades and nozzles of LPT was damaged.</p> <p>iii) LPT Casing There was a hole (crack), which was about 9 cm long and about 2 cm wide, generated near LPT stage 4 (in the direction of around three o'clock if seen from the engine aft). Besides, the core cowl*1 outside the hole generated on LPT casing was free from damage.</p> <div style="border: 1px solid black; height: 155px; width: 577px; margin: 10px auto;"></div> <p style="text-align: center;">Figure 4: Hole (crack) generated on LPT casing</p>
<p>2.4 Personnel Information</p>	<p>(1) Captain Male/Age 50 Airline transport pilot certificate (Airplane) November 12, 2002 Type rating for Boeing 767 October 16, 2013 Class 1 aviation medical certificate Validity September 21, 2018</p> <p>(2) FO Male/Age 43 Commercial pilot certificate (Airplane) August 1, 2001 Type rating for Boeing 767 March 11, 2003 Instrument flight certificate April 19, 2002 Class 1 aviation medical certificate Validity August 25, 2018</p>
<p>2.5 Aircraft Information</p>	<p>(1) Aircraft Type: Boeing 767-300 Serial number: 28837 Date of manufacture: August 22, 1997 Certificate of airworthiness: No. 2009-115 Validity: During the period in which the aircraft is maintained in accordance with the Maintenance Management Manual approved based on Civil Aeronautics Act Total flight time 53,100 hours 51 minutes Flight time since the last periodic check (C maintenance on November 24, 2017) 1,242 hours 00 minutes</p>

*1 "core cowl" denotes a metal cowl that covers the outside of engine casing that covers compressor, combustion chamber and turbine of engine.

