Aircraft Accident Investigation Bureau of Myanmar

The aircraft accident investigation bureau (AAIB) is the aircraft investigation authority in Myanmar responsible to the Ministry of Transport and Communications. Its mission is to promote aviation safety through the conduct of independent and objective investigations into air accident and incidents.

For aviation related investigations, the AAIB conducts the investigations in accordance with Myanmar Aircraft Act and Rules and Annex-13 to the Convention on International Civil Aviation.

In carrying out the investigations, the AAIB adheres to ICAO's stated objective, which is as follows:

"The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability."

Accordingly, it is inappropriate that AAIB reports should not be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

FINAL REPORT OF SERIOUS INCIDENT OF MYANMAR NATIONAL AIRLINES CESSNA 208B GRAND CARAVAN (Reg: XY-AMB) AT MAWLAMYING DOMESTIC AIRPORT ON 27th NOVEMBER, 2018

SYNOPSIS

At 09hour 28 min (local time) on 27th November 2018, Myanmar National Airlines, Training Flight, CESSNA 208B GRAND CARAVAN (Reg:XY-AMB) while landing roll on the Runway-04 of the Mawlamyine Domestic Airport, occurred a runway excursion. On board Cessna Grand Caravan (Reg: XY-AMB) aircraft were the Pilot-in -command (PIC), First Officer (FO), Flight Operations Inspector (FOI), Two Trainees (Pilot and First Officer) and four cabin crews.

The plane left Yangon International Airport for Mawlamyine Airport at 08h 40 min (Local time). On the way to Mawlamyine airport, the weather was fine. The flight level was 7000 ft. The approach was made to Runway-04 of Mawlamyine Airport. While the aircraft (XY-AMB) was approaching to final threshold point, after reaching 30 ft above the threshold, when the pilot (FO) reduced the power, the aircraft was suddenly landed on the runway with nose down position. So the nose wheel was broken and busted due to the hard Impact. And then the plane was bounced about 25 ft from the runway. After the initial bounced landing, the aircraft was landed on the runway again and veered off the left side of the Runway. And then it was stopped on the edge about 1800 ft from the Runway-04. The propeller came to hit the ground and blades were twisted and deformed. No fire broke out and no one was injured in the serious incident.

Aircraft Details

Myanmar National Airline

Registered owner and operator	:	Myanmar National Airlines
Aircraft type	:	Cessna Grand Caravan 208B
Nationality	:	Republic of the Union of Myanmar

Registration	:	XY-AMB
Place of Occurrence	:	Mawlamyine Domestic Airport, RWY-04, VYMM, N 16° 26' 36", E 97°39' 34"
Date & Time	:	27th November, 2018 at 09h 28min (local time) (UTC 02h 58 min)
Type of operations	:	Training Flight
Phase of operations	:	Landing roll
Persons on Board	:	Crew-9

1. FACTUAL INFORMATION

1.1 History of the Flight

The route of the Cessna Grand Caravan (XY-AMB) on that day was Yangon-Mawlamyine-Yangon.

Figure :1 Layout of Serious Incident Site

1.2 Injuries to Persons

1.2.1 Myanmar National Airlines

Injuries	Crew	Passengers	Other	Total
Fatal	0	0	0	0
Serious	0	0	0	0
None	9	0	0	9
Total	9	0	0	9

1.3 Damaged to Aircraft

1.3.1 Myanmar National Airlines (Cessna Grand Caravan 208 B) (XY-AMB)

(a) Nose Landing Gear was broken and Nose wheel was busted.

(b) Propeller blades were twisted and deformed.

(c) Emergency Locator Transmitter (ELT) transmitted distress signal.

(d) The plane was nosedived into the grass turf at the edge of the Runway- 04.

Figure-2 The Aircraft came to rest on the grass tuft at the edge of the Runway

Figure-3 Aircraft Nosedived position after the accident

Figure-4 The Ground Mark of the Nose wheel Touched down point (Viewed from Runway-04 to crash site)

Figure-5 The Ground Mark of the Propeller Striking the Runway and Nose Landing Gear Oleo (Viewed from Runway-04)

Figure-6 The Ground Mark of the Propeller Striking the Runway and Nose Landing Gear Oleo (Viewed from Runway-04)

Figure-7 The Ground Mark of Nose Landing Gear Oleo (Viewed from Runway-04)

