FINAL REPORT ON SERIOUS INCIDENT INVOLVING M/S INDIGO AIRCRAFT VT-IFP (A320) AND M/S KUWAIT AIRWAYS AIRCRAFT 9K-APA (A330-200) AT MUMBAI ON 30.11.2016

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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 2012, the sole objective of the investigation of an accident shall be the prevention of accidents and incidents and not 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.

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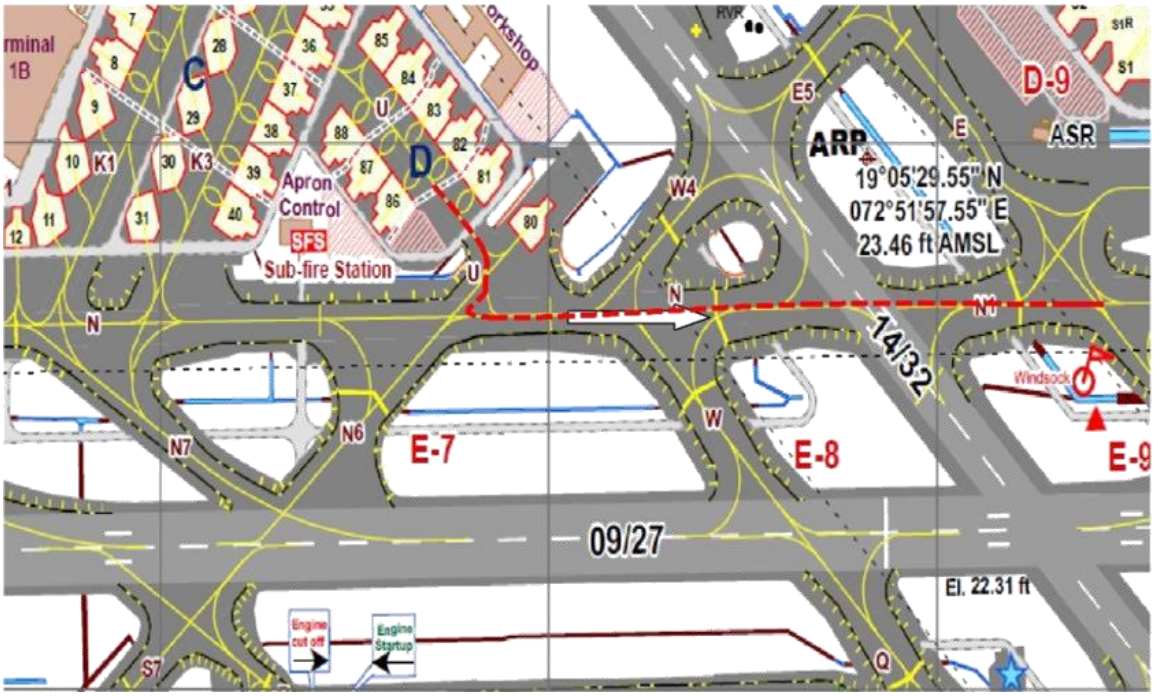
1. Aircraft :	**Aircraft 1 M/s Indigo** **Type** : Airbus **Model** : A320 **Nationality** : INDIAN **Registration** : VT-IFP **Aircraft 2 M/s Kuwait Airways** **Type** : Airbus **Model** : A330-200 **Nationality** : Kuwait **Registration** : 9K-APA
2. Date of occurrence :	30.11.2016
3. Time :	0001 UTC
4. Last point of Departure :	**Aircraft 1** : Mumbai **Aircraft 2** : Kuwait
5. Point of intended landing :	**Aircraft 1** : Jaipur **Aircraft 2** : Mumbai
6. Geographical location :	19° 05' 30" N & 072° 51' 58" E
7. Type of operation :	SCHEDULED
8. Phase of operation :	Taxi-In / Taxi out
9. Type of occurrence :	Ground Collision
10. Injury to persons :	NIL

(All timings in this report are in UTC unless otherwise stated)

1.0 FACTUAL INFORMATION

1.1 History of the flight

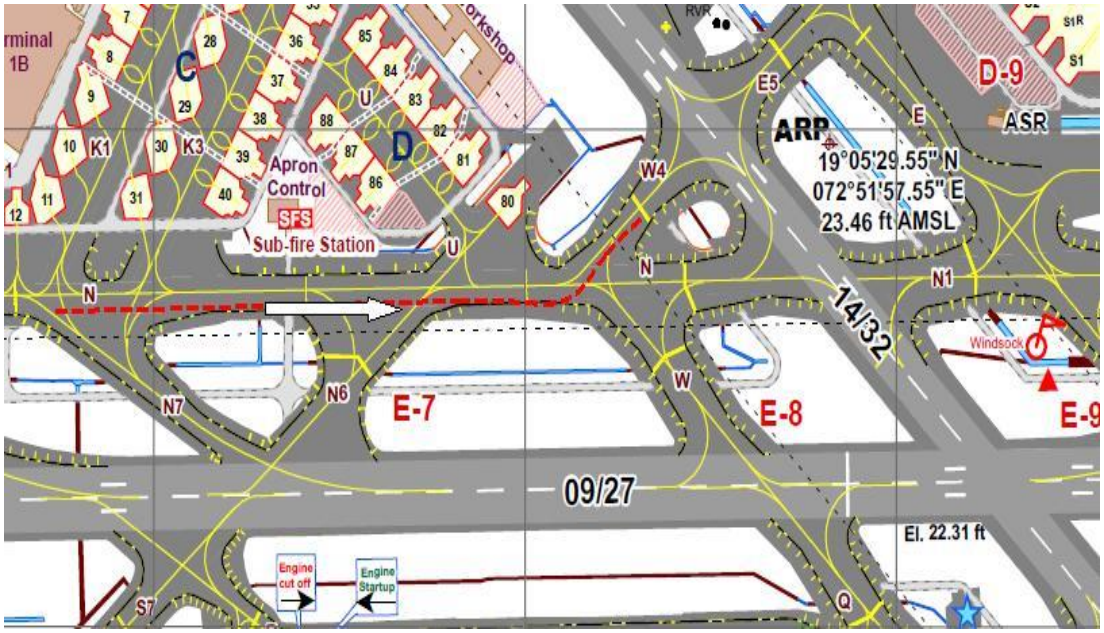
On 30.11.2016, Aircraft 1 was scheduled to operate flight 6E-207 from Mumbai to Jaipur and was parked on bay 82. After both engines were started and ground equipment disconnected, aircraft 1 was cleared to taxi via U, N, cross runway 14, N1 and hold short of M7. The above clearance was qualified by "Once clear of Aircraft 2 on the right", which was at that time taxiing on taxiway N towards taxiway W4. The reported visibility at 0530 hrs IST was 2200 m in haze.



