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FINAL REPORT ON ACCIDENT TO M/s ACSPL CESSNA CITATION 560XL AIRCRAFT VT-AVV ON 27TH AUG 2019 AT ALIGARH AIRFIELD, UTTAR PRADESH

FOREWORD

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2017, the sole objective of the investigation of an accident shall be the prevention of accidents and incidents and not to apportion blame or liability. The investigation conducted in accordance with the provisions of the 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 evidences collected during the investigation, opinion 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.

GLOSSARY

AAIB	Aircraft Accident Investigation Bureau, India
ADC	Air Defence Clearance
AME	Aircraft Maintenance Engineer
AMM	Aircraft Maintenance Manual
API	Assistant Pilot Instructor
ARC	Airworthiness Review Certificate
ATD	Actual Time of Departure
ATC	Air Traffic Control
AUW	All Up Weight
BHP	Brake Horse Power
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirement
CFI	Chief Flying Instructor
CG	Centre of Gravity
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DGCA	Directorate General of Civil Aviation
ELT	Emergency Locator Beacon
FAA	Federal Aviation Administration
FAB	Flight Authorization Book
FRTOL	Flight Radio Telephone Operators License
FTO	Flying Training Organization
Gal/Hr	Gallons/ Hour
Hrs	Hours
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IST	Indian Standard Time
KIAS	Knots Indicated Air speed
Lat	Latitude
Long	Longitude
Ltr/Hr	Litre/Hour
METAR	Meteorological Terminal Aviation Routine
MTOW	Maximum Takeoff Weight
NM	Nautical Miles
NSOP	Non- Scheduled Operating Permit
PI	Pilot Instructor
PIC	Pilot in Command
POH	Pilot's Operating Handbook
PSWS	Pilot Safety and Warning Supplement
RFFS	Rescue and Fire Fighting Services
RPM	Rotation Per Minute
RT	Radio- Telephony
RTR	Radio- Telephony Restricted
SOD	Staff On Duty
SOP	Standard Operating Procedure
SPL	Student Pilot Licence
TSN	Time Since New
VFR	Visuals Flight Rules
UTC	Coordinated Universal Time

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FINAL INVESTIGATION REPORT ON ACCIDENT TO M/s AIR CHARTER SERVICES CESSNA CITATION 560XL AIRCRAFT VT-AVV AT ALIGARH ON 27/08/2019

1.	Aircraft Type	:	Cessna Citation 560XL
	Nationality	:	Indian
	Registration	:	VT –AVV
2.	Owner and Operator	:	M/s Air Charter Services Pvt Ltd
3.	Pilot – in –Command	:	ATPL holder on type
	Extent of injuries	:	Nil
4.	First Officer	:	CPL Holder on type
	Extent of injuries	:	Nil
5.	Place of Incident	:	Dhanipur Airstrip, Aligarh
6.	Date & Time of Incident	:	27Aug 2019, 0840IST
7.	Last point of Departure	:	Delhi Airport
8.	Point of intended landing	:	Dhanipur Airstrip, Aligarh,(UP)
9.	Type of operation	:	Non-scheduled Operation
10.	Crew on Board	:	02
11.	Passengers on Board	:	04
	Extent of injuries	:	Nil
12.	Phase of operation	:	Landing
13.	Coordinates of Site	:	27 °51' 47” N ; 078° 08' 23” E
14.	Aerodrome elevation	:	619 ft / 189 m

(ALL TIMINGS IN THE REPORT ARE IN IST)

EXECUTIVE SUMMARY

On 27.08.2019, Cessna Citation 560XL aircraft VT-AVV of M/s Air Charter Services Pvt Ltd (ACSPL) while operating a non-scheduled flight from Delhi to Aligarh met with an accident during landing at Dhanipur Airstrip, Aligarh. There were 4 passengers and 02 crew members on board the aircraft. There was no injury reported to any person on board aircraft.

The Aircraft took off from Delhi at 0820 Hrs. The enroute weather was reported to be fine and the flight was uneventful. While the aircraft was 40 Nm from the Aligarh airstrip, crew made radio contact with personnel of Pioneer Flying Club manning ground radio and requested for weather and QNH. The weather & QNH reported by the person manning ground radio at Aligarh was “winds 290°/03, visibility 5 km and QNH 1005”. The aircraft was advised to contact when “10 Nm inbound”. The prevalent weather conditions met the requirement of VFR operations. Aircraft contacted person manning ground RT at 10 Nm inbound and was advised to Land. Crew decided to land on “runway 11” which was straight in approach. During visual approach on runway 11 and after crossing the displaced threshold, crew heard a loud bang from left side when the aircraft was approximately below “100 feet AGL” and aircraft severed to the left with a 20° bank. Thereafter, crew tried to control and level off the aircraft. However, aircraft hit the ground and veered towards left of the runway. Finally, aircraft stopped near perimeter wall of the airstrip and left wing caught fire. Crew along with the passenger on board evacuated the aircraft. Aircraft was destroyed in the accident.

Occurrence was classified as Accident as per the Aircraft (Investigation of Accidents and Incidents) Rules, 2017. DG-AAIB Order dated 27Aug, 2019appointed Mr. Anil Tewari, Director as Investigator-in-Charge and Mr Dinesh Kumar, Air Safety Officer as an Investigator to investigate into the cause of the accident.

In accordance with the provisions of Annex 13, an accredited representative was appointed by NTSB, USA to associate with the investigation.

1. FACTUAL INFORMATION

1.1 History of the Flight

On 27 Aug 19, M/s Air Charter Services Pvt Ltd Cessna Citation 560 XL aircraft (VT-AVV), while operating a flight from Delhi to Aligarh (Dhanipur Airstrip) was involved in an accident during landing on runway 11.The operator is having a maintenance facility at Aligarh Airport and aircraft was scheduled to undergo ADS-B modification. There were 02 cockpit crew and 04 SOD onboard the aircraft. The aircraft was under the command of a PIC, who was an ATPL holder duly qualified on type with a CPL holder co-pilot, duly qualified on type as Pilot Monitoring.

This was the first flight of the day for both pilots. Both, PIC and Co-Pilot had prior experience of operating to Aligarh airport, which is an uncontrolled airport. As per the flight plan, ETD from Delhi was 0800 IST and ETA at Aligarh was 0820 IST. The crew had reported around 0630 IST at Delhi airport and underwent BA test. The MET report to operate the aircraft to Aligarh was well within the VFR conditions. The aircraft Take-off weight was within limits including 1900 Kgs of fuel on board.

As per the statement of PIC, the Co-pilot was briefed about pre departure checklists including METAR before approaching the aircraft. Once at the aircraft, prefight checks were carried out by PIC before seeking clearance from Delhi delivery (121.95 MHz). Aircraft was accorded start up clearance by Delhi ground (121.75 Mhz) at 0800 IST.ATC cleared the aircraft to line up on runway 11 and was finally cleared for takeoff at 0821 IST. After takeoff, aircraft changed over to Delhi radar control from tower frequency for further departure instructions. Aircraft was initially cleared by Radar control to climb to FL090 and was given straight routing to Aligarh with final clearance to climb to FL130. Thereafter, aircraft changed to Delhi area control for further instructions.

