
# FINAL INVESTIGATION REPORT ON INCIDENT TO M/s GUJARAT FLYING CLUB, CESSNA FA 152 AIRCRAFT, VT-EMM, ON 19.03.2020 AT VADODARA

GOVT OF INDIA
O/O DIRECTOR AIR SAFETY
WESTERN REGION
NEW INTEGRATED OPERATIONAL COMPLEX
SAHAR ROAD
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MUMBAI-400099

**INDEX**

In accordance with Annex 13 to the ICAO Convention on International Civil Aviation and Aircraft (Investigation of Accidents and Incidents) Rules, 2017 of India, the sole objective of this investigation is the prevention of aircraft incidents & accidents. It is not the purpose of this activity to apportion blame or liability.

**FINAL INVESTIGATION REPORT ON INCIDENT TO M/S GUJARAT FLYING CLUB, CESSNA FA 152 AIRCRAFT, VT-EMM, ON 19.03.2020 AT VADODARA**

**GENERAL INFORMATION:**

| | | |
|---|---|---|
| a) | Aircraft Type & Model | : Cessna FA 152 Aircraft |
| | Nationality | : Indian |
| | Registration | : VT-EMM |
| b) | Owner | : M/s The Aero Club of India |
| c) | Operator | : M/s The Gujarat Flying Club |
| d) | Pilot in command | : SPL holder |
| e) | Extent to injuries | : Nil |
| f) | First Officer | : N/A |
| g) | Extent to injuries | : N/A |
| h) | Passengers onboard | : Nil |
| i) | Extent to injuries | : N/A |
| j) | Place of incident | : Vadodara, Gujarat (VABO) |
| k) | Co-ordinates of Incident site | : N 22.340563, E 73.230490 |
| l) | Date and time of Event | : 19.03.2020, Approx. 11:33 IST |
| m) | Last Point of Departure | : VABO |
| n) | Point of Intended Landing | : VABO |
| o) | Type of operation | : Training flight (Solo) |
| p) | Phase of operation | : Landing |
| q) | Type of Incident | : Abnormal Runway Contact |

(All timings in the report are in IST, unless otherwise specified)

**SYNOPSIS:**

On 19.03.2020, M/s The Gujarat Flying Club, Cessna FA 152 Aircraft, VT-EMM was involved in nose landing gear collapsed incident while landing at Vadodara airport, Gujarat. The aircraft was engaged in a solo circuit and landing exercise at Vadodara airport by a trainee pilot. The incident flight was the first solo flight of the trainee pilot. During landing, the aircraft touched on nose landing gear and bounced resulting in damage to the nose landing gear and propeller blades. There was no injury to the trainee pilot. There was fuel leakage, however there was no fire.

DGCA ordered the investigation of the incident by appointing an Investigator-in charge under Rule 13(1) of the Aircraft (Investigation of Accidents and Incidents) Rules, 2017.

The investigation has revealed that the incident occurred due to improper flare techniques during landing resulted the aircraft to touch the runway on Nose wheel and bounce. Subsequent improper bounce recovery techniques caused multiple bounce and damage to Nose landing gear and engine propeller. The loose tube axle inside the bearing led to the detaching of the nose gear wheel on impact

Inadequate training on Go-Around Procedure, Recovery from Bounce, Balloon & PIO/Runway change procedure to trainee pilot prior to solo release flight are the contributory factors to the incident.

## 1.0 FACTUAL INFORMATION

### 1.1 HISTORY OF THE FLIGHT

On 19th March 2020, Cessna FA 152 aircraft, VT-EMM of M/s The Gujarat Flying club was involved in an incident of abnormal runway contact during landing at Vadodara, Gujarat. The aircraft was under command of trainee pilot. The incident flight was authorised by CFI for Trainee pilot to carry out her first solo circuit and landing exercise. Prior to incident flight, 05 circuit & landings were conducted for the Trainee Pilot by CFI on Aircraft VT-EMM on the same day. During the previous sortie (5th circuit and landing), CFI requested to ATC to have one more circuit and landing for the same trainee pilot. ATC informed only one circuit and landing is possible due arrival of one of Commercial flight (Flight No. IGO2026). CFI confirmed and

informed to ATC that trainee pilot will be carrying out solo flight. Aircraft parked at stand 5 and CFI came out. Trainee pilot was released for her first solo flight. Trainee pilot taxied the aircraft VT-EMM and took off at around 11:23 Hrs IST and carried out Left hand circuit on RWY22. The flight was uneventful till the final approach. The approach was stabilised, and the winds were calm.

As per statement of trainee, the airspeed was approx. 65 kts while landing & the flap configurations was 20 degrees. At around 11:30 Hrs IST during landing the aircraft was flared out at high, while controlling the landing Trainee pilot pushed the control column a bit more forward than needed. Subsequently the nose wheel touched down first, aircraft bounced and then the main landing gears touched, and trainee pulled the control column again and the aircraft bounced three times. During bounce landing the propeller hit the runway surfaces twice and both propeller blades were bent. The nose wheel was detached due impact & the nose landing gear collapsed, aircraft veered off to the Right edge of RWY22 and stopped. The aircraft was finally rested on basic strip outside the RH Side Runway edge of RWY 22 at distance approx. 27.5 Meters from the Runway centreline and approx. 582 Meters from RWY 22 threshold.