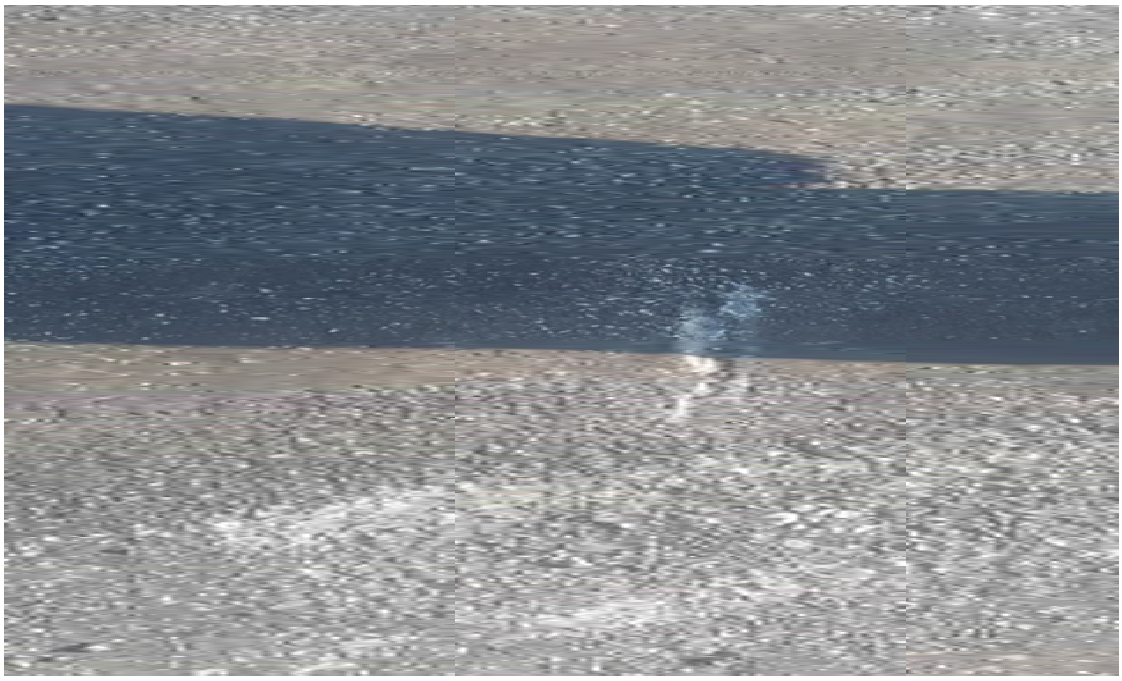

Figure-8 The Ground Mark of Propeller Striking the Runway

Figure-9 The Broken Part of Nose Wheel on the Runway

Figure-10 The Broken Part of Nose Wheel Hub

Figure-11 The Broken Part of Nose Landing Gear

Figure-12 The Cockpit View after the Incident

Figure-13 The Closer View of the Propeller damaged

Figure-14 The Closer View of the Nose Landing Gear Damaged

1.4 Other Damage

There was no other damage due to this serious incident.

1.5 Personnel Information

Pilot in Command (Myanmar National Airlines)

Age	:	47
Licence	:	ATPL
Licence issued date	:	16-10 -2015
Total hours	:	6326:20
On type	:	478:40
Medical expire	:	30-4-2019
Line check date	:	27-10-2018
Type rating check date	:	27-10-2018
Last 90 days	:	62:47
Last 30 days	:	39:16
Last 24 hours	:	4:41

Co-Pilot (Myanmar National Airlines)

Age	:	33
Licence	:	CPL
Licence issued date	:	24-10-2012
Total hours	:	1819:39
On type	:	219:39
Medical expire	:	30-6-2019
Line Check date	:	29-10-2017
Type rating check date	:	8-6-2017
Last 90 days	:	32:48
Last 30 days	:	17:13
Last 24 hours	:	Nil

1.6 Aircraft information

1.6.1 General

Myanmar National Airlines Aircraft

Manufacture	:	Cessna Company- USA
Type	:	Cessna 208B Grand Caravan
Serial number	:	5234
Date of Manufacture	:	21-9-2015
Total Airframe hours	:	830:56
Certificate of Registration	:	XY-AMB
C of A issue date	:	1-10-2018
Last Time Check	:	16-11-2018(OA/100 FH)
Total Flying hours	:	830:56

1.7 Meteorological Information

The observation reported at Mawlamyine Domestic Airport on the 27th November at 9:06 (Local Time) was wind direction 070°, 10 to 15 knots, visibility 2 to 3 mile, WX-D-H-SS, QNH 1016 and Temperature 28° C.

