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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Serious Incident Investigation Report

PT. Sriwijaya Air
Boeing 737-500;PK-CLJ
Minangkabau International Airport, Padang
West Sumatera
Republic of Indonesia
27 March 2013

NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2014

This Final Report was produced by the National Transportation Safety Committee (NTSC), 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the NTSC 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).

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ABBREVIATIONS AND DEFINITIONS

AGL	:	Above Ground Level
AOC	:	Air Operator Certificate
ATC	:	Air Traffic Control
ATIS	:	Aerodrome Terminal Information Services
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
BMKG	:	*Badan Meterologi Klimatologi dan Geofisika* (Metrological Climatologically and Geophysical Agency)
°C	:	Degrees Celsius
CASR	:	Civil Aviation Safety Regulation
CPL	:	Commercial Pilot License
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
FCTM	:	Flight Crew Training Manual
FDR	:	Flight Data Recorder
ft	:	Feet
hPa	:	Hectopascals
Hrs	:	Hours
ICAO	:	International Civil Aviation Organizationn
IIC	:	Investigator in Charge
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
kts	:	Knots (nm/hours)
mHz	:	Mega Hertz
KNKT (NTSC)	:	*Komite Nasional Keselamatan Transportasi* (National Transportation Safety Committee)
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
QFE	:	Height above airport elevation (or runway threshold elevation) based on local station pressure
QNH	:	Height above mean sea level based on local station pressure
S/N	:	Serial Number
SSCVR	:	Solid State Cockpit Voice Recorder
SIC	:	Second in Command
TSN	:	Time since New
TT/TD	:	Ambient Temperature/Dew Point
USA	:	United States of America

UTC	:	Universal Time Coordinate
WIB	:	Waktu Indonesia Barat / West Indonesian Standard Time

INTRODUCTION

SYNOPSIS

On 27 March 2013 a Boeing 737-500 aircraft registered PK-CLJ operated by PT. Sriwijaya Air was scheduled on a passenger services with flight number SJ 021 from Polonia Airport Medan to Minangkabau International Airport (MKB/WIPT) then to Soekarno-Hatta International Airport Jakarta (CGK/WIII).

Prior to leave the hotel at Medan the PIC was explained that he had stomach ache and the crew noticed that the PIC went to the toilet several times during the flight from Medan to Minangkabau.

On arrival from Medan to Padang during taxi to the parking position, witnesses reported that the aircraft taxi speed was faster than other aircraft normally. The FDR recorded that the aircraft taxi speed was 18 kts. The aircraft stop around 4 meters further than the marking line with the left wing was near and almost hit the aerobridge. The marshaller informed that he already gave stop signal, however the aircraft kept moving. The aircraft then pushed back to the correct position and disembarking all passengers.

There was no hazard report made by the Sriwijaya Air staff or Minangkabau staff in respect of this occurrence.

When approaching the threshold runway 15, prior to line up, the pilot turned the aircraft to the left. The aircraft stopped on approximate heading of 270° with the nose wheel out of the runway about 4.2m and in full deflection to the left.

On the runway was found 22 meters of rubber skid mark of the nose wheel beginning from the center guide until aircraft stopped.

The FDR data revealed that during the initial turn for a line up on the runway 15, the aircraft taxi speed was 21 knots.

There was no discrepancy reported of the aircraft and runway lighting system prior and during the serious incident.

At 1210 UTC all passengers and crew disembarked safely through the aft passenger door.

The aircraft evacuated to airport main apron one day after the serious incident at 2100 UTC (0400 LT).

On 9 July 2013 PT. Sriwijaya Air informed the National Transportation Safety Committee in the letter number: QSS/DS/IV/2013/R-12 dated 01 April, contained several safety actions done by the PT Sriwijaya Air.

