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AIRCRAFT SERIOUS INCIDENT REPORT

FINAL REPORT ON THE SERIOUS INCIDENT INVOLVING
BAE JETSTREAM 32 AIRCRAFT, REGISTRATION CS-DVQ
WHICH OCCURRED AT PRINCIPE AIRPORT
ON 19TH JUNE 2024.

NATIONAL ACCIDENT INVESTIGATION COMMISSION

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GLOSSARY OF ABBREVIATION USED IN THIS REPORT

ACCID	Accident
ACMI	Aircraft Crew Maintenance and Insurance
INCID	Incident
ASDA	Accelerate Stop Distance Available
AOC	Air Operator Certificate
ATSB	Australia National Transport Safety
CNIPAIA	National Commission for Accident and Incident Investigation
CWY	Clearway
EASA	European Union Aviation Safety Agency
FAA	Federal Aviation Administration
FPPR	Principe Airport
FR	Flight Recorders
ICAO	International Civil Aviation Organization
INAC	National Civil Aviation Authority of STP
INT	Intermediary
NTSB	The National Transport Safety Board
RPM	Revolutions Per Minute
RWY	Runway
STP	Sao Tome and Principe
TODA	Take off Distance Available
TORA	Take off Run Available
UTC	Universal Time Coordinated

GENERAL INFORMATION

AIRCRAFT SERIOUS INCIDENT REPORT Nº: SA/19/06/2024/RF

TITLE: SERIOUS INCIDENT.

NAME OF OWNER: SEVENAIR, S.A.

OPERATOR: SEVENAIR, A.S. WET LEASE (ACMI)FOR STP AIRWAYS

MANUFACTURER: British Aeropasce, U.K.

MODEL: BAe Jetstream32.

NATIONALITY AND REGISTRATION: CS-DVQ

PLACE OF OCCURRENCE: Principe Airport

DATE OF OCCURRENCE: June 19th, 2024.

TIME OF OCCURRENCE: 09 hours and 30 minutes UTC.

CREW: 2 pilots

PASSENGERS: 18

EXPLANATORY NOTE

This report states the technical findings to the circumstances and causes of this occurrence, in accordance with Annex 13 to the Chicago Convention and the Law No. 3/ 2021, published in Diário da República (National Gazette) No. 07 SERIE I of January 22.

This report does not seek to apportion blame or establish accountability, but it is only the determination of causes and making recommendations aimed at preventing its recurrence. The sole purpose of this technical report is to draw lessons, which could prevent future accidents.

SYNOPSIS

National Commission for Accident and Incident Investigation (CNIPAIA) was notified of the occurrence on the June 19th, 2024. The Commission opened immediately the investigation on occurrence. The all stakeholders were notified accordingly.

At to 2000 feet and joining left downwind leg runway 18, right engine flamed out with indication of oil pressure warning and decreasing of rpm.

Assessing the situation the crew performed the emergency engine failure shut down and proceeded for landing at Principe runway 18.

1.0 FACTUAL INFORMATION

1.1 HISTORY OF FLIGHT

STP Airways flight 8F-211(operated by SevenAir) from Sao Tome to Principe with 20 persons on board (18 paxs plus 2 crew members) had a smooth flight until the occurrence of the event.

At 09 hours and 30 minutes UTC the aircraft Jetstream 32, CS—DVQ, descended to 2000 feet, joined the left downwind leg to runway 18, the right engine flamed out followed by low oil pressure warning and decreasing in RPM. Crew identified engine failure and performed memory items for “Engine Failure or Emergency in Flight Shut Down”.

Assessing the situation after very quick debriefing, the decision was to relight the engine but the attempt was unsuccessful and the crew performed the emergency engine failure shut down procedures and landed safely on runway 18 at Principe Airport.

The heavy use of brakes during landing caused them to overheat, which triggered the tire fuse plugs which led to right tire burst.

1.2 INJURIES TO PERSONS

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	NIL	NIL	NIL
SERIOUS	NIL	NIL	NIL
MINOR	NIL	NIL	NIL
NONE	2	18	

1.3 DAMAGE TO AIRCRAFT: Minor (right landing gear' tire blowout)

1.4 PERSONNEL INFORMATION

1.4.1 The Captain

Year of Birth: 16/12/1981

Nationality: Portuguese

Gender: Male.

Licence: ATPL (A)

Licence Validity: In accordance with medical certificate validity

Medical Certificate /Validity: 06/04/2025

Total Flying Experience: 3255:25 hours

Flying Experience on Type (JS32) : 2937:05 hours

1.4.2 The First Officer

Year of Birth: 04/02/2000

Nationality: Portuguese

Gender: Male.