Taxi route followed by aircraft 1 for departure

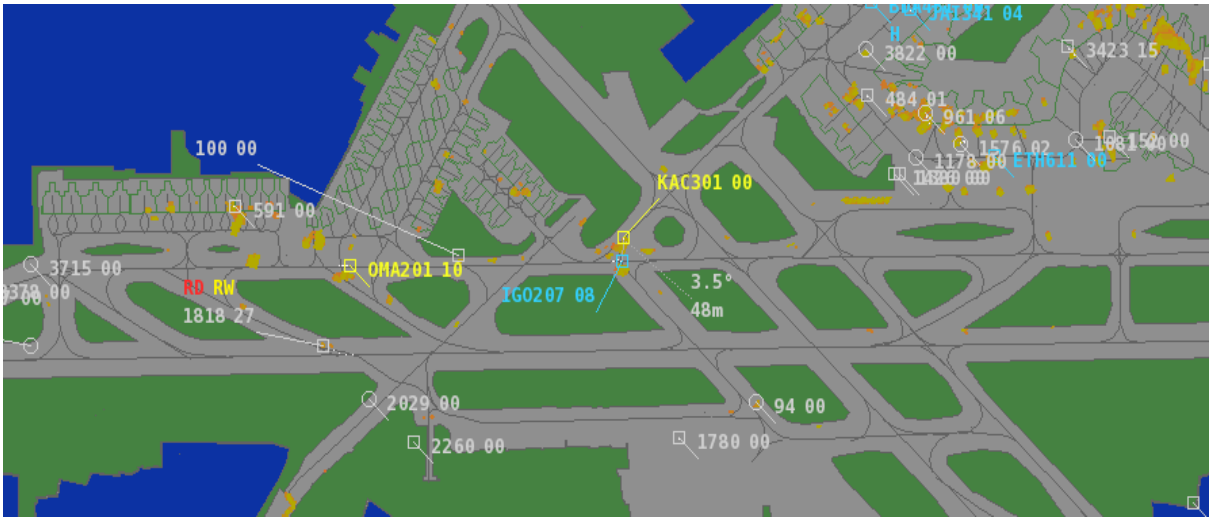
Aircraft 2 had operated flight KAC 301 from Kuwait to Mumbai and landed on RWY 27. After vacating the runway, it continued to taxi via TWY N, W4 and was holding short of RWY 14 as per the instructions from the ground controller (SMC 1). The aircraft was holding on TWY W4.

Aircraft 1 held position till Aircraft 2 crossed U intersection on N to W4 to hold short of Runway 14. Aircraft 1 turned left on taxiway N and held position short of W4. ATC further instructed Aircraft 2 to taxi forward to keep N clear. Crew of the Aircraft 2 confirmed that they have taxied ahead and was clear of taxiway N.



Taxi route followed by aircraft 2 after landing

Aircraft 2 taxied ahead on taxiway N, on W4 holding short of runway 14. Crew of Aircraft 1 was then instructed to switch to 121.75 MHz and while they were taxiing, the flight crew felt the aircraft shaking. Immediately after that, they received a call from the Lead Cabin Attendant that a passenger had reported seeing the left wing coming in contact with another aircraft. Crew of Aircraft 1 decided to return back to the bay for inspection.



Aircraft 2 also reported that “We felt shaky when the Aircraft 1 passed behind”. Aircraft 1 while taxiing on the portion of TWY N just behind the Aircraft 2 which

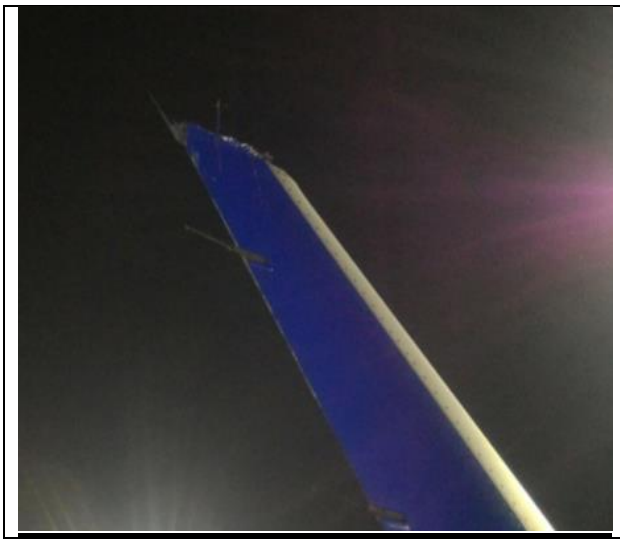
was holding on TWY W4, aircraft 1 wing tip touched lower portion of right wing of aircraft 2. Aircraft 1 reported the incident to ATC and returned to bay for rectification. Aircraft 2 also felt some jerks when the aircraft 1 passed by and reported the same to ATC. Aircraft 2 had flown back to its base after clearance on maintenance from the OEM.

1.2 Injuries to persons

There was no injury to any persons either on board the aircraft (both) or on ground during the incident.

1.3 Damage to aircraft:

Aircraft 1



Upper section of LH Sharklet was found sheared off from the main wing structure. Leading Edge stainless steel cap of sharklet was damaged from the top edge. Both outer and inner skin of the sharklet was damaged.

Aircraft 2

Following areas suffered damages:

- Outboard Aileron lower skin
- Out board aileron Trailing edge wedge structure
- Lower wing surface / Wing trailing edge fairings (Superficial paint scratches)

1.4 Other damage

Nil

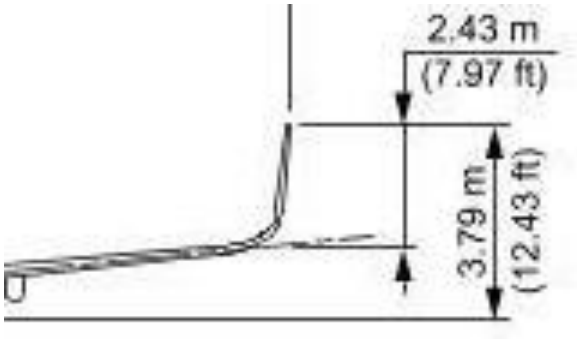
1.5 Personnel information

Both the aircraft i.e. 1 & 2 were operated by different scheduled airlines and the flight crew was appropriately licensed. They fulfilled all the requirements of concerned State for operating the flight.