Respecting to the safety actions refer to several significant findings during the investigation, the National Transportation Safety Committee issued several safety recommendations addressed to PT. Sriwijaya Air, Minangkabau Airport and Director General of Civil Aviation.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 27 March 2013 a Boeing 737-500 aircraft registered PK CLJ operated by PT Sriwijaya Air was scheduled on a passenger services with flight number SJ 021 from Polonia Airport, Medan to Minangkabau International airport (MKB/WIPT) Padang then to Soekarno-Hatta International airport Jakarta (CGK/WIII).

Prior to leave the hotel at Medan the PIC was explained that he had stomach ache and the crew noticed that the PIC went to the toilet several times during the flight from Medan to Minangkabau.

On arrival from Medan to Padang during taxi to the parking position, witnesses reported that the aircraft taxi speed was faster than other aircraft normally. The FDR recorded that the aircraft taxi speed was 18 knots.

While stopping on the parking stand number 4, the aircraft did not stop on the proper position. It was stop around 4 meters further than the marking line with the left wing was near and almost hit the aerobridge. The marshaller informed that he already gave stop signal, however the aircraft kept moving. The aircraft then pushed back to the correct position and disembarking all passengers.

Figure 1: The wheel marks and aircraft last position

There was no hazard report made by the Sriwijaya air staff or Minangkabau staff in respect of this occurrence.

After the preparation completed, the flight then continued to Soekarno-Hatta Airport. In this flight the PIC was planned to act as Pilot flying and the SIC as Pilot Monitoring.

At 1142 UTC (1842 LT) the pilots received clearance to taxi out and enter back track runway 15. When approaching the threshold runway 15, the pilot turned the aircraft to the left. The aircraft stopped at 1155 UTC on approximate heading of 270° with the nose wheel out of the runway about 4.2 meters and in full deflection to the left.

On the runway was found 22 meters of rubber skid mark of the nose wheel beginning from the center guide until aircraft stopped.

The FDR data revealed that during the initial turn for a line up on the runway 15, the aircraft taxi speed was 21 knots.

Figure 2: The aircraft last position

There was no discrepancy reported of the aircraft and runway lighting system prior and during the serious incident.

During this serious incident, the weather reported by the local meteorology office was fine with horizontal visibility was 8 km.

The airport rescue and fire fighting arrived few minutes after the occurrence and observed the condition surround the aircraft and also assisted the passenger disembarkation process.

At 1210 UTC all passengers and crew disembarked safely through the aft passenger door.
The aircraft evacuated to airport main apron one day after the serious incident at 2100 UTC (0400 LT).

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	6	95	101	-
TOTAL	6	95	101	-

1.3 Damage to Aircraft

An observation and visual check noted that there was no damage on the aircraft.

1.4 Other Damage

There was no other damage reported.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	:	Male
Age	:	54 years old
Nationality	:	Indonesia
Marital status	:	Married
Date of joining company	:	07 April 2008
License	:	ATPL
Date of issue	:	11 July 2006 (Resigned)
Validity	:	31 July 2013
Aircraft type rating	:	B737-300/-400/-500
Instrument rating	:	B 737-300/-400/-500
Medical certificate	:	Class 1
Last of medical	:	20 February 2013
Validity	:	20 August 2013
Medical limitation	:	None
Last line check	:	18 January 2013
Last proficiency check	:	19 January 2013

Flying experience

Total hours	:	28,000 Hours

Total on type	:	5,420 Hours
Last 90 days	:	218 Hours 50 minutes
Last 60 days	:	142 Hours 40 Minutes
Last 24 hours	:	6 hours 18 minutes
This flight	:	1 hours 29 minutes

- The company has made the post of serious incident corrective action programs and several items of the program have been performed.
- The Pilot in Command has been resigned from the company on 11 April 2013 prior to conduct physiological consultation and drug test program which were part of the corrective action program.