Licence: CPL (A)

Licence Validity: In accordance with medical certificate validity

Medical Certificate /Validity: 12/08/2024

Total Flying Experience: 489:35 hours

Flying Experience on Type (JS) : 77:45 hours

1.5 AIRCRAFT INFORMATION

1.5.1 General Information

Type: BAe.Jetstream 32

Manufacturer: British Aerospace

Serial Number: 857

Year Built: 1989

Certificate of Airworthiness: PT-018/15 issued on 09/07/2015

MTOW: 7350 Kg

MLW: 7080 Kg

Airframe: Hours 24839

Cycles 38658

Engines: Honeywell TPE 331-12

Engine nº 1: Hours 23811: 45

Cycles: 34368

TSN: 23911:45

TSN: 4137:36

Engine nº 2: Hours 21813: 42

Serial Number: P 66037C

Cycles: 35540

TSN: 23.793:25

TSO: P-66009C

Propeller nº 1: 4HFR34C653 MC CAULEY

Serial Number: 71422

TSN: 22407:32

TSO: 1219:23

Propeller nº 2 4HFR34C653 MC CAULEY

Serial Number: 11392

TSN: 9734:25

TSO: 1236:30

Fuel Quantity on Board: 795 Kgs







1.6 METEOROLOGICAL INFORMATION

Time: 09:00 UTC

Wind: 160/12

Visibility: 10km

Present Weather: Nil

Clouds: Bkn 030

Temperature: 27

Dew Point: 23

QNH: 1013

1.7 FLIGHT RECORDERS

Not Applicable

1.8 AIDS TO NAVIGATION

VOR/DME

1.9 COMMUNICATIONS

There was two-way communication between the crew and control tower during all phases of the flight.

1.10 AERODROME INFORMATION

Principe Airport with ICAO location FPPR has a runway designation of 18/36.

The surface is coated with asphalt and has a dimension of 1750(m) x 30(m) with elevation of 180 (m).

The Aerodrome Reference Point is 01°39'46"N 007°24'42"E

Types of traffic permitted – VFR

Operational Hours 06:00 -17:30

Other declared distances of RWY are as follows:

RWY length: 1750(m)

RWY width: 30 (m)

TORA: 1750 (m)

TODA: 1750(m)

ASDA: 1750(m)

LDA: 1750(m)

Strip: 60(m)

CWY: 150(m)

Runway inspection is usually carried out by the airport fire service personnel before any take off and landing.

1.11 MEDICAL AND PATHOLOGICAL INFORMATION

N/A

1.12 SURVIVAL ASPECT

There was no need for any survival operation

1.13 TEST AND RESEARCH

N/A

1.14 ORGANIZATIONAL AND MANAGEMENT

1.14.1 OPERATOR

STP Airways-Transportes Aéreos de São Tomé e Príncipe is national air Carrier Company registered and incorporated according to the Laws of Sao Tome and Principe and is holder of Air Operator Certificate nº 01/AOC/2016 issued on 27 March 2024 valid to 26 June 2024.

The company is authorized to perform commercial air operations as defined in the operations specifications, in accordance with Operations Manual and the Regulation STP CAR Part 119 and ICAO Annex 6.

SevenAir,S.A. is the company operating on Wet Lease(ACMI) for STP Airways on flight routing São Tomé-Príncipe- São Tomé.

SevenAir,S.A , Ltd is a company registered and incorporated according to the Laws of Portugal and is holder of Air Operator Certificate nº COA- PT-02/07,Revision 26 issued on 06.06.2023.

This certificate certifies that SevenAir, S.A. is authorized to perform Commercial Air Operations, as defined in the operations specifications, in accordance with the Operations Manual, Annex V to Regulation (EU) 2018/1139 and its delegated and implementing acts.

1.14.2 CIVIL AVIATION AUTHORITY

Instituto Nacional de Aviação Civil (INAC) is the civil aviation regulatory authority of São Tomé e Príncipe. It is a Department under the Ministry of Infrastructures and Natural Resources. INAC is concerned with the following main competencies:

- Cooperation with International Civil Aviation Organization.
- Agreements on air transport and other Civil Aviation matters.
- Permission for overfly, entry, exit and transit of aircraft.
- Certification and supervision of Airport and Air Operators.
- Authorization and Supervision of flight operations.
- Registration and Certification of the Aircraft.
- Certification of Aircraft Maintenance Base.
- ATS Supervision.
- Licensing of air navigation facilities.
- Airspace regulation and supervision of navigation and air traffic services.
- Licensing of Aeronautical Personnel.

Autoridade Nacional de Aviação Civil (ANAC) is the civil aviation regulatory body of Portugal. It regulates all aspect of civil aviation in Portugal. The head office is located in Lisbon

1.14.3 AIRPORT OPERATOR

Empresa Nacional de Aeroportos e Segurança Aérea (ENASA) is the Operator of the Principe Airport. It is in charge of air navigation services, airport security and is also the provider of marshaling services

1.15 ADDITIONAL INFORMATION

The disembarkation went normal and the wellbeing of the passengers was taken into consideration. In consequence of occurrence, the aircraft was grounded until Maintenance team took further directives and corrective actions.

2.0 ANALYSIS

The sudden flame out of the engine #2, the unsuccessful attempt by the crew to relight the engine with RPM stabilizing at 40% and windmilling and with indication of low oil pressure light, provides clear indication of sequence of events and causes.

