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KOMITE
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TRANSPORTASI

Runway Incursion Investigation Report

PT. Aviastar Mandiri
DHC-6; PK-BRS
Soedjarwo Tjondronegoro Airport
Serui - Papua
Republic of Indonesia
14 September 2009



KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA
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This final report was produced by the Komite Nasional Keselamatan Transportasi (KNKT) 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, INDONESIA.

The report is based upon the investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

The final report consists of factual information collected until the final report published. This report includes analysis and conclusion.

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ABBREVIATION AND DEFINITION

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
BMKG	Badan Meterologi, Klimatologi dan Geofisika
°C	Degrees Celsius
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
DGCA	Directorate General of Civil Aviation
FDR	Flight Data Recorder
hPa	Hectopascals
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IIC	Investigator in Charge
Kg	Kilogram(s)
Km	Kilometer(s)
Kt	Knots (NM/hour)
Mm	Millimeter(s)
NM	Nautical mile(s)
KNKT / NTSC	<i>Komite Nasional Keselamatan Transportasi</i> / National Transportation Safety Committee
PF	Pilot Flying
PIC	Pilot in Command
PM	Pilot Monitoring
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
SCT	Scattered
SIC	Second in Command
S/N	Serial Number
TS/RA	Thunderstorm and rain
TSN	Time Since New
TT/TD	Ambient Temperature/Dew Point
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

INTRODUCTION

SYNOPSIS

On 14th September 2009, a De Havilland DHC 6 Twin Otter, registered PK-BRS was being operated under Visual Flight Rules (VFR) on a scheduled passenger service from Frans Kaisiepo Airport, Biak to Soedjarwo Tjondronegoro Airport, Serui – Papua. On board in this flight were two pilots, 1 engineer and 9 passengers.

The Second in Command (SIC) who occupied left hand seat acted as Pilot Flying (PF) and the Pilot in Command occupied right hand seat was a training captain (instructor) acted as Pilot Monitoring (PM). The SIC first flight to Serui was at 11 September 2009 and was the check flight to be qualified First Officer. The flight was the first landing occupied the left seat pilot.

While approaching Serui Airport, the pilot received information that the wind direction was 150° to 200° and velocity 15 up to 20 knots. This wind figure has a cross wind component up to 10 knots from the right and tail wind component of 12 up to 16 knots. The aircraft landed with flap 20 positions and target threshold speed was 87 knots. The PIC noticed that on final approach, the aircraft speed was higher than the target and he announced (call out) to the SIC.

The normal operation for takeoff used runway 18 and landing used runway 36, these caused by high terrain on the north side of the airport. The aircraft landed on runway 36.

Prior to touch down the aircraft floated over the runway and on landing roll the aircraft drifted to the right. At speed approximately 40 knots, the aircraft then drifted to the right, the SIC countered the situation by right rudder but could not manage the aircraft back to centreline. The right main wheel has run out of the runway. The SIC then tried to correct the situation by applied nose wheel steering. The aircraft then experienced a ground loop and stopped at 90° position to the runway.

During the ground loop and the aircraft turning 90°, the forward inertia in combination with the tail wind component had made the left wing lifted up and the right wing tip and right engine propeller touched the runway. The forward inertia also collapsed the nose landing gear to 120° to the left relative to the aircraft longitudinal axis.

The pilot then shut down both engines and commanded to the passengers to evacuate. No one injured in this accident. The aircraft has substantially damage

The investigation determined that factors involve in this occurrence were:

- The decision making process was not well performed where the high risk situation and less experience of pilot flying increase the potential to endanger the landing.
- The unfamiliarity of the pilot flying to the nose wheel steering sensitivity might cause the excessive operation during the veer recovery.

The investigation also determined several contributing factors as follows:

- Single landing direction had caused the pilot decided to land while there was a combination of cross and exceeded tail wind landing limitation.
- The assignment of less experience pilot occupied left seat where the aircraft was designed for single pilot operation.

During the investigation, the KNKT has received any safety action.

The KNKT issued several safety recommendations to address safety issue identified during the investigation to PT. Aviastar Mandiri Airlines and Directorate General of Civil Aviation (DGCA).

