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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

PT. Wings Abadi Airlines

PK – LMS

Boeing Company MC Donnell Douglas DC9-82

Juanda Airport, Surabaya, East Java

Republic of Indonesia

20 October 2008



NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
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GLOSSARY OF ABBREVIATIONS

AD	Airworthiness Directive
AFM	Airplane Flight Manual
AGL	Above Ground Level
ALAR	Approach-and-landing Accident Reduction
AMSL	Above Mean Sea Level
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATPL	Air Transport Pilot License
ATS	Air Traffic Service
ATSB	Australian Transport Safety Bureau
Avsec	Aviation Security
BMG	Badan Meterologi dan Geofisika
BOM	Basic Operation Manual
°C	Degrees Celsius
CAMP	Continuous Airworthiness Maintenance Program
CASO	Civil Aviation Safety Officer
CASR	Civil Aviation Safety Regulation
CPL	Commercial Pilot License
COM	Company Operation Manual
CRM	Cockpit Recourses Management
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DFDAU	Digital Flight Data Acquisition Unit
DGCA	Directorate General of Civil Aviation
DME	Distance Measuring Equipment
EEPROM	Electrically Erasable Programmable Read Only Memory
EFIS	Electronic Flight Instrument System
EGT	Exhaust Gas Temperature
EIS	Engine Indicating System
FL	Flight Level
F/O	First officer or Co-pilot
FDR	Flight Data Recorder
FOQA	Flight Operation Quality Assurance
GPWS	Ground Proximity Warning System
hPa	Hectopascals
ICAO	International Civil Aviation Organization

IFR	Instrument Flight Rules
IIC	Investigator in Charge
ILS	Instrument Landing System
Kg	Kilogram(s)
Km	Kilometer(s)
Kt	Knots (NM/hour)
Mm	Millimeter(s)
MTOW	Maximum Take-off Weight
NM	Nautical mile(s)
KNKT / NTSC	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
PIC	Pilot in Command
QFE	Height above aerodrome elevation (or runway threshold elevation) based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
RESA	Runway End Safety Area
RPM	Revolution Per Minute
SCT	Scattered
S/N	Serial Number
SSCVR	Solid State Cockpit Voice Recorder
SSFDR	Solid State Flight Data Recorder
TS/RA	Thunderstorm and rain
TAF	Terminal Aerodrome Forecast
TSN	Time Since New
TT/TD	Ambient Temperature/Dew Point
TTIS	Total Time in Service
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

SYNOPSIS

On 20 October 2008, a Boeing Company Mc Donnell Douglas DC9-82 aircraft, registered PK-LMS, was being operated on a scheduled passenger service from Jakarta Soekarno–Hatta Airport to Juanda Airport, Surabaya. There were 174 persons on board; three pilots, four flight attendants, and 167 passengers.

The pilot flying was a candidate First Officer (copilot) under training, and the Pilot in Command (PIC) was the instructor acting as the support/monitoring pilot. One qualified copilot occupied the jump seat in the cockpit.

The pilots subsequently reported that the approach to Surabaya was normal.

The crew of an aircraft holding at the runway intersection reported that a main wheel detached from LMS as it touched down.

The crew of LMS taxied the aircraft to the apron, and during the transit check found that the number-two main wheel (left inboard main landing gear) was not on the aircraft. The wheel was subsequently found on the runway shoulder, on the right side of the runway.

None of the aircraft's occupants were injured and they disembarked normally.

The investigation found that the worn inner threads of the axle number two (left main landing gear) caused the detachment of the axle nut and the separation of the wheel from the axle wheel number two. The strength and tightness of the thread joint could not be assured by the magnitude of tightening torque.

The power source to the aircraft's flight recorders was left on during the ground inspection immediately following the serious incident, so all cockpit voice data was overwritten and not available to the investigation.

The National Transportation Safety Committee (NTSC) issued recommendations to PT. Wings Abadi Airlines during the investigation to inspect the fleet to ensure the serviceability of landing gear axle threads. The NTSC also recommended that the airline should promulgate procedures requiring flight crew and maintenance personnel to deactivate the power source to flight recorders as soon as practicable after an accident or serious incident. The NTSC also urged the DGCA to ensure that Indonesian operators have flight recorder deactivation procedures and they are implemented.

1 FACTUAL DATA

1.1 HISTORY OF THE FLIGHT

On 20 October 2008, a Boeing Company Mc Donnell Douglas DC9-82 aircraft, registered PK-LMS, was being operated on a scheduled passenger service from Jakarta Soekarno–Hatta Airport to Juanda Airport, Surabaya¹. There were 174 persons on board; three pilots, four flight attendants, and 167 passengers.