While at approximately 45 Nm from Aligarh, VT-AVV made contact with Aligarh (personnel of M/s Pioneer Flying Club manning radio) on 122.625 MHz. Ground R/T operator informed “wind 100/2-3 Kts, QNH 1005, Runway 11 in use” and that flying of Pioneer Flying Club is in progress. Further, he instructed crew to contact when at 10 Nm inbound. After obtaining initial information from ground R/T operator, VT-AVV requested Delhi area control for descent. The aircraft was cleared for initial descent to FL110 and then further to FL080. On reaching FL080, aircraft was instructed by Delhi area control to change over to Aligarh for further descent instruction in coordination with destination.

At approx 10 Nm, VT-AVV contacted ground R/T operator on 122.625 MHz and requested for long finals for runway 11. In turn, ground R/T operator asked crew to report when at 5 Nm inbound. As per PIC, after reaching 5 Nm inbounds, Aligarh cleared VT-AVV to descend to circuit altitude and land on runway 11.

Aircraft had commenced approach at 5 Nm at an altitude of 2200 ft. Approach and landing checks briefing including wind, runway in use were carried out by PIC. During visual approach, Co-pilot called out to PIC “Slightly low on profile”. As per PIC, Co-pilot call out was duly acknowledged and ROD was corrected. Thereafter, PIC was visual with runway and took over controls on manual. Co-pilot was monitoring instruments and parameters. While PIC was focused on landing, a loud bang from left side of the aircraft was heard by PIC when the aircraft was below 100 feet AGL. Aircraft started pulling towards left and impacted the ground short of runway 11 threshold. After impact, aircraft veered off the runway and its left wing caught fire. The aircraft stopped short of airfield boundary wall. Crew carried out emergency evacuation. Co-pilot opened main exit door from inside of the aircraft for evacuation of passengers.

Aircraft was destroyed due to post crash fire. The fire tender reached the crash site after 45 Minutes.

1.2 Injuries to Persons

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR / NONE	NIL /02	NIL / 04	NIL/Nil

1.3 Damage to Aircraft

The aircraft wing and fuselage impacted the ground on extended portion of runway ahead of the threshold of RWY 11. Various aircraft parts (landing gears, wing high lift devices and components of the lower fuselage) were damaged after touchdown and were found scattered throughout the aircraft track.

The cockpit, LH wing and aircraft cabin were destroyed due to the post crash fire.