1.5.2 Second in Command

Gender	:	Male
Age	:	24 Years
Nationality	:	Indonesia
Marital status	:	Married
Date of joining company	:	28 June 2011
License	:	CPL
Date of issue	:	23 March 2011
Validity	:	28 February 2014
Aircraft type rating	:	B737-300/-400/-500
Instrument rating	:	B737-300/-400/-500
Medical certificate	:	First Class
Last of medical	:	09 April 2012
Validity	:	09 October 2013
Medical limitation	:	None
Last line check	:	21 February 2013
Last proficiency check	:	22 February 2013

Flying experience

Total hours	:	600 Hours
Total on type	:	400 Hours
Last 90 days	:	205 Hours 03 Minutes
Last 60 days	:	122 Hours 50 minutes
Last 24 hours	:	6 Hours 18 Minutes
This flight	:	1 Hours 29 Minutes

1.6 Aircraft Information

1.6.1 General

Registration Parking spot	:	PK-CLJ
Manufacturer	:	Boeing
Country of Manufacturer	:	USA
Type/ Model	:	B 737-500
Serial Number	:	27517
Date of manufacture	:	26 January 1995
Certificate of Airworthiness		
Issued	:	23 November 2012
Validity	:	22 November 2013
Category	:	Transport
Limitations	:	None
Certificate of Registration		
Number	:	3214
Issued	:	23 November 2012
Validity	:	22 November 2013
Time Since New	:	48,505 hours
Cycles Since New	:	26,198 Cycles
Last Major Check	:	C-02
Last Minor Check	:	A01 Phase

1.6.2 Engines

Manufacturer	:	General Electric, USA
Type/Model	:	CFM56-3B1
Serial Number-1 engine	:	858118
▪ Time Since New	:	42,878 Hours
▪ Cycles Since New	:	22,823 cycles
Serial Number-2 engine	:	857985
▪ Time Since New	:	43,553 hours
▪ Cycles Since New	:	23,516 cycles

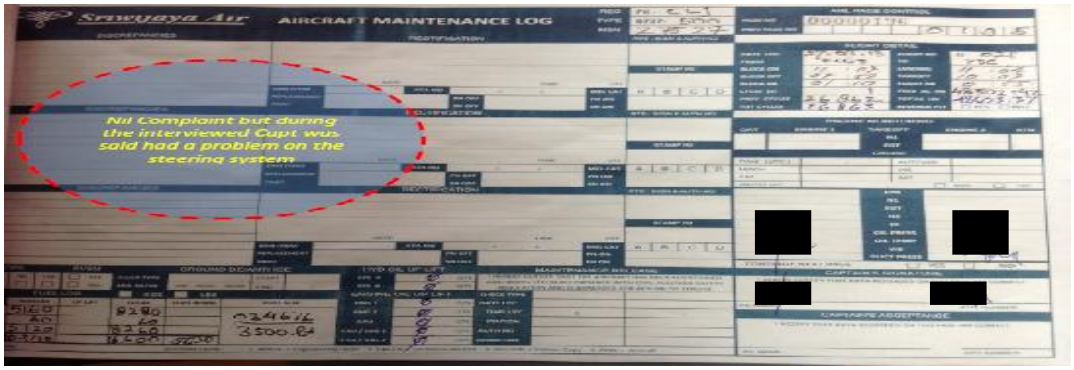

Figure 3: The AML (Aircraft Maintenance Log) signed by the captain after the serious incident showed no discrepancy was reported

1.7 Meteorological Information

Weather Report for Minangkabau International Airport, issued 27 March 2013, at 1200 UTC as follows:

Wind	:	110 / 04 knots
Weather	:	NIL
Temperature	:	28°C
Dewpoint	:	24°C
Visibility	:	8 km
QNH	:	1009 mbs
QFE	:	1008 mbs

1.8 Aids to Navigation

Ground-based navigation aids / onboard navigation aids / aerodrome visual ground aids and their serviceability were not a factor in this serious incident.

1.9 Communications

The communication between the pilots and ATC controller was recorded in the Cockpit Voice Recorder (CVR) and was clear. There were no significant communications contributed to this serious incident.