1.8 Aid to Navigation

Mawlamyine Domestic Airport was equipped with the following facilities:

VYMM AD 2.19 RADIO NAVIGATION AND LANDING AIDS

Type of aid CAT of ILS/MLS (MAG VAR)	ID	Frequency	Hours of operation	Transmitting antenna coordinates	Elevation of DME transmitting antenna	Remarks
1	2	3	4	5	6	7
N.D.B	MM	330 kHz	HO	162635.95N 0973927.82E	Not applicable	Coverage: 50 NM Em: NON/A2A

1.9 Communication

Communication facilities in Mawlamyine Domestic Airport was as follows: As per record the communication on that day was normal.

VYMM AD 2.18 ATS COMMUNICATION FACILITIES

Service designation	Call sign	Channel	Hours of operation	Remarks
1	2	3	4	5
MAWLAMYINE APPROACH CONTROL	MAWLAMYINE APPROACH: EN	119.700 kHz	HO	Nil
MAWLAMYINE TOWER	MAWLAMYINE TOWER: EN	118.700 MHz	HO	Nil

VYMM AD 2.19 RADIO NAVIGATION AND LANDING AIDS

Type of aid CAT of ILS/MLS (MAG VAR)	ID	Frequency	Hours of operation	Transmitting antenna coordinates	Elevation of DME transmitting antenna	Remarks
1	2	3	4	5	6	7
N.D.B	MM	330 kHz	HO	162635.95N 0973927.82E	Not applicable	Coverage: 50 NM Em: NON/A2A

1.10 Aerodrome Information

Mawlamyine Domestic Airport has one main Runway 04/22 with a length of 5298 ft and wide of 150 ft at an elevation of 23.8 M (78ft) above mean sea level. The airport has an ATC control tower, controlling class C airspace.

The aerodrome category for the fire fighting is CAT4.

1.11 Recorders

The aircraft was installed with a 25-hour solid state Cockpit Voice and Data Recorder (CVDR, Model FA 2100), with SER-000905121 and PNR 2100-3083-51 from FAIRCHILD Inc.

The recorded flight data was of good quality. The CVDR contained 315 hours and 34 minutes of flight data. The flight data contained 33 parameters in the data frame file. The recorded voice data contained four audio tracks each of 2 hours 4 minutes and 14 seconds duration.

1.12 Wreckage, Site and Impact Information

The coordinates of accident site is Latitude N 16°26' 36" and Longitude E 97° 39'34". When Aircraft Accident Investigation Bureau (AAIB), Myanmar investigators arrived at the occurrence site, the aircraft was on the grass area which is on the left side of the Runway of Mawlamyine Airport. The serious incident aircraft had been removed for normal airfield operation.

Measurements and photographs were taken on the occurrence site, ground marking and tracks were inspected and casual interviews were conducted among witnesses.

1.13 Medical and Pathological Information

No one was injured. The Pilot-in-command (PIC) and First Officer (FO) of Cessna 208B Grand Caravan were sent to hospital for medical examination. There were no evidence of any relevant medical factors that could affect the performance of the pilots.

1.14 Fire

There was no fire before, during and after the accident.

1.15 Survival Aspects

As soon as the occurrence happened, all the crew reviewed the outside situation, get out of the aircraft and went to the airport terminal by the rescue team vehicles. Aircraft Fire Fighters and rescue team were on the stand by and got ready to initiate their rescue operations.

1.16 Test and research

There is no test and research for this case. When AAIB Myanmar investigators arrived at the occurrence site, the incident aircraft had been moved to the grass area which is on the left side of the Runway-04. So Flight Data Recorder (CVDR) was impounded for the investigation.

1.17 Organizational and Management Information

1.17.1 Myanmar National Airlines

Myanmar National Airlines (MNA) headed by Chief Executive Officer (CEO) is the national flag carrier of Myanmar and has the most extensive network in the country and international schedule flight to Singapore, Bangkok, Chiangmai and Hongkong as well. It had 18 numbers of fleet such as Boeing 737-800, Embraer-190, ATR-72-600, Beech and Cessna Grand Caravan. Myanmar National Airlines, Engineering and Maintenance Department in which doing the installation, Inspection and maintenance of their aircrafts. They were doing maintenance in conformity with Myanmar Civil Aviation Requirements (Part 145 and Part M). It was Observed that Brake system, navigation system, Control Service and Engine of the incident aircraft were operational and normal conditions. Most Pilots from Myanmar National Airlines receive their initial flying training in the operator's fleet of Cessna Grand Caravan 208B. The instructors for the training are senior pilots of the operator. The operator does not include the use of flight simulators as part of their training curriculum for this aircraft type. The pilots operating the Cessna Grand Caravan 208B aircraft are required to undergo proficiency checks every six months.