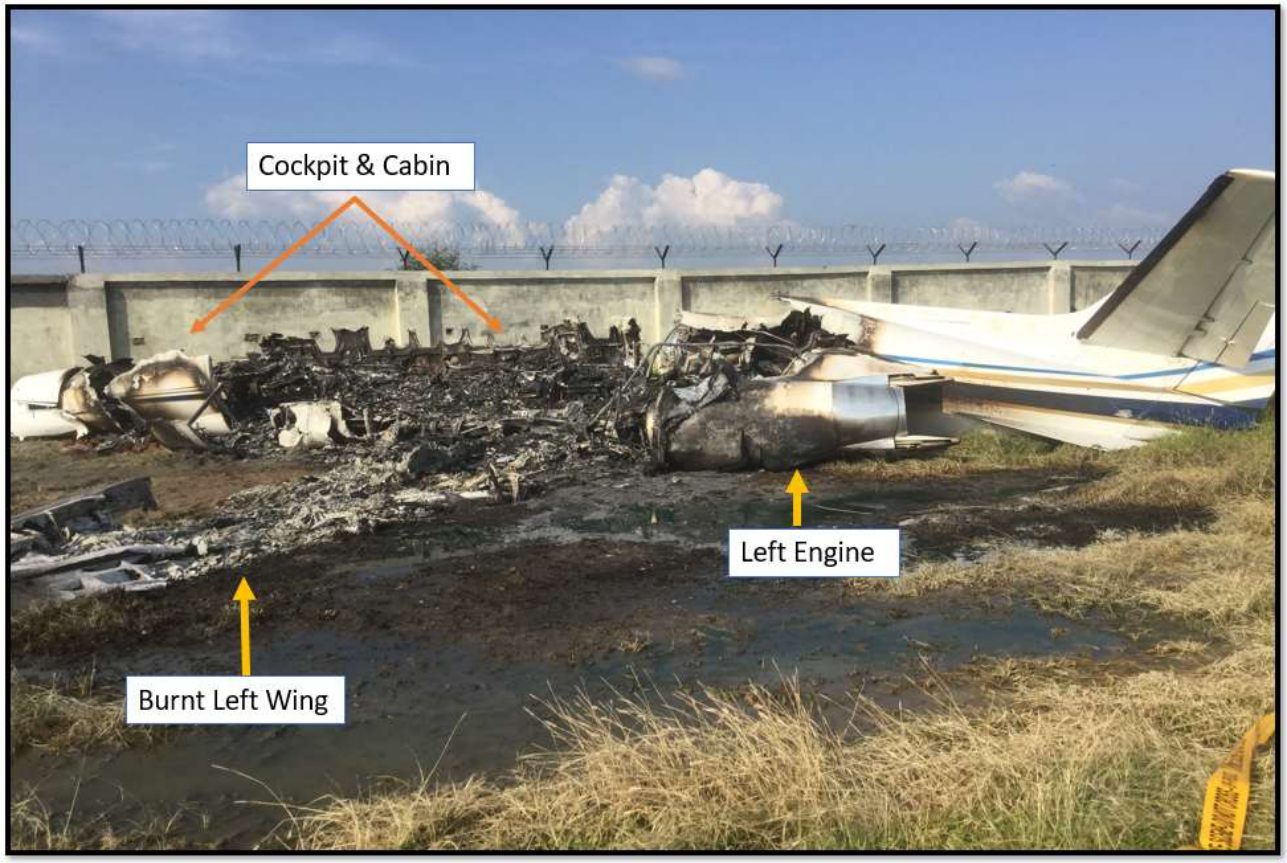

Fig-1: Port Side View of VT-AVV

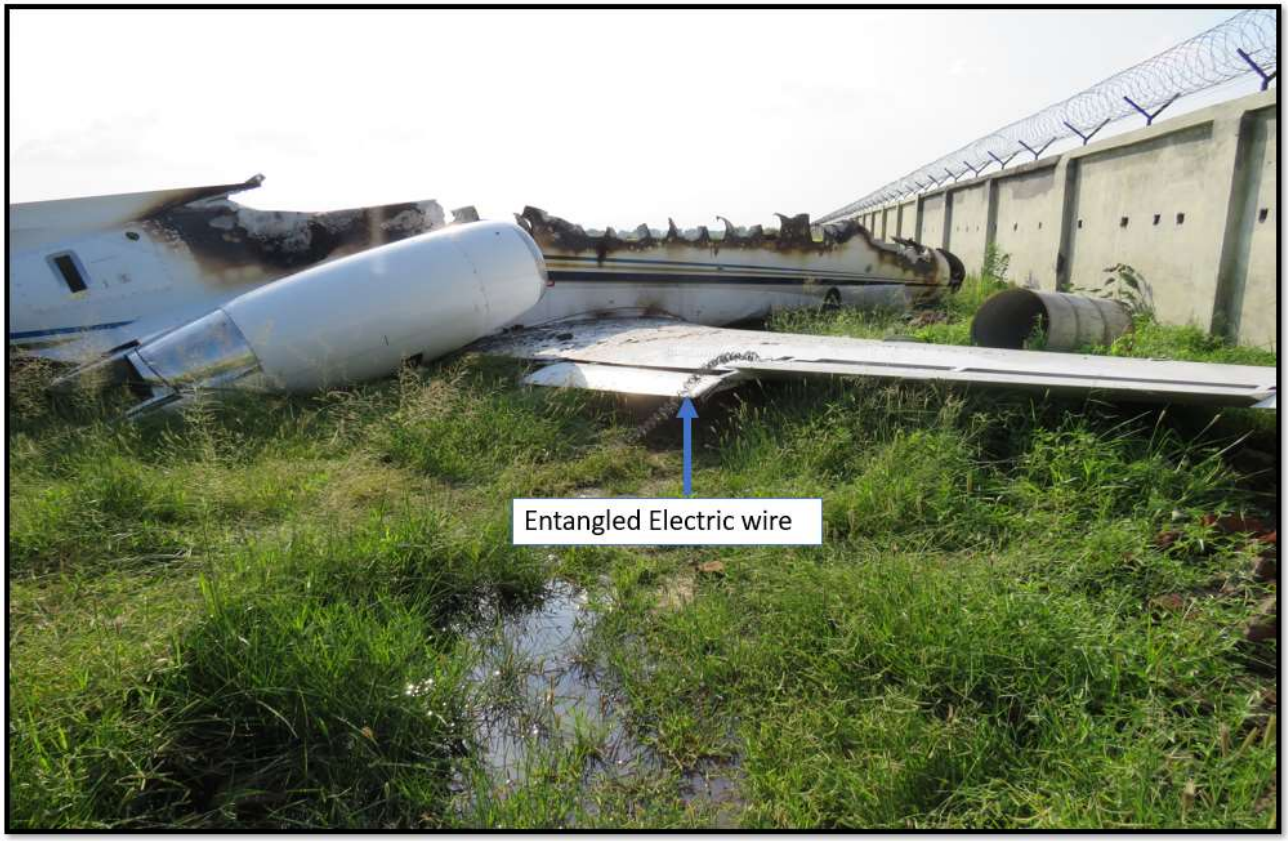

Fig-2 : Starboard View of VT-AVV

1.4 Other Damage

Before touchdown, the aircraft MLG got entangled with overhead powerlines which were crossing the under construction extended runway. Following damages were observed:

(a) High tension powerlines crossing the extended portion of the runway 11 were damaged.

(b) The insulators fitted on electrical poles were found bent in the direction of involved flight.