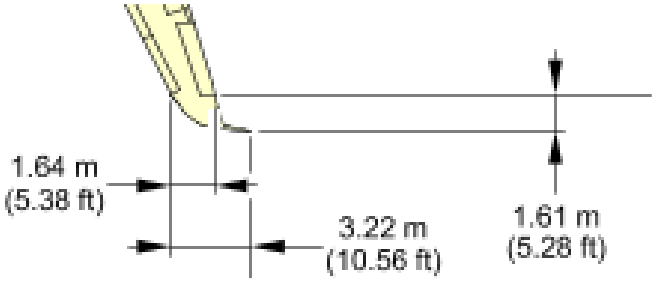
1.6 Aircraft information

Aircraft 1 is an A-320 aircraft with sharklet as wingtip device.

Wingtip devices such as sharklets / winglets and blended wings were introduced to improve aircraft performance by reducing drag, which in turn reduces fuel burn and associated emissions. There are several types of wingtip devices, and although they function in different manners, the intended effect is to reduce the aircraft's drag by partial recovery of the tip vortex energy. These devices also improve aircraft handling characteristics. Such devices increase the effective aspect ratio of a wing with relatively very small increase in wingspan.



Front View of sharklet



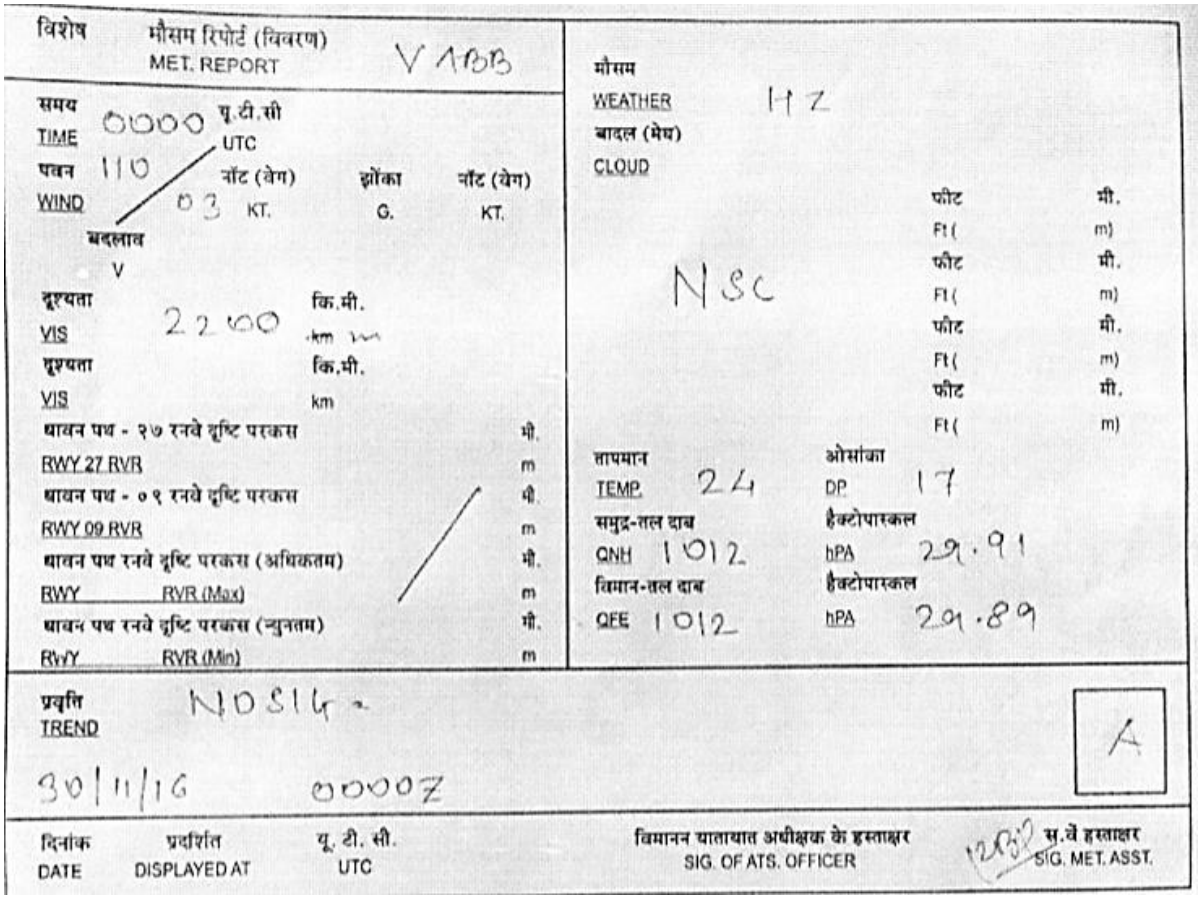
Top View of sharklet

So, for aircraft such as the aircraft 1, the addition of sharklet / winglets does increase the wing dimensions of the aircraft. However, they do not extend upwards perpendicular to the horizontal plane, but rather extend upwards, backwards and outwards from the wing itself. Specific to the aircraft 1, the winglet extends the wing by 1.61 m from the wing joint and rises to a height of 2.43m above the wing.

The aircraft 2 is Airbus A-330 aircraft and as is with the most modern transport aircraft, it has swept wings which are subject to a phenomenon known as 'swept wing growth' or 'wing creep'. This occurs during a turn when the wingtip describes an arc greater than the normal wingspan due to the geometry of the aircraft and the arrangement of the landing gear. Though in the present case, the aircraft 2 was standing still at the time aircraft 2 had hit its wing.