The aircraft was in a Tail high position and trainee pilot was stuck in her seat. No distress call was made by the trainee pilot. Fuel was spilled from the aircraft and there was no fire. Fire station was advised on WALKIE-TALKIE to proceed towards the crash site, information regarding Passengers on-board and grid location was passed to fire station. Crash siren and crash bell were pressed simultaneously. Trainee pilot was reported safe by Fire personnel. Commercial Flight IGO2026 was advised to hold overhead Vadodara due to runway blockage. Rescue team came and trainee pilot was carried by ambulance to the Airport's MI Room and clinically examination conducted. No injury was reported.

### 1.2 INJURIES TO PERSONS:

| Injuries | Crew | Passengers | Others |
|---|---|---|---|
| Fatal | 00 | 00 | 00 |
| Serious | 00 | 00 | 00 |
| Minor/ None | 01 | 00 | |

### 1.3 DAMAGES TO THE AIRCRAFT:

Post Incident, Cessna FA 152 aircraft, VT-EMM had received the following damages:

1. Due impact the nose landing gear fork found broken, subsequent the nose landing gear wheel detached from Nose landing gear fork & Nose wheel assembly also damaged. (Fig 01)


**Fig 01 Photograph shows Nose landing gear fork & Nose landing gear assembly damaged**

2. Due Propeller hit to the runway surfaces, both propeller blades were bent

**Fig 02 Photographs shows Propeller blades bent**

**1.4 OTHER DAMAGE:** One Runway Edge lights (# B-124) of RH side of RWY 22 was found broken by Aircraft VT-EMM.

## 1.5 PERSONNEL INFORMATION

### 1.5.1 PILOT IN COMMAND (TRAINEE PILOT):

| | |
|---|---|
| AGE | 19 Years, Female |
| License | SPL (student pilot license) Holder |
| Date of License Issue and Valid up to | Issued date: 17.10.2016, Validity:16.10.2021 |
| Category | Aeroplane |
| Date of Medical (Class-II) Exam & validity | Exam date: 10.07.2018<br>Validity: 09.07.2020 |
| Date of FRTOL issue & validity | Issued Date: 18.12.2017<br>Validity: 17.12.2027 |
| IR rating and instructor rating | N/A |
| Total Flying Experience | 28:50 Hrs |
| Total flying experience during last 1 year | 15:30 Hrs |
| Total flying experience during last 06 months | 06:55 Hrs |
| Total flying experience during last 30 days | 04:45 Hrs |
| Total flying experience during last 07days | 01:35 Hrs |
| Total flying experience during last 24 Hrs | 00:50 Hrs |
| Duty time last 24 Hrs | Nil |
| Rest before the flight | More than 24 Hrs |

On 19.03.2020, the trainee had carried out 05 circuit and landings at Vadodara airport on RWY22 along with CFI before the incident flight and trainee pilot was debriefed.

As per progress report, Student was briefed for the standard circuit pattern and procedures, approach, and landing, checks as per checklist, given practise for the same. Student found to perform consistent in circuit, approach and landing corrections, lookout scan of flight parameters was all satisfactory.

Final approach and landing were found to be safe and satisfactory. Found fit to fly solo and released for First Solo.

The flight time and flight duty times were within the limits. No incident/accident involvement of Student pilot was observed from the previous records.

From the Flight Trainee's progress report, the irregular flying with lots of break period is observed which might have affected her learning & performance. The trainee has joined the flying club in year 2016 and her first training flight was on 17.10.2016. Trainee Pilot has flying experience of 21:55 Hrs with longer interval between flying, however from 30.01.2020 onwards, trainee was regular at the flying club, and trainee flew training sorties on circuit & landing exercise with other instructors at the flying club and completed only 28:50 Hrs since joining.

**1.6 AIRCRAFT INFORMATION:**

The details provided below are as on prior to incident flight.

| | |
|---|---|
| Aircraft Registration | VT-EMM |
| Type of Aircraft | Cessna FA 152 |
| Aircraft Serial No. | FA-152-0392 |
| State of Manufacturing | France |
| Manufacturing year | 1986 |
| Owner | M/s Aero Club of India, New Delhi |
| Operator | M/s The Gujarat flying club, Vadodara |
| Certificate of Airworthiness number and issue date | 1812 dated 11/09/1986 |
| ARC number and Validity | EMM/1812/ARC/6TH/2019221 Valid up to 29/12/2020 |
| Aircraft TSN | TSN :23520:05 Hrs |
| Maximum All Up Weight | 760 Kg |
| Minimum crew necessary | One |
| Engine Type, Sl.No., TSN, TSO | Type : LYCO 0-235-N2C, S/N: L-24122-15, TSN: 15643:35 Hrs, TSO: 2027:25 Hrs |
| Propeller Type & Sl no. | Type: Mccualley 1A103, Sl No. :NF-012 |
| Last weight scheduled carried out date | 01-08-2013 |

| | |
|---|---|
| Aero Mobile station licence and validity | A-151/WRLO-19 valid up to 31.12.2022 |
| Any Major/Scheduled inspection prior to the incident | 100 Hrs/12 months inspection carried out on 26.02.2020 at 23435:50 A/F hours & 50 hrs inspection carried out on 08.03.2020 at 23475:50 A/F hours which also includes the inspection of NLG for condition and security of attachment |

After completion of Daily Inspection schedule and Pre-departure schedule aircraft was released to service on 19/03/2020 for the routine training sortie. As per the Load & Trim sheet, the Centre of Gravity was within limits. No snag was reported to Aircraft before the incident flight.