Note: ***The powerlines were not carrying power at the time of impact.***

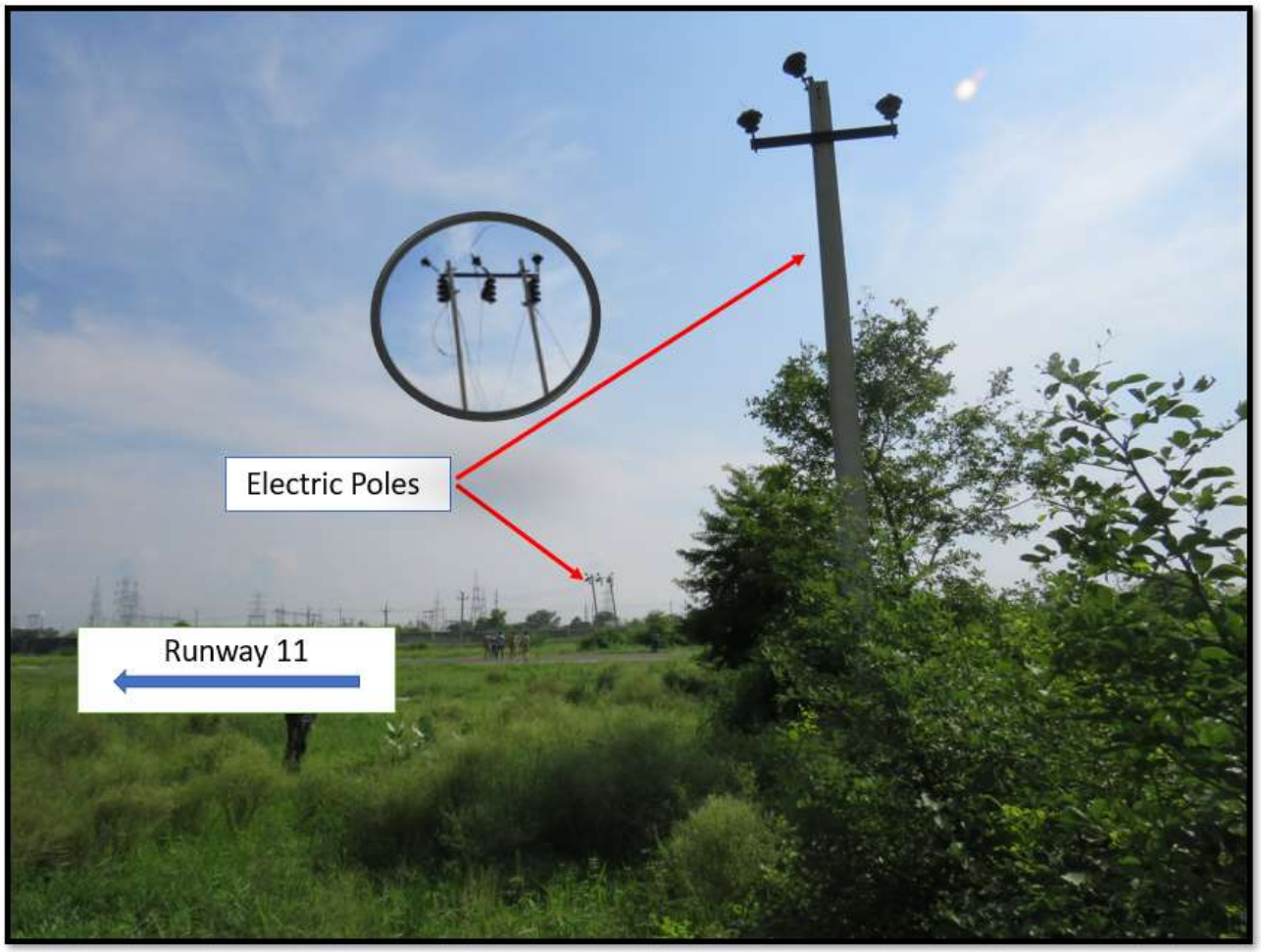

Fig-3: Electrical Cable Installations on Runway Strip 11

1.5 Personnel Information

1.5.1 *Pilot – In – Command*

Age	:	**44 years**
License	:	**ATPL**
Date of Issue	:	**23.11.2015**
Valid up to	:	**22.11.2020**
Category	:	**AEROPLANE**
Date of Class I Med. Exam.	:	**20.06.2019**
Class I Medical Valid up to	:	**03.07.2020**
Date of issue FRTOL License	:	**03.04.2007**
FRTO License valid up to	:	**02.04.2022**
Endorsements as PIC	:	**Cessna 152A, King Air C90, PC-12, P-180, King Air 300, C56XLS**
Total flying experience	:	**5484:00 HRS**
Total flying experience on type	:	**1064:00 Hrs**
Last Flown on type	:	**25.08.2019**
Total flying experience during last 1 year	:	**600:15 Hrs**
Total flying experience during last 6 Months	:	**289:55 Hrs**
Total flying experience during last 30 days	:	**38:50 Hrs**
Total flying experience during last 07 Days	:	**3:30 Hrs**
Total flying experience during last 24 Hours	:	**NIL**
Rest period before flight	:	**Adequate**
Whether involved in Accident/Incident earlier	:	**No**

1.5.2 *Co-Pilot*

Age	:	**33 years**
License	:	**CPL**
Date of Issue	:	**07.04.2011**
Valid up to	:	**03.07.2021**
Category	:	**AEROPLANE**
Date of Class I Med. Exam.	:	**08.01.2019**
Class I Medical Vaid up to	:	**10.01.2020**
Date of issue FRTOL License	:	**07.04.2011**
FRTO License valid up to	:	**03.07.2021**
Endorsements as PIC	:	**Cessna 172R, Cessna 152, PA-34, King Air C-90**
Total flying experience	:	**1365:15 Hrs**

Total flying experience on type	:	**1060:00 Hrs**
Last Flown on type	:	**23.08.2019**
Total flying experience during last 1 year	:	**574:55 Hrs**
Total flying experience during last 6 Months	:	**264:15 Hrs**
Total flying experience during last 30 days	:	**38:15 Hrs**
Total flying experience during last 07 Days	:	**02:35 Hrs**
Total flying experience during last 24 Hours	:	**NIL**
Rest period before flight	:	**Adequate**
Whether involved in Accident/Incident earlier	:	**No**

Both crew had experience of operating flight to / from Aligarh and were fully aware of topography of Aligarh Airfield. Further, PIC had earlier operated four times to / from Aligarh prior to accidented flight. They had last operated to / from Aligarh in Apr 2019.

1.6 Aircraft Information

1.6.1 General Description

The Cessna Citation 560XL is a low wing aircraft with retractable tricycle landing gears and a conventional tail. A pressurised cabin can accommodate two crew and upto 12 passengers (nine is standard). Two Pratt & Whiney PW545C turbofan engines are pylon-mounted on the rear fuselage. Multiple structural load paths and system redundancies have been built into the aluminium airframe. Metal bonding techniques have been used in many areas for added strength to reduce weight. Certain parts with non-critical loads such as the nose radome and fairings are made of composite materials to save weight. The airframe design incorporates anti-corrosion applications and lightning protection. The Model 560XL is certified to the requirements of U.S. 14 CFR Part 25, Transport category, including day, night, VFR, IFR, flight-into-known icing conditions and steep approach. Optional certifications include Part 91 Category II.

A circular fuselage section is utilized with a maximum internal cabin width of 66 inches (1.68 m). A dropped aisle in the passenger cabin provides 68 inches (1.73 m) of headroom. The nose section includes a composite radome, high resolution radar and the avionics bay. The windshields are designed to meet bird resistance requirements of 14 CFR Part 25. Operable side windows are provided for the pilot and co-pilot. The cabin door is located on the forward left-hand side of the fuselage and is 54 inches (1.37 m) high with a maximum width of 24 inches (0.61 m). A plug-type emergency exit is located on the aft right-hand side of the cabin. The aft fuselage is equipped with small strakes on both sides.

The strakes are of a conventional construction and extend the usable C.G. range of the aircraft.