1.10 Aerodrome Information

Airport Name	:	Minangkabau International Airport
Airport Identification	:	PDG/MKB (WIPT)
Airport Operator	:	PT. Angkasa Pura II
Coordinate	:	0º 47' 12" S 100 16' 50" E
Elevation	:	18 feet/ 5 m
Runway Direction	:	15-33
Runway Length	:	2749 m
Runway Width	:	15 m
Surface	:	Asphlat

1.11 Flight Recorders

1.11.1 Flight Data Recorder

Manufacturer	:	L3 Communications
Type/Model	:	SOLID STATE FDR (SS FDR)/FA2100
Part Number	:	2100-4043-00
Serial Number	:	618

All parameters of the Flight Data Recorder (FDR) data were successfully downloaded at the NTSC facility.

The relevant FDR data is as follows:

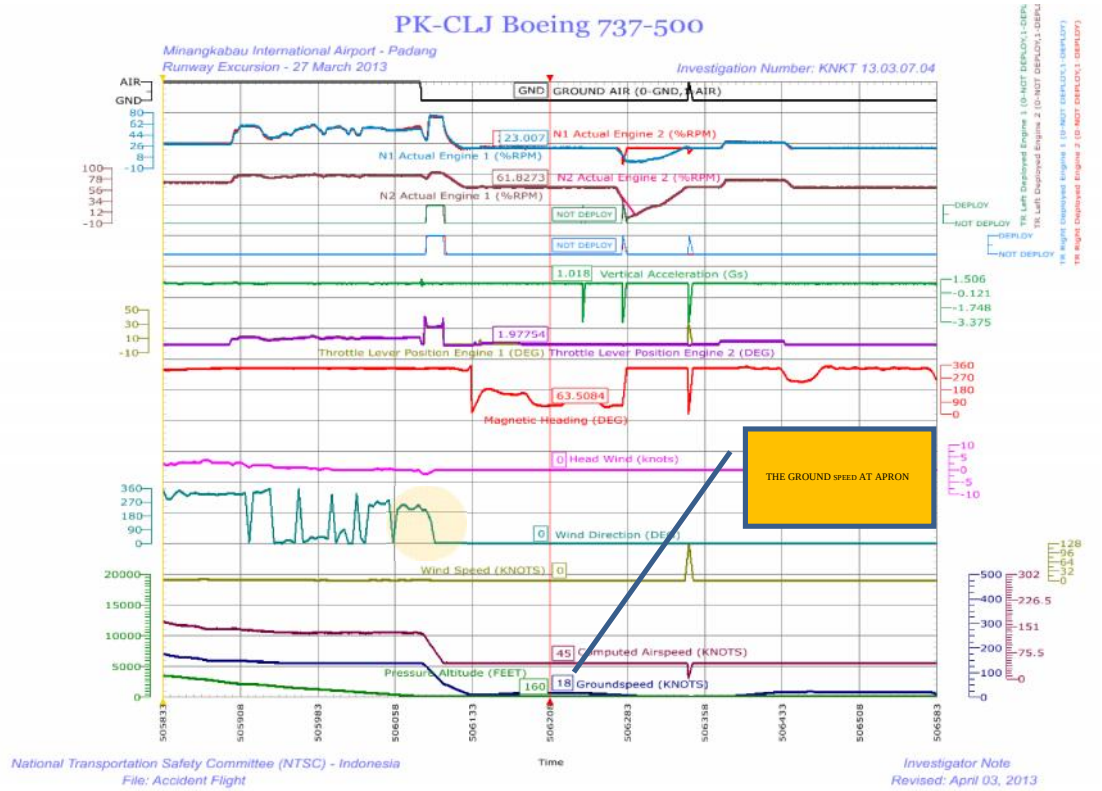

Figure 4: The FDR data shows the aircraft taxi speed at appron

The FDR recorded that the taxi speed when the aircraft entered the apron was 18 knots.