1.7 Meteorological information

The METAR issued for time 0000 UTC is as given below:


विशेष
मौसम रिपोर्ट (विवरण)
MET. REPORT
VABB
समय TIME 0000 यू.टी.सी UTC
पवन WIND 110 03 KT. झोंका G. नॉट (वेग) KT.
बदलाव V
दृश्यता VIS 2200 कि.मी. km
दृश्यता VIS कि.मी. km
धावन पथ - २७ रनवे दृष्टि परकस RWY 27 RVR मी. m
धावन पथ - ०९ रनवे दृष्टि परकस RWY 09 RVR मी. m
धावन पथ रनवे दृष्टि परकस (अधिकतम) RWY RVR (Max) मी. m
धावन पथ रनवे दृष्टि परकस (न्युनतम) RWY RVR (Min) मी. m
मौसम WEATHER HZ
बादल (मेघ) CLOUD NSC
फीट Ft(मी. m)
तापमान TEMP 24 ओसांका DP 17
समुद्र-तल दाब QNH 1012 हैक्टोपास्कल hPA 29.91
विमान-तल दाब QFE 1012 हैक्टोपास्कल hPA 29.89
प्रवृत्ति TREND NOSIG
30/11/16 0000Z
A
दिनांक DATE प्रदर्शित DISPLAYED AT यू. टी. सी. UTC
विमानन यातायात अधीक्षक के हस्ताक्षर SIG. OF ATS. OFFICER
सू.वे हस्ताक्षर SIG. MET. ASST.

1.8 Aids to navigation

Mumbai airport is equipped with VOR (frequency 116.60 MHz), DME (frequency 1200/1137 MHz), NDB (frequencies 396 kHz), ASDE (frequency 9375 MHz). PAPI & ILS Cat- II is installed on Runway 27. PAPI & ILS Cat-I is installed at 09 & 14 and SALS is installed at Runway 32.

1.9 Communications

Both the aircraft maintained positive communication with the ATC throughout the flights till the time of coming in physical contact with each other or even afterwards.

1.10 Aerodrome information

The IATA location Identifier code is BOM and ICAO location Indicator code is VABB. The elevation AMSL of airport is 11.9 m (39.1 ft). The airport is licensed by DGCA for both IFR and VFR traffic. The airport reference code is 4F. The airport has two cross runways made of Asphalt. The dimensions of runway and declared distances are as below.

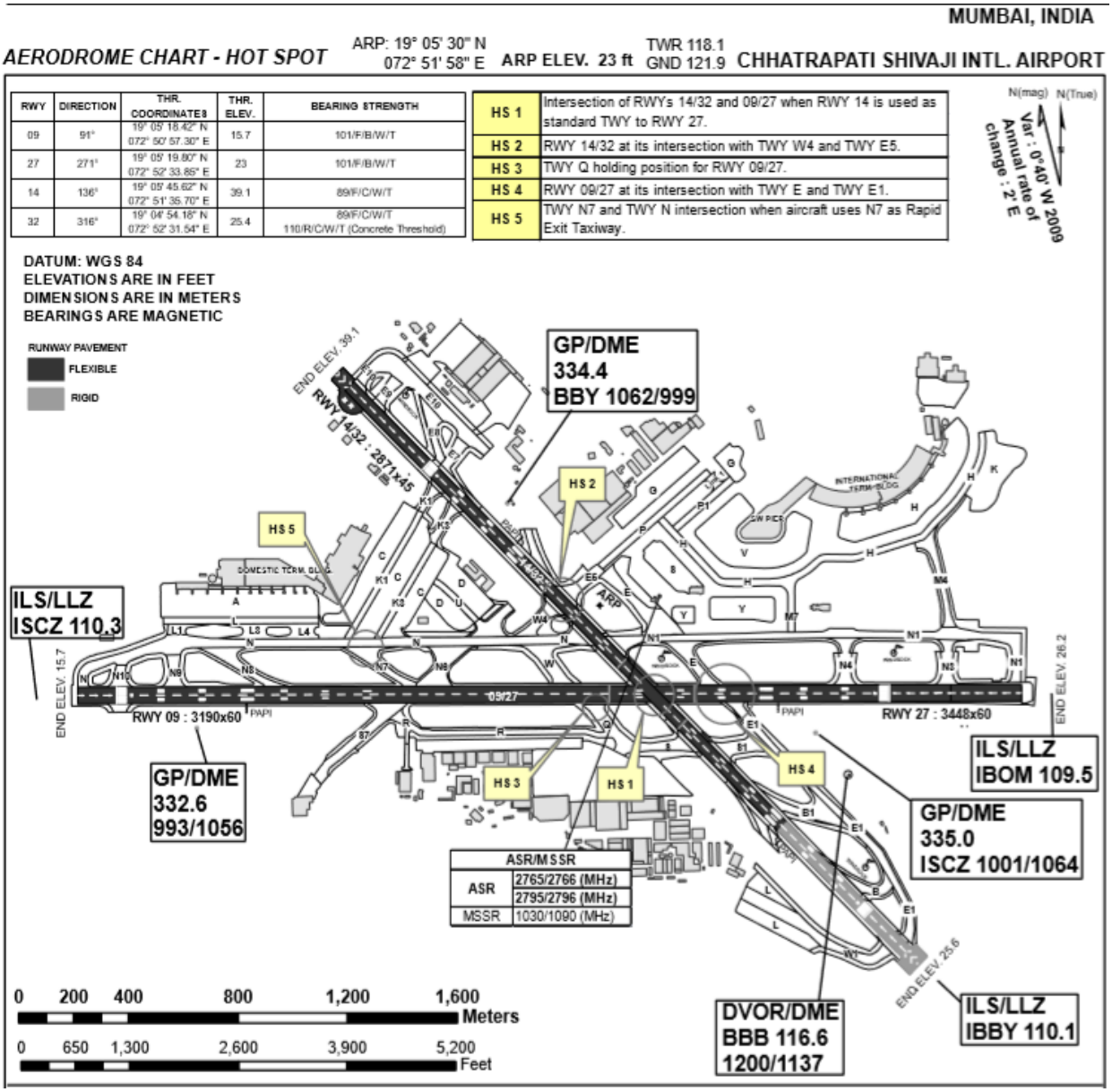
- Rwy 27 -- 3448m × 60m
- Rwy 09 -- 3188m × 60m
- Rwy 14/32 -- 2871m × 45m

DECLARED DISTANCE (IN METER)				
RWY DESIGNATOR	**TORA**	**TODA**	**ASDA**	**LDA**
09	3188	3188	3188	3048
27	3448	3448	3448	2965
14	2871	2871	2871	2471
32	2871	2871	2871	2673

The Airport Reference point is 19°05'30"N 072°51'58"E. Runway has marking for Designation, THR, TDZ, Centerline, Rwy Edge and is lighted for THR, Edge, End, TDZ, and Centerline. The Airport Rescue and Fire Fighting Services was Category ‘9’ (Nine).

