Tire shred on takeoff, Airbus A340-300, C-FYKX, August 18, 2003

Micro-summary: **The tires on this A340 were shredded on takeoff.**

Event Date: **2003-08-18 at 0316 HST**

Investigative Body: **National Transportation Safety Board (NTSB), USA**

Investigative Body's Web Site: **http://www.ntsb.gov/**

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National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: LAX03IA259	Aircraft Registration Number: C-FYKX
Occurrence Date: 08/18/2003	Most Critical Injury: None
Occurrence Type: Incident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Honolulu	HI	96818	0316	HST	

Airport Proximity: On Airport	Distance From Landing Facility:	Direction From Airport:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Airbus	A340-300	Airplane

Sightseeing Flight: No Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

HISTORY OF FLIGHT

On August 18, 2003, at 0316 Hawaiian standard time (HST), an Airbus Industrie A340-300 transport category airplane, Canadian registration C-FYKX, sustained minor damage when its center landing gear tires shredded on takeoff roll from the Honolulu International Airport, Honolulu, Hawaii. The captain, first officer, relief pilot, 10-cabin crew, and 172 passengers were not injured. The airplane was operated by Air Canada of Quebec, Canada, as flight 33 under the provisions of 14 CFR Part 129 international operations. The international flight departed Honolulu and was destined for Sydney, Australia. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed.

According to the captain, who was the non-flying pilot, the engine start and taxi for takeoff were normal, and the brake temperatures were considered low for the long taxi. The flight taxied to runway 8R and started its takeoff roll. When the airplane reached approximately 100 knots the flight crew felt a slight vibration similar to that felt with a slight nose gear shimmy and/or rough runway. The rotation (approximately 155 knots) was described as smooth. When the landing gear handle was placed to the retracted position, the flight crew received a LGCIU (Landing Gear Control and Interface Unit) #2 fault indication on the EICAS (Engine Indicating Crew Alerting System).

The flight crew heard wind noise around the airplane and knew the landing gear doors were not retracted. The first officer (flying pilot) flew the airplane along its departure course and they contacted air traffic control and informed them the airplane was experiencing landing gear problems. When the airplane passed through 1,500 feet, the flight crew viewed the wheel condition page on the EICAS and noted that all of the landing gear doors were open. The checklist was referenced and indicated that the landing gear should be recycled down then up again. When the crew placed the landing gear handle to the down position they received an indication the landing gear were down and locked and the landing gear doors were closed. When the crew placed the landing gear handle back to the retracted position, they received the same LGCIU #2 fault. After that, they reset the LGCIU #2 circuit breaker, but did not note a change in the system.

The flight crew contacted their dispatch, informed them of the problem, and elected to return to Honolulu. They elected to conduct an overweight landing on runway 8L (the longest runway) and obtained a landing gear down and locked indication before landing. The landing was uneventful until the airplane decelerated to approximately 50 knots. That's when the flight crew obtained a LGCIU #1 fault along with the LGCIU #2 fault. The loss of the #1 system eliminated the nose wheel steering. The captain directed the airplane off runway 8L onto runway 4L, where the airplane came to a stop.

Maintenance personnel met the airplane on runway 4L and informed the flight crew of the damage to

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Narrative (Continued)

the center landing gear tires and landing gear doors. Airport personnel brought stairs out to the airplane and the passengers and crews deplaned the airplane and were driven to the terminal area.

According to the flight crew, the cabin crew did not report hearing any loud bangs or pops, but did notice the noise of the tire debris impacting the airplane belly.

AIRCRAFT INFORMATION

The aircraft was equipped with this centerline landing gear to permit operation with an increased maximum certified operating weight of 271,000 kilograms. For the occurrence flight, the take-off weight was about 240,900 kilograms. The centerline landing gear is a forward-retracting gear that incorporates a mechanical downlock and an airframe-mounted uplock. It is positioned under the center of the fuselage and directly in line with the rear wheels on the left and right main landing gear bogies. The centerline landing gear's primary purpose is to carry a share of the aircraft weight on the ground so as to not overload the main landing gear. The center landing gear consists of two wheels (#9 and #10) positioned side-by-side on one axle, each utilizing a 36-ply, tubeless tire. The center landing gear does not utilize brakes.

The tire for wheel #9 was manufactured by Goodyear Aviation and was retread on two previous occasions, as marked by the R-2 on its sidewall; its last retread taking place in March 2003. The tire for wheel #10 was also manufactured by Goodyear and was retread on three previous occasions; the last retread taking place in April 2003.

On August 16, 2003, at 1900 HST, the aircraft underwent a regularly scheduled service check in Vancouver, British Columbia, Canada. The service check required that the tire condition and pressure be checked. According to the service check checklist, the center wheel tire pressure should be between 158 and 166 pounds per square inch (psi). The checklist does not require the checked tire pressure to be noted. The checklist does indicate that if a tire is found under-inflated, a "maintenance snag" is to be entered into Air Canada's line maintenance computer system. The maintenance snag is to be "monitored," and if the tire is found to be under-inflated again during the next service check, the wheel is to be removed and replaced. If the tire is found to be within the tire pressure limits at the next service check, the maintenance snag is to be removed. Review of the maintenance records for the incident airplane revealed no open maintenance snags relating to the center landing gear tire servicing.