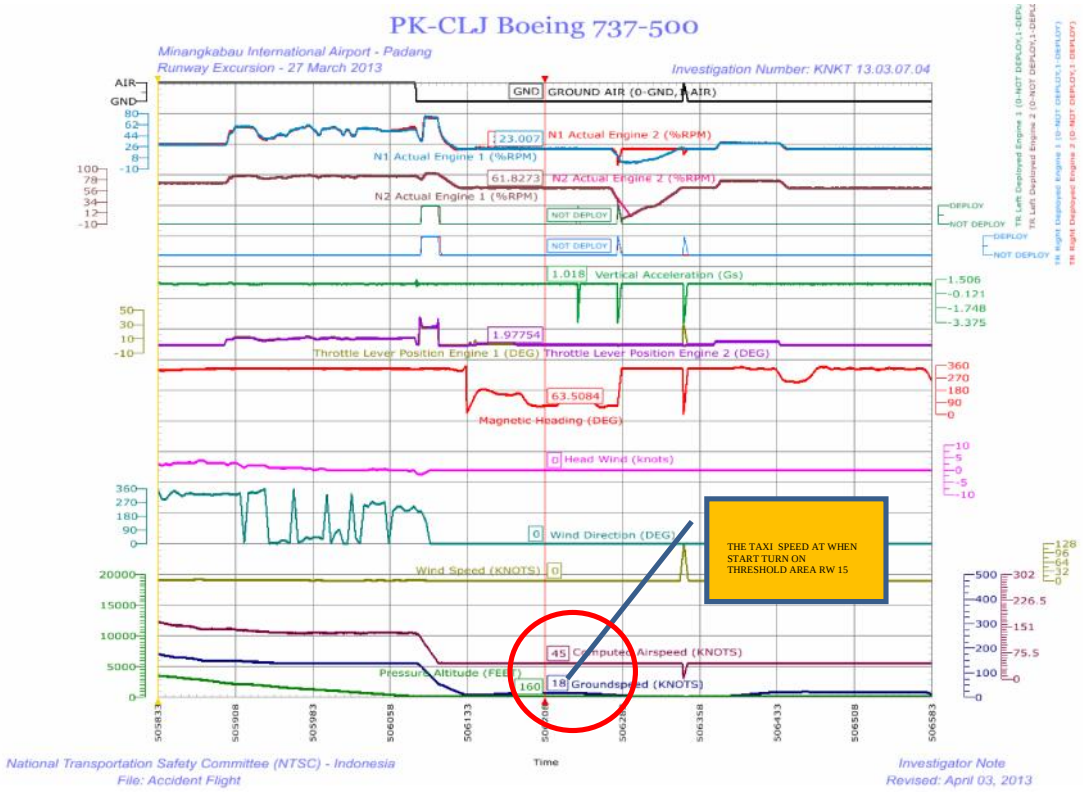

Figure 5: The FDR data shows the initial aircraft ground speed when start turning on the runway 15

The aircraft speed illustration prior and after the aircraft veered off the runway shoulder end 15.