1 FACTUAL INFORMATION

1.1 History of the Flight

On 14th September 2009, a De Havilland DHC 6 Twin Otter, registered PK-BRS was being operated under Visual Flight Rules (VFR) on a scheduled passenger service from Frans Kaisiepo Airport, Biak to Soedjarwo Tjondronegoro Airport, Serui¹ – Papua. On board this flight were two pilots, 1 engineer and 9 passengers. This flight was the third flight for the crew and the aircraft for the day, and was the second flight of the same route.

The Second in Command (SIC) who occupied left seat acted as Pilot Flying (PF) and the Pilot in Command occupied right seat was a training captain (instructor) acted as Pilot Monitoring (PM).

Prior departure Biak, pilots received weather information of Serui Airport was clear. The flight departed Frans Kaisiepo Airport Biak at 0030 UTC (0930 LT). The flight to Serui Airport until commenced to approach was uneventful.

While approaching Serui Airport, the pilot received information that the wind was 150° to 200° and velocity 15 up to 20 knots. The pilot did not feel any turbulence on approach. The aircraft planned to land on runway 36, with flap 20 positions and target threshold speed was 87 knots. At 500 feet on final approach, the pilot set the propeller to maximum position.

The PM noticed that on final approach, the aircraft speed was higher than the target and announced (call out) to the PF.

According to the report it was known that prior to touch down the aircraft floated over the runway. The aircraft touched down normally and on landing roll, the aircraft tend to drift to the right. The SIC countered the situation by applied left rudder. The aircraft then returned to the centreline.

At speed approximately 40 knots, the aircraft then drifted to the right, the PF countered the situation by applied right rudder but could not recover the aircraft back to centreline. The right main wheel has veered off the runway.

The PF tried to recover the situation by applied the nose wheel steering. The aircraft experienced a ground loop and stopped at 90° position to the runway direction on heading 270°.

The pilot shut down both engines and commanded to the passengers to evacuate. No one injured in this accident.

¹ Soedjarwo Tjondronegoro Airport, Serui will be named Serui for the purpose of this report

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	2	10	12	-
TOTAL	2	10	12	-

1.3 Damage to Aircraft

The aircraft has substantially damage. The details of the damages are as follows:

- The nose wheel was folded backward to 8 o'clock position relatives to aircraft facing forward;
- The right wing tip dent;
- Lower part of nose section broken;
- All propeller blade tips of the right engine bend;
- Right main wheel tire detached from the hub.



Figure 1: Damage on the nose section



Figure 2: Right Wing Tip.

1.4 Other Damage

An observation found also that there was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Age	: 38 Years
Marital status	: Single
Nationality	: Indonesia
License	: ATPL
Valid to	: 31 January 2010
Aircraft type rating	: DHC 6 Twin Otter; BE 1900 D
Instrument rating	: Valid
Medical certificate	: Class 1
Date of medical	: 23 April 2009
Valid to	: 23 October 2010
Last proficiency check	: 6 January 2009
Total hours	: 9231 hours 14 minutes
Total on this type	: 9201 hours 14 minutes
Last 90 days	: 152 hours 42 minutes
Last 24 days	: 63 hours 17 minutes
Last 24 hours	: 1 hours 40 minutes

This flight : 26 minutes

The PIC joined the company on January 2009 as a Captain for DHC 6-300 Twin Otter. His experienced with previous operator was a pilot for same type for 9 years and operated in Papua area. He was familiar with the area and airport.

1.5.2 Second in Command

Gender : Male
Age : 34 Years
Marital status : Married
Nationality : Indonesia
License : CPL
Valid to : 30 June 2010
Aircraft type rating : DHC 6-300 Twin Otter
Instrument rating : Valid
Medical certificate : Class 1
Remark Holder shall wear corrective lenses
Date of medical : 15 April 2009
Valid to : 15 October 2009
Last proficiency check : 2 June 2009
Total hours : 2313 hours 42 minutes
Total on this type : 86 hours 47 minutes
Last 90 days : 72 hours 57 minutes
Last 24 days : 28 hours 47 minutes
Last 24 hours : 1hour 40 minutes
This flight : 26 minutes

The SIC joined the company on April 2009. His experienced with previous operator was as pilot for Casa 212 and Cessna Caravan. This schedule flight was his first operation in Papua area. The first flight to Serui was at 11 September 2009 and was the check flight to be qualified First Officer and passed as qualified as First Officer for DHC 6 – 300. This flight was his third flight to Serui and the first landing occupied the left seat pilot.