The pilot flying was a candidate First Officer (copilot) under training, and the Pilot in Command (PIC) was the instructor acting as the support/monitoring pilot. One qualified copilot occupied the jump seat in the cockpit.

This flight was the first sector of the day for the crew, at the start of a four-day flight schedule.

During the descent to Surabaya, the weather was VMC (Visual Meteorological Condition), with temperature 34 degrees Celsius. The crew was given air traffic control instructions to track direct to Waypoint NIMAS for an Instrument Landing System (ILS) approach to Surabaya.

The copilot decided to turn off the auto pilot at 1,000 feet in order to improve his handling skill. The approach was normal.

The crew of an aircraft holding at the runway intersection reported that a main wheel detached from LMS as it touched down.

The crew of LMS taxied the aircraft to the apron, and during the transit check found that the number-two² main wheel gear was not on the aircraft. The wheel was subsequently found on the runway shoulder, on the right side of the runway.

None of the aircraft's occupants were injured and they disembarked normally.

¹ Juanda Airport Surabaya will be named Surabaya for the purpose of the report.

² Main landing gear wheels are numbered one to four, with wheel number one the left outboard, and wheel number four the right outboard.

1.2 INJURIES TO PERSONS

There were no injuries to persons as a result of this serious incident.

Table 1: Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	7	167	174	Not applicable
TOTAL	7	167	174	-

The crew and passengers were Indonesian citizens.

1.3 DAMAGE TO AIRCRAFT

The number-two (left inboard) main wheel had separated from its axle. The axle nut and the axle cover also separated from the axle. The nut was found in the axle cover. The axle-nut locking mechanism was still in its position.



Figure 1: The number-two main wheel axle

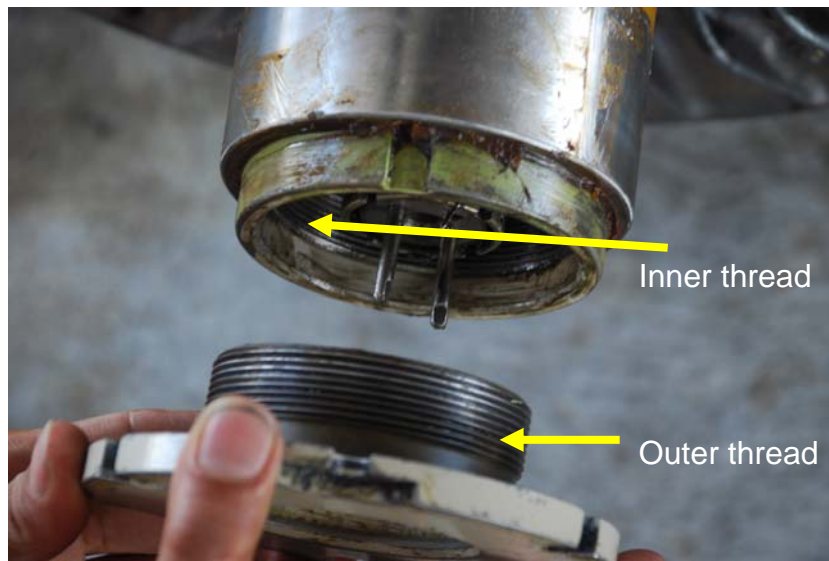


Figure 2: The main wheel axle and axle nut

The aircraft was not damaged.

1.4 OTHER DAMAGE

There was no other damage to property and/or the environment.

1.5 PERSONNEL INFORMATION

The pilots held valid licenses and ratings for the operation of the aircraft. This section covering flight crew is not relevant to this serious incident.

1.6 AIRCRAFT INFORMATION

1.6.1 General

Registration Mark	: PK-LMS
Manufacturer	: Mc Donnell Douglas Company
Country of Manufacturer	: United State of America
Type/ Model	: DC9-82
Serial Number	: 49114
Date of manufacture	: April 1982
Certificate of Airworthiness	
Valid to	: 31 December 2008
Time Since New	: 65,904 hours
Cycles Since New	: 40,317 cycles
Time since overhaul	: 15,217 hours

The aircraft had previously been operated by Continental Airlines, USA, and registered as N14890 until June 2003.

From 16 June 2003 to the date of the serious incident, the aircraft was operated by PT. Wings Abadi Airlines, Indonesia, and registered as PK-LMS.