## 1.7 **METEOROLOGICAL INFORMATION:**

Meteorological report was available with the crew for briefing before flight. The Aircraft VT-EMM took off at 1120 Hrs & after completion of circuit Aircraft landed at Vadodara Airport at approx. 1130 Hrs IST. The METAR obtained from Vadodara airport on the date of incident from 11:00 IST (19.03.2020) Hrs to 11:30 IST (19.03.2020) Hrs are quoted as below:

| Report time in IST | 11:00 | 11:30 | 12:00 |
|---|---|---|---|
| Winds | Calm | Wind from 180° at 04 knots | Calm |
| Visibility | 5000m | 5000m | 5000m, |
| Temperature | 30°C | 31°C | 32°C |
| Dew point | 16°C | 17°C | 16°C |
| QNH | 1012 hPa | 1012 hPa | 1012 hPa |
| Weather | NOSIG | NOSIG | NOSIG |

## 1.8 **AIDS TO NAVIGATION:**

Vadodara airfield is a licenced Civil-Defence airfield, and the operations are controlled by the Airports Authority of India. There is single runway available at Vadodara airfield which has the orientation 04/22. SAPL Available for Runway 04/22 However the ILS landing facility is available for runway 22 only. The PAPI is available for the runway 04 / 22. Aerodrome Beacon is available at the Aerodrome. Two-way VHF communications is available at the airport. There were no known navigation aid difficulties reported by the Trainee pilot.

## 1.9 COMMUNICATION:

Aircraft is equipped with Very High Frequency sets and a High Frequency set for communication. There was always two-way communication established between the ATC and aircraft. However, post incident Trainee pilot could not make a distress call on VHF.

## 1.10. AERODROME INFORMATION:

Vadodara (VABO) airfield is a licensed Civil-Defence airfield, and the operations are controlled by the Airports Authority of India. There is single runway available at Vadodara airfield which has the orientation 04/22 having length 2589 Meters and width 150 Meters. The Runway Surface is made of Bitumen. Both Runway directions are in use depending upon the wind direction. SAPL Available for Runway 04/22 However the ILS landing facility is available for runway 22 only. The PAPI is available for the runway 04 / 22. Aerodrome Beacon is available at the Aerodrome. Two-way VHF communications is available at the airport. The ATC is controlled and manned by M/s Airports Authority of India (AAI).
The emergency services i.e., the fire fighting vehicle and the medical facilities is manned by the M/s AAI. The elevation of Vadodara Airfield is 121 feet. As per ATC, Post-incident site inspection & runway inspection were carried out, there were no abnormalities observed on Runway 22 or in the vicinity of the Incident Site.

**1.11 FLIGHT RECORDERS:** Aircraft is neither fitted with any flight recorders nor required on this aircraft as per Civil Aviation Requirements.

## 1.12 WRECKAGE & IMPACT INFORMATION:

The aircraft was found disabled outside the RH Runway Edge of RWY 22 on basic strip at distance approx. 05 meters from the Runway Edge and approx. 582 Meters from RWY 22 threshold. & Nose Landing gear wheel was detached due impact on Nose landing gear during landing on touchdown. (Shown in Fig 03)

Nose Landing gear wheel was found from a distance 12.4 meters from the LH Runway Edge and approx. 464 Meters from RWY 22 threshold. (Shown in Fig 04). Fuel leak from the aircraft was observed. There was no fire on the aircraft after Aircraft veered off from RWY 22 to the RH Runway Edge.

Following External Damages observed to Aircraft VT-EMM during visual inspection of the aircraft:

a) Nose landing gear found broken with its mount on firewall.
b) Nose landing gear fork found broken.
c) Nose wheel assembly found damaged.
d) Nose wheel found detached on LH side of RWY22.
e) Nose gear steering linkages (LH found broken and RH found bent)
f) Dent found in lower part of firewall.
g) Fuel strainer fuel line found bent.
h) Fuel Strainer mounting found bent.
i) Engine tubular mount found broken.
j) Propeller found bent on both edges.
k) Damage to Engine internal parts suspected due to propeller strike.
l) Engine lower cowl found damaged.
m) Exhaust tail pipe found damaged.
n) Cabin heat linkage found broken.
o) Dent found on Horizontal Stabilizer (RH) with crack on leading edges.
p) RH main landing tube found bent & damaged.
q) Bolt (Connecting NLG Fork, Tube Axle and Ferrule) was not recovered from the incident site.


