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**Important Information and Instruction for Recipients and Public**

1. Appended, in the upcoming pages, is the 'Final Report', together with the Safety Recommendations, of investigation of Serious Incident of ATR 72-500 Aircraft, Registration No. S2-AHF of Novoair Ltd, occurred on 17 November 2021 at VGSD Airport, Saidpur, Bangladesh.
2. The Investigator-in-charge (IIC) of the Aircraft Accident Investigation Team (AAIT), Designated by the undersigned has prepared this Final Report, as Bangladesh is the State of Occurrence as well as the State of Registry and the State of Operator of the aircraft.
3. Earlier, on 18 November 2021, the AAIC-BD had sent to all concerned the 'Notification' of the Serious Incident which was in conformity with Standard 4.1 of Annex 13 and thereafter, dispatched and published the 'Preliminary Report' on 15 December 2021, in conformity with Standard 7.4 of Annex 13.
4. As per standard 6.3 of ICAO Annex 13, the AAIC-BD had sent, to all concerned, the draft Final Report on 29 August 2022 and requested to provide 'Comments' (if intended) on the draft Final Report within sixty (60) days from the date of the transmittal of correspondence. The AAIC-BD received comments from Novoair, the aircraft operator and the Accredited Representative from BEA, France. All the relevant comments received from Novo Air and ACREP from France have been incorporated in the final report as per the provision of ICAO Annex 13.
5. The AAIC-BD is dispatching this 'Final Report' as per standard 6.5 of Annex 13.
6. This Final Report will soon be available in the website [www.caab.gov.bd](http://www.caab.gov.bd) (Menu: AAIC-BD) for public view.
7. Soon the AAIC-BD will send the Safety Recommendations, listed in Subject Sub-Head 3.4 of this report, to applicable States/ Organizations for effective corrective actions for the purpose of safety in aviation and prevention of accident/ serious incident/ investigable incident.

*P. Q. H. Z.*  
Head  
Aircraft Accident Investigation Committee  
Bangladesh  
15 November 2022

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(ii)

### FINAL REPORT

INVESTIGATION INTO SERIOUS INCIDENT OF ATR 72-500 AIRCRAFT REG NO S2-AHF  
OF NOVOAIR OCCURRED ON 17 NOVEMBER 2021 AT VGSD AIRPORT,  
SAIDPUR, BANGLADESH



**PREPARED BY  
OFFICE OF THE AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE OF BANGLADESH**

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### FOREWORD

This Serious Incident, categorised by the Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD) as so, has been conducted by the AAIC-BD, in accordance with Bangladesh Civil Aviation Act 2017 and in conformity with Annex 13 to the Chicago Convention on International Civil Aviation.

On 17 November 2021, the Head of AAIC-BD received a 'Mandatory Occurrence Report' (MOR) through an e-mail sent by the Operator, NOVOAIR, narrating about the occurrence of one ATR 72-500 Aircraft, Nationality and Registration Mark S2-AHF during landing at Runway 34 of VGSD Airport, Saidpur, Bangladesh.

Immediately following the occurrence, the Head of AAIC-BD, formed two-member 'Go-team' to proceed by the first available flight to Saidpur to inspect and protect the necessary evidences. The 'Go-team' left Dhaka for Saidpur by the first available flight on 18 November 2021 as there was no flight on the day of occurrence. This was in pursuance to Standard 3.3 of Annex 13, wherein the AAIC-BD took all reasonable measures to protect the evidences and maintain safe custody of the aircraft and its contents for such a period as was necessary for the purposes of investigation. The Head of AAIC-BD also advised the Airport/ Aerodrome authority on telephone for ensuring adequate protection of all the evidences and safe custody of the aircraft and its contents until the arrival of the 'Go-team' at the site of occurrence.

The Office of the AAIC-BD, on the same day, issued the necessary 'Notification' Vide 30.00.0000.013.35.001.21-95, Date 18 November 2021 for the information of all concerned (National and International) as per the requirements of Annex 13. This was followed by forming of two-member Aircraft Accident Investigation Team (AAIT) which was issued through a 'Memorandum' Vide 30.00.0000.013.35.002.21-96, Date 18 November 2021 to conduct the investigation. The two-member AAIT comprised of Member Operations of the AAIC-BD as the Investigator-in-charge (IIC) and the Member Engineering of the AAIC-BD as the Member of AAIT, who conducted this investigation independently and without any external influence, what so ever.

