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FINAL INVESTIGATION REPORT ON ABNORMAL RUNWAY CONTACT INCIDENT TO AIRCRAFT CESSNA 172S, VT-JSN, M/S BLUE RAY AVIATION PVT LTD AT MEHSANA ON 17 DECEMBER 2022

GOVERNMENT OF INDIA
OFFICE OF DIRECTOR OF AIR SAFETY (WR)
INTEGRATED OPERATIONAL OFFICE COMPLEX,
SAHAR ROAD, VILEPARLE (E), MUMBAI – 400099

Foreword

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 13(1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017, the sole objective of the investigation shall be the prevention of accidents and incidents and not apportion blame or liability. The investigation conducted in accordance with the provisions of above said rules shall be separate from any judicial or administrative proceedings to apportion blame or liability.

This document has been prepared based upon the evidence collected during the investigation, opinions obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.

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ABBREVIATIONS

AME	Aircraft Maintenance Engineering
AMM	Aircraft Maintenance Manual
AOP	Air Operator Permit
ARC	Airworthiness Review Certificate
AUW	All Up Weight
ATC	Air Traffic Control
BA	Breath Analyzer
CAR	Civil Aviation Regulations
CCTV	Closed Circuit Television
C of A	Certificate of Airworthiness
FDTL	Fight Duty Time Limitations
FRTO	Flight Radio Telephony Operator
FTPR	Flying Trainee Progress Report
FTO	Flight Training Organization
Hrs	Hours
IMD	India Meteorological Department
IST	Indian Standard Time

Kts	Knots
MLW	Maximum Landing Weight
NLG	Nose Landing Gear
NOSIG	No Significant
Operator	AOP holder of the incident aircraft
PDR	Pilot Defect Report
PIC	Pilot in Command
PIO	Pilot Induced Oscillations
POH	Pilot's Operating Handbook
QNH	Pressure Setting to Indicate Elevation of Landing Aerodrome
RWY	Runway
RT	Receiver-Transmitter (Radiotelephony)
SPL	Student Pilot’s License
TPM	Training Procedure Manual
VFR	Visual Flight Rules

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GENERAL INFORMATION

1.	Aircraft	Type	:	Cessna
		Model	:	172S
		Nationality	:	Indian
		Registration	:	VT-JSN
2.	Name of the Owner/Operator		:	M/s Blue Ray Aviation Pvt. Ltd
3.	Pilot in Command		:	SPL holder
	Extent of Injuries		:	NIL
4.	Date and time of incident		:	17.12.2022, 16:18 IST
5.	Place of the incident		:	Mehsana
6.	Geographical location of site Of Occurrence (Lat. Long)		: :	23°36'4.28"N 72°22'26.40"E
7.	Last point of Departure		:	Mehsana, Gujarat
8.	Point of intended landing		:	Mehsana, Gujarat
9.	No. of Persons on board		:	01 (Student pilot)
10.	Extent of Injuries		:	N/A
11.	Type of operation		:	Solo Flying Training Flight
12.	Phase of operation		:	Landing
13.	Type of Incident		:	Abnormal Runway Contact (Pilot Induced Oscillations)

(All timings in the report are in IST)

SYNOPSIS

M/s Blue Ray Aviation Pvt. Ltd (Flight Training Organization) CESSNA 172S aircraft VT-JSN was involved in an incident of abnormal runway contact during landing at Mehsana, Gujarat on 17.12.2022. The incident flight was the second solo flight of the day for the student pilot. Student pilot departed for a solo circuit landing flight on VT-JSN at 15:59 IST from runway 05. After take-off, the student pilot made a circuit and approached for the landing. During the landing roll, the aircraft entered into 'Pilot Induced Oscillations' and bounced several times. During these bounces, the propeller blades of the aircraft struck the runway and got damaged. The nose landing gear, engine mount strut, lower firewall, shock mount rubber unit, fuselage lower skin, rudder pedal bar, nose gear support bracket and Cabin lower front floor of the aircraft were also damaged. After the bounces diminished, the aircraft veered towards the right side of the runway centerline and stopped on the runway. There was no injury to the student pilot. There was no fuel leakage and there was no fire. The incident occurred at 16:18 IST. The weather was fine at the time of the incident.

The Director General of Civil Aviation ordered the investigation of the incident by appointing an Investigator In-charge vide order No. DGCA-15018(17)/31/2022-DAS dated 23.01.2023 under Rule 13(1) of The Aircraft (Investigation of Accidents and Incidents) Rules 2017. The investigation concluded that insufficient flare and subsequent incorrect bounce recovery technique during landing led the aircraft to enter into Pilot Induced Oscillations resulting in damage to propeller and aircraft structure.

1. FACTUAL INFORMATION:

1.1 History of Flight:

M/s Blue Ray Aviation Pvt. Ltd (FTO) CESSNA 172S aircraft, VT-JSN was involved in an incident of abnormal runway contact during landing at Mehsana, Gujarat on 17.12.2022 while conducting a solo circuit landing sortie. The flight was under the command of a student pilot and authorized by the Flight Instructor to carry out circuit & landing exercises. Before the incident flight, the student pilot flew for around 1:12 hours as a solo circuit landing pattern and made 05 landings on different aircraft (Cessna-172R, VT-AAQ) on the same day.