**Fig 03. Aircraft VT-EMM in tail high position on right side runway edges of RWY22**

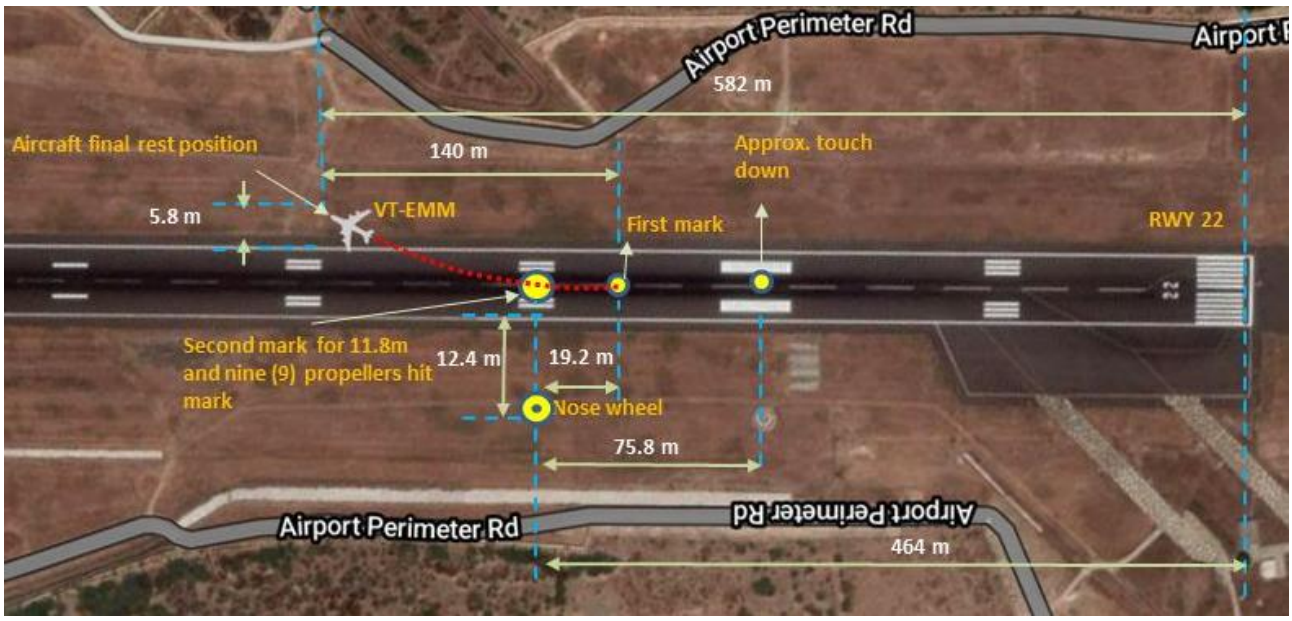


**Fig 04. Runway diagram depicts the flight profile VT-EMM after touchdown to final rest position**

### 1.13 MEDICAL AND PATHOLOGICAL INFORMATION:

Post-Incident, the involved trainee pilot was undergone Breath Analyzer test for Alcohol at Vadodara airport and result was found to be negative.

**1.14 FIRE:** There was no fire. However, there was a fuel spillage after incident.

**1.15 SURVIVAL ASPECTS:** Incident was survivable.

### 1.16 TESTS & RESEARCH:

The failed / damaged parts of the nose wheel assembly were examined in Aircraft Engineering Directorate, DGCA Hqrs. Upon examination, The Inner Diameter of bearing inner race and Outer Diameter of tube axle at the corresponding bearing locations have been dimensionally examined and it is found that the parts under excessive clearance /play (undersized) in their assembly from the prescribed limits observed. Hence, tube axle (As Shown in Fig.05) is worn out and undersized at the bearing diameter locations. There was an indication of undersized tube axle, circumferential rubbing marking and pitting were noticed on the tube axle.

The worn-out tube axle outer diameter at the bearing locations would have eased the bearing units to rotate over the tube axle. This could have also caused the entire wheel assembly along with bearing unit (which is restrained by ring retainer within the wheel assembly) to move on lateral direction. The lateral movement of the wheel would have probably caused offsetting of wheel loading on the tube axle, movement of bearing units

close to ferrule's inner surfaces & causing subsequent rubbing, also causing slipping of one ferrule unit by approximately 90 degree and enlargement of bolt holed on the ferrule perhaps due to load offset.

Over a period, the stated events would have loosened the fastening of NLG tube axle unit with NLG Fork and perhaps caused the disintegration of wheel unit from NLG due overload and exposing the fork to come in direct contact with landing surface. The chip off/ flaking away of rolling elements within the rollers also suggestive of overload due to offset wheel loading. Other failures like, steering tube, steering tube linkage failure, shimmy damper lug failure and wheel rim damage are consequential failures.

Wheel assembly detachment failure could have probably due impact contributed by undersize/ worn out tube axle and subsequent the NLG collapsed.

The nose landing gear assembly is to be inspected during 100 Hrs/12 months & 50 hrs inspection which includes the inspection of NLG for condition and security of attachment, however there is no specific inspection to measure the dimensions of axle tube and the bearing of the nose wheel.

