



PAKISTAN CIVIL AVIATION AUTHORITY
(SAFETY & INVESTIGATION BOARD)



**SERIOUS INCIDENT TO M/S. ASSL
CESSNA F-406 AIRCRAFT, REG. # AP-BFK
ON 15 DECEMBER 2010 AT SUKKUR AIRPORT**

INVESTIGATION REPORT

SERIOUS INCIDENT TO M/S ASSL CESSNA F- 406 AIRCRAFT REG. NO. AP-BFK AT SUKKUR AIRPORT ON 15 DEC 2010

SYNOPSIS: On 15 Dec 2010, a Cessna F-406 aircraft, Reg. No. AP-BFK of Aircraft Sales & Services (ASSL) Pvt Ltd got airborne from JIAP Karachi and after completing a training "Under Supervision" flight landed at Sukkur airport. After break of 20-30 minutes and change of "Pilot In Command", the aircraft started up for a ferry back flight to destination Karachi. The aircraft was cleared by Sukkur ATC to taxi out, back track and line up RW-14. At the end of runway 32, pilot started to shift into right half. As PIG retarded the throttle, he observed abrupt swing towards right edge at the same time right brake getting stuck. Aircraft could not be controlled and stopped by application of brakes and other available means. The aircraft went off the prepared surface, while left wing of the aircraft still on runway surface. Aircraft came to halt with the nose leg fixed into the ground.

The investigation was ordered by the Director General Civil Aviation Authority vide Memorandum No. HOCAA/1901/340/SIB Dated 21st December' 2010.

1. FACTUAL INFORMATION

1.1 **History of the Flight :** Earlier, in continuation, the aircraft had flown a Training - Cross country Flight on sector Karachi-Nawabshah-Sukkur, and another flight at overhead Sukkur. The incident flight was a Ferry flight to Karachi.

1.2 **Injuries to Persons:** No injury to any crew member and occupant.

1.2.1 **Damage to Aircraft:** Aircraft sustained substantial structural damage whereby both sides Propellers tips were damaged, nose landing gear fork broke and wheel separated. Also, main gear assemblies got misaligned.

1.3 Aircrew information

1.3.1	Capt. Nisar Raja	:	Pilot in command
	Total Experience	:	5500 Hours
	Total Command Exp	:	4500 Hours
	Command on Type	:	150 Hours

1.4 Personnel information

1.4.1	Capt. Salal Shah (P-11 (U/S)	:	Passenger on P-2 seat
1.4.2	Capt. Afaq A Khan (P-1 (UIS)	:	Passenger seat
1.4.3	Capt. Pervez Samuel (CP)	:	Passenger seat

1.5 Aircraft Information

1.5.1	Aircraft make/model	:	Cessna/ F-406, CARAVAN-II
1.5.2	Manufacturing Date	:	30th April, 1992
1.5.3	Serial No	:	0059
1.5.4	Date of Induction	:	March, 1997
1.5.5	Aircraft Registration	:	AP-BFK
1.5.6	Aircraft Hours/Cycles	:	5707FH/ 5723 cycles (At incident)
1.5.7	Last major maintenance, phase 2 was carried out at 5691 FH, 5700 CSN on 18 Nov 2010.		

1.6 Engine Information

1.6.1	Engine Type/Model	:	PTSA/112
1.6.2	Engine No 1 (SN 12625)	:	2112 hrs
1.6.3	Engine No 2 (SN 12624)	:	2112 hrs

- 1.7 **Propeller Type/Model** : **McCauley/3GFR34C701**
- 1.7.1 Propeller No 1 SN 900684 : 304 hrs
- 1.7.2 PropellerNo2 SN813182 : 503hrs
- 1.7.3 Compressors wash of Engine No 1 and Engine No. 2 carried out on 18 Nov 2010 at 5691 TSN, 2101.1 TSO as per maintenance record sheets of engine.
- 1.7.4 Both Engines were overhauled on March, 2002, whereas Propeller No 1 on May, 2009 and Propeller No 2 on June 2008.
- 1.7.5 Last phase 2 inspections of Propeller No 1 and Propeller No. 2 were carried out on 18 Nov 2010 at 293 and 492.3 hours respectively.
- 1.8 **Defect History:** There had been several observations by aircrew on the aircraft brakes, drifting right with retardation of power, auto feathering etc. Scrutiny of the aircraft flight log book revealed no specific trend related to aircraft system performance and engine performance. However on 7 Oct 2010 pilot reported that after landing, the brakes were found stuck for which discs were replaced. Brakes noisy problem was again reported on 16 Nov 2010, and bleeding was carried out to rectify the reported defect and aircraft was released. No defect was recorded afterwards till 15 Oct 2010, the date of occurrence.
- 1.9 **Metrological Information:** Weather reported was HAZE with visibility 6 KM.
- 1.10 **FDR / CVR:** Aircraft AP-BFK was not equipped with FDR/ CVR.
- 1.11 **Wreckage & Impact Information:** Aircraft was found **58 feet** away from the right edge of runway and at about **108 feet** from runway centre line in rough/ unprepared ground. There were tyre marks visible on runway for about **320 feet** before aircraft left prepared surface. Nose leg of the aircraft was found fixed into ground at 108 feet from centre of runway. Detailed wreckage diagram is attached as **Appendix 'C'**.
- 1.12 **Fire/ Smoke:** No fire/ smoke was neither reported or observed by Fire Services at Sukkur.