The incident flight was the second flight of the day for the student pilot. The flight instructor briefed the student pilot about the solo circuit landing profile, with a planned duration of 48 minutes. The weather was suitable for the flight. After the briefing, the student pilot did pre-flight checks, weight & balance checks, and made an entry in the authorization book. Subsequently, after completing the standard checks & procedures, the aircraft departed uneventfully from runway 05 of Mehsana Airport at 15:59 IST.

After departure, the student pilot made a circuit and approached for the landing on Runway 05. Before landing, clearance was obtained from Mehsana ATC. Subsequently while landing, the aircraft nose landing gear touched down first followed by the main landing gears. The aircraft bounced and entered into Pilot Induced Oscillations. The aircraft bounced six times while landing and during these bounces, the propeller blades of the aircraft struck the runway and got damaged. The nose landing gear, engine mound strut, lower firewall, shock mount rubber unit, fuselage lower skin, rudder pedal bar, nose gear support bracket and Cabin lower front floor of the aircraft were also damaged. The aircraft finally stopped on the runway after traveling 406.30 m distance post-first touchdown. On being contacted by ATC after coming to a halt, the student pilot informed that the rudder of the aircraft was not working. Subsequently, the flight instructor arrived at the site, and later on instructions of the flight instructor the student pilot switched off the engine and exited the aircraft unhurt. No injury was reported. Thereafter the aircraft was removed from the runway.

1.2 Injuries to persons:

Injuries	Crew	Passenger	Others
Fatal	NIL	NIL	NIL
Serious	NIL	NIL	NIL
Minor	NIL	NIL	NIL
None	01	00	---

1.3 Damages to Aircraft:

Cessna 172S aircraft, VT-JSN had received the following damages:

1.3.1 **Aircraft Propeller –** The propeller is fitted in front of the engine and the engine is mounted on the nose section of the aircraft. The propeller is made up of aluminum alloy. Both the propeller blades were bent at the tips as a result of the propeller strike**.**

Fig. 01 – Aircraft Propeller

1.3.2 **Nose landing gear** - The nose landing gear is connected to the rudder pedal. The nose landing gear strut was dislocated from its original orientation. The nose landing gear was shifted slightly front side and left side.

Fig. 02 – Nose Landing Gear

1.3.3 **Engine mount -** It is located in front of the firewall. The engine mount strut was found bent.

Fig. 03 – Engine mount

1.3.4 **Shock mount** - Three shock mounts on the lower left side of the firewall (front section of the fuselage) were found sheared from the shock mount assembly.

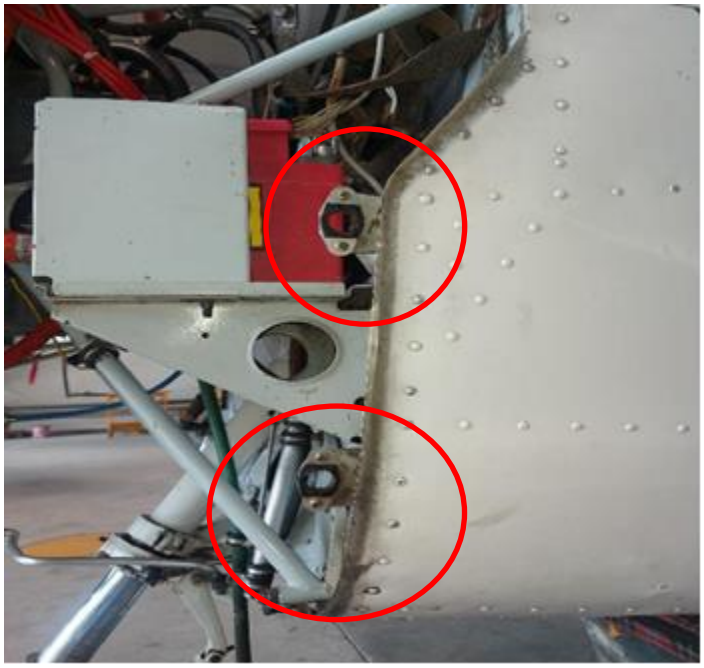

Fig. 04 - Shock mount rubber units sheared

1.3.5 **Lower firewall** - The lower firewall was buckled.

Fig. 05 - Damaged Lower firewall

1.3.6 **Fuselage lower skin wrinkled** –Fuselage lower skin was wrinkled and sheared due to impact. The wrinkle was spread in the bottom fuselage from NLG struts to the wing strut.

Fig. 06 - Fuselage lower skin

1.3.7 **Rudder pedal bar** – It is located below the rudder pedal in the cockpit. The rudder pedal bar was found bent.