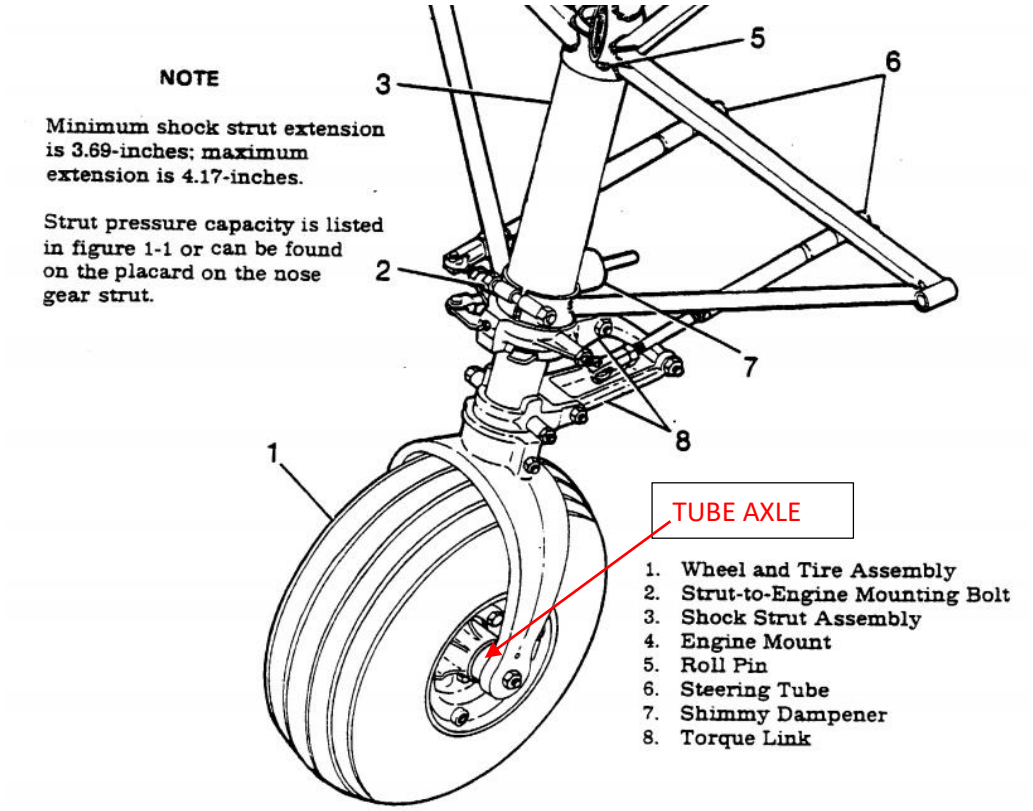


**Fig.05 Cessna FA 152 Aircraft Nose landing Gear Assembly**

The Engine of the involved Aircraft was also sent for strip investigation at the approved vendor's Facility. There is no major damage to the internal parts of the Engine observed. The external damages observed on parts and

accessories were due to the impact of the engine at the time of incident. The carbon deposits noticed on piston dome is a normal as observed on engine received. As per the Strip investigation report, the engine was running and delivering power at the time of incident.

## 1.17 ORGANIZATIONAL & MANAGEMENT INFORMATION:

M/s Gujarat flying Club is a flying training organisation (FTO) located at the AAI Airport, Vadodara. The Approval of the FTO was done on 07 April 2016 and is valid till 06 April 2021. The FTO has one CFI, one Dy.CFI, two FI and 04 API for imparting training to the trainee pilots. The FTO has a total of three Aircraft, One Cessna 172 and two Cessna 152s. The FTO has in house maintenance set up under CAR M Sub part F & G which is valid till 31 December, 2020.

## 1.18 ADDITIONAL INFORMATION:

1.18.1

There was a similar incident occurred to M/s Falcon Aviation Academy, Cessna 152 Aircraft, VT-PTB at Faizabad on 04.03.2015. In this case, during landing at flare, the trainee pilot felt a sudden sink in the aircraft. The aircraft bounced on the main landing gear. The trainee pilot tried to control the aircraft by pulling the nose but she could not control the aircraft and the aircraft again sank and bounced on the main landing gear for the second time. It finally landed on the nose gear during the third impact. There were no injuries to the trainee pilot. Due to the impact, the nose gear sheared off from the fork attachment fitting the similar issue of tube axle found loose (running) with the bearings of the nose landing gear wheel was observed.

Probable Cause of the incident was Student pilot improper flare during landing made the aircraft bounce and her improper bounce recovery technique to recover from the bounced landing resulted into the incident. The loose tube axle inside the bearing led to the breaking of the nose gear on impact.

During the investigation of the failed nose wheel at DGCA HQ, indication of poor maintenance in the nose wheel area was observed. The tube axle was found to be undersized beyond manufacturer specified limits. The loose tube axle inside the bearing led to the breaking of the nose gear on impact.

Based on findings one of Safety recommendation was to carry out onetime inspection to measure the dimensions of axle tube and of the bearing of the nose wheel of the entire fleet of the flying club.

1.18.2ATC tape recording was available and used for the facts and analysis. Events based on ATC tape transcript are as follows:

| |
|---|
| 05:44:12 From the ATC tape transcript, VT-EMM (CFI) has requested one more circuit landing for the trainee pilot as Solo. ATC replied only one circuit is possible due arrival. |
| 05:44:12, VT-EMM requested for taxi instruction from stand 5 |
| 05:46:23 VT-EMM was cleared to taxi to holding point of RWY22 |
| 05:47:22 VT-EMM was cleared to follow Left hand circuit after departure. |
| 05:47:58, VT-EMM was requested to confirm to expedite the departure due arrival of Indigo2022, VT-EMM replied affirmative |
| 05:48:10 VT-EMM was cleared to line up on RWY22 and report ready for departure and to expedite |
| 05:50:06 VT-EMM was requested present position for line up |
| 05:50:30,VT-EMM again requested for present position for line up |
| 05:50:36, VT-EMM replied negative and inform will call you when ready for departure |
| 05:52:06, VT-EMM reported ready for departure At 05:52:09, Tower reported whether and winds were copied by VT-EMM and cleared for take-off In mean time, IAF aircraft was also ready for departure and was at holding point F cleared for departure after the circuit landing flight of aircraft VT-EMM, and arrival of Indigo flight 2026 on RWY 22. |
| 05:54:08 VT-EMM was requested to report on final, VT-EMM was airborne at 05:54:08 VT-EMM was requested to report on final, |
| 05:55:04 VT-EMM reported on left downwind RWY 22 |
| 05:57:46 VT-EMM reported on final |
| 05:57:50 Tower reported wind calm RWY22 clear to land |
| 05:57:56 VT-EMM reported clear to land and winds copied |
| 05:58:53 IGO2026 was requested to report on 30 miles |
| 06:00:00 tower reported IGO 2026 to hold overhead due RWY delay not determined as the Cessna skid off RWY22 |
| 06:01:00 IAF aircraft was requested to proceed back due Cessna 152 skid off |
| 06:04:48 IGO 2026 was requested to stop descent at FL55 |
| 06:04:50 IGO 2026 was advised that delay not determined as of now. |
| 06:06:24 IAF aircraft went back to dispersal with the Marshaller |
| Further the Aircraft VT-EMM was removed from the basic strip after clearance from Office of Director Air Safety (WR), Mumbai and the IGO 2026 was landed. |

(All timings are mentioned in ATC tape transcript are in UTC):

### 1.18.3 **FIRST SOLO RELEASE PROCEDURE & REQUIREMENTS**:

As per TPM of M/s GFC Chap 5 para 15 “before the first solo flight”,

Quote “FIRST SOLO for this exercise the instructor should make it clear to the student that he is to make only one circuit and landing unless he needs to overshoot. The student should also be told that if on landing he makes a large bounce or for some reason the landing does not seems to be turning out well, he should not be ashamed of going around again. After a bounced landing, the balked landing procedures, where go-around should be executed” Unquote.

### 1.18.4 **TRAINEE PILOT’S SUBMISSION**

Aircraft VT-EMM was parked at stand 5, CFI got out from the aircraft and then trainee pilot asked for taxi instructions and got cleared for left hand circuit to RWY22. The circuit carried out was proper and gave a downwind call on the RT and the finals call on RT when turned on finals, called out that the approach was stabilised, got my power back to 1500 rpm on finals, because the winds were calm. Then when the runway edges were opening, she called out that the runway edges are opening and got the throttle to idle at the threshold. After that she flared out a bit high, while controlling the landing she pushed the control column a bit more than needed. Subsequently the nose wheel touched down first, bounced and then the main landing gears touched and pulled the control column and the aircraft bounced again and again, bounced three times. After that the aircraft veered to the right edge of the RWY22 and stopped because she had pressed the brakes. Later she tried to transmit on RT, but it stopped working, she tried to open her seat belt as well, but the aircraft was in a tail high position and was stuck in seat. Later the rescue team came and opened seat belt and carried her to MI room by ambulance. On clarification, following were added to her statement:

- The speed was high on approach and incident flight was her first solo flight.
- The CFI had briefed on the balloon & bounce recovery techniques except the go around procedures.
- The Airspeed was approximately 65 knots while landing and flap configuration was 20 degrees.

### 1.18.5 CHIEF FLIGHT INSTRUCTOR’S SUBMISSION

Trainee has total flying of 28:50 Hrs and has been given sufficient dual training on normal circuit and landing exercises. During day sortie, Trainee was briefed for normal circuit and approach to land exercises. Trainee carried out checks and procedures, taxied and carried out circuits and landings satisfactorily.

On 19.03.2020, before her release for first solo check sortie, 05 standard circuit & landing exercise were carried out. Out of five, first circuit was carried out CFI with trainee assisted on flight controls as a demonstration expected for the correct circuit pattern and approach and landing expected by the trainee in the check. Onwards four circuits were flown by the trainee herself and her performance during the check was found to be consistent for correct approaches and safe landing with corrective actions as required. Hence overall assessment for the trainee to carry out ONE SOLO Circuit after this check found to be steady, consistent & safe enough. After consent from trainee & upon ATCO's clearance, the trainee was released for her first solo-one circuit to land.

Prior to releasing her solo and during dual check, trainee was given demonstration of corrective actions for high balloon/bounce.

Performance of trainee for the entire sortie found to be safe and satisfactory. Winds were calm and trainee was released for her first solo.

During her solo flying, From ATC tower CFI supervised her circuit pattern and final approach and landing maneuvers. It was observed that the take-off, climb after take-off, circuit pattern and final approach carried out by trainee as solo occupant was normal as expected. However, landing maneuver and corrective action taken by the trainee found to be not correct as briefed/ demonstrated during the dual training sorties. It was observed that the Aircraft bounced and ballooned, and the trainee pilot gave unexpected/ wrong corrective inputs, i.e., pushing the control column forward which have been warned/ instructed to trainee many times during her training sorties. As a result of which the aircraft nose wheel collapsed with propeller hit on the runway surface and aircraft stopped with runway excursion.