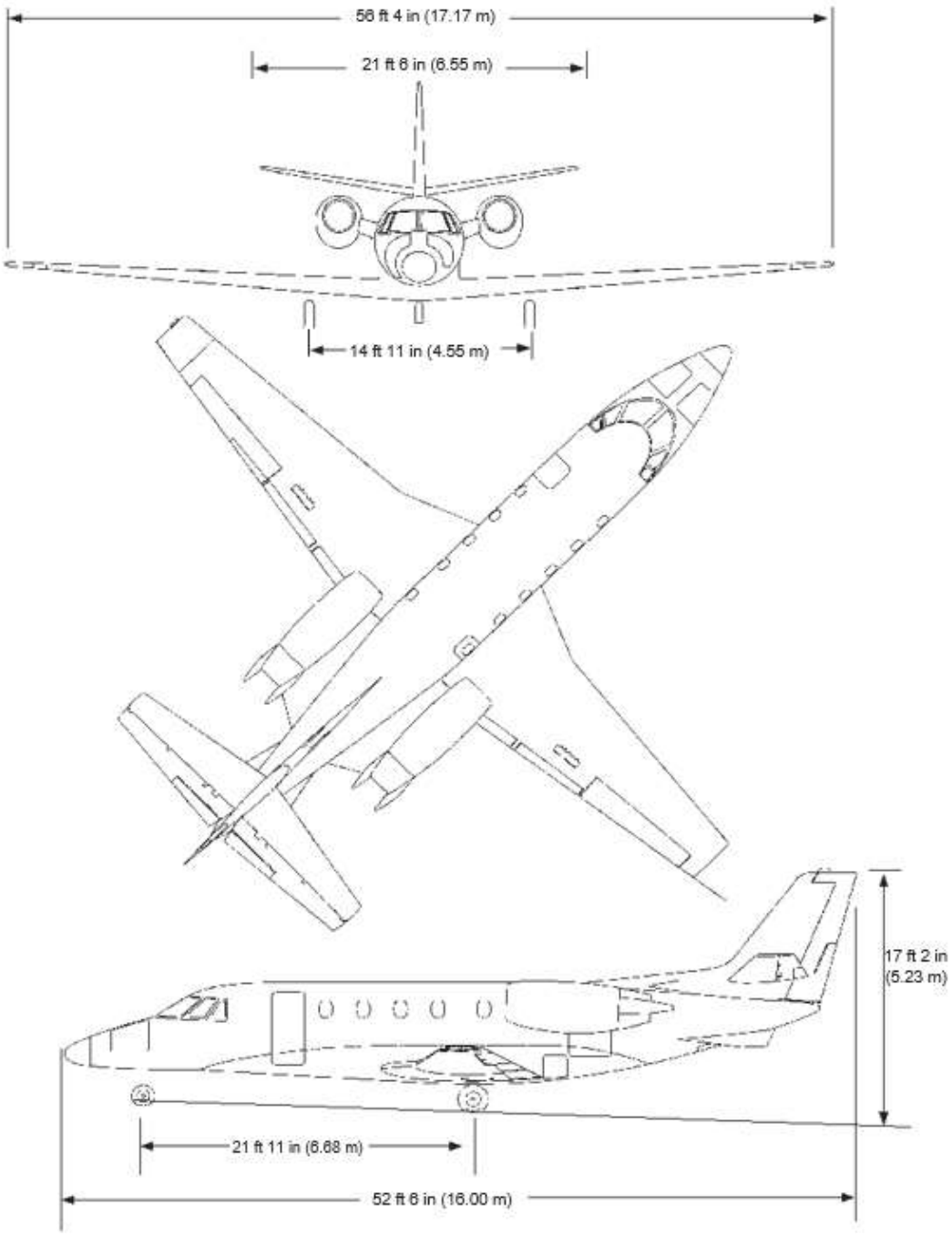

Fig- 4: 3D View of Cessna Citation 560XL Aircraft

The straight wing design is of conventional, all metal construction. The wing incorporates fuselage attachment points and a dropped carry-through which permit a continuous dropped aisle in the passenger cabin and lavatory. The wing structure has a two-cell torque box formed by spars, stringers, ribs and skin. Four degrees dihedral contributes to lateral stability. Integral fuel tanks are located in each wing forward of the aft spar and in the wing carry through section which passes under the fuselage. Control

surfaces on the wing include an outboard aileron with a trim tab on the left side, two flap sections per wing, and an upper and lower speed brake on each wing.

The empennage consists of a vertical stabilizer, horizontal stabilizer and a dorsal fin. The dorsal fin is attached to the top side of the rear fuselage and has two ram air ducts to provide air for use in the aircraft heat exchangers. The horizontal stabilizer incorporates a nine-degree dihedral for minimum sonic fatigue and thrust effects. Control surfaces include the elevators with a trim tab on each elevator and a rudder with a rudder servo/trim tab.

Power plant

Two Pratt & Whitney Canada PW545C turbofan engines are installed on the Citation XL, one on each side of the rear fuselage in easily accessible nacelles. The PW545C produces a static takeoff thrust of 4,119 pounds (18.32 KN) at sea level, up to 77°F (25°C) and has a bypass ratio of 3.8 to 1.

Auxiliary Power Unit (APU)

The Honeywell RE100 (XL) APU is installed in the tail cone equipment bay. The APU supplies bleed air for pressurization and air conditioning, electrical power for engine assisted starts, and other benefits. It is certified for use in flight up to 30,000 feet (9,144 m).

1.6.2 Aircraft Technical Information

Manufacturer	:	**Cessna Aircraft Company, USA**
Type	:	**Cessna Citation 560 XL**
S.No.	:	**560-5259**
Year of Manufacture	:	**2002**
Certificate of Airworthiness	:	**No. 6562 Date of issue: 03/09/2013**
Category	:	**Normal**
Sub Division	:	**Passenger**
Certificate of Registration	:	**4453 issued on 31.08.2013**
Owner	:	**M/s Air Charter Services Pvt. Ltd, New Delhi**
Minimum Crew Necessary	:	**02**
Maximum All Up Weight	:	**9072 Kgs**
Last Major Inspection	:	**12 Months inspection carried out on 28.01.2019**
Last Inspection	:	**High exposure area wash carried out on 26.08.2019.**
Airframe Hrs Since New	:	**7688:23 Hrs till the day of accident**
Airframe Hrs Since last C of A	:	**28 :13 Hrs till the day of accident**

The aircraft is certified in 'Normal' (Passenger) category, for day and night operation under VFR & IFR. The maximum operating altitude is 25000 feet and maximum take-off weight is 9072 Kgs. The Maximum Landing weight is 8482 kgs. The aircraft length is 16 meters, wingspan is 17.17 meters and height of this aircraft is 5.23meters.

The aircraft was holding a valid Aero Mobile License at the time of accident. This aircraft operated under Non Scheduled Operator's Permit No 15/2008 which is valid up to 14.05.2024. As on 27.08.2019, the aircraft had logged 7688:23 Airframe Hours and 6453 Cycles.

The aircraft and its Engines are being maintained as per the maintenance programme consisting of calendar period/ flying hours or Cycles based maintenance as per maintenance programme approved by Regional Airworthiness office, Delhi.

The aircraft was last weighed on 8thJuly, 2016 and the weight schedule was prepared and duly approved by DGCA. As per the approved weight schedule, the Empty Weight of the aircraft is5687 Kgs. Maximum AUW with fuel tanks full is 9072 Kgs. Empty weight CG is 34.7 % of MAC. Prior to the accidented flight, the weight and balance of the aircraft was well within the operating limits.

The left Engine S/N PCE-DB0311 had logged 13142:09Hrs. and 10280 cycles and the right Engine S/N PCE-DB0440 had logged 7171:59Hrs. and 6030 cycles. There was no defect reported on the previous flight.

All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its Engines had been complied with as on the date of accident.

1.7 Meteorological Information

There is no meteorological office located at Aligarh from where weather observations are taken and recorded. As per the Pioneer Flying Club at the Aligarh Airfield, weather on the day of accident was "wind 290/03 Knots, visibility 5 Km, SKC, QNH 1005, No SIG".

1.8 Aids to Navigation

No Navigational Aids are available at Aligarh Airfield. However, a windsock is available and is clearly visible from M/s Pioneer Flying Club from where ground R/T is being handled.

1.9 Communications

At the time of accident, the aircraft was in contact with staff of M/s Pioneer Flying Club manning ground R/T on frequency 122.625 MHz. From the CVR transcript, it was apparent that there was always two-way positive communication between the flight crew and ground R/T.

1.10 Aerodrome Information

Aligarh aerodrome is an uncontrolled airfield. The airstrip is located 2.3 Nm North West of Aligarh VOR. The aerodrome is used for flying by two flying clubs. The runway orientation is 29/11 and is cleared for day VFR operations only. It has been given the approval for the night flying training w.e.f. 29Nov 2010. The runway is not equipped for the night flying, however, goose neck lamps are being used for night flying training.

As per NOC issued by AAI, local flying is to be conducted within the local flying area (LFA) of 5N m radius centered at 27°51'43" N 078°08'53" E. Any flying beyond LFA is to be carried out after filing flight plan with Delhi FIC and obtaining ATC clearance as applicable.

Runway Dimensions

Length	1220 meters (4000 feet)
Width	23 meter (75 feet)

Presently, the runway length is being extended. The total length of runway under extension ahead of transverse line marking from threshold is 415 m. However, the estimated date of completion of runway extension is not available. Further, there are no markings/signs available to indicate status of extended portion of runway. There is no ATC available at the airport.

Fig-5: Satellite Image (Google) of Aligarh Airport

1.11 Flight Recorders

The aircraft was fitted with serviceable SSCVR and DFDR units. Flight recorders were recovered from the aircraft and CSMU were found intact with sign of external thermal damage.