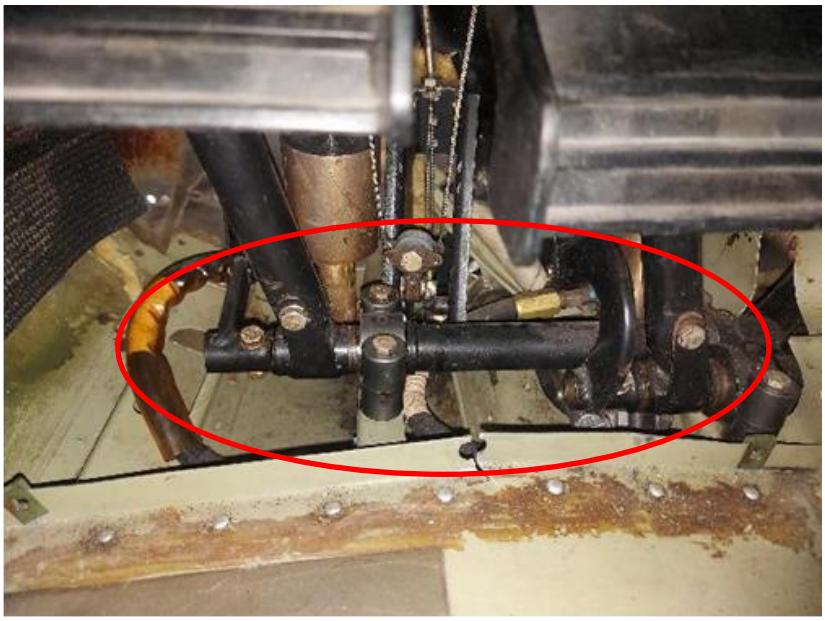

Fig. 07- Rudder pedal bar

1.3.8 **Nose gear support bracket** –The nose gear support bracket detached from the attachment with the fuselage lower skin.

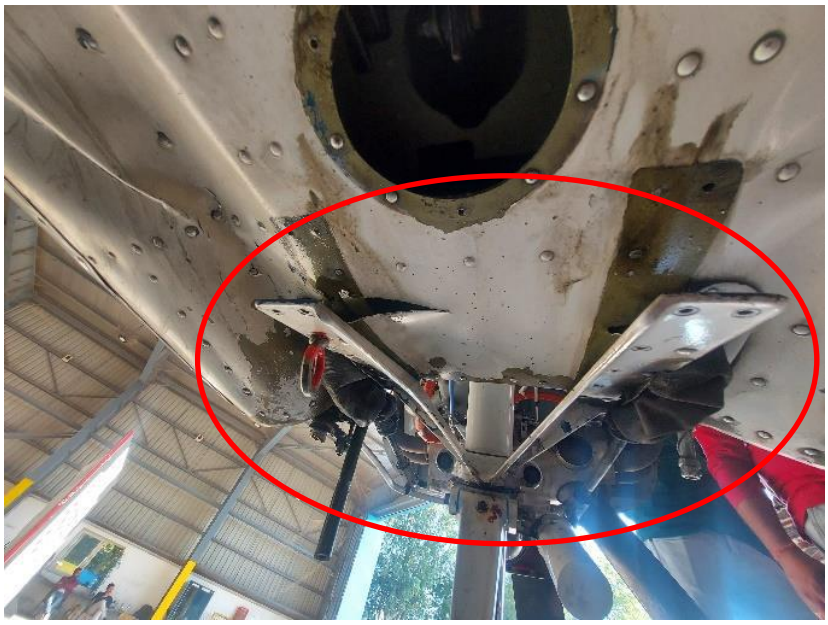

Fig. 08 - Nose gear support bracket detached from fuselage lower skin

1.3.9 **Cabin forward floorboard** - Cabin's forward floorboard was wrinkled.

Fig. 09-Cabin forward floorboard wrinkled

1.4 **<u>Other Damage:</u>** The runway surface got damaged due to a propeller strike. Two strike marks were noticed on the right side of the center line at 309.30 m from the threshold.

1.5 Personnel Information:

Student Pilot (PIC):

Pilot (Gender, age)	Female, 27 years 4 months
License	SPL
License valid up to	26/04/2032
Category	Aeroplane
Class	Single Engine Land
Medical Assessment Class	Medical Class 1
Date of Medical Exam	15/01/2022
Medical exam Valid up to	28/01/2023
FRTO License date of issue	10/10/2022
FRTO License Valid up to	09/10/2032
Total Flying experience	50:00 Hrs
Experience on type	50:00Hrs
Total solo Flying experience	17:30 Hrs
Total Flying Experience during last 180 days	41:36 Hrs
Total Flying Experience during last 90 days	36:54 Hrs
Total Flying Experience during last 30 days	24:42 Hrs
Total Flying Experience during last 07 days	07:18 Hrs
Total Flying Experience during last 24 Hours	01:12 Hrs
Rest before the flight	More than 24 Hrs

Before the incident flight on 17.12.2022, the trainee had carried out 05 solo circuits and landings at Mehsana airport followed by debriefing. The student pilot was released for the second Solo flight of the day by the flight instructor. The flight time and flight duty times were within limits.

As per the Flying Trainee Progress Report (FTPR), the student pilot joined the flying club in the year 2022 and her first training flight was conducted on 28.04.2022. After completing of 25:18 hours of flying and undergoing training and practices, the student pilot was released for her first solo flight on 18.11.2022 which was uneventful and satisfactory. Subsequently, the student pilot operated various dual and solo training sorties wherein no adverse remarks on the landing performance were made by the trainer. Before the incident flight, the student pilot had a total flying experience of 50:00 hours out of which 17:30 hours were for solo flying.