WRECKAGE AND IMPACT INFORMATION

Airport personnel searched both runway 8R and 8L for tire debris. Approximately 80% of the tires were found on both runways; however, the departure runway contained the majority of the debris.

The Goodyear tire beads remained attached to their wheels, but the wheel plies and retread was destroyed and shredded. The left wheel displayed more peening damage to its outboard edge than the right wheel. The left wheel also displayed more heat signatures on the bearing access cover than the right wheel.

The center landing gear sustained damage to its left and right wheels, the left aft door retraction arm, and the aft center door retraction arms. Numerous belly panels were punctured and numerous panel supports were bent.

The tire remnants were shipped back to Air Canada for further examination by Air Canada and Goodyear personnel.

TESTS AND RESEARCH

Examination of the tire debris revealed the casing and cap for both tires were shredded. Only the

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bead and portions of the sidewall remained on each wheel. The tire segments were sorted out by using characteristics such as discoloration, side markings, and shape. The #10 wheel tire segments were very blue, which is an indication of the tire at one time being very hot (oil "sweating" out of the rubber). The #10 tire broke up into many pieces varying in size. The #9 tire was not discolored out of the ordinary, and it broke up into primarily large pieces. The majority of the tire segments for both the #9 and #10 tires included various sizes of caps and casings. The thickness of the tread pieces ranged from one fabric ply in width to the entire thickness of the tread/casing/liner. Some of the large tread pieces are diamond shaped (or similar to an X-type pattern), which according to Goodyear and Air Canada, suggested a "rapid failure mode." Goodyear's analysis of numerous retread/casing interfaces, indicates that the retread package adherence to the surrounding casing was "excellent for both tires," and there was "no obvious workmanship issues with either tire."

The wheel fuse plugs were tested for leaks and one of the fuse plugs off of wheel #9 was found to leak. To quantify the degree of leak, the leaking fuse plug was installed on a serviceable Airbus A340 main wheel/tire assembly and inflated to full operating pressure (210 psig). The serviceable assembly was allowed to stabilize, and after 12 hours, a 6-psi drop was noted. This was considered to be a moderate leak, but within serviceable limits. Assuming the leaking fuse was leaking at the rate tested, the tire pressure would have dropped approximately 15 psig since the last service check, which took place approximately 32 hours prior to the event.

The failure descriptions mentioned above were consistent with that of a rapid failure. According to Goodyear and Air Canada, the two likely scenarios leading to this type of failure is a foreign object damage (FOD) situation, or a low tire pressure situation. It should be noted that no FOD was collected with the tire debris from the runway, and no damage was sustained by the nose landing gear, which is in line with the center landing gear.

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Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Honolulu International	HNL	13 Ft. MSL	8R	12000	200

Runway Surface Type: Asphalt

Runway Surface Condition: Dry

Type Instrument Approach: ILS-complete

VFR Approach/Landing: Full Stop; Precautionary Landing

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Airbus	A340-300	910

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No		606300 LBS	4

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Fan	CFM International	CFM56-5C4	31200 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
AAIP	08/2003	7 Hours	Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?
No		

Owner/Operator Information

Registered Aircraft Owner	Street Address		
Air Canada	Air Canada Centre 1235; P.O. Box 14000		
	City: Dorval, Quebec	State	Zip Code

Operator of Aircraft	Street Address		
Same as Reg'd Aircraft Owner	Same as Reg'd Aircraft Owner		
	City	State	Zip Code

Operator Does Business As: Air Canada

Operator Designator Code: ARNF

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): Foreign Operation

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Part 129: Foreign

Type of Flight Operation Conducted: Scheduled; International; Passenger Only

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Occurrence Type: Incident

First Pilot Information

Name	City	State	Date of Birth	Age
On File				

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number:

Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA:

Instrument Rating(s): Airplane

Instructor Rating(s):

Type Rating/Endorsement for Accident/Incident Aircraft? Yes | Current Biennial Flight Review?

Medical Cert.: | Medical Cert. Status: | Date of Last Medical Exam:

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time										
Pilot In Command(PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Same as Accident/Incident Location		HNL	0316	HST

Destination	State	Airport Identifier
Sydney		SYD

Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing: Teletype

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
HNL	0253	HST	13 Ft. MSL	NM	Deg. Mag.

Sky/Lowest Cloud Condition: Few 4000 Ft. AGL

Condition of Light: Night

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 29.99 "Hg

Temperature: 27 °C

Dew Point: 20 °C

Wind Direction: 70

Density Altitude: Ft.

Wind Speed: 9

Gusts:

Weather Condtions at Accident Site: Visual Conditions

Visibility (RVR): Ft.

Visibility (RVV) SM

Intensity of Precipitation:

Restrictions to Visibility: None

Type of Precipitation: None

Accident Information

Aircraft Damage: Minor

Aircraft Fire: None

Aircraft Explosion None

Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				2	2
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				10	10
Other Crew					
Passengers				172	172
- TOTAL ABOARD -				185	185
Other Ground					
- GRAND TOTAL -				185	185

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Administrative Information

Investigator-In-Charge (IIC)

Nicole L. Charnon

Additional Persons Participating in This Accident/Incident Investigation:

Mike Spencer
Aviation Safety Inspector
Federal Aviation Administration
135 Nakolo Place
Honolulu, HI 96819