1.17.2 Air Traffic Control

Department of Civil Aviation is the air traffic control service provider at Mawlamyine Airport.

1.18 Additional Information

1.18.1 Testimony of Myanmar National Airlines Pilot

He stated that he was flying the UB-Training Flight, Yangon-Mawlamyine-Yangon route. After take off the aircraft completely, he handed over the First Officer (FO) to control the flight. The Flight level was 7000 ft. The weather was fine on the way. He got a contact with the Mawlamyine control tower 65 nautical miles away from Mawlamyine Airport. He got the weather information: Wind direction 070°, wind velocity 10 knots to 15 knots, visibility 2 to 3 miles Ceiling Distance Haze with sunshine, Temperature 26° C and QNH 1016, Runway-04. Before landing check was made and then he joined approach Runway-04. During approaching, airspeed has been reached about 102 knots. So, he warned the First officer to reduce airspeed. While the aircraft was approaching to final threshold point, he made a first flare at 30ft high level before the threshold. At 15 ft high level above the threshold, after doing the second flare, when the First Officer reduced the power to idle, the aircraft was unexpectedly landed on the Runway with nose down position (negative pitch). So the nose wheel was broken and busted due to the hard impact. And then the Plane was bounced about 25ft from the runway. After the initial bounced landing, the aircraft was landed on the runway again. So he controlled the aircraft control column backwards to prevent the propeller striking the runway. While controlling the aircraft, he was hard to control the plane with nose up position, because the plane started to reduce airspeed. And then the plane was veered off the left side of the runway and stopped on the edge of the Runway 04. Although he shut down the engine according to the procedure, the nose gear oleo was folded down in the soil on the runway shoulder and propeller had came to hit the ground already. And then he asked the cabin crew to disembark the training members and sent them to the terminal. After that he reported about it to his management on the phone.

1.18.2 Testimony of Myanmar National Airlines First Officer

He stated that the route on that day was Yangon-Mawlamyine-Yangon route. He started to leave Yangon airport at (02:16UTC) .The flight level was 7000ft and on the way to Mawlamyine; the weather was fine. About 4 nautical mile final to Mawlamyine airport the flight level was 3000ft. At that time the

weather provided by the Mawlamyine was wind direction 070°, 10 knots (sometime guest wind 15 knots), Runway-04. Before landing check was made and then approach was made to Runway-04. While on approach about 600ft high level, he increased the aircraft power about 480ft-lbs because the aircraft started to reduce airspeed below 80 knots suddenly. So he made the power adjustment and approached to the Runway-04. He made a first flare before the threshold. Approach speed was 92knots crossing the threshold. When he made the second the flare, the pilot reduced the power. At that time, the plane suddenly landed on the runway with hard impact. Although he lifted up the plane from the runway, the plane bounced and its nose wheel had been broken already. After that he could not control the plane well. So that the pilot shut down the engine according to the procedure. And then the plane stopped on the ground, where the left side of the Runway-04. After that he shut off the fuel selector switch.

2. ANALYSIS

2.1 Introduction

The analysis by the investigation team has focused on the following areas:

a) Individual/ team action
b) Weather condition
c) Flight recorder data analysis
d) Standard Operation Procedures and crew response

2.2 Individual/Team Action

2.2.1 Flight crew

Both the pilot-in-command (PIC) and first officer (FO) had operated into Mawlamyine Airport for many times and were familiar with the runway condition and airport facilities. The PIC had (478:40) hours on type and total flying hours (6326:20) and the first officer (FO) had (219:39) hours on type and total flying hours (1819:39) respectively. Their licenses were valid.

2.3 Weather Condition

The weather was within the operating limits of the aircraft and there was no report of any localized weather conditions that might have adversely affect the flight crew's ability to operate the aircraft safely.

2.4 Flight Recorder Data Analysis

The CVDR contained both recorded flight and voice data. The recorded flight data was of good quality. The CVDR contained 315 hours and 34 minutes of flight data. The flight data contained 133 parameters in the data frame file. The recorded voice data contained four audio tracks each of 2hours 4 minutes and 14 seconds duration.