As observed from the FTPR, the student pilot was given training related to ballooning/ bounce & recovery, short field take-offs & partial flaps landings, differential flaps approaches, flapless takeoffs and landings, emergencies in various phases, etc during her entire flying experience.

It was observed from the FTPR that the student pilot was not involved in any incident/accident prior to the incident flight.

1.6 Aircraft Information:

Manufacturer	Textron Aviation Inc.
Type	Cessna 172S
Aircraft Registration	VT-JSN
Manufacture Serial No.	172S9106
Year of manufacturer	2002
Certificate of Registration No.	3653/3 Cat 'A'
Certificate of Airworthiness No.	3062
C of A issued on	10/12/2007
ARC issued on	18/05/2022
ARC Expiry on	31/05/2023
Category/ Subdivision of C of A	Normal/ Passenger
Minimum Crew necessary	One
Aircraft empty weight	770.856Kgs
Maximum All Up Weight	1157.7Kgs
Maximum Landing Weight	1157.7Kgs
Date of Aircraft weighment	26/07/2007
Airframe hours since new	12453:20Hrs
Last major inspection	100Hrs
Last major inspection carried out on	16/12/2022
Engine	
Manufacturer	Lycoming
Type (Model)	IO-360-L2A
Serial No.	L-37766-51E
Engine hours since new	2910:00Hrs
Date of Overhaul	22/09/2022
Engine hours since Overhaul	262:00Hrs
Last major inspection	100Hrs
Last major inspection carried out on	16/12/2022
Propeller Details	
Manufacturer	Mc CAULEY
Type	1A170E/JHA7660
Sl. No.	VI23025
Propeller hours since new	8451:37Hrs
Date of Overhaul	24/02/2022
Propeller Hours since Overhaul	1972:37Hrs
Last major inspection	100Hrs
Last major inspection carried out on	16/12/2022
Undercarriage	Tricycle type fixed

The aircraft was being maintained in accordance with the AMM requirements and all the required scheduled maintenance was found to have been performed on the aircraft by appropriately licensed/ authorized personnel.

After completion of the Pre-flight Inspection schedule, the aircraft was released to service on 17.12.2022 for the routine training sorties. After its release to service on 17.12.2022, the aircraft was flown for 05 flights (02- dual and 03- solo) by pilots for 07:24Hrs and made 11 landings before the incident flight wherein no abnormalities/ snags were reported to Aircraft.

As per the Load & Trim sheet of the incident flight, the Centre of Gravity was within limits. The student pilot carried out pre-flight inspection before operating the incident flight and no abnormality was observed during the same. Scrutiny of the journey logbook revealed that no snag had been reported by the student pilot after the incident flight as well.

Subsequent to the incident, a leak test of the airspeed indicator fitted on VT-JSN was carried out by the operator and found to be satisfactory. It was established that there were no abnormalities pertaining to the airspeed indicator fitted on VT-JSN. Therefore, the aircraft was considered airworthy at the time of the incident.

The engine installed on the aircraft was sent for strip inspection and repair at the Lycoming facility, USA. After undergoing repairs, the engine was released from the shop on 19.05.2023.

The complete maintenance and repair are still to be accomplished on the aircraft VT-JSN and the aircraft remains grounded at the time of writing this report.

1.7 Meteorological Information:

The Mehsana tower maintains weather records from the online met data of IMD Ahmedabad. For Mehsana airport, winds, visibility, temperature and clouds are obtained with the help of local aids available at the airport like airport windsocks, visibility markers set around the airport, operating aircraft, weather applications, etc. The weather-obtaining procedure at Mehsana was not documented by the operator in any of the controlled documents at the time of the incident.

The Aircraft VT-JSN departed (chocks-off) at 15:59 Hrs IST and after completion of the circuit, landed at Mehsana Airport at approx. 16:18 Hrs IST on runway 05. As per the weather records maintained at ATC Mehsana, the weather on 17.12.2022 was as follows:

Time in IST	15:37	16:50
Wind	Wind direction 340° at 05 Kts	Wind direction 350° at 05 Kts
Visibility	>5000m	>5000m
Temperature	34 °C	32 °C
Dew Point	11 °C	11 °C
QNH	1011 hPa	1011 hPa
Weather	NOSIG	NOSIG

- Actual winds, as per the statement of the ATC controller, at the time of take-off were 350° at 05knots as noticed from the windsocks.
- Actual winds as communicated by the ATC controller at the time of issuing landing clearance, as per the statement of the student pilot, were North East 05knots.

1.8 Aids to Navigation:

Mehsana aerodrome is not equipped with any navigational aids except windsock and aerodrome beacon. All the flying activities are based on Visual Flight Rules.

1.9 Communications:

At the time of the incident, the aircraft was having two-way communications with the ATC tower at the tower frequency 132.425 MHz. At the time of the incident, the ATC of the flight school was operated by one of the students of the academy holding an RT license. There is no facility for recording radio communications at the ATC. There was no snag reported in the communication system of either the aircraft or the ATC.

1.10 Aerodrome Information:

Mehsana Airport is an uncontrolled airfield. It is used for non-scheduled operations and flying training operations. There is a single Runway available, i.e. Rwy 05/23, at Mehsana airfield. Both Runway directions are in use depending upon the wind direction. Runway 05 was used for take-off and landing of the incident flight.