The AAIC-BD published the 'Preliminary Report' of the investigation of this serious incident on 15 December 2021. Subsequently, it sent the draft Final Report on 29 August 2022 to relevant authorities, organizations and agencies for their significant and substantiated comments. The comments, so received, have been incorporated by the AAIT in this final report reflecting the significance and substances provided by the relevant authorities, organizations and agencies.

This 'Final Report' has been compiled by the AAIT under the leadership of the IIC and is being dispatched to all applicable addressees in accordance with the requirements of Standard 6.4 of ICAO Annex-13 and in the interest of prevention of aircraft accident, serious incident and/or investigable incident, the report will also be publicly available soon to comply with the requirements of Standard 6.5 of ICAO Annex-13.

The AAIC-BD conceives that investigation of any aircraft occurrence should focus on identifying the true underlying causes and/or contributing factors rather than indicating on some human omissions for the occurrence.

As per the principle of AAIC-BD and that of ICAO Annex 13, the sole objective of this investigation has been perceived to prevent aircraft accidents and incidents. The purpose of this activity has not been comprehended to apportion blame or liability.

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## List of Acronyms

AAIC	Aircraft Accident Investigation Committee
AAIC-BD	Aircraft Accident Investigation Committee of Bangladesh
AAIT	Aircraft Accident Investigation Team
ACCREP	Accredited Representative
ANO	Air Navigation Order
ATC	Air Traffic Control
ATR	Aerei da Trasporto Regionale; or "Regional Transport Airplanes"
CAA	Civil Aviation Authority
CVR	Cockpit Voice Recorder
FDR	Flight Data Recorder
IIC	Investigator-In-Charge
IRO	In Respect of
LT	Local Time
MD	Managing Director
NDB	Non-Directional Beacon
NLG	Nose Landing Gear
OPS	Operations
OIM	Operators Information Message
QAR	Quick Access Recorder
REG	Registration
RWY	Runway
TC	Task Card
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VGSD	Saidpur Airport, Saidpur, Bangladesh
VOR	VHF Omnidirectional Radio Range
VSF	Vendor Service Bulletin

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**OFFICE OF THE AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE OF BANGLADESH**  
**MINISTRY OF CIVIL AVIATION & TOURISM**  
**3<sup>RD</sup> FLOOR CAAB HEADQUARTERS (OLD BUILDING) KURMITOLA DHAKA-1229**



REF. NO. 30.00.0000.013.35.005.21 (ATR 72-500 S2-AHF/ 17 NOV 2021)-141

DATE: 15 NOVEMBER 2022

		3.1.4.1	Other Damage
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		3.1.12	Wreckage and impact information
		3.1.12.1	General information on the site of the Accident/ Serious Incident/ Investigable Incident and the distribution pattern of the wreckage, detected material failures or component

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OFFICE OF THE AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE OF BANGLADESH  
MINISTRY OF CIVIL AVIATION & TOURISM  
3<sup>RD</sup> FLOOR CAAB HEADQUARTERS (OLD BUILDING) KURMITOLA DHAKA-1229