1.11.1 Cockpit Voice Recorder

SSCVR Part No. 2100-1020-02, Sl.no. 150001 (Make: L3 Communications, USA) was installed in the aircraft. The SSCVR was downloaded and analysed. The recording of entire duration of flight (Delhi to Aligarh sector) was found available and clearly audible. However, Standard Checks and procedures were found to be lacking specially while approaching uncontrolled runway. Following key points have been observed from the CVR transcript while aircraft was in final phase of landing: -

(a) Lack of adherence to standardised checks, procedure and communication protocol among the crew, especially with regard to uncontrolled airfields operations.

(b) No record of briefings and discussions between the crew on SOP for uncontrolled runway.

(c) While PIC had been informed by PM “low on profile” (in a very subdued voice), no affirmative response by PIC noted in the readout.

1.11.2 Digital Flight Data Recorder

DFDR part No. 980-4700-025, Sl.no.8344 (Make: Honeywell, USA) was installed on the aircraft. The unit was retrieved from the aircraft with sign of external fire damage; however, CSMU was fully intact with no signs of damage. The DFDR is configured for recording following parameters:

(i) Relative Time
(ii) Pressure Altitude
(iii) Indicated Airspeed
(iv) Magnetic Heading
(v) Vertical Acceleration
(vi) Pitch Attitude
(vii) Roll Attitude
(viii) Flaps Position
(ix) Auto Pilot

(x) Communication Transmission

(xi) LH Engine N1

(xii) RH Engine N1

(xiii) Thrust Reverser LH

(xiv) Thrust Reverser RH

(xv) Speed Brake

(xvi) OAT

1.12 Wreckage and Impact Information

During visit to crash site and on inspection of first impact point & the track followed by the aircraft, following were observed: -

(a) The first point of impact was located at a distance of 104m ahead of the transverse marking at threshold of RWY11.

(b) The second point of impact was located at a distance of 91m ahead of the transverse marking of threshold RWY11. From this point onwards, fuel / oil stains were observed on the paved surface.

(c) Pieces of broken powerlines were found throughout the track followed by the aircraft.

(d) Lower wing access panel and portion of antenna were found at a distance 43m on the track followed by the aircraft.

Fig-6: Wreckage distribution diagram

(e) LH MLG wheel and wingtip navigation light cover were found near the threshold marking of RWY11 at about 36m from the transverse marking of RWY11. The LH MLG was found at a distance of 9m from the runway centreline.

Fig-7: Final Rest Position of the Aircraft

(f) The MLG oleo components were found near the shoulder of RWY11 at a distance 44m from runway centreline.

Fig-8: Landing Gear Tyre Markings on Runway

(g) Flap tracks, components of NLG door and a fuel probe were found on the aircraft track at a distance of 161.2m from the edge of the runway. The presence of fuel probe on the aircraft track and fuel stains on the touchdown area indicated that fuel tank was already ruptured before touchdown.

(h) At the final rest position, the aircraft nose was at distance of 1.38m from the perimeter wall and orientation had changed approximately 120° w.r.t. approach direction.

(j) Landing gears were found collapsed and the aircraft fuselage and wing were in contact with the ground. The RH MLG actuator link was found to have broken. One powerline was found entangled on RH wing and passing below the fuselage and entangled with the LH wing. The final location of the aircraft was approximately 260 m from the first point of contact.

1.13 Medical and Pathological Information

The crew were subjected for Pre-flight Medical Examination at Delhi on 27/08/2019 at 0726 IST (PIC) and 0704 IST (P2) and they were found fit by the qualified doctor and hence the crew were cleared to operate the flights on that day.

1.14 Fire

(a) There was post impact fire.
(b) No Fire services were available at the time of accident.
(c) Fire services arrived after 45 minutes of the accident.
(d) Only Fire tender was only used for extinguishing post crash fire.
(e) No crash fire tender was available throughout the fire fighting exercise.

1.15 Survival Aspects

The accident was survivable.

1.16 Tests and Research

Nil

1.17 Organisation and Management Information

Air Charter Services Private Limited (ACSPL) was established in the year 2000-2001, with the main objective to carry out business of charter of aircraft, brokerage, charter operations and other associated services. ACSPL was granted Permit No. 15/2008 in the year 2008 to operate Non-Scheduled Air Transport Services (Charter). Air Charter Services have experienced and qualified pilots on all types. Each fleet, except SKA B200 has examiner(s), who regularly conduct proficiency Checks.

The company has the following aircraft on its AOP.