Runway 05 information is as follows:

RWY 05	**Latitude**	23°36'4.28"N
	Longitude	72°22'26.40"E
	Elevation	275.591 ft
	Dimension	996 m x 30m

The emergency services i.e., the firefighting vehicle and the medical facilities are provided by the M/s GUJSAIL. Post-incident site inspection & runway inspection were carried out, and there were no abnormalities observed on Runway 05 or in the vicinity of the incident Site except for propeller strike markings. No other markings like tire marks, or wing or tail strike marks were noticed on the runway.

1.11 Flight Recorders:

The aircraft is not fitted with any flight recorders.

1.12 Wreckage and Impact Information:

Runway inspection was carried out after the incident and no abnormalities, except propeller strike marks, were observed on the runway surface.

Aircraft entered into PIO after touchdown. Approximate points of aircraft contacts with the runway surface were identified and the probable path taken by aircraft on the runway was generated with the help of CCTV recordings from various cameras installed at the airport. The following are the approximate distances measured-

- The distance between the threshold point of runway 05 and the aircraft touchdown Point is 63 m.
- The distance between the aircraft touchdown Point and propeller strike point is 246.30 m.
- The distance between the threshold point of runway 05 and the propeller strike point is 309.30 m.
- The distance between the propeller strike point and the aircraft stop point is 160 m.
- The distance between the propeller strike point and the centerline of the runway is 3 m toward the right side.
- The distance between the threshold point of runway 05 and the aircraft stop point is 469.30 m.
- The distance between the aircraft's final halt point and the centerline of the runway is 9.40 m toward the right side.

Refer the Runway Figure 10 describing the approximate path followed by the aircraft during the landing roll up to the final halt point:

a) Point A – Threshold Point of the runway 05
b) Point B – Initial touchdown Point of the Incident aircraft
c) Point C – Propeller strike point
d) Point D – Aircraft stop point