1.6 Aircraft Information

Registration Mark	: PK-BRS
Manufacturer	: De Havilland, Canada
Country of Manufacturer	: United States of America
Type/ Model	: DHC 6-300, Twin Otter
Serial Number	: 299
Year of manufacture	: 1971
Certificate of Airworthiness	
Issued	: 24 June 2009
Validity	: 30 November 2010
Category	: Passenger
Limitations	: None
Certificate of Registration	
Validity	: 23 March 2010
Time Since New	: 41,904 hours 11 minutes
Cycles Since New	: 93,939 cycles
Last EMMA C-33	: 22 August 2009
Next EMMA	TSN 41,974.23
Weight and balance valid up to	29 April 2011
Swing Compass valid up to	23 October 2009
Radio permit valid up to	7 April 2010

The aircraft was designed for single pilot operation.

The nose wheel steering was available for the left seat pilot.

Engine Data

Manufacturer	: Pratt & Whitney Canada
Model	: PT6A-27
Serial number #1	: PCE PG 0039
Serial number #2	: PCE PG 0346

Aircraft performance

Maximum Take-Off Weight	: 12,500 lbs
Maximum Landing Weight	: 11,500 lbs
Maximum Cross wind Landing	: 27 knots
Maximum Tail wind landing	: 10 knots

1.7 Meteorological Information

Actual weather reported was:

Observed time	:	00.30
wind	:	150-200 / 15 – 20 knots
visibility	:	10 km
Present weather	:	Nil
Cloud base	:	Few Cu Sc 420 – 450 meters
Temperature/ dew point	:	31 / 25
QNH	:	1011.1 Mbs
QFE	:	1010. 4 Mbs

1.8 Aids to Navigation

Not relevant to this accident below:

1.9 Communications

All communications between air traffic services (ATS) and the crew were conducted normally and not relevant to this accident.

1.10 Aerodrome Information

Soedjarwo Tjondronegoro Airport, Serui was a civil aerodrome and managed by Ministry of Transportation.

The Airport had single runway with azimuth of 36/18. The runway length was 650 meters and the width was 23 meters.

The observation on the runway surface condition found loosing small stones of the runway pavement at almost all part of the runway.

Normal operation for takeoff used runway 18 and landing used runway 36, these caused by high terrain on the north side of the airport.

There was a church with the height approximately 25 meters and at approximately 50 meters on the west side of the runway.

On the left side of final runway 36 there was an antenna with the height approximately 50 meters.

1.11 Flight Recorders

The aircraft was equipped with a Cockpit Voice Recorder

.Manufacture : L3 COMM
Part Number : S100-0080-00
Serial Number : 02472

1.12 Wreckage and Impact Information

Aircraft stopped at approximately 400 meters from the beginning runway 36 or approximately 250 meters from the beginning runway 18 on heading 090°.