1.6.2 Landing gear

Left (number one) main landing gear

Part number	: 5930593-5511
Serial number	: C91177
Total Time Since New	: 40,214 hours
Cycles Since New	: 32,604 cycles
Total Time Since Overhaul	: 3,283 hours
Cycles Since Overhaul	: 3,068 cycles
Date of last landing gear servicing	: 27 August 2008

Right (number 2) main landing gear

Part number	: 5930593-5512
Serial number	: CPT5113
Total Time Since New	: 60,410
Cycles Since New	: 32,787
Total Time Since Overhaul	: 16,878
Cycles Since Overhaul	: 10,913
Date of last landing gear servicing	: 30 November 2007

1.7 METEOROLOGICAL INFORMATION

Not relevant to this serious incident.

1.8 AIDS TO NAVIGATION

Not relevant to this serious incident.

1.9 COMMUNICATIONS

There was normal communication between the air traffic controllers and the flight crew.

1.10 AERODROME INFORMATION

Not relevant to this serious incident.

1.11 FLIGHT RECORDERS

The aircraft was equipped with a Solid State Digital Flight Data Recorder (SSFDR) and a Solid State Cockpit Voice Recorder (SSCVR) with a 30-minute recording time. Following the serious incident, the APU was running for more than 2 hours during all of the ground handling preparation and towing processes. The power sources to the SSFDR and SSCVR were not isolated immediately following the serious incident. This resulted in the SSCVR being overwritten by data not related to the occurrence.

The SSCVR was read out at the Merpati Maintenance Facility in Surabaya under the supervision of National Transportation Safety Committee (NTSC) investigators. The investigators verified that the SSCVR data was conversations between engineers in the cockpit and on the ground concerning the preparation and towing processes. There was no data relevant to the landing.

1.12 WRECKAGE AND IMPACT INFORMATION

Not relevant to this serious incident.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

No medical or pathological investigations were conducted as a result of this serious incident, nor were they required.

1.14 FIRE

There was no pre- or post-incident fire.

1.15 SURVIVAL ASPECTS

None of the occupants were injured, and they vacated the aircraft unaided.

1.16 TESTS AND RESEARCH

Not relevant to this serious incident.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

Owner/Operator: PT. Wings Abadi Airlines
Lionait Tower
Jln. Gajah Mada No.7
Jakarta 10130
Indonesia

Air Operator Certificate: 121-012

1.18 ADDITIONAL INFORMATION

Investigation carried out the following examination activities immediately after the serious incident:

- The detached nut from wheel number two was re-installed onto axle number two (left main inboard axle). After three turns, the nut was still loose/slag.
- The detached nut from wheel number two was installed onto axle number one (left main outboard axle). After three turns, the nut was still loose/slag.
- The detached nut from wheel number two was installed onto axle number three (right main inboard axle). The nut was able to be tightened.
- The nut that had been removed from serviceable axle number three was installed onto axle number two. After three turns, the nut was still loose/slag.
- The threads on axle number two were excessively worn.



Figure 3: After tightening by three turns, the nut was still loose and had slag relative to the axle

The nut was pushed toward the axle, without turning the nut on the threads, and the gap between the axle and the nut closed. Figure 5.