**1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES:** NIL

**2.0 ANALYSIS:**

**2.1 SERVICEABILITY OF THE AIRCRAFT & MAINTENANCE ASPECTS:**

After completion of Daily Inspection schedule and Pre-departure schedule the aircraft VT-EMM was released with valid C of A and ARC, Nil snags and no active MEL invoked before the incident flight. Aircraft was airworthy before the incident flight.

During the investigation of the failed nose wheel at AED, DGCA HQ, indication of poor maintenance in the nose wheel area was observed. The tube axle was found to be undersized beyond manufacturer specified limits. The loose tube axle inside the bearing led to the detachment of the nose gear wheel from NLG forks on impact and subsequent the NLG collapsed. The scheduled 100 Hrs. /12 months inspection carried out on 26.02.2020 at 23435:50 A/F hours & 50 hrs. Inspection carried out on

08.03.2020 at 23475:50 A/F hours which also includes the inspection of NLG for condition and security of attachment. However, there is no specific task/inspection to measure the dimensions of axle tube and of the bearing of the nose wheel.

As per the Strip investigation report of the Engine, the engine was running and delivering power at the time of incident.

Trainee pilot informed that she could not make distress call on R/T. However, when Maintenance Manager reached to incident spot and opened the door to put the master switch off for preventing the fire hazard, he listened the R/T call before switching off the master switch.

In absence of specific maintenance task/inspection to measure the dimensions of NLG axle tube and diameter of inner race of the bearing of the nose wheel, the looseness between them could not be inspected which might have led to the detaching of the nose gear wheel on impact. As these are not covered any maintenance schedule, the maintenance aspects of the Aircraft may not be considered a contributory factor to the incident.

## 2.2 PILOT HANDLING OF THE AIRCRAFT:

Prior to the incident the trainee pilot underwent 05 circuits & landing exercise. Based on the satisfactory performance of trainee, CFI requested ATC if they could get one more circuit for trainee pilot to go solo. The ATC informed only one circuit is possible, and CFI informed that the trainee would carry out only one circuit and landing. This was the first solo flight for the trainee pilot.

Aircraft took off at around 11:23 Hrs IST and carried out Left hand circuit on RWY22. The flight was uneventful till the final approach. It was observed that the take-off, climb after take-off, circuit pattern and final approach carried out by trainee as solo occupant was normal. The approach was stabilised, and the winds were calm. As per statement of trainee, the airspeed was approx. 65 kts while landing & the flap configurations was 20 degrees.

The Aircraft was flared out at high, while controlling the landing Trainee pushed the control column a bit more forward than needed. Subsequently the nose wheel touched down first, bounced and then the main landing gears touched, and trainee pulled the control column and the aircraft bounced three times after that the aircraft veered to the right edge of the RWY22 and stopped as applied brakes. Later Trainee pilot could not transmit/ make a distress call on R/T and tried to open seat belt, but the aircraft was in a tail high position and trainee pilot was stuck in seat. Later the rescue team came and opened seat belt and rescued her.

The trainee pilot was inside the cockpit till the rescue team reached to incident site which could have been dangerous as there was a fuel spillage

which could have resulted into post impact fire. The pilot handling is considered as a factor to the incident.

Post incident, the trainee pilot did not put the mixture ignition switch and master switch to OFF position. The Maintenance manager of M/s Gujarat flying club when he reached to incident spot, he opened the door and put the master switch to OFF position for preventing the fire hazard.

Hence, it can be concluded that the pilot handing of the aircraft is the main factor to the incident

## 2.3 WEATHER:

From the available metrological information and statement of the involved trainee pilot, the wind was calm at the time of incident.

Hence, it can be concluded that Weather was not a contributory factor to the incident.

## 2.4 TRAINING ASPECTS:

The trainee Pilot has joined the flying club in year 2016. Her first training flight was on 17.10.2016 and till 19.09.2019 She has flying experience of 21:55 Hrs with longer interval between flying, however from 30.01.2020 onwards, trainee was regular at the flying club, and trainee flew training sorties on circuit & landing exercise with other instructors at the flying club and most of the time the approach & landing were assisted by Flying instructor and debriefed as needs to be consistent and proactive, however the overall performance of the trainee was found to be satisfactory.

From the Flight Trainee's progress report, the irregular flying with lots of break intervals are observed which might affected her learning & performance.

On 19.03.2020, before her release for first solo check sortie, 05 standard circuit & landing exercise were carried out. Out of five, first circuit was carried out CFI with trainee assisted on flight controls as a demonstration expected for the correct circuit pattern and approach and landing expected by the trainee in the check. Onwards four circuits were flown by the trainee herself and her performance during the check was found to be consistent for correct approaches and safe landing with corrective actions as required. Hence overall assessment for the trainee to carry out ONE SOLO Circuit after this check found to be steady, consistent & safe enough. After consent from trainee & upon ATCO's clearance, the trainee was released for her first solo flight, i.e. one circuit to land. However, as per submission of Trainee pilot, three circuit & landing were assisted by CFI and last two Circuit & landing exercise were carried out by the trainee pilot.