REF. NO. 30.00.0000.013.35.005.21 (ATR 72-500 S2-AHF/ 17 NOV 2021)-141

DATE: 15 NOVEMBER 2022

			malfunctions. Details concerning the location and state of the different pieces of the wreckage are not normally required unless it is necessary to indicate a break-up of the aircraft prior to impact. Diagrams, charts and photographs may be included in this section or attached in the appendices
		3.1.13	Medical and pathological information
		3.1.13.1	Brief description of the results of the investigation undertaken and pertinent data available therefrom
		3.1.14	Fire
		3.1.14.1	If fire occurred, information on the nature of the occurrence, and of the firefighting equipment used and its effectiveness
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		3.1.16	Tests and research
		3.1.16.1	Brief statements regarding the results of tests and research
		3.1.17	Organizational and Management Information
		3.1.17.1	Pertinent information concerning the organizations and their management involved in influencing the operation of the aircraft. The organizations include, for example: the operator; the air traffic services; airway, aerodrome and weather service agencies; and the regulatory authority. The information could include, but not be limited to, organizational structure and functions, resources, economic status, management policies and practices, and regulatory framework?
		3.1.18	Additional information
		3.1.18.1	Relevant information not already included in 3.1.1 to 3.17.1
		3.1.19	Useful or effective investigation techniques
		3.1.19.1	When useful or effective investigation techniques have been used during the investigation, briefly indicate the reason for using these techniques and refer here to the main features as well as describing the results under the appropriate subheadings 3.1.1 to 3.18.1?
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	<b>3.3 Conclusions</b>	3.3.1	Findings
		3.3.2	Causes
		3.3.3	Contributing Factors
	<b>3.4 Safety Recommendations</b>	3.4.1	Intermediary Safety Recommendations
		3.4.2	Safety Recommendations
<b>4. APPENDICES</b>	<b>4.1 Appendices</b>	4.1.1 -	Will be sequentially preserved in office file

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	<b>OFFICE OF THE AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE OF BANGLADESH</b> <b>MINISTRY OF CIVIL AVIATION &amp; TOURISM</b> <b>3<sup>RD</sup> FLOOR CAAB HEADQUARTERS (OLD BUILDING) KURMITOLA DHAKA-1229</b>	
REF. NO. 30.00.0000.013.35.005.21 (ATR 72-500 S2-AHF/ 17 NOV 2021)-141		DATE: 15 NOVEMBER 2022

## 1. TITLE

### 1.1 Composition of Title

1.1.1 Name of the Operator	NOVOAIR Ltd
1.1.2 Name of the Manufacturer	ATR
1.1.3 Aircraft Model	ATR 72-500
1.1.4 Aircraft Nationality	Bangladesh
1.1.5 Aircraft Registration Marks	S2-AHF
1.1.6 Place of Accident/ Serious Incident/ Investigable Incident	VGSD Airport, Saidpur Bangladesh
1.1.7 Date of Accident/ Serious Incident/ Investigable Incident	17 November 2021

## 2. SYNOPSIS

### 2.1 Details of Synopsis

2.1.1 Notification of Accident/ Serious Incident/ Investigable Incident to national and foreign authorities	Office of the Aircraft Accident Investigation Committee of Bangladesh notified to all relevant Authorities and Agencies as per Standard 4.1 of ICAO Annex 13.
2.1.2 Identification of the Accident/ Serious Incident/ Investigable Incident Investigation Authority	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD).
2.1.3 Accredited Representation	<p>(a) Having received the Notification from the AAIC-BD, BEA, France, being the State of Aircraft's Design and Manufacture, responded immediately by appointing its Accredited Representative and confirmed that it would remain standby for any kind of support, should AAIC-BD requires.</p> <p>(b) On 29 March 2022, the ACCREP asked for an update on the investigation. Accordingly, the update of the investigation was sent to ACCREP on the same date. On 07 April 2022, the ACCREP wanted to share the information of update of the investigation with the Technical Advisor from ATR. The IIC gave the consent. ACCREP also provided with their comments on draft Final Report which are incorporated in this Final Report.</p>
2.1.4 Organization of the Investigation?	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD).
2.1.5 Authority releasing the report	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD)
2.1.6 Date of publication or dispatch of report	The date of dispatch is 15 November 2022. This Final Report is being sent to 'Specific Addressees' conforming the requirements of Standard 6.4 of ICAO Annex 13.
2.1.7 Brief resume of the circumstances leading to the Accident/ Serious Incident/ Investigable Incident	On 17 November 2021, one ATR 72-500 aircraft, Registration No. S2 AHF, belonging to Novoair of Bangladesh, was scheduled from Hazrat Shahjalal International Airport (VGHS), Dhaka to Saidpur Airport (VGSD). The aircraft took off from Dhaka at 1205 UTC and landed at Saidpur at 1255 UTC. During landing roll, following the touching down of the nose landing gear, both the pilots experienced severe vibration and judder followed by the aircraft tendency to swing to the right. The nose gear tyres of the aircraft made zigzag marks on the runway surface covering an approximate distance of 4800 feet until the aircraft came to a stop. The aircraft engines were switched off on the runway by the flight crew and the Air Traffic Controller-(ATC) was informed accordingly. All passengers and crew were safely disembarked.