Hot Spots

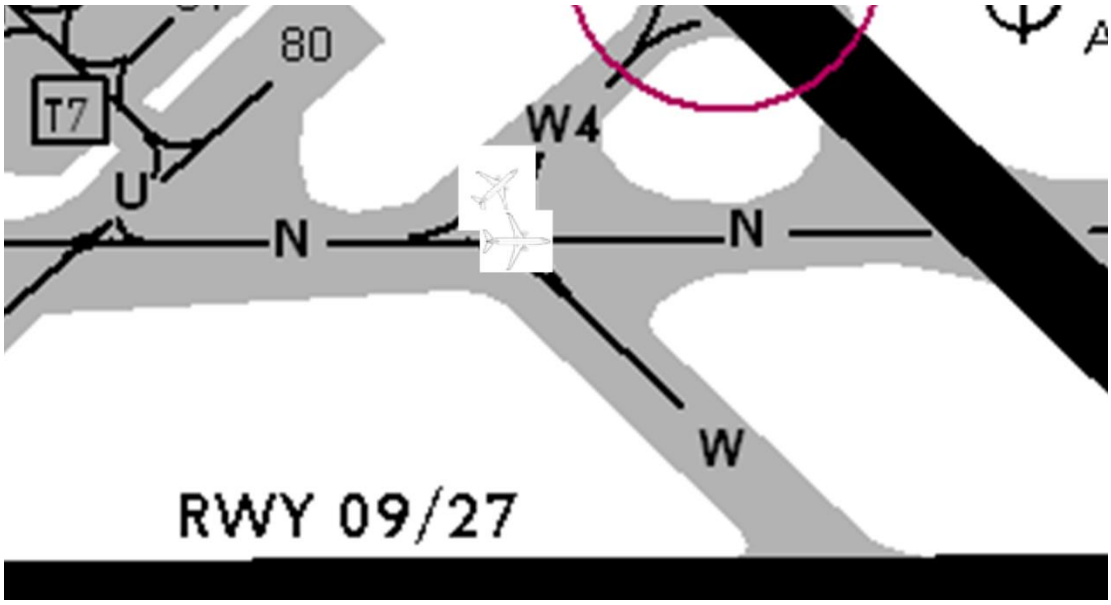
The following figure shows the “hot spots” at the C.S.I.A which do not include the location where the wings of the two aircraft had hit each other.



Taxi Holding Position

Taxi holding positions are normally located so as to ensure clearance between an aircraft holding and any aircraft passing in front of the holding aircraft, provided that the holding aircraft is properly positioned behind the holding position. Clearance to the

rear of any holding aircraft cannot be guaranteed. The position of the two aircraft at the time when the wings came in contact with each other is as shown in the following figure:



The taxing restriction were in place as per the AIP(for VABB) dated 01 April 2012 AD 2.20 para 4.2. As per the restrictions *"Aircraft holding on TWY W4 at holding position RWY 14/32 will prohibit aircraft taxing on TWY N."*

As per the Aerodrome Manual MIAL/AO/DOC/01.01 Issue 06, Rev 00 dated 30.07.2016, *"Aircraft holding on TWY N11. N10, N6, W and W4 will prohibit aircraft to taxi on TWY N."*

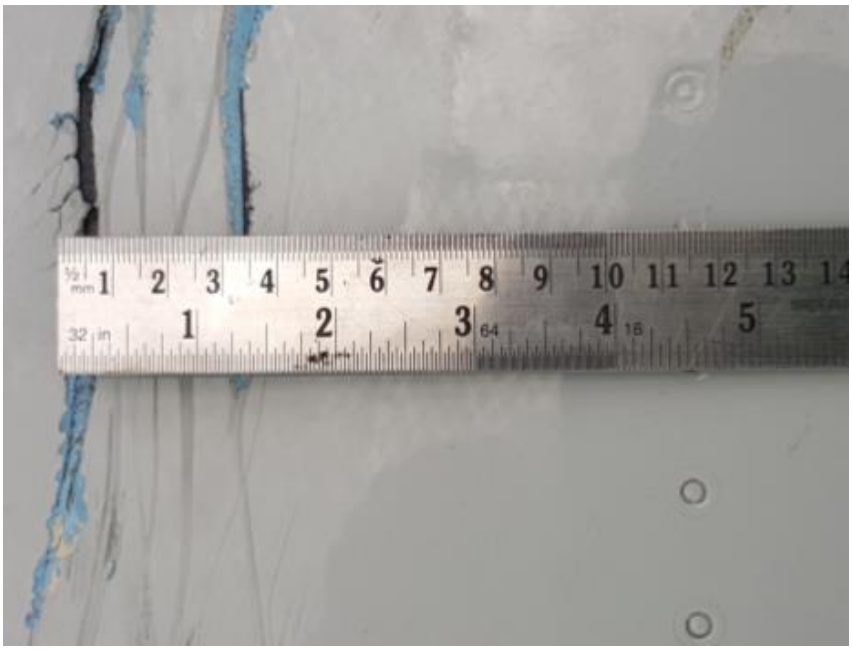
1.11 Flight recorders

The relevant information from SSFDR and SSCVR from the Aircraft 1 were obtained and has been used to corroborate the evidences otherwise available for investigation purposes. The communication between the ATC/SMC and aircraft 2 was also available and has been used for analysis.

1.12 Wreckage and impact information

The upper section of LH wing sharklet of aircraft 1 had come in contact with the lower surface of the wing of the aircraft 2. Leading edge stainless steel cap of sharklet sheared off from the top. Both outer and inner skin of the sharklet was

damaged. The scrapping of the wing sharklet with the wing of aircraft 2 has damaged outboard aileron lower skin, outboard aileron trailing edge wedge structure and lower wing surface/ wing trailing edge fairings. The main wing bottom surface had superficial paint scratches. Repairs and maintenance action was carried out on both the aircraft and were released after clearance by OEMs.