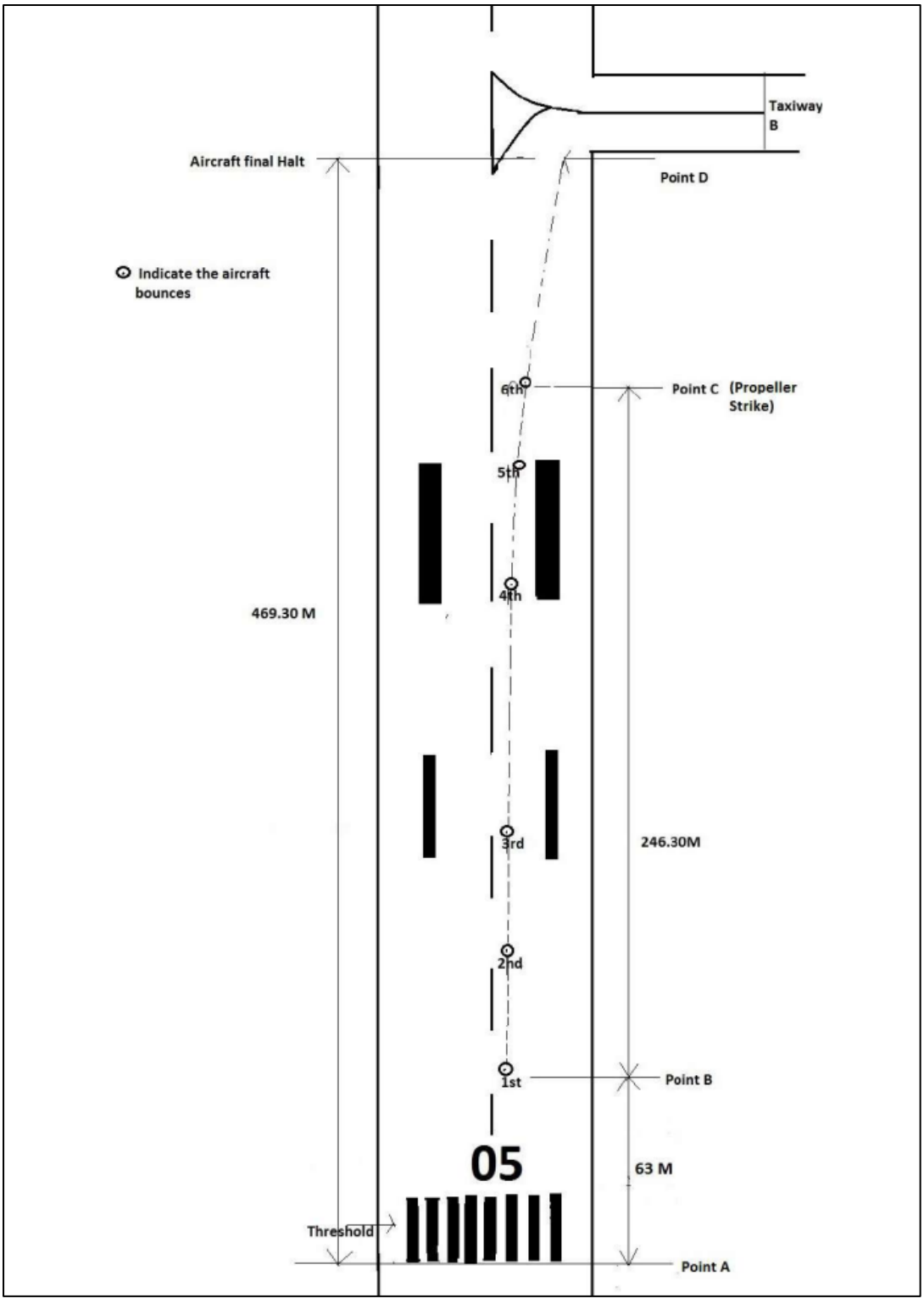

Fig. 10 – Path followed by aircraft on runway 05

1.13 Medical and Pathological Information:

The student pilot was subjected to a BA examination before operating 1st flight of the day on 17.12.2022 at Mehsana and found to be negative. Further, the involved Student pilot had also undergone a post-incident Breath Analyzer test for Alcohol at Mehsana airport and the result was found to be negative.

1.14 Fire:

There was no fire or smoke before or after the incident.

1.15 Survival Aspects:

The incident was survivable.

1.16 Tests and Research:

Not applicable.

1.17 Organizational and Management Information:

M/s Blue Ray Aviation is a DGCA (Directorate General of Civil Aviation) approved organization to conduct Flying Training (Pilot Training), Charter Services, and Maintenance of Aircraft. M/s Blue Ray is based in Mehsana– Gujarat. The operator provides flying training services in different types of aircraft, i.e. Cessna 152, Cessna 172 R/S & Cessna 182T. The organization is approved under CAR M Subpart G to manage the Continuing Airworthiness of the aircraft operated by them. The organization also holds approval under CAR 145 to maintain the aircraft operated by them.

1.18 Additional Information:

1.18.1 PDR of the incident flight made by student pilot-

PDR entry of the incident flight was made as: 'Nose collapse, Propeller strike.'

1.18.2 As per excerpts from the statement of the student pilot-

- On 17.12.2022, the student pilot reported to the FTO at 09:30 IST and performed a BA test at 10:13 IST. Prior to the incident flight, 01 flight (as a solo circuit landing pattern) was conducted by the student pilot on the same day. She flew around 1:12 hour with 05 landings on the different Cessna-172R aircraft (VT-AAQ).
- The FI of the organization had authorized the circuit and landing sortie. It was the second flight of the day for the student pilot. The flight instructor briefed the student pilot about the circuit and landing profile, with a planned duration of 48 minutes.
- The student pilot did Pre-flight, weight & balance and made an entry in the authorization book. The aircraft departed at 15:59 IST.

- Just after take-off, the student pilot noticed that the aircraft speed was not increasing beyond 60knots and decided to carry out only one circuit and land back.
- Subsequently, on turning for cross winds, the speed started increasing to 70knots and later to 95knots when the aircraft leveled out at 1300ft.
- While the student pilot was in the base leg, she gave flaps of 20˚, and at the top of finals, she gave flaps of 30˚.
- Subsequently, the student pilot aligned the aircraft with Runway 05 during approach and took landing clearance.
- The student pilot got landing clearance from ATC to land on Runway 05. The wind direction while receiving landing clearance was north-east and the wind speed was 05knots. At 500ft, the aircraft speed was 70knots & approach was stable.
- The student pilot started reducing power gradually and gave sufficient trim but the aircraft speed was not reducing. The student pilot started pulling back controls and checked for the throttles but the speed was still 70knots.
- The student pilot started flaring but the aircraft was going down with speed and nose down.
- Subsequently student pilot tried pulling up but was unable to and went into PIO. The student pilot tried controlling the aircraft by giving the elevator input but it was not sufficient.

1.18.3 As per excerpts from the statement of the ATC controller-

- At the time of take-off, the winds were 350° at 05knots as noticed from the windsocks.
- The controller saw that VT-JSN made a normal take-off and made the correct circuit as per procedures. The approach was normal on the correct glide path when VT-JSN was cleared to land.
- The ATC controller had given landing clearance to VT-JSN aircraft on runway 05. VT-JSN gave a readback for the same and landed on runway 05.
- Before the touchdown ATC controller noticed that her flare was a bit unusual. After touchdown firstly the aircraft bounced and then entered into Pilot Induced Oscillations around 3-4 times and then stopped on the right edge of the runway.
- The ATC controller contacted the student pilot on RT, the student pilot said the rudder was not working and the same was informed to the Flight instructor. Then the instructor went to the spot and asked VT-JSN to switch off the engine using the RT set.

1.18.4 As per excerpts from the statement of Flight Instructor-

- On 17.12.2022, the FI reported at 11:45 IST. He had authorized the solo circuit landing sortie of the student pilot.
- The weather was clear with winds calm at the time of the sortie. Winds were less than 5kts from north which was slightly crosswind and in favor of Runway 05.
- The flight instructor briefed the student pilot about the circuit and landing profile, with a planned duration of 48 minutes. The weather was suitable for the flight.

The aircraft departed at 15:59 IST.

- After 20 minutes, the ATC controller informed to Flight instructor, that aircraft VT-JSN was not moving from runway 05.
- They visited the aircraft. The flight instructor instructed the student pilot to shut down the engine. The student pilot shut down the engine and exited the aircraft without any injuries.
- At the time of the incident, the wind direction was 350deg, the wind speed was 05kts, and the weather was clear with more than 5000m visibility.