After the incident, engine inspection found several signs of internal damage.

These included broken and worn gears, burnt turbine blades and nozzle segments, bearing with metallic debris and parts that were corroded or cracked:

Broken and worn gears

- It was identified broken “teeth” and abnormal wear in the gears of the engine ‘reduction gearbox involving the main gear (known as bull gear and high speed pinion) coupled to it

Burnt-through turbine blades and nozzle segments

- The turbine blades and segments (stators) showed perforation and burn marks from excessive heat

Bearings contaminated with metal debris;

- The presence of metallic particles in the bearings suggests that metal fragments circulated in the oil lubrication system. It is expected when there is gearing failure or other moving components such as fractured or worn parts that release filling and fragments which are carried by the oil, resulting in damage to the bearings and other support surfaces.
- In previous accidents involving failure of TPE331 gearbox, the same thing happened.
- In 2004 incident with BAeJetstream 32, the separation of part of the bull gear led to the dispersal of metallic debris and oil throughout the engine’s interior.

Corroded and cracked components

- Several internal components showed cracks and signs of corrosion; it is possible that some cracks were already developing before the event, for example micro cracks due to high-cycle fatigue in rig gear support could evolve until they caused rupture

These findings are consistent with a catastrophic failure of the reduction assembly, likely initiated by fatigue or overload in a critical high speed gear and propagating by cascading consequences such as:

Loss of gear synchronization, turbine overspeed and overheating and oil contaminated by metal particles that caused lubrication failure.

It would be pertinent to highlight that there has been a history of similar occurrences in this type of Garret/Honeywell TP331-12 UHR engine on the BAe Jetstream 32, with notable incidents of reduction gear and turbine failures and other technical defects as well, that were investigated by authorities such as the FAA (USA), EASA (Europe), NTSB (USA), ATSB (Australia) and by the Honeywell.

For example some security events occurred worldwide as following:

- Country USA 13/12/1994, Registration N918AE, Engine flame out.
- Country Poland, 15/09/2010, Registration SP-KWN, low pressure oil and decreasing in RPM.
- Country Sweden, 03/05/2013, Registration ES-PJR, engine power and RPM fluctuation.
- Local Argentina 02/06/2016, Registration LV-ZST, left engine fire on the ground.
- Country Australia 14/12/2016, Registration VH-OTE, low torque and engine shut down; fuel control faulty and bearing found to have failed due to bearing cage that separates the bearings was found broken
- Country Peru, 20/09/2022, Registration OB-2152, loss of power during take off.

In the light of these occurrences the authorities issued Service Bulletins (SB) and Directives of Airworthiness (ADs) to address gear and turbine reliability problems in the TPE331 engines.

As references we have:

- Airworthiness Directive issued on August 2005 by Civil Aviation Safety Authority of Australia on Reduction Gear and Shaft Assembly for the companies to inspect for wear and replace gearbox components complying with limitations on interchangeability in accordance of accomplishment Instructions of Honey International Inc. ASB TPe 331-A72-2087.
- FAA AD 2002-12-09, Airworthiness Directive for Honeywell TPE331-11 AND12 Series Engines-gearbox Inspection and SOAP Program.
- Honeywell ASB TPE331/A72/2087- Alert Service Bulletin on Bull Gear and HSP Failures-Mandatory Gearbox Life Limits.

3.0 CONCLUSIONS

3.1. FINDINGS

- (1) The aircraft had a valid Certificate of Airworthiness
- (2) The company had a valid Air Operator Certificate
- (3) The state of registration and operator is Portugal on Wet Lease (ACMI) for STP Airways
- (4) There were 2 crew and 18 paxs on board the aircraft
- (5) The pilots were qualified and certified to conduct the flight
- (6) There was effective communication between Air Traffic Controller (ATC) and the Flight Crew

(7) Engine # 2 Failure during Approach and unsuccessful attempt to relight it

(8) The Fire Service team at Principe airport was in a state of readiness for any emergency during the landing.

(9) The crew was up to challenge showing skills and good airmanship hence landing the aircraft safely.

3.2 CAUSAL FACTORS

Catastrophic failure of the reducer gear set (specially the high-speed bull/pinion)

3.3 CONTRIBUTORY FACTORS

Lubrication system failure due to metallic shavings and fragments as consequence of abnormal wear in the gears.

Critical components exceeded by fatigue failure of bull gear and high speed pinion coupled to it, which could be by limit of turbine cycles or internal gearing

Potential failure in Negative Torque Sensing System (NTS) prevented relighting even with N1 present.

4.0 SAFETY RECOMMENDATIONS

4.1 Although the operator complied with the service bulletins, it would always be useful the Operator to check complete history of equivalent cycles and compliance with the limits defined in Service Bulletin 72-0476 and similar.

4.2 Based on similarities with various occurrences in this type of engine and notwithstanding the Service Bulletins and Airworthiness Directive issued by several authorities for the purpose to address the case of engine failures, it is advisable the Honeywell consider the issuing of new guidelines to prevent the recurrence.