According to the flight data readout, the crew of XY-AMB conducted a visual approach into Mawlamyine Airport for Runway-04 on 27 Nov 2018. The crew disconnected the autopilot system at 03:01:11 UTC when aircraft was approximately 573 ft above ground level. At that point, the engine was developing 490 ft-lbs of torque and the indicated airspeed as 94 knots.

The recorded rate of descent was in the range of 530 to 770 ft/min. During this period, the maximum indicated airspeed reached was 106 knots at 03:01:58 UTC when the aircraft was 149 ft above ground level. According to the CVR transcript, the pilot monitoring verbalized “reduce the power check airspeed” at 03:01:59UTC.

According to the CVR transcript, after making the first flare, the following were observed in the subsequent few seconds:

About 03:02:07 UTC, Pilot in command said “height five zero and reduce the power”, the first officer said “ second flare” with pitch angle of aircraft continuing with the increasing trend and Pilot-in-command (PIC) was heard saying “ reduce power” again.

About 03:02:09 UTC, the first officer said “ roundout” at that time, aircraft was 35ft above ground level. Engine torque started to increase from recorded value of 140 ft-lb. Sharper increase in pitch angle was observed, reaching a maximum of +2degrees(nose up). After that the pitch angle was observed to start decreasing at 03:02:10 UTC.

According to the flight data readout, at 03:02:10UTC, +2.938G of vertical acceleration was recorded with Pitch angle reaching -8degrees (nose down)shortly thereafter. A sequence of rattling sound lasting two seconds was recorded. This is consistent with the nose gear making contact with the paved surface of the runway first as the recorded ground/air mode signal at that instance was “in air” and the recorded radio height was 1ft above ground level.

Between 03:02:11 UTC and 03:02:12 UTC, the pitch angel increased from -8 degrees to +12 degrees with increasing torque. Three seconds later, at 03:02:15 UTC, the recorded radio height was 15ft above ground level. This is consistent with the aircraft gaining height after the earlier bounced landing. According to the FDR readout, about 03:02:18UTC, +2.104G of vertical acceleration was recorded with the pitch angle at +5 degrees. A second sequence of rattling sound was recorded. This is consistent with the aircraft landing on the runway again after the initial bounced landing. The ground signal was recorded at 03:02:31UTC.

The last recorded indicated airspeed was 0 knot, pitch angle was -13 degrees and this consistent with final position of the aircraft at the grass tuff to the left side of Runway-04.

2.5 Operation Procedures

According to the Airspeed for normal operation (landing approach), normal approach, flaps land speed must between 75 and 85 KIAS. The pilot must maintain the airspeed and control the stabilized approach.

Generally, if a pilot determines by the time the aircraft is at the decision height (for a precision approach) or missed approach point (for a non-precision approach), that the runway or its environment is not in sight, of that a safe landing cannot be accomplished for any reason, the landing approach must be discontinued (a go-around) and the missed approach procedure must be immediately initiated. It is also common for pilots to practice a missed approach as part of initial or recurrent instrument training. Unstabilized approaches account for most approach and landing accidents. For this reason, an approach should be stabilized by one thousand feet above runway altitude. Otherwise, a go-around should be executed by the pilot.

3. CONCLUSIONS

3.1 Findings

From the evidence available, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organization or individual:

a) The approach was unstable as the airspeed of the aircraft was consistently above the required range of landing speed between 75-85 KIAS.

b) The pilot-in-command was aware that the airspeed on short finals was in excess of the landing speed as he was heard verbalizing to power repeated in the CVR recordings.

c) Despite the unstabilized approach, both flight crew appeared committed to land the aircraft and did not consider executing a go-around.

d) The aircraft experienced a hard landing on the first instance of touching down on the runway, with the vertical acceleration reaching a value of +2.938G. This resulted in the nose gear breaking off.

e) With the nose gear detached, the pilot flying was unable to maintain directional control, that likely resulted in the aircraft veering off the runway.

f) The two pilots could not maintain the airspeed for normal landing operation and could not control unstabilized approach of the aircraft.

3.2 Primary Cause

During an unstabilized approach, both flight crew managed to land the aircraft and did not consider executing a go-around.

4. SAFETY RECOMMENDATIONS

To reduce and eliminate of accidents and serious incidents, AAIB recommended the followings:

4.1 The Pilots should be encouraged to execute a go-around during an unstabilized approach.

4.2 The operator should include the use of flight simulator as part of their training curriculum for this aircraft type.

Investigator -in -charge