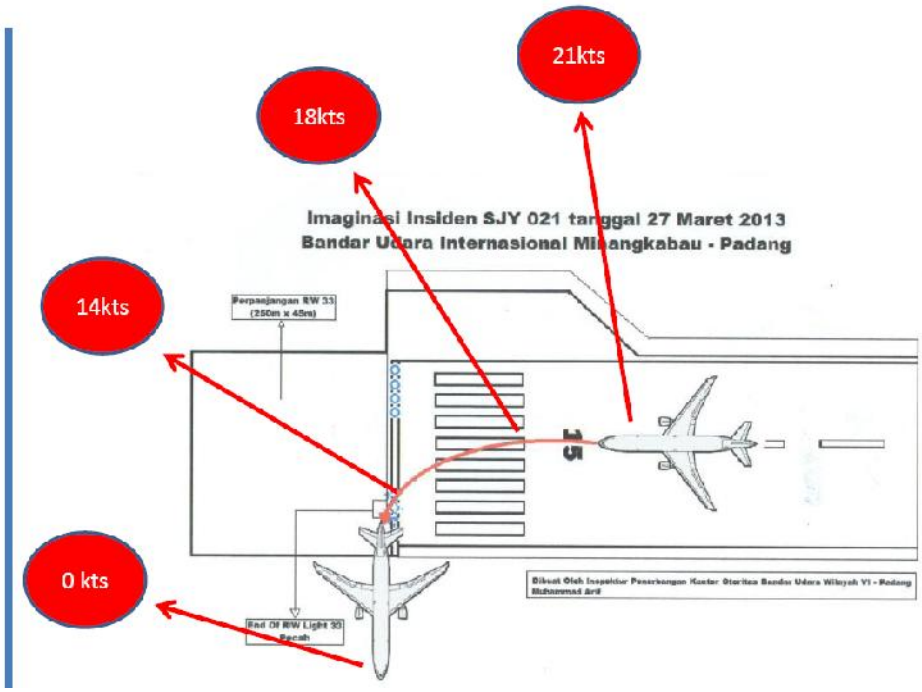

Figure 6: The aircraft speeds illustrates from the FDR data

1.11.2 Cockpit Voice recorder

Manufacturer	:	L3 Communications
Type/Model	:	SOLID STATE CVR (SS CVR)
Part Number	:	S100-0080-00
Serial Number	:	02186

The CVR was downloaded on 03 April 2013 and contained 30 minutes of good quality recording. The audio files were examined found to contain the serious incident flight.

1.12 Wreckage and Impact Information

During the site observation the NTSC investigators found:

- The excavated lines of the nose wheels were marked on the surface along end of runway shoulder till its rest to stop showed both of nose wheels was skidding on the surface with approximate angle was 70 ° to the right.
- Visually checked found that no physical damage on the aircraft.

Figure 7: The aircraft last position prior evacuation process

The excavated lines of the nose wheels were marked on the surface along end of runway shoulder till its rest to stop. Each excavated lines provide angles of approximately 70° on the surface.

- The figure below was not the actual nose wheel direction at the time of serious incident as the nose wheel has been turned to the center position for the evacuation purposes.

Figure 8: The excavated lines on the surface

1.13 Medical and Pathological Information

No medical or pathological investigation has been performed.

1.14 Fire

There was no evidence of fire pre or post of this serious incident.

1.15 Survival Aspects

It considered not relevant to this serious incident.

1.16 Tests and Research

No items tested or researched were required to be conducted as a consequence of this serious incident.

1.17 Organizational and Management Information

Aircraft Operator	: PT. SRIWIJAYA AIR
Address	: Jl. Pangeran Jayakarta No. 68C
Certificates Number	: AOC /121-035
Operator Designator	: SJY

The organization and elements within the company are compliance as per the CASR 121 requirement.

1.18 Additional Information

Herewith are some ground manoeuvre procedures as stated in the Flight Crew Training Manual (FCTM).

Chapter 2.8 FCT 737 CL (TM) July 29, 2011on a subject of **Visual Cues and Techniques for Turning while Taxiing:**

The following visual cues assume the pilot's seat is adjusted for proper eye position. The following techniques also assume a typical taxiway width. Since there are many combinations of turn angles, taxiway widths, fillet sizes and taxiway surface conditions, pilot judgment must dictate the point of turn initiation and the amount of nose wheel steering wheel required for each turn. Except for turns less than approximately 30°, speed should be 10 knots or less prior to turn entry. For all turns, keep in mind the main gear are located behind the nose wheels, which causes them to track inside the nose wheels during turns.