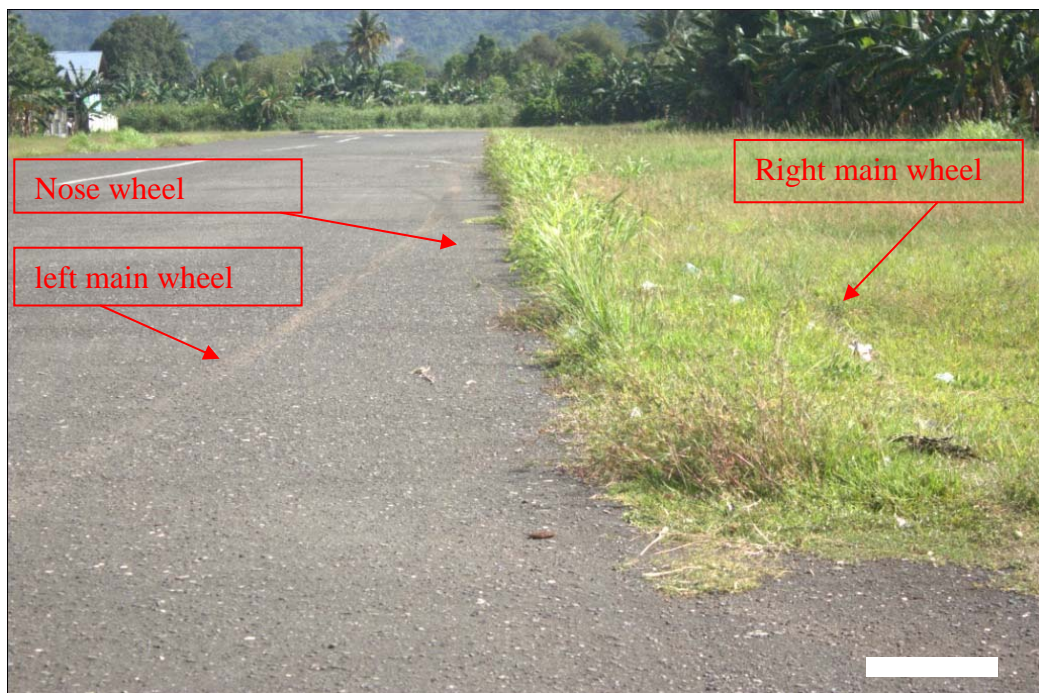


Figure 3: Touchdown marks on taxiway SP2

1.13 Medical and Pathological Information

There was no medical examination performed following this occurrence.

1.14 Fire

There was no pre or post-impact fire..

1.15 Survival Aspects

Not relevant to this accident.

1.16 Tests and Research

Not relevant to this accident.

1.17 Organizational and Management Information

1.17.1 PT. Aviastar Mandiri airlines

Aircraft Owner : PT. Aviastar Mandiri Airlines
Aircraft Operator : PT. Aviastar Mandiri Airlines
Address : Puri Sentra Niaga Blok B no.29,
Kalimalang, Jakarta 13620, Indonesia
Aircraft Operator Certificate Number : AOC/135-029

1.18 Additional Information

There was no other factual information that was relevant to the circumstances leading up to the occurrence.

1.19 Useful or Effective Investigation Techniques

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

2 ANALYSIS

The analysis part of this report will discuss the relevant issues to aircraft veer off to the right and overturned on the runway 36 on 14 September 2009.

The analysis will therefore focus on:

- Aerodynamics effect
- Decision making to land at tail wind condition.

2.1 Aerodynamics effect

The aircraft landed on runway 36. The wind was reported at 150°-200° with the velocity of 15 up to 20 knots. This wind figure has a cross wind component up to 10 knots from the right and tail wind component of 12 up to 16 knots.

The biggest part of aircraft affected by the cross wind is the vertical stabilizer. As the vertical stabilizer was pushed by the cross wind from the right, it has made the nose of the aircraft tend to veer to the right. During the landing roll, the aircraft drifted to the right.

At the beginning of the landing roll, the aircraft veered to the right, the pilot managed to correct the aircraft back to the centre line by applying left rudder. The second veer was unrecovered by rudder and the right main wheel veered off the runway, this might due to the rudder effectiveness had decrease on low speed. The pilot countered the situation by applying the nose wheel steering.

The nose wheel steering controls the nose wheel with the maximum deflection of 60° to the left and right. An excessive application of the nose wheel steering had made the aircraft turned in a “ground loop”. During the ground loop and the aircraft turning 90°, the forward inertia in combination with the tail wind component had made the left wing lifted up and the right wing tip and right engine propeller touched the runway. The forward inertia also collapsed the nose landing gear to 120° to the left relative to the aircraft longitudinal axis.

The nose wheel steering was available only on the left seat pilot. This flight was the first flight for the PF occupied left seat pilot. The PF might have not familiar to the operation to the nose wheel steering including its sensitivity. The unfamiliarity might cause the excessive operation of the nose wheel steering during the veer recovery.

2.2 Decision making to land at tail wind condition

The decision making is a process of collect data, analysis, risk assessment and take decision. It is important that all flight deck crewmembers identify and communicate any situation that appears unsafe or out of the ordinary. Experience has proven that the most effective way to maintain safety of flight and resolve these situations is to combine the skills and experience of all crewmembers in the decision making

process to determine the safest course of action.

The runway was one way runway operation, normal operation for takeoff uses runway 18 and landing uses runway 36, these were caused by high terrain on the north side of the airport. Refer to the aircraft performance limitation stated that the maximum landing tail wind component was 10 knots. The calculation of the wind condition for landing runway 36, found that the tail wind component was 12 up to 16 knots and the cross wind component was 10 knots.

The combination of tail and cross wind requires higher skill, experience and awareness of the pilot. This PF was the first officer and this flight was the first flight for the PF occupied the left seat.

The decision to land in such conditions indicated that a decision making process was not well performed where the high skill condition was required and less experience of pilot flying increase the potential to endanger the landing.