(a) SKA B 200

(b) Cessna Citation 560 XL

(c) Pilatus PC12/45

(d) Falcon 2000LX

(e) Augusta 109 S

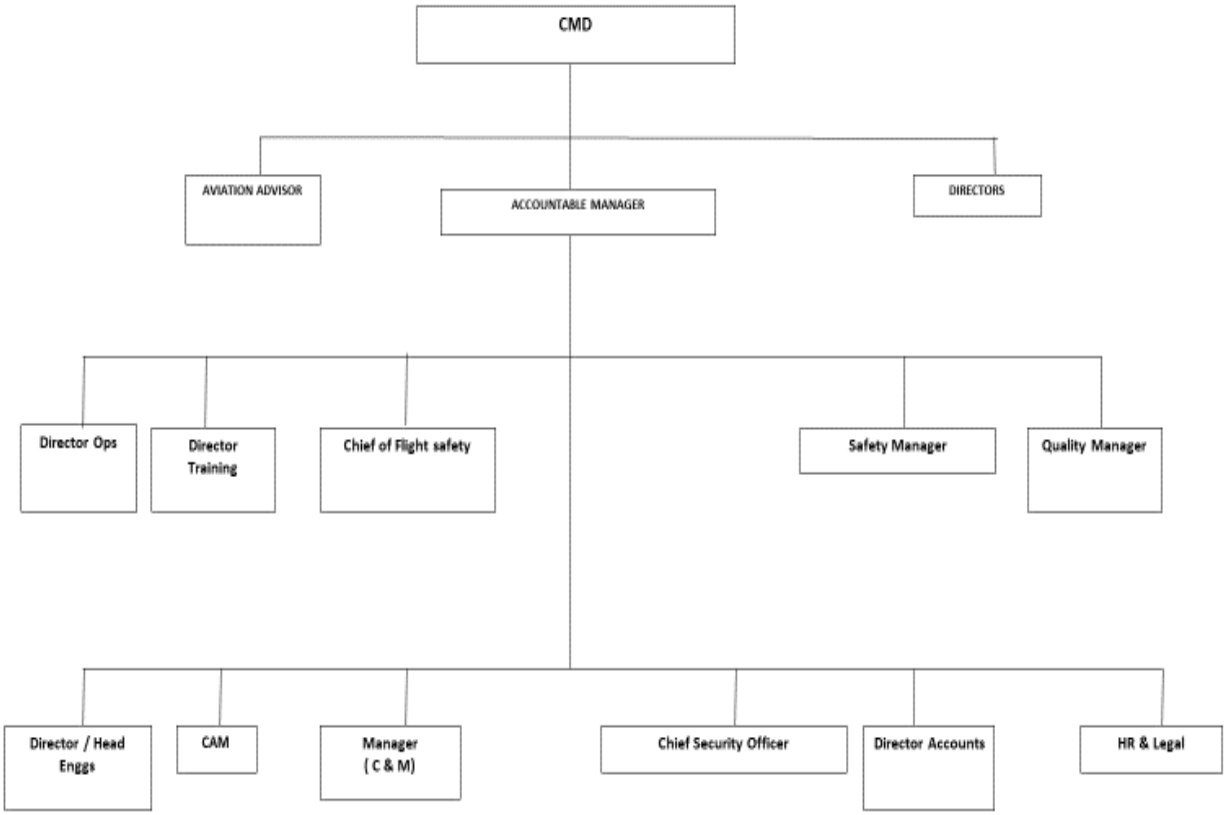

Fig-9: Organisational Chart

1.18 Additional Information

Extract of ACSPL SOP on Operation at Aligarh

In Sep 2013, SOP was made by M/s ACSPL to provide guidelines to pilots operating at Unmanned Airfields. The first revision of SOP was issued in May 2019 specifically for Aligarh airport operations. The SOP for Aligarh airport consists of information regarding the airstrip, infrastructure available and procedure to operate including the precautions / risk mitigation to be followed are clearly mentioned. The salient features of the SOP are as follows: -

(a) ***Approval for Operation***: Approval to operate to unmanned airstrip is to be obtained in writing from District Administration (District Collector I District Magistrate as the case may be) for landing and takeoff of Aircraft at the designated airstrip on specified date and time as per the desired schedule. For Aligarh, operator has landing permission till 15 Mar 2021; however, company ops department shall forward flight plan and information prior to any flight.

(b) ***Contents of Application***: The application should include type of aircraft, Registration no. of aircraft, name and address of owner/operator of aircraft, name of pilot, name(s) and nationality of passengers, time of planned operation, clearance of civil aviation department, etc.

(c) ***Provision of Safety and Security services***: While applying for approval, permission should also be sought for providing security guards/ local police assistance for security of the aircraft and provision of Fire-tender and Ambulance during landing, takeoff and duration of halt.

Risk Mitigation

In the SOP, following risk mitigation actions are clearly mentioned:

(a) Since this is a 'DAY VFR OPS ONLY' airport, anytime visibility is less than 5 km, delay arrival.

(b) Look out for local Flying by Training Aircraft ‘Fairly intense mostly’ on Cessna-172

(c) **Look out for Power cable on Rwy 11 approach.**

(d) **Extension of work on undershoot of Rwy 11 is in progress, Exercise caution for men and material at site.**

(e) **Rwy 29, preferable for landing, winds permitting.**

Airfield Information

While applying for permission, information should be obtained from the office of DC/DM regarding: -

(a) Exact location of the airstrip in terms of coordinates (Lat, Long) or distance and bearing from any prominent point.

(b) State of the Airstrip: Runway surface, condition, suitability for landing of type of aircraft in use.

(c) Security arrangements and fencing.

(d) Date and time of last aircraft operated with type of aircraft.

(e) Any obstructions on landing/ takeoff path

(f) Availability of wind sock or smoke candle to assist pilot in assessing wind direction and speed.

(g) Availability of any kind of ground to air communication like, R/T or walky-talky, facilities etc.

(h) Availability of aircraft parking place.

(i) Availability of Night parking facilities (If required).

(j) Availability of transport and crew rest facilities (If required).

(k) Contact tel. / mobile nos. for Pilot assistance after landing

<u>Other sources of Airfield Information and briefing:</u>

(a) Find out if any other operator has operated to the said airfield. Contact the Pilot who operated last to get the latest update.

(b) If ACSPL has operated flight to the same destination earlier, PIC detailed for the flight must take a brief from the pilot who operated earlier.

(c) In case services of any local agent are being utilized, he should be asked to visit the site and give the latest update.

(d) Google imagery must be utilized for familiarizing with the area although it should not be used for navigation.

(e) Plot coordinates of airfield (Lat/Long) on Google Map and confirm the correctness of coordinates.

Operation of Flight

Ground Reconnaissance: Ground reccee of the area may be carried out in case of any doubt about suitability of existing conditions or operation of the flight. If necessary, suitably qualified Pilot may be deputed at operations site, in advance, with walky-talky to guide and assist the flying Pilot during landing and takeoff.

Before Descent: Ascertain QNH settings and wind pattern from the nearest controlled airfield. During descent before landing, when close to the ground and of ATC R/T reach, strictly monitor the terrain and traffic information. After landing at the airfield, inform ATC over the phone. Find out in advance the ATC under whose control the unmanned airfield lies (area wise). Coordinate with that ATC, regarding descent and climb procedure for arrival T/O and departure from the unmanned airfield.

Dummy run before landing: Pilot should make a dummy run over the airstrip before landing to check for any obstruction on runway, to assess wind direction to indicate to the ground party about arrival of the aircraft. It should then make a proper circuit approach and landing.

In case during operation, the PIC feels that it is unsafe to operate to the said airfield, he must divert to a suitable airfield, the pilot's decision due to flight safety shall be final.

ACSPL's Circular to operate at Aligarh

Additionally, an operation circular 05/ 2019 dated 25.05.2019 has been issued by operator specifically for Aligarh operations.

Extract of Operations Circular -5/2019

Operation of flight to unmanned airfield is a critical operation and requires thorough planning, preparation and execution for safety of operation. This Circular is issued to provide information on the risk analysis and mitigation carried in respect of Aligarh Airfield which is an unmanned airfield.

(a) Since this is a 'DAY VFR OPS ONLY' airport, anytime visibility is less than 5 km, delay arrival

(b) Look out for local Flying by Training Aircraft Fairly intense mostly on Cessna -172.

(c) Look out for Power cable on Rwy 11 approach/ Extension. Also, caution for men and material on undershoot of Rwy 11. It's preferable to use Rwy 29, winds permitting.

(d) **Extended portion of the runway is not to be used.**

SOP of M/s ACSPL clearly states that Air Crew to read Aligarh SOP and take adequate briefing from operations, before operating flight.

Fig-10: Extension Work of Runway

1.19. Useful or Effective Investigation Techniques

Nil

2. ANALYSIS

2.1 Serviceability of the Aircraft

The aircraft had a valid Certificate of Airworthiness on the day of accident. The scrutiny of the Airframe Log book revealed that as on 27.08.2019, the aircraft had logged 7688:23 Airframe Hours and 6453 Cycles whereas Engine # 1 had logged 13142:09 Hrs. and 10280 cycles and Engine # 2 had logged 7171:59 Hrs. and 6030 cyclessince new.There was no defect reported on the previous flight. The morning DI was carried out on the day of accident at Delhi.

Scrutiny of the snag register revealed thatno snag was reported on the aircraft prior to the accidented flight. There was no MEL on the aircraft prior to the flight. The aircraft weight & balance was well within the operating limits for the flight.

The aircraft and its engines were maintained as per the Maintenance Program consisting of calendar period/ flying Hours or Cycles based maintenance as per maintenance program approved by DGCA.

