



National Transportation Safety Board Aviation Accident Final Report

Location:	ANCHORAGE, AK	Accident Number:	ANC99LA099
Date & Time:	07/29/1999, 1500 AKD	Registration:	N707CK
Aircraft:	Boeing 747-269B	Aircraft Damage:	Substantial
Defining Event:		Injuries:	5 None
Flight Conducted Under:	Part 121: Air Carrier - Non-scheduled		

Analysis

During climbout, the Boeing 747 crew noted a loud 'thump,' followed by a change in the number three engine instrument indications. One crewmember noted there was a fist-sized hole in the side of the engine cowling. The captain shut down the number three engine, returned to the departure airport, and landed without further incident. A postlanding inspection revealed that the inboard aileron sustained substantial damage. Disassembly of the engine revealed that there were eleven 2nd stage turbine blades that were fractured in the midspan area, and one other 2nd stage turbine blade that was elongated and necked down in the midspan area with most of the shroud tip rubbed off. The turbine exhaust case had a 16 1/2-inch long hole between the case front flange and the front mount rail. Engine service records revealed that when the turbine exhaust case was overhauled, Airworthiness Directive (AD) 96-25-10 was complied with by incorporating Chromalloy Anniston Division's, Supplemental Type Certificate (STC) SE00047AT-D. The intent of STC SE00047AT-D is to comply with FAA Airworthiness Directive (AD) 96-25-10 by increasing the wall thickness of the turbine exhaust case, thus providing enhanced containment capabilities in the event of an internal engine failure. A portion of the turbine exhaust case was sent to the NTSB Materials Laboratory for examination. A Safety Board metallurgist confirmed that both the hardness and microstructure were consistent with design specifications stipulated in Chromally Anniston Division's STC.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of a turbine blade, and subsequent penetration of the shroud (containment ring). A factor associated with the accident was the FAA's insufficient design standards/requirements addressed in an FAA Air Worthiness Directive, which called for a strengthened containment ring. The failed containment ring was in compliance with the Air Worthiness Directive.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CLIMB - TO CRUISE

Findings

1. (C) TURBINE ASSEMBLY, TURBINE BLADE - FAILURE
2. (C) TURBINE ASSEMBLY, SHROUD - PENETRATED
3. (F) INSUFFICIENT STANDARDS/REQUIREMENTS, AIRCRAFT - FAA(ORGANIZATION)

Factual Information

On July 29, 1999, about 1500 Alaska daylight time, a Boeing 747-269B airplane, N707CK, had an uncontained engine failure during climb-out from the Anchorage International Airport, Anchorage, Alaska. The flight was being conducted under Title 14, CFR Part 121, as a nonscheduled international cargo flight, operated by Kitty Hawk International, Inc., as Flight 11281. There were no injuries to the five crewmembers aboard. Visual meteorological conditions prevailed at the time of departure from Anchorage, and an instrument flight plan had been filed for the flight to Bangkok, Thailand.

During an interview with the National Transportation Safety Board (NTSB) investigator-in-charge on July 30, a company quality assurance official stated that about 20 minutes after departure, the crew noted a loud "thump," followed by a change in the number three engine instrument indications. He said that one of the crewmembers went to the back of the airplane to visually check the status of the engine, and noted there was a "fist-sized hole in the side of the engine cowling." The quality assurance official stated that the captain shut down the number three engine, returned to Anchorage International Airport, and landed without further incident.

A postaccident inspection revealed that the inboard aileron sustained substantial damage.

On July 30, 1999, the airplane was three-engine ferried from Anchorage to the operator's maintenance base in Oscoda, Michigan, where the engine was removed. The engine was subsequently shipped to a maintenance facility in Tel Avia, Israel, for disassembly and examination.

On September 7, 1999, the engine was disassembled under the direction of an NTSB Powerplant Group Chairman, and in the presence of the parties to the investigation. The disassembly revealed that there were eleven 2nd stage turbine blades that were fractured in the midspan area, and one other 2nd stage turbine blade that was elongated and necked down in the midspan area, with most of the shroud tip rubbed off.

The turbine exhaust case had a 16 1/2-inch long hole between the case front flange and the front mount rail.

The Powerplants Group completed its examination of the engine on September 8. A copy of the Group Chairman's report is included in this report.

An examination of the engine maintenance records revealed the engine was removed from service due to a cracked diffuser case on August 1, 1998, at 43,946 hours total time, and 11,629 cycles. During this maintenance procedure, an overhauled turbine exhaust case was installed.

The engine records revealed that when the turbine exhaust case was overhauled, FAA Airworthiness Directive (AD) 96-25-10 was complied with by incorporating Chromalloy Anniston Division's, Supplemental Type Certificate (STC) SE00047AT-D. The intent of STC SE00047AT-D is to comply with FAA Airworthiness Directive (AD) 96-25-10 by increasing the wall thickness of the turbine exhaust case, thus providing enhanced containment capabilities in the event of an internal engine failure.

A portion of the turbine exhaust case was sent to the National Transportation Safety Board's Materials Laboratory for examination. A Safety Board metallurgist confirmed that both the hardness and microstructure were consistent with design specifications stipulated in

Chromally Anniston Division's STC. A copy of the NTSB materials laboratory factual report is included in this report.

Pilot Information

Certificate:	Airline Transport	Age:	45
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last Medical Exam:	04/14/1999
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	11000 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Boeing	Registration:	N707CK
Model/Series:	747-269B 747-269B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	21541
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	07/19/1999, Continuous Airworthiness	Certified Max Gross Wt.:	800000 lbs
Time Since Last Inspection:	268 Hours	Engines:	4 Turbo Fan
Airframe Total Time:	59727 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	JT9D-7J
Registered Owner:	KITTY HAWK INTERNATIONAL, INC.	Rated Power:	48650 lbs
Operator:	KITTY HAWK INTERNATIONAL, INC.	Air Carrier Operating Certificate:	Air Cargo
Operator Does Business As:		Operator Designator Code:	K4HA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Observation Time:	0000
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Unknown / 0 ft agl	Temperature/Dew Point:	-10° C
Lowest Ceiling:	Unknown / 0 ft agl	Visibility	100 Miles
Wind Speed/Gusts, Direction:		Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	ANCHORAGE, AK (ANC)	Type of Flight Plan Filed:	IFR
Destination:	BANGKOK (VTBD)	Type of Clearance:	IFR
Departure Time:	1510 ADT	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	5 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	CLINTON O JOHNSON	Adopted Date:	07/10/2001
Additional Participating Persons:	TERRENCE R MUSICK (FAA); ANCHORAGE, AK		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.