As per Statement of Trainee Pilot, on 19.03.2020, prior to releasing her solo and during dual check, CFI had briefed the trainee pilot on the balloon & bounce recovery technique except the go around procedures. However, From the Flight Trainee's progress report, the trainee was not briefed for Go-Around Procedure, Recovery from Bounce and Balloon & PIO/Runway change procedure for prior her first solo exercise.

From the statement of trainee, Chief flight instructor & Flight trainee's progress report, it can be concluded that the inadequate trainings for Go-Around Procedure, Recovery from Bounce, Balloon & PIO/Runway change procedure for prior to solo release flight is a contributory factor to the incident.

## 3.0 CONCLUSION:

### 3.1 FINDINGS:

3.1.1 The Aircraft had valid C of A and ARC before the incident flight and there was no snag reported to the aircraft before and during the flight.

3.1.2 Post incident the Trainee pilot had undergone the BA test for alcohol and the result was negative.

3.1.3 The incident flight was trainee pilot's first solo flight.

3.1.4 From the Flying trainee's progress record, the longer intervals of non-flying are observed from period from 17.10.2016 to 19.03.2020 and completed only 28:50 hrs since joining.

3.1.5 From the Flight Trainee's progress report & Trainee Pilot's statement, the trainee was found to be not briefed/ trained for Go-Around Procedure, Recovery from Bounce, Balloon & PIO/Runway change procedure for prior to her first solo exercise.

3.1.6 Improper flare techniques by trainee pilot during landing resulted the aircraft to touch the runway on Nose wheel and bounce. Subsequent improper bounce recovery techniques causes multiple bounce and damage to the nose landing gear and engine propeller.

3.1.7 Post incident, the trainee pilot did not put the mixture ignition switch and master switch to OFF position. Trainee pilot could not transmit/ make a distress call on R/T.

3.1.8 The trainee pilot could not come out from the Aircraft till the rescue team reached to incident site.

3.1.9 The loose tube axle inside the bearing led to the detaching of the nose gear wheel on impact.

3.1.10 There is no any specific maintenance task/inspection to measure the dimensions of axle tube and of the bearing of the nose wheel for Cessna 152 type Aircraft.

3.1.11 Probably Weather was not a contributory factor.

### 3.2 PROBABLE CAUSES:

Improper flare and bounce recovery techniques during landing resulted in multiple bounces and damaged to the nose landing gear and engine propeller.

### 3.3 CONTRIBUTORY FACTORS:

Inadequate trainings on Go-Around Procedure, Recovery from Bounce, Balloon & PIO/Runway change procedure prior to solo release flight was a contributory factor to the incident.

## 4.0 SAFETY RECOMMENDATIONS:

4.1 Suitable Corrective training to trainee pilot.

4.2 Action deemed fit by DGCA HQ based on findings made in the report.

Digitally signed by DILIP BABUBHAI CHAVDA

Date: 28.06.2021
Place: Mumbai

Dilip Chavda
Air Safety Officer &
Investigator-in-charge, VT-EMM

| Abbreviations | |
|---|---|
| # | Number |
| AAI | Airports Authority of India |
| AED | Aircraft Engineering Directorate |
| A/F | Airframe |
| ARC | Airworthiness review certificate |
| AMM | Aircraft maintenance manual |
| API | Assistant Pilot instructor |
| ATC | Air traffic control |
| ATCO | Air Traffic controller |
| BA | Breath Analyzer |
| C/L | Checklist |
| C of A | Certificate of Airworthiness |
| CPL | Commercial pilot licence |
| CFI | Chief Flight Instructor |
| CAR | Civil aviation requirements |
| DGCA | Directorate General of Civil Aviation |
| Dy CFI | Deputy Chief Flight Instructor |
| FRTOL | Flight Radio telephone operator's licence |
| FTO | Flying Training Organization |
| FTPR | Flight trainee' Progress report |
| GFC | The Gujarat Flying Club |
| FI | Flight Instructor |
| ft. | Feet |
| HQ or Hqrs | Head Quarter |
| Hrs | Hours |
| ILS | Instrument landing system |
| ICAO | International Civil Aviation organization |
| Kg | Kilogram |
| LDA | Landing distance available |
| LH | Left Hand |
| LHS | Left hand side |
| MEL | Minimum equipment list |
| METAR | Meteorological terminal aviation routine weather report OR Meteorological aerodrome report |
| M/s | Messers |
| MSL | Mean Seal Level |
| NA or N/A | Not Applicable |
| NLG | Nose Landing Gear |
| NG | Next Generation |
| PAPI | Precision approach path indicator |
| PIO | Pilot induced Oscillation |
| QNH | Query Nautical Height |
| P/N | Part Number |
| RH | Right hand |
| RHS | Right hand side |
| RC | Route check |
| RTR | Radio telephony restricted (Aeronautical) |
| R/T | Radio telephony |
| RVR | Runway visual range |
| RWY or R/W | Runway |
| SPL | Student pilot licence |
| SAPL | Simple Approach lighting |
| Sl No. | Serial Number |
| THR | Threshold |
| TBO | Time between overhaul |
| TPM | Training and Procedures Manual |
| TSN | Time since new |
| TSN | Time Since Overhaul |
| TODA | Take-off distance available |
| TORA | Take-off run available |
| UTC | Universal time coordinated |
| VABO | Vadodara Airport (ICAO) |
| VHF | Very high frequency |
| VOR | VHF Omni range |