Chapter 2.11 FCT 737 CL (TM) July 29, 2011on a subject of **Turns of 180 degrees:**

Turning radius can be reduced by following a few specific taxi techniques. Taxi the airplane so that the main gear tires are close to the runway edge. This provides more runway surface to make the turn. Stop the airplane completely with the thrust at idle. Hold the nose wheel steering wheel to the maximum

steering angle, release the brakes, then add thrust on the outboard engine. Only use the engine on the outboard side of the turn and maintain 5 to 10 knots during the turn to minimize turn radius

1.19 Useful or Effective Investigation Techniques

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

2 ANALYSIS

According to the particular of the information and the data collected which are have strong related to this prior and post of the serious incident, therefore this analysis will be focused on these following areas:

- Manoeuvring speed limit on the apron
- Line up turning
- Situational Awareness

2.1 Manoeuvring speed limit on the apron

The Flight Crew Training Manual (FCTM) on subtitle chapter Visual Cues and Techniques for Turning while Taxiing stated that except for turns less than approximately 30°, speed should be 10 knots or less prior to turn entry.

The FDR recorded that the taxi speed when the aircraft entered the apron was 18 knots and this mean that the aircraft taxi speed was 8 knots faster than the recommended in the FCTM.

2.2 Line up turning

Refer to Flight Crew Training Manual (FCTM) on subject Turns of 180 degrees stated that an 180 degrees turn should started with the main gear tires closes to the runway edge to provide more runway surface to make the turn. The taxi speed should maintain 5 to 10 knots during the turn to minimize turn radius.

The FDR was recorded that at the initial aircraft turn speed for a line up position on the runway 15 was 21 knots, this mean that the aircraft speed when turn was 11 knots faster than the recommended in the FCTM. The high speed most likely was the caused the nose wheel skid instead of turning.

The investigation also revealed that the rubber mark was found initiated from the centre line of the runway. This indicated that the turn did not initiate from the runway edge. This has made the available area for turning was not sufficient for the aircraft to make 180 degrees turn.

2.3 Situational Awareness

Situational awareness refers to the pilot's "perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future" (Endsley, 1995, p. 36). According to Endsley, SA can be considered as knowledge of what is happening now (Level 1 SA), knowledge of what has happened previously (Level 2 SA), and knowledge of what is expected to occur in the future (Level 3 SA).

The PIC has more than 10 years experience as a Pilot in Command for domestic and regional flights, with more than 5 years experience as PIC in the B737 series.

Refer to the particular experiences, it might be assumed that the Pilot in Command had sufficient knowledge and skill such as, knowing well all of the limitations and flight techniques to operate the B737 properly and safely.

Three significants condition of the pilot associate to the situational awareness are:

— The PIC was claimed that he had stomach ache and did not reported to the company.

— The PIC was late to recognise the marshaller (AMC officer) sign to stop the aircraft during parking.

— The PIC made a turn while the aircraft speed was 11 knots higher than the recommended speed started from the centre of the runway.

Refer to the those conditions it can be concluded that the Pilot in Command had partially missed of the 3 levels of the Situational Awareness and it most likely contributed to the disobeying in some of limitations of ground manoeuvring.

3 CONCLUSION

3.1 Findings

a. The aircraft was airworthy and there was no evidence that the aircraft has any system malfunction prior to this serious incident.

b. Both pilots had valid license and medical certificates.

c. The aircraft was within the correct weight and balance limitation.

d. The PIC acted as pilot flying.

e. When arriving from Medan, the aircraft entered and taxi on the apron was faster than normally speed and the FDR recorded that the taxi speed was 18kts.

f. The aircraft was not properly stop while parking on spot number 4 and the left wing was close and almost hit the aerobridge.

g. There was no hazard report in respect with this occurrence which shown that the Safety Management System was not well implemented.

h. At the initial turn to line up position on the runway 15 the aircraft taxi speed was 21knots.

i. The mark of the nose wheels was approximately 22 meters initiated from the centre of the runway until the aircraft stop was found.

j. There was no any discrepancy reported of the aircraft and runway lighting system prior and during the time of serious incident.