From the above, it is inferred that the serviceability of the aircraft is not a factor to the accident.

2.2 Weather

The weather information provided to the aircraft by personnel handling ground RT was above minima. Further, no variation in the weather condition, deterioration and abrupt changes were forecasted.

Hence, weather is not considered a factor in this accident.

2.3 Operational Aspect

As per company tailored SOP (to be read in conjuction with DGCA CAR Section 4 Series B Part VI dated 22 Mar 2012) to operate into/from Aligarh airstrip clearly states that prior to any flight to unmanned airstrip, approval needs to be obtained in writing from District Administration before operating flight on specified date and time as per desired schedule. For Aligarh,operator has landing permission till 15 Mar 2021, however,SOP clearly states that company operations department will forward the flight plan and inform Aligarh Administration prior to any flight requesting provisionfor securityguards/ local police assistance for security of the aircraft, CFT and Ambulance during landing, takeoff and duration of halt. A written permission was sought from Aligarh administration one day prior to accident by M/s ACSPL. However, there was no response received from Aligarh administration prior to the accidented flight. No Fire/ Crash tender was made availble at the Aligarh airport which resulted into substantial damageto aircraft due to post crash fire.As per PIC's statement, fire tender arrived after 45 minutes of accident.

In operator's SOP for Aligarh airstrip, crew are required to look out for power cable on runway 11 approach and exercise caution for men and material as extension work on undershootrunway 11 was in progress. Moreso, SOP states that runway 29 be preferred for landing, if wind permitting.Further, risk mitigation actions are clearly mentioned in the SOP. However, both the crew had prior exposure of landing / takeoff from Aligarh airfield and were fully conversant of Aligarh airfield Topography.

During CVR analysis, it is evident that ground RT controller communicated winds 02-03 knots, which were well within limits for landing on runway 29. Instead of approaching from runway 29 for landing, crew preferred runway 11 as it was "straight in approach". The operator SOP also mentions a "Dummy run before landing" to assess the ground situation before making a decision for landing.

It is clearly stated in the Operations Circular 05/2019 issued by the operator that it must be read in conjuction with SOP issued for aircraft operation from unmanned airfield.

Operation circular issued by Operator has celarly marked the risk area associated with powerline running across extented portion of the runway11.

Hence, non adherence of SOP dated May 2019 issued by Operator is considered a factor in this accident.

2.4 Circumstances Leading to the Accident

Aircraft (VT-AVV) took off from Delhi at 0820 Hrs and enroute flight was uneventful. While the aircraft was at 40 Nm from the Aligarh airstrip, crew made radio contact with personnel manning radio on ground at Aligarh. Thereafter, crew requested for weather and QNH. The weather reported was above minima and winds were 290°/02-03 knots. As the prevalent weather conditions were above VFR conditions, any of the runway i.e. 29 or 11 could have been used for landing keeping prevalent weather condition at the time of accident in mind. Finally, crew decided to land on runway 11 which was straight in approach, in contravention to company's own operation circular 05/2019 which states runway 29 is preferable for landing, wind permitting.

As per CVR readout, while the aircraft was on approach, PM intimated in a very subdued voice to PIC that aircraft is low on profile. As per PIC's statement, corrective actions were taken and PIC tried to maintain the aircraft altitude but affirmative action(s) by PIC could not be substantiated from recorder readouts. Aircraft was low on profile and main wheels got entangled in the third set of powerline crossing the extended portion of runway 11 at a height of 23 ft which was located at a distance 594 ft ahead of threshold of RWY11. It is evident that the aircraft was at a height below 23 feet at a distance of 180m (594 feet) ahead of the transverse marking of threshold RWY11. As per statement of both crew, they heard a loud "bang" from the left side when the aircraft was approximately below "100 feet AGL". Thereafter, crew tried to control the aircraft and level off from left bank. Subsequently, aircraft hit the ground and veered off towards left of the runway. Finally, aircraft stopped near perimeter wall of the airfield and left wing of the aircraft caught fire. Crew along with the passengers on board evacuated the aircraft. Aircraft was destroyed in the accident.

3. CONCLUSION

3.1 Findings

(a) The Certificate of Airworthiness, Certificate of Registration and Certificate of Flight Release of the aircraft were current / valid on the date of accident.

(b) Both pilots were qualified on the type to operate the flight and had previous experience of landing at Aligarh airfield. Crew were familiar with the runway topography.

(c) The visual approach for runway 11 under VFR condition was carried out. PIC informed person manning ground RT about his preference for runway 11.

(d) Weather information available to the aircraft was “visibility 5 Km, SKC, wind 290/02-03 Kts, QNH 1005, No Significant” and above minima for landing at destination. One wind sock is available at the airfield.

(e) As per the operator “SOP for Aligarh airfield”, approval needs to be obtained in writing from District Administration before landing and takeoff from Aligarh airfield.One day prior to the accident, company ops department intimated the flight plan to Aligarh adminstration.However, no confirmation was given by local administration of Aligarh to operator for provisioning of safety services.

(f) As per the Aligarh Administration, there is a blanket clearance given by Civil Aviation Department, Governmnet of UP for landing and takeoff from Aligarh till 15th March 2021.However, fire services were not available at the time of landing.

(g) Operator SOP clearly states crew to look out for power cable on runway 11 approach and exercise caution as extention work of ruwnay 11 was in progress.

(h) Ground RT Controller cleared the aircraft for landing. PIC selected to land on runway 11.

(j) Three sets of powerlines were crossingextended portion of runway 11. There were no markings / signage which indicated the current status of the extended portion ahead of RWY11 threshold.

(k) Before landing on runway 11, aircraft main landing gear got entangledwith the powerline which was23 feet in height, due to which aircraft banked towards left and crash landed on extended portion of runway.

(l) After landing, aircraft caught fire and was destroyed.

(m) There was no injury to any of the occupants onboard the aircraft.

(n) The emergency services were activated, however, fire tender reached at site after 45 minutes. Local flying school at Aligarh used its resources to contain the fire after crash.

(o) SOP issued by operator for unmanned airfield operations does not have date of issue

3.2 PROBABLE CAUSE OF THE ACCIDENT

While landing on runway 11, aircraft main landing gears got entangled in the powerline crossing extended portion of runway , due to which aircraft banked towards left and crash landed on extended portion of runway 11.

Contributory factor:

i. It appears that there was a lack of proper pre-flight briefing, planning, preparation and assessment of risk factors.

ii. Non-Adherence to SOP.

iii. Sense of complacency seems to have prevailed.

4. SAFETY RECOMMENDATIONS

4.1 DGCA may advise M/s ACSPL to issue an 'Operation Circular' highlighting the incident and advice crew to strictly adhere to the company's "SOP" for operation to unmanned airfield.

4.2 DGCA shall issue instructions to all airports to remove all the hazardous installations before carrying out any civil work on runway.

(Dinesh Kumar)
Investigator

(Anil Tewari)
Investigator-In-Charge

Date: 23-03-2020
Place: New Delhi