1.18.5 As per excerpts from the statement of AME-

- The AME had performed the preflight inspection of the aircraft as per the approved preflight inspection scheduled on 17.12.2022. During preflight inspection, all the parameters like aircraft exterior, oil quantity, fuel sampling, tire pressure of nose landing gear & both main landing gear, propellers & wings leading edges were found satisfactory.
- After the incident, he visited the aircraft and found a propeller strike and the nose landing gear dislocated & leaned forward.

1.18.6 Information obtained from CCTV footage-

- The CCTV cameras are installed at various places in the airport including both ends of the runway. The takeoff and landing of the incident flight of VT-JSN aircraft were recorded in the CCTV cameras with good clarity.
- The aircraft VT-JSN took off (got airborne) from RWY 05 at 16:13 IST. During takeoff, the aircraft went to the slightly left side off the centerline. No other abnormality was observed.
- The aircraft VT-JSN was observed to be in landing configuration during short finals (landing flaps deployed) with a slight nose-down attitude. In the absence of sufficient flare, the aircraft made contact with the runway surface on its nose landing gear first followed by main landing gears. The aircraft touched down just adjacent to the RWY 05 centerline (towards the right side) after the runway identifier.
- After touchdown, the aircraft entered into Pilot Induced Oscillations (PIO) wherein the aircraft bounced six times. A propeller strike was observed to have occurred during the sixth bounce and near the right side of the RWY 05 centerline.
- The propeller was observed to be rotating throughout the landing roll. Lateral control of aircraft was maintained throughout PIO.
- The aircraft was stopped on the runway surface towards the right side of the runway centerline.

1.18.7 Speed limits and configuration of aircraft during final approach-

As per the Master Briefing Book of the academy, which contains details of the pilot training exercises and used for training & briefing purpose, Lesson: 11-Circuit and Landing, the aircraft need to approach for landing with flap 30˚ with

the speed maintained between 65-70knots. As per POH, the Maximum speed limit for flap 30˚ is 85knots.

1.18.8 Ballooning/ Bounce/ PIO recovery technique-

As per the Master Briefing Book of the academy, which contains details of the pilot training exercises and used for training & briefing purposes, Lesson: 11- Circuit and Landing, salient points of Ballooning/ Bounce/ PIO recovery technique are as follows:

- If ballooning/ bounce is not excessive: a follow-up landing may be executed by simply holding a slight nose-up attitude which leads to a subsequent touchdown.
- If ballooning/ bounce is excessive: it is best to execute a go-around immediately, do not attempt to commence landing.
- The PIO recovery technique is the same as the ballooning/ bounce recovery technique. When a PIO is severe, the safest procedure is to execute a go-around immediately. In a severe PIO, the airplane's pitch oscillations can become progressively worse until the airplane strikes the runway nose first with sufficient force to collapse the nose gear. Attempts to correct a severe PIO with flight control and power inputs are most likely untimely and out of sequence with the oscillations and only make the situation worse. Do not attempt to commence the landing. Appy full power while simultaneously maintaining directional control and lowering the nose to a safe climb altitude (Go around).

1.19 Useful or Effective Investigation Techniques:

Nil

2. ANALYSIS:

2.1 Serviceability of the aircraft and maintenance aspects:

All the maintenance/airworthiness documents pertaining to the aircraft VT-JSN were valid at the time of the incident. No scheduled inspection was found due to the aircraft before the incident flight. The aircraft VT-JSN had flown 05 flights (02- duel and 03- solo) with different pilots before the incident flight wherein no snags were reported. Further, no snag was pending for rectification before the incident sortie. The weight of the aircraft at the time of take-off was 968.65Kgs, which included 114.59Kgs of fuel, against the Maximum AUW/ MLW of 1157.7Kgs.

It was established that there were no abnormalities concerning the airspeed indicator fitted on VT-JSN. The difficulties claimed to have been encountered by the student pilot in terms of increasing/ reducing the speed of the aircraft by controlling power and attaining the desired landing attitude by giving trim & pulling back controls could not be corroborated & established as no adverse remarks or defects were existing on the issues before the incident flight or reported during the flight or recorded after the incident flight.

Further, the issue concerning the rudder as reported by a student pilot on RT after stopping on the runway was consequential to the incident as rudder pedals are connected with the nose landing gear which got dislocated from its original orientation and bent due to impact on the runway surface.

In view of the above discussion, the aircraft was considered airworthy before the incident flight, and the maintenance factor is ruled out.

2.2 Operational aspects/ aircraft handling by pilot:

The student pilot was medically fit, had a valid license, had adequate rest, and was found to be within FDTL limits before she operated the flight on 17/12/2022. Medical fitness & FDTL of the crew were not a factor in this incident.

The student pilot had flown Cessna-172R VT-AAQ aircraft in a circuit landing pattern for around 1:12 hours on the same day prior to the incident flight wherein she had made 05 landings. All 05 circuits and landings were uneventful and landings were marked as satisfactory in the FTPR.

The incident flight was conducted by the student pilot more than 04:00 hours from the first flight wherein she was authorized by the Flight Instructor to carry out a circuit and landing exercise on VT-JSN. The weather was clear with winds calm at the time of the incident flight.