2 ANALYSIS

2.1 Technical Analysis

- 2.1.1 **Aircraft Wreckage Analysis:** After the occurrence the survey of incident site was conducted. The important signs / rubbing marks of tyres on the runway and other related evidences were preserved through digital photography. The damaged parts were examined with a view to establish cause/s of incident. Nose leg of the aircraft was found fixed deep into ground at 108 feet from centre of runway. However, it was revealed that the damages caused to aircraft were due to aircraft going off runway on unprepared surface.



- 2.1.2 A taxi test was conducted prior to a ferry from Sukkur airport after replacement of damaged nose landing gear. Aircraft then successfully ferried back to JIAP Karachi.
- 2.1.3 **Document / System Analysis:** The technical analysis of documents and systems revealed no technical malfunction and the systems were functional till the occurrence.
- 2.1.4 **Conclusion:** Although, the aircraft had history of a sound from right brake and drifting to right when power was retarded during flare out phase of flight, auto feather intermittent in the past, and similar observations were made by aircrew, yet nothing could be isolated as technical malfunction which

might have caused the occurrence as the aircraft was successfully ferried to Karachi after replacement of damaged nose landing gear.

22 Ops Analysis

- 2.2.1 Narrative of Events:** The flight was scheduled to undertake under supervision (UIS) training flight of newly converted Pilots. The composition of crew on board for complete cross country was as follows:-

Captain Pervez Samuel -	Pilot in Command (Chief Pilot) ()
Capt Afaq A Khan -	P-1 (U/S)
Capt Salal Shah -	P- II(U/S)
Capt Nisar Raja -	Safety Pilot

- 2.2.2** The flight took off from JIAP Karachi at **1445** hours for Nawabshah and Sukkur. For first sector, Capt Pervez Somuel was Pilot in Command and Capt Afaq as P1 (UIS). The aircraft reached overhead Sukkur at **1600** hours, carried out one letdown followed by touch & go landing and a full stop landing. In the second sector which was flown Overhead Sukkur, Capt Samuel being on Left seat took Capt Salal in the Right seat and carried out a UIS touch & go landing followed by a full stop landing. The aircraft was switched off at Sukkur at **1635** hours.
- 2.2.3** After a break of about **20-25** minutes, Capt Samuel indicated him being not well, and asked Capt Nisar (Safety Pilot) to take over the Left seat as Pilot in Command and ferry back the aircraft to JIAP Karachi while Capt Salal Shah occupied the RT Seat. Capt Nisar asked for start up and Taxi. Aircraft started up normal and after start up checks were carried out, PIC observed that the Parking Brake was not in properly secured position and seemed faulty. PIC informed Capt Samuel (CP on board) and was reluctant to taxi out. On which CP asked PIC to release the brakes and see the behaviour of the aircraft. The aircraft behaviour was "normal".
- 2.2.4** Aircraft was given instructions to enter active, back track and Line up R/W **14**. While aircraft was taxiing on the R/W to carry out Line up **14**, stated to be at normal taxi speed, about **1100** short of the Line up point, PIC observed a sudden and abrupt drift of the aircraft to the right. As stated, PIC immediately applied left brake and differential power (Right Eng Power was increased with reduction in Left) to control the drift and straighten out aircraft. The aircraft showed a little response (for a very small time), but when the Right engine power was brought back to help reduce speed, the aircraft continued its vicious and uncontrolled swing to the Right.
- 2.2.5** By now aircraft speed had been reduced appreciably, yet there was **10-15** deg of deviation with runway heading. The aircraft continued moving forward with existing drift towards Right edge of runway and could not be completely stopped. Aircraft entered unprepared surface after crossing right edge of runway. Engines were cut after it came to halt. Later, ATC was informed, all switches were selected off and aircraft was evacuated. As a result, NLG fork broke with nose leg getting separated; and both engines' propellers were extensively bent / damaged. Emergency services at Sukkur were timely activated. SIB team visited the site on the same day and collected available evidences and recorded statements.
- 2.2.6** The PIC stated to have observed following to be the most probable causes responsible for uncontrolled *ale* behaviour;
- 2.2.6.1** Faulty Parking Brake.
- 2.2.6.2** Right Brake got jammed.
- 2.2.6.3** Left Eng generating asymmetric power.
- 2.2.6.4** Auto Feathering.