k. The weather reported by the local meteorology office was fine with horizontal visibility was 8 km.

l. The excavated lines of the nose wheels marked on the runway surface showed that the nose wheel was skidding with approximate angle were 70 ° to the left.

m. The AML (Aircraft Maintenance Log) signed by the PIC after the serious incident showed no discrepancy was reported.

n. The PIC had stomach ache and went to the toilet several times during flight.

o. The PIC has been resigned from the company on 11 April 2013 prior to conduct physiological consultation and drug test which was part of the company corrective action programs.

p. The investigation in respects to the Human Factors aspects for the pilot in command could not be continued.

3.2 Contributing Factors

The Pilot in Command had partially missed of the 3 levels of the Situational Awareness and most likely contributed to the disobeying in some limitations of ground manoeuvring.

4 SAFETY ACTION

At the time of issuing this investigation report, the National Transportation Safety Committee has been informed by PT Sriwijaya Air of safety actions have been taken resulting from this serious incident.

Following this serious incident the Quality, Safety and Security (QSS) department planned to perform several corrective actions to the flight crew involved. The PIC has perform some items before resign from the company, the SIC had performed all items of the corrective actions.

On 9 July 2013 PT. Sriwijaya Air informed to the National Transportation Safety Committee by the letter number: QSS/DS/IV/2013/R-12 dated 01 April 2013 contained information that the QSS department had issued recommendations to Board of Directors, Principal Operation Inspector (POI), and Principal Maintenance Inspector (PMI) on identified safety deficiency.

QSS department has identified that the incident causes most probably due to lack of situational awareness and coordination among the pilots, as such, the QSS has issued the following recommendation:

1. The LINE CHECK should be a priority and the checker assigned has to seat in the observer seat, and he/ she has to watch closely the CRM interaction associates with SOP and other common practices in the aviation
2. The proficiency check briefing should consist of the explanation and its background of the all QSS Recommendation published.
3. The preflight briefing is a mandatory and at the end of the briefing each crew has to declare that he/she has physically and mentally ready for flight.
4. The active pilot has to rise their awareness especially when flying in a marginal condition such as:
   - Transition between sunset to sunrise and reciprocally;
   - Runway in use is changed;
   - The Hold Item List (HIL) more than one item. If necessary this case can be grouped as an additional briefing.
5. The pilot who has bad habit and identified to be below the minimum standard of flying performance should not be paired with the pilots with identified has the same conditions.
6. Each pilots and or staff has to report the unsafe act and or hazard found out to the QSS.

5 SAFETY RECOMMENDATIONS

The NTSC had examined deeply all contents of the **QSS/DS/IV/2013/R-12** which is explaining several safety actions proposed to the Board of Director of PT. Sriwijaya Air.

Respecting to the safety actions and several significant findings during the investigation, the National Transportation Safety Committee issued several safety recommendations address to:

5.1 PT. Sriwijaya Air

1. NTSC agree and has same perception to the contents of: QSS/DS/IV/2013/R-12 dated 01April 2013 especially on the elements of Human Factors areas. As an additional, Sub part 2.3 of this report described the critical element that would enable to enrich the direction for the implementation.

2. There was no hazard report related to the occurrence when arriving from Medan. A hazard report to this occurrence might prevent to the subsequent occurrence by early hazard identification to determine the risk level. This indicated that the SMS has not well implemented. NTSC recommends to encourage and implementation of proper Safety Management System.

5.2 Minangkabau Airport/ PT. Angkasa Pura II

There was no hazard report related to the occurrence when arriving from Medan. This occurrence has jeopardized the airport facility and should become a mandatory reported event as part of Safety Management System. NTSC recommends encouraging Safety Management System and implementing properly.

5.3 Directorate General of Civil Aviation

Has to ensure that the SMS is well implemented by the operator, moreover it is not limited to the other Air Operator Certificate and Airport Certificate holders.