After completion of routine pre-flight and weight & balance preparations, the aircraft departed for the circuit and landing exercise. The aircraft got airborne normally after clearance from ATC and following normal circuit patterns, made an approach at around 70knots of airspeed as informed by the student pilot. The approach speed, at which aircraft VT-JSN was approaching as per the student pilot, was within limits as per POH and considered appropriate as per instructions mentioned in the Master Briefing Book of the academy, Lesson: 11- Circuit and Landing. Further, it can be concluded from the statement of the student pilot and CCTV recordings that the aircraft VT-JSN was in landing configuration.

In addition, as per the weather records and statements, the winds were calm when VT-JSN was cleared for landing on runway 05. Also, the statements of the involved student pilot and the ATC controller managing RT indicated that the approach was stabilized with respect to aircraft speed and glide path. Hence, it can be considered that the aircraft was stabilized during approach.

Subsequently, as evident from the CCTV recordings, in the absence of sufficient flare, the aircraft contacted the runway surface on its nose wheel first followed by the main wheels, and bounced. After the bounce, the student pilot tried to control the aircraft by pulling up but was unable to control the aircraft and went into PIO. The student did not apply the correct recovery technique, i.e. go-around, to recover from the bounce leading to a series of subsequent bounces which resulted in a propeller strike and damage to the nose landing gear, engine mount strut, lower firewall, shock mount rubber unit, fuselage lower skin, rudder pedal bar, nose gear support bracket and cabin front floorboard of the aircraft. The

aircraft finally stopped on the runway after traveling 406.30 m distance post-first touchdown. The Flight Instructor instructed the student pilot to shut down the engine. The student pilot shut down the engine and exited the aircraft without any injuries.

A review of FTPR indicated that the student had been imparted training on various exercises like ballooning/ bounce & recovery, short field take-offs & partial flaps landings, differential flaps approaches, flapless takeoffs and landings, emergencies in various phases, etc during her entire flying experience. The student pilot had operated various dual and solo training sorties wherein no adverse remarks on the landing performance were made by the trainer. Further, all solo landings made by the student pilot were assessed as satisfactory by the Flight Instructor in FTPR. The overall performance of the trainee was found to be satisfactory.

2.3 Weather:

Mehsana tower maintains weather records from the online met data of IMD Ahmedabad; however, for Mehsana airport, weather details are obtained with the help of local aids available at the airport like airport windsocks, visibility markers set around the airport, operating aircraft, weather application, etc.

Such local weather obtaining procedure for Mehsana airport was not documented by the operator in any of the controlled documents of the FTO at the time of the incident, however, it is ascertained that weather was suitable for conducting solo flying and not a contributory factor.

3. CONCLUSION:

3.1 Findings:

3.1.1 The aircraft was certified airworthy at the time of the incident. This aircraft had flown five sorties on the same day prior to the incident sortie and no snags were reported.

3.1.2 The student pilot was medically fit, had a valid license, had adequate rest, and was found to be within FDTL limits.

3.1.3 The student Pilot had 50:24 hours of total flying experience including 17:30 hour's solo flying experience. The FTPR record reveals that the student's overall flying performance was satisfactory. The student Pilot carried out the last sortie on 17.12.2022 (Same day).

3.1.4 The incident flight takeoff weight and landing weights were within limits.

3.1.5 The difficulties claimed to have been encountered by the student pilot in terms of increasing/ reducing the speed of the aircraft and attaining the desired landing attitude could not be corroborated & established.

3.1.6 The issue concerning the rudder as reported by the student pilot on RT after stopping on the runway was consequential.

3.1.7 The local weather obtaining procedure was not documented by the operator in any of the controlled documents, however, it is ascertained that weather was suitable for conducting solo flying and not a contributory factor.

3.1.8 The aircraft was stabilized during the approach.

3.1.9 The CCTV footage indicated that the aircraft did not flare sufficiently at the time of landing and contacted the runway surface on the nose landing gear followed by the main landing gears.

3.1.10 Subsequent to the first touchdown, the aircraft bounced and could not be controlled by the student pilot and entered into Pilot Induced Oscillations.

3.1.11 The student pilot did not apply the correct recovery technique, i.e. go-around, to recover from the bounce leading to a series of subsequent bounces resulting in damage to the propeller and aircraft structure.

3.1.12 The aircraft finally stopped on the runway after traveling 406.30m distance post-first touchdown.

3.1.13 The student pilot exited the aircraft without any injuries.

3.2 Probable Cause:

Insufficient flare and subsequent incorrect bounce recovery technique during landing led the aircraft to enter into Pilot Induced Oscillations resulting in damage to propeller and aircraft structure.

4. SAFETY RECOMMENDATIONS:

4.1 Suitable Corrective training to student pilot.

4.2 Operator may be advised to include local weather obtaining procedure in the TPM.

4.3 Any other action as deemed necessary by DGCA HQ based on findings made in the report.

Ajay Dattatray Phule
Air Safety Officer
Member

30.11.2023

Pathik Vaghela
Dy. Director of Air Safety
Investigator In-charge

Place: Mumbai
Date: 30.11.2023

----End of the report—