- 2.2.7 **Change In Flight Plan by Chief Pilot.** Captain Samuel, also the Company Chief Pilot was PIC for the entire flight plan. He is well experienced and had total flying experience of 5200 hours with 4500 hours as Command pilot. Being on duty since morning he had spent about six hours in the office, before this aircraft took off at 1445 hrs. Full stop landing at Sukkur was made at 1635 hours, after which Captain Samuel felt not well to undertake further flight. By this time he had also done eight hours of duty, and correctly decided to ask Captain Nisar to fly the aircraft back to Karachi.
- 2.2.8 PIC was authorized and had adequate experience to undertake this ferry flight. He had, in the recent past, operated this aircraft as PIC during Parachinar operations. Though, Capt Salal Shah was occupying P-2 seat, but was not required to be U/S during this sector, rather be a passenger. While Captain Samuel (Chief Pilot) and Captain Afaq Khan occupied passenger seats in the cabin area.
- 2.2.9 **Incident Event.** The aircraft started up and taxied to back track to line up RWY-14 normally, except PIC had observation on ineffectiveness of Parking brakes. However, same was observed to be normal during back track. Back track entire length of the runway is undertaken at speeds relatively higher than normal taxi speeds. Understandably, the taxi back during back track must have been at relatively higher speeds.
- 2.2.10 Close to approaching end of runway, aircraft started to shift into right side of the runway to create room for turning anti-clockwise and line up RWY-14. However, while doing so, the aircraft behaviour to viciously drift right beyond control, required to be analysed. For doing so, two major aspects needed to be considered; the airworthiness of aircraft and proficiency of PIC. As the airworthiness of aircraft has been discussed and analysed above, the proficiency level of PIC is analysed below;
- 2.2.10.1 **Proficiency level of PIC.** PIC is an Ex-PAF pilot and was trained in PAF. He is an experienced pilot having flown number of similar aircraft including Falcon DA-20. He had 150 hours of command experience on the type. There has been no observation by Chief Pilot or peers on his professional skills. Besides, he was also responsible for managing the Flight Safety aspects of the Company.
- 2.2.11 **The Incident.** Sukkur runway is 9000 x 100 feet in dimension. The aircraft drifting marks were visible after 8000 feet down the runway for 320 feet on the runway surface. Meaning by that brakes and similar measures were applied to control and stop the aircraft, it however, continued to drift right. As the speed was not much at this stage, aircraft stopped with its nose wheel 58 feet from right edge of runway, (108 feet from runway centre line). Pattern of propeller marks on ground were indicative of the fact that propellers came to stop after aircraft came to halt on unprepared surface.
- 2.2.12 Stopping aircraft after landing from much higher speeds is never a problem. As it was backtrack phase of flight, the aircraft was not maintaining speeds of post-landing roll, yet the aircraft seemed to have maintaining not at normal brisk walking pace.
- 2.2.13 **Conclusion.** PIC being aware of the aircraft defect history, as stated, could not maintain cautious taxi speeds during back track.

3 CONCLUSIONS

- 3.1 Aircraft had history of defective brakes and asymmetric affect of power reduction, yet nothing conclusive could be determined as technical un-serviceability to have contributed towards the occurrence. Change of flight crew at Sukkur to ferry back was in line. Aircraft was suspected to be maintaining higher than fast walking pace as it was on backtrack on runway. Flight crew procedures to control unexpected behaviour of aircraft in close proximity of edge of runway could not avert the runway excursion by 58 feet.
- 3.2 **Cause of the Occurrence:** In the absence of conclusive findings pointing towards causation of occurrence, probable cause of runway excursion is attributed to the combination of suspected brake and associated aircraft systems as well as suspected higher than normal taxi speed while on backtrack.

4. OBSERVATIONS

- 4.1.1 The engines were cut after aircraft came to halt and had its nose wheel fixed in unprepared surface.
- 4.1.2 Unprepared surface / fair weather strip adjacent to main runway was observed to be uneven / softer.

5. FINDINGS

- 5.1.1 Defect history of aircraft and aircrew observations are indicative of brake malfunction and yawing/drift of aircraft to right in the past.
- 5.1.2 Scheduling of Captain Nisar Raja as Pilot in Command to ferry the flight from Sukkur to Karachi was unplanned and as a result of sudden unfitness of Capt Samuel.
- 5.1.3 The Captain of the aircraft was experienced enough to undertake ferry flight to Karachi.
- 5.1.4 Though, no specific technical malfunction could be isolated to have attributed towards the causation, yet flight crew seem to have lesser confidence in the complete airworthiness of aircraft.
- 5.1.5 Flight crew statements indicate that aircraft was taxiing at normal/ fast walking pace.
- 5.1.6 Vicious and unexpected behaviour of aircraft close to the edge of runway did not allow enough time to flight crew to control the aircraft.
- 5.1.7 Nose landing gear fork was damaged due to entering into unprepared surface.
- 5.1.8 Both sides Propellers blades tips were damaged due to running engines with nose wheel fixed in to the surface.

6. SAFETY RECOMMENDATIONS

- 6.1 Company to ensure adequate confidence of flight crew in airworthiness of aircraft.
- 6.2 Flight crew be encouraged to report snags in writing.
- 6.3 In case of any doubt about aircraft systems, the chances must not be taken without having ascertained its serviceability by qualified technical In-charge.
- 6.4 Aerodrome Regulatory Authority to reiterate on implementation of necessary guidelines for ensuring runway sides / fair weather strips as per aerodrome regulations.





ASSL < > H

WX < > OX

DB < > 41W