Scratch Marks on lower surface of wing of aircraft 2

1.13 Medical and pathological Information:

The flight crew members of the Aircraft 1 had undergone pre flight medical as per the Indian DGCA requirements and was found satisfactory..

1.14 Fire

Nil

1.15 Survival aspects

The incident was survivable

1.16 Tests and research:

Nil

1.17 Organizational and management information

Both the aircraft were operated by Scheduled Airlines.

1.18 Additional information

Air Accident Investigation Unit Ireland has published a Synoptic Report of similar occurrence to Boeing, 737-8AS aircraft(s) with winglets at Dublin Airport, Ireland on 7 October 2014. The relevant excerpts on “Human Factors” from the report are as follows:

- **HUMAN FACTORS**

- **Depth Perception**

Humans gauge depth and distance by obtaining visual cues from the observed environment and then interpreting these cues to form a judgement of distance. The sources of visual cues can be divided into binocular and monocular.

With binocular vision, because the eyes are 50-60 mm apart, they each receive a different image of the same object on their respective retina. As each eye moves and focuses on the object, the brain uses a combination of the muscle tone of lens accommodation and eyeball convergence to obtain an indication of depth. The merging of the images from each eye and changes in muscle tone are used to form a three-dimensional picture of the environment. This process is known as Stereopsis. However, it is less useful when objects are far away because the images on the retina become more similar with increasing distance.

Ernsting’s Aviation Medicine states: “The brain considers optical infinity to be anything more than 6 m away from the observer, and so accommodation and eyeball convergence are limited to within a 6 m range”. It goes on to say “Binocular cues of stereopsis mediate the perception of relative distance, i.e. one object is in front or behind another, at distances of up to about 60 m but are only of value for the perception of the absolute distance of objects that are about 10 m or less away from the observer”. For stereopsis to work, both eyes must have an un-obscured view. There are a number of monocular cues including:

- Relative Size: The relative size of an object projected on the retina. For this to be a useful cue requires the knowledge of the size of the object from previous experience. Then the brain can gauge the distance based on the size of the object on the retina.

- Overlapping: A more distant object will appear partially hidden by a nearer object.
- Moving Parallax: When the head is moved from side to side, objects that are close appear to move more rapidly than objects that are further away. A similar effect occurs when an observer views objects from a moving vehicle.

"Overlapping" and "Moving Parallax", when used in conjunction, can give a good indication of the relative positions of two objects, but motion is required, and the objects being judged must be one behind the other for this technique to be effective.

- **Cognitive Biases**

There are a number of cognitive biases which describe the inherent shortcomings in thinking to which humans are susceptible and which may adversely affect the decision making process:

- **Confirmation bias**: The tendency to search for, interpret, focus on and remember information in a way that confirms one's preconceptions.
- **Expectation bias**: Eurocontrol defines expectation bias as "Having a strong belief or mind-set towards a particular outcome". An insidious effect of Expectation Bias is that if a person repeatedly performs a task with a successful outcome, an expectation may develop that future attempts at the task will have a successful outcome.

From the analysis portion of the above mentioned investigation report, the relevant discussions are as follows:

"Medical research identifies that "The brain considers optical infinity to be anything more than 6 m away from the observer, and so accommodation and eyeball convergence are limited to within a 6 m range […]. Binocular cues of stereopsis mediate the perception of relative distance, i.e. one object is in front or behind another, at distances of up to about 60 m but are only of value for the perception of the absolute distance of objects that are about 10 m or less away from the observer".

As the line of sight distance from cockpit to wingtip for the aircraft in that case was approximately 27 m, it was clear that this distance was well outside the considered value for the perception of absolute distance by sole reference to binocular cues.

Specific to judging distances, when viewing objects, the eye tends to be drawn to angular changes, edges and corners which help the observer define the outline of an object and gauge its orientation and distance. The eye is also drawn to areas of high contrast or color change. Specific to the wingtip structure in that occurrence, as the surface presented to the pilot did not project at a sharp angle from the wing, but evolved from a blended curve into an upright structure, it presented further difficulties in terms of depth perception. Furthermore, the eye may be drawn to wing features with relief/contrast, such as the navigation light and extended leading edge slats, which are up to 1.5 m closer to the pilot than the winglet tip.

Additionally, the upright portion of the winglet angles outwards from the wing, and is swept back from the pilot's view, compounding the difficulty. The fact that the other aircraft was presented to the Commander in that case at an obtuse angle further complicated his ability to judge separation accurately. In addition, the prevailing environmental conditions at the time of the occurrence of morning darkness, a raindrop covered cockpit window, with resultant diffused ramp lighting, may have affected the Commander's ability to accurately judge the separation distance.

The combination of modern aircraft wing sweep, the overall length of the wing and the winglet structure at the end of the wing brings new challenges to flight crew in judging wingtip separation from other aircraft and ground obstructions. Evidence suggests that from the normal seating position in the aircraft, it is difficult to view the winglet itself and in fact a head movement outboard towards the rear port window is required to improve the view. This is not a normal viewing position for the pilot as priority is given towards looking ahead, in order to maintain the centerline and to ensure that the aircraft does not encroach beyond specified holding points.

The Investigation in that case found that for pilots operating winglet equipped aircraft and/ or aircraft with large wingspan, it is not possible to accurately judge absolute distance between the wingtip and another object. Therefore, regardless of

experience, there is a risk that in attempting to judge separation distance at close quarters to another object, a collision may occur. As such pilots should err on the side of caution and if doubt exists as to whether an aircraft can be passed safely, the flight crew should stop, advise ATC, and request alternative instructions if available.**"**

1.18.1 ICAO/ DGCA Requirements

ICAO Annex 11 – Air Traffic Services / CAR

Annex 11 to the Convention on International Civil Aviation provides Standards and Recommended Practices for Air Traffic Services (ATS).

Section 2.2 prescribes that the objectives of an ATS shall be to:

(a) prevent collisions between aircraft;

(b) prevent collisions between aircraft on the maneuvering area and obstructions on that area;

(c) expedite and maintain an orderly flow of air traffic;

(d) provide advice and information useful for the safe and efficient conduct of flights;

(e) notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Section 3.1 requires, inter-alia, that Air Traffic Control Service shall be provided:

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d) to all aerodrome traffic at controlled aerodromes

Section 3.3 requires, inter-alia, that an Air Traffic Control unit shall:

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c) issue clearances and information for the purpose of preventing collisions between aircraft under its control.