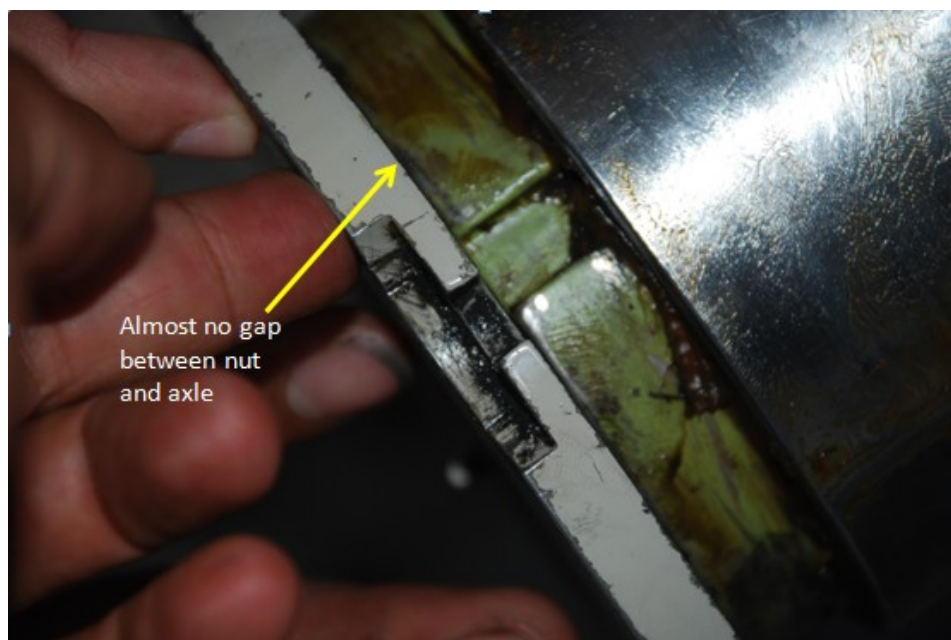


Figure 4: The gap between the axle and the nut after pushing the nut

Immediately after the investigation's axle inspections, specifically the inspection of the axle thread conditions, the National Transportation Safety Committee issued a recommendation to the operator to perform a one-time inspection of the landing gear axle inner threads on the

McDonnell Douglas DC9-82 aircraft in its fleet for possibility of worn axle threads. The recommendation drew the operator's attention to the need for any axle found to have inner threads worn to be removed and replaced by a serviceable axle.

The operator reported that following its fleet inspection, no other McDonnell Douglas DC9-82 aircraft had worn axle threads.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

The investigation was conducted in accordance with NTSC approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

Wheel number two (left main inboard) separated from the left main landing gear axle. The attaching nut had separated from the axle, but was still in the axle cover. There was no indication of nut loosening since the locking mechanism was still in position. The detachment of the nut was due to axial displacement. This was only possible when the strength and tightness between the threads of the axle and the nut was not sufficient.

This situation is detailed in section 1.18 of this report and lead to the conclusion that the inner threads of the left landing gear axle number two and axle number one, were worn out. The tightening was only possible at about the last two threads. In such situations the strength and tightness of the thread joint could not be assured by the magnitude of tightening torque.

The investigation determined that the axle threads were worn prior to the reinstallation of the wheel at the last servicing, and the wheel and nut should not have been fitted to the aircraft; the axle should have been replaced.

3 CONCLUSIONS

3.1 FINDINGS

- The aircraft was certified as being airworthy at the time of the departure from Jakarta.
- All flight crew held valid licences.
- The axle nut and the wheel detached from the axle number two in radial displacement due to the worn inner thread of the left main landing gear.
- The axle was unserviceable at the time of the last main wheel replacement.

3.2 CAUSES

The worn inner threads of the axle number two (the left inboard main landing gear) caused the detachment of the axle nut and the separation of wheel number two.

The strength and tightness of the thread joint could not be assured by the magnitude of tightening torque. The attachment nut and the wheel detached from the axle due to the very few serviceable remaining inner threads on the axle.

4 SAFETY ACTIONS AND RECOMMENDATIONS

4.1 SAFETY ACTIONS

As a result of a recommendation by the National Transportation Safety Committee during the investigation, the operator conducted an inspection of axles on its McDonnell Douglas DC9-82 fleet to determine the serviceability of main landing gear axles. The operator reported that no other McDonnell Douglas DC9-82 aircraft had worn axle threads.

4.2 SAFETY RECOMMENDATIONS

As a result of the investigation into this serious incident, the National Transportation Safety Committee made the following recommendations.

4.2.1 Recommendation to PT. Wings Abadi Airlines

Immediately after the investigation's axle inspections, specifically the inspection of the axle thread conditions, the National Transportation Safety Committee issued a recommendation to the operator to perform a one-time inspection of the landing gear axle inner threads on the McDonnell Douglas DC9-82 aircraft in its fleet for possibility of worn axle threads.

The recommendation drew the operator's attention to the need for any axle found to have inner threads worn to be removed and replaced by a serviceable axle.

4.2.2 Recommendation to PT. Wings Abadi Airlines

The National Transportation Safety Committee recommends that PT. Wings Abadi Airlines promulgate a procedure, and instruct all flight crew and maintenance personnel, to deactivate the power source to the Cockpit Voice Recorder, following an accident or serious incident. The deactivation should be accomplished as soon as practicable after the aircraft has stopped.

4.2.3 Recommendation to Directorate General of Civil Aviation

The National Transportation Safety Committee (NTSC) issued the following recommendation to the Directorate general of Civil Aviation with the release of report KNKT 08.04.09.04 and is reissued with this report. The NTSC recommends that the Directorate General of Civil Aviation, as a matter of urgency, ensure that all Indonesian operators of aircraft equipped with a Cockpit Voice Recorder (CVR) have a procedure, and have instructed all flight crew and maintenance personnel, to deactivate the power source to the CVR, following an accident or serious incident. The deactivation should be accomplished as soon as practicable after the aircraft has stopped.