3 CONCLUSION

3.1 Findings

1. The aircraft was airworthy prior to the accident.
2. Both pilots held valid license and medical certificate.
3. The Second in Command (SIC) acted as Pilot Flying (PF) was the first landing occupied the left seat pilot and the Pilot in Command occupied right seat was a training captain (instructor) acted as Pilot Monitoring (PM).
4. The runway was one way runway, normal operation for takeoff uses runway 18 and landing used runway 36, these were caused by high terrain on the north side of the airport.
5. The PM noticed that on final approach, the aircraft speed was higher than the target and announced (call out) to the PF.
6. The aircraft landing on cross wind and exceed the performance limitation tail wind component.
7. At the beginning of the landing roll, the aircraft veered to the right caused by the cross wind, the pilot managed to correct the aircraft back to the centre line by applying left rudder. The second veer was unrecovered by rudder this might due to the rudder effectiveness had decrease on low speed and the right main wheel veered off the runway.
8. An excessive application of the nose wheel steering had made the aircraft turned in a “ground loop”.
9. The nose wheel steering was available only on the left seat pilot. The flight was the first flight of the PF occupied pilot left seat. PF might have not familiar to the operation to the nose wheel steering including its sensitivity. The unfamiliarity might cause the excessive operation of the nose wheel steering during the veer recovery.

3.2 Contributing factors²

The decision making process was not well performed where less experience pilot handling the aircraft in a the high risk situation such as one way landing operation and wind condition lead to excessive operation of the nose wheel steering during the veer recovery.

² “Contributing factors” is an event or condition that, if it occurred in the future, would increase the likelihood of an occurrence and/ or severity of the adverse consequences associated with an occurrence.

4 SAFETY ACTION

At the time of issuing this Final Report, the Komite Nasional Keselamatan Transportasi had received safety actions following this accident from operator.

4.1 PT. Aviastar Mandiri

PT. Aviastar Mandiri has performed internal investigation as reported on the investigation report number AS/09/46 date 22 October 2009, including recommendations as follows:

- a. Captaincy training for the SIC to be postponed until further evaluation.
- b. A comprehensive program for upgrading training need to be reviewed to accommodate segregation level of authorization. Level of authorization can be based on the difficulties of the runway environment.
- c. Time schedule of flight to Serui to be arranged not to landing after 10 AM to avoid strong tail wind component.

Following to the recommendations stated in the investigation report, the Operation Manager issued notice to airman on 29 December 2009 with subject: suspend upgrading training stated as follows:

- a. Reference: safety recommendation contained on the internal investigation report number AS/09/46 date 22 October 2009 concerning incident occurred to DHC-6 Twin Otter PK-BRS, herewith highly informed that any upgrading training for DHC-6 Twin Otter flight crews is to be suspended in all bases of our operations.
- b. This Notice to Airman is valid until further written notice and granted for all pilots and instructors to carry out.

5 SAFETY RECOMMENDATIONS

The Komite Nasional Keselamatan Transportasi consider that the safety action taken by PT. Aviastar Mandiri were relevant to improve the situation.

Based on the factual data and the findings contributed to the runway excursion occurrence on 14 September 2009 at runway 36 Soedjarwo Tjondronegoro Airport, Serui. The Komite Nasional Keselamatan Transportasi issue several safety recommendations to address identified safety issues.

5.1 PT. Aviastar Mandiri Airlines

The pilot decision making process was not well performed to anticipated the high risk situation combined with less experience of pilot flying. Therefore the KNKT recommends to the air operator to review the pilot decision making which considering risk assessment, aircraft performance limitations and CRM best practices.

5.2 Directorate General of Civil Aviation (DGCA)

The Komite Nasional Keselamatan Transportasi recommends to the DGCA to oversight the safety recommendations addressed to the aircraft operator in this report.

- a. To ensure that Aerodrome Manual Sub chapter 5.43 should refer to the detail contain of CASR SMS subpart 7.
- b. The SMS implementation should refer to CASR SMS especially for the Safety Risk management.

5.3 Directorate General of Civil Aviation (DGCA)

Refer to the ICAO Annex 19 sub chapter 7, the DGCA shall implement documented surveillance processes, by defining and planning inspections, audits, and monitoring activities on a continuous basis. Therefore the KNKT recommends proactively assure the oversight and ensure that the recommendations issued in this final report were implemented correctly.