The above requirements are laid down verbatim in the DGCA India Civil Aviation Requirement (CAR) **Section 9 – Air Space and Air Traffic Management Series 'E' Part I Issue II** dated, 8th January 2010 revision 4 of 7.11.2016.

1.19 Useful or effective investigation techniques

Nil

2.0 ANALYSIS

2.1 Aircraft (s)

The damaged LH Wing sharklet of aircraft 1 was removed and inspection was performed to ensure no other structure other than the sharklet has been affected by the impact. RIB 27 attachment region was inspected for damage or signs of pulled rivets and there were no damages. The aircraft 2 was also inspected and after maintenance action departed Mumbai CSIA.

There was no abnormality whatsoever with the aircraft prior to the incident.

2.2 Crew

The crew of both the aircraft fulfilled all the requirements to operate the flight(s)

2.3 Recorders

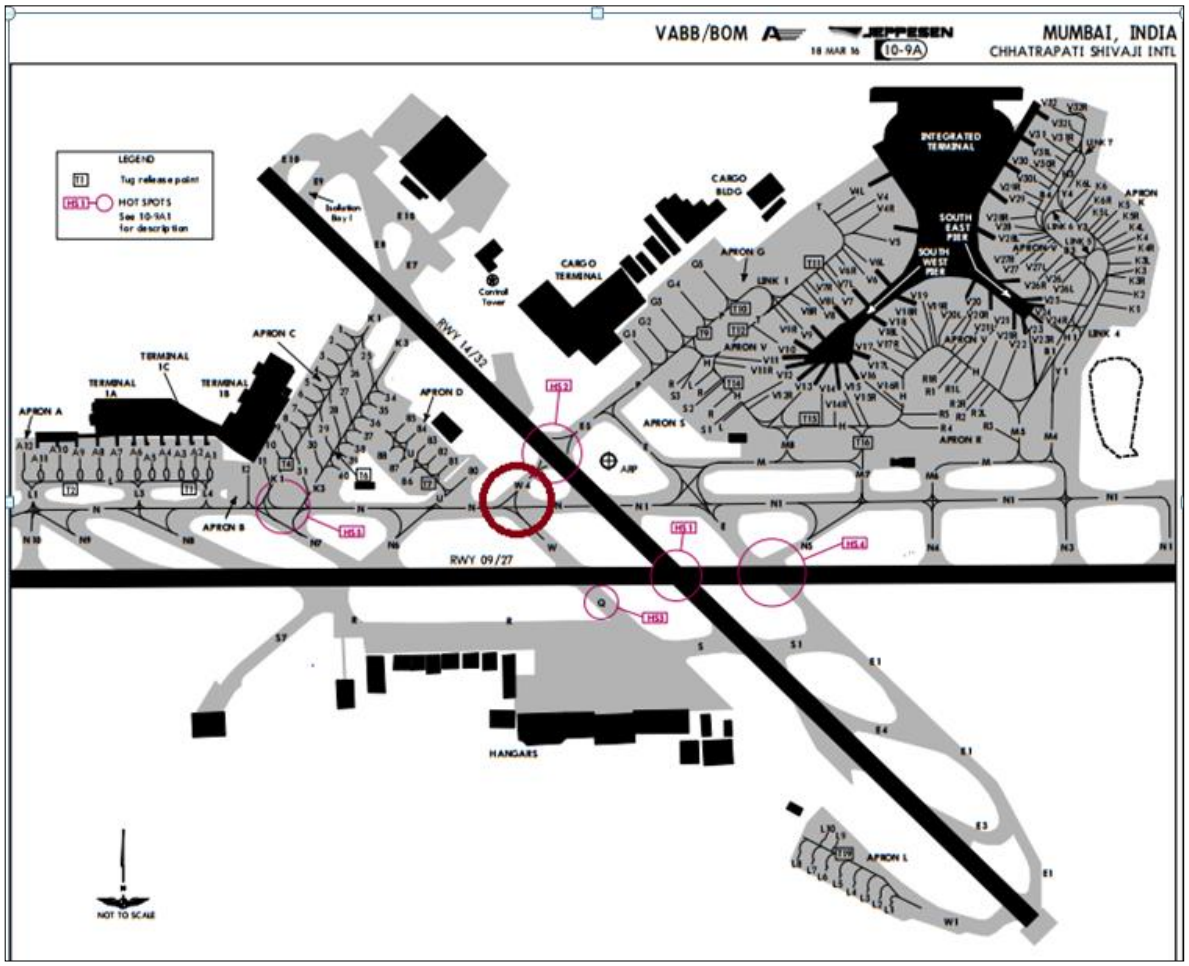
The CVR/ FDR of aircraft 1 and the ATC/ SMC recordings were perused.

The aircraft 1 had stopped on taxiway N ahead of W4. Further taxi was continued on N after 40 seconds. The taxi speeds of aircraft 1 were found within limits. Taxi instructions for aircraft 1 were to taxi behind aircraft 2 from their right on U, N, Cross Runway 14, N1, M7 intersection. Aircraft 1 accordingly waited for aircraft 2 to pass them from the right and thereafter commenced taxi. It stopped short of W4 intersection. Aircraft 2 was then instructed by ATC to taxi ahead to keep taxiway N clear. Aircraft 2 moved ahead and confirmed the same to ATC. Crew continued taxi on taxiway N and were instructed to switch to 121.75 MHz.

Lead Cabin attendant of aircraft 1 called Captain to inform that a passenger had seen the LH wing of the aircraft getting struck by another aircraft. Aircraft 1 decided to return back to bay for inspection. All briefings and checklists were completed satisfactorily.

As soon as the aircraft 1 crossed aircraft 2 from behind, the aircraft 2 contacted SMC and intimated that they were clear of Taxiway N. It was further informed by aircraft 2 that they felt shaky, shaking when the aircraft 1 passed from behind.

2.4 Taxiways and restrictions at CSIA



CSIA Mumbai is an International airport and is approved by DGCA. As per the approved Aerodrome Manual of CSIA, the a*ircraft holding on TWY N11, N10, N6, W and W4 will prohibit aircraft to taxi on TWY N.* The taxing restrictions as per the AIP (for VABB) were existing as *"Aircraft holding on TWY W4 at holding position RWY 14/32 will prohibit aircraft taxing on TWY N."*

ATC instructions to aircraft 1 were therefore in conflict with the above mentioned Taxi Restriction as mentioned in the AIP. Though, flight crew of aircraft 1 had in their statements mentioned that they were aware of the Taxi restrictions on taxiway N, when another aircraft is holding on taxiway W4. Further the flight crew of aircraft 1 also mentioned that a portion of W4 / N is dark and is not well lit up. The visibility at the time of incident was 2200 m in haze with no significant change.

2.5 Circumstances leading to the incident

Aircraft 1 which was to depart CSIA Mumbai was instructed to taxi forward on taxiway N, cross Runway 14, N1, M7, behind aircraft 2 from the right which was taxiing on taxiway N towards taxiway W4 after landing into CSIA Mumbai. Crew of aircraft 1 had held position for aircraft 2 to pass from the right. Aircraft 1 then turned left on taxiway N and held short of W4. ATC instructed aircraft 2 to move ahead so that taxiway N is clear for aircraft 1. Once crew of aircraft 1 saw that the aircraft 2 had moved ahead, the aircraft 1 continued further taxiing as per the instructions.

In case of wings with sharklets, the increase in height of the wing tips is significant as it extends above the height of the aircraft's horizontal stabiliser. Prior to the introduction of sharklets / winglets, wingtips would have had sufficient vertical clearance to pass underneath the horizontal stabilizer of the same aircraft type.

Crew of aircraft 1 was aware of the Taxi restrictions on taxiway N, when another aircraft is holding on taxiway W4. As per the crew, they continued taxiing further only after ATC instructed crew of aircraft 2 to taxi ahead to remain clear of taxiway N behind and after seeing the aircraft 2 moving ahead on W4. The portion of W4 / N was relatively dark and was not well lit up. As per the METAR issued for 0000UTC, the reported visibility was 2200 m in haze with no significant change. Winds were 110º/03Kts.

When following a taxiway route, pilots are expected to keep a good lookout and are responsible for taking all possible measures to avoid collisions with other aircraft and vehicles.

Due to an error of judgment on the part of crew of aircraft 1, while crossing taxiway N keeping aircraft 2 on the left on W4 resulting in the LH wing tip (sharklet) coming in physical contact with the wing of aircraft 2. Initially flight crew of aircraft 1 were not aware of the contact of LH sharklet, but once apprised by the cabin crew decided to return back to bay for rectification.

It is well established in the incident investigation reports available that pilots operating winglet equipped aircraft and/ or aircraft with large wingspan, cannot

accurately judge absolute distance between the wingtip and another object. Therefore, regardless of experience, there is a risk that in attempting to judge separation distance at close quarters to another object, a collision may occur.

3.0 Conclusions

3.1 Findings

- Both the aircraft were fully airworthy. The flight crew fulfilled all the regulatory requirements to undertake the flight.
- The visibility at the time of incident was 2200 m in haze with no significant change. Still night operation was in progress. The portion of W4 / N was relatively dark and could have been better lit up.
- Aircraft 1 was instructed to taxi on U, N, Runway 14, N1 and hold short of M7, behind aircraft 2 (passing from the right) which was taxing on taxiway N towards taxiway W4.
- Aircraft 1 turned left on taxiway N and held short of taxiway W4, because aircraft 2 was holding short of Runway 14.
- ATC instructed aircraft 2 to move ahead on taxiway W4 to remain clear of taxiway N.
- Aircraft 2 taxied ahead which was noticed by crew of aircraft 1.
- Aircraft 1 then taxied forward on taxiway N after confirming that the aircraft 2 had taxied forward on taxiway W4.
- Cabin crew of aircraft 1 had at the same time called the Captain to inform that a passenger had seen the LH wing of aircraft 1 hitting another aircraft during taxi.
- Flight crew of aircraft 1 decided to return back to bay for inspection and requested ATC for taxi instructions back to bay.
- ATC cleared the aircraft to return back to bay for inspection.

- Taxiing on taxiway N is prohibited when an aircraft is holding on Taxiway W4, Runway 14 as per Local Traffic Regulations (VABB AD 2.20 AIP). There was lack of supervision resulting in unsafe condition.
- The wingtip clearance as judged by Captain of aircraft 1 before taxiing ahead of taxiway W4 on taxiway N was insufficient.
- Human factors played a role in causing the incident as medical study reveals that it is not possible to accurately judge absolute distance or separation when the line of sight distance is more than 10 m.
- No FRC comment provided by dispatch with regard to restrictions on taxiing on taxiway N in the provided flight crew documentation.
- The organization failed in providing guidance to flight crew regarding the difficulty associated with assessing wing tip clearance.
- The wingtip clearance as judged by Captain before taxiing ahead of taxiwayW4 on taxiway N was insufficient

3.2 Probable Cause

Following are the factors which resulted in the incident

a) Non availability of any advice to the flight crew by dispatch (of operator) with regard to restrictions on taxiing on taxiway N.

b) Clearing the aircraft 1, in violation to the existing regulations, to taxi on taxiway N when an aircraft is holding on Taxiway W4

c) Insufficient lighting on portion of W4/N.

d) Assumption by the flight crew of aircraft 1 that they were clear of aircraft 2 and continuing taxing onto taxiway N, thereafter crossing runway 14 without realizing that left winglet had contacted the aircraft 2.

e) Difficulty to accurately judge absolute distance or separation when the line of sight distance is more than 10m

4. Safety Recommendations:

1. Indigo Airlines may provide guidance material to the flight crew regarding the difficulty associated with assessing wing tip clearance.

2. MIAL/ AAI may review the procedure for taxiing on taxiway N when an aircraft is holding on taxiway W4, short of Runway 14.

3. MIAL/ AAI may declare the W4/ N as hot spot till a permanent fix is available for the point.

4. MIAL may carry out assessment of the visibility conditions in the portion of W4 / N and take necessary corrective action if required.

(Jasbir Singh Larhga)
Member, Committee of Inquiry

(R S Passi)
Member, Committee of Inquiry

Date : 13.11.2018

Place : New Delhi