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### 3. BODY

#### 3.1 Factual Information

##### 3.1.1 History of the flight:

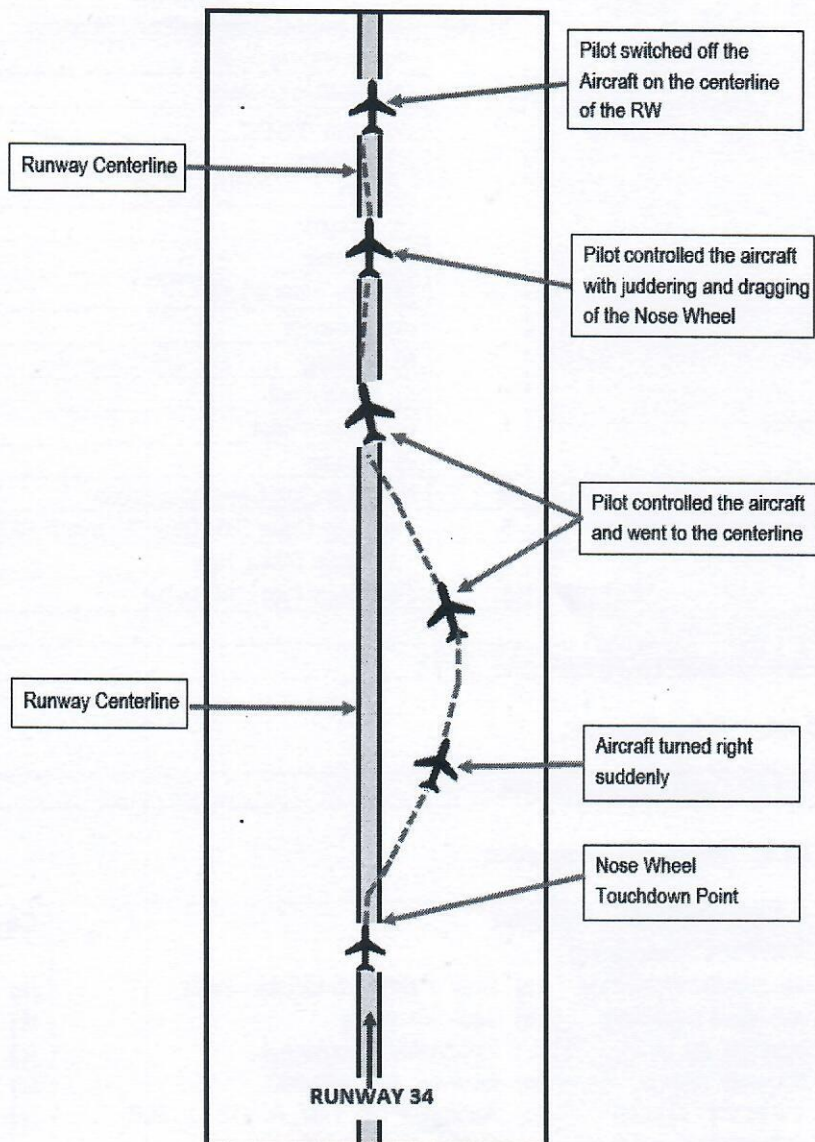
3.1.1.1 Flight number	VQ 967
3.1.1.2 Type of operation	Commercial
3.1.1.3 Last point of departure	VGHS
3.1.1.4 Time of departure (Local time or UTC)	1205 (UTC)
3.1.1.5 Point of intended landing	VGSD
3.1.1.6 Flight preparation	As per the Schedule, the aircraft was pre-flighted by the ground crew and visual check was carried out by the flight crew. There were no discrepancies/observations. The flight was a scheduled domestic passenger carrying IFR flight that originated from VGHS Dhaka and landed at VGSD Saidpur.
3.1.1.7 Description of the flight and events leading to the accident/ serious incident/ investigable incident including reconstruction of the significant portion of the flight path, if appropriate.	<p>(a) The aircraft took off from Dhaka at 1205 UTC and landed at Saidpur at 1255 UTC. From take-off from Dhaka until the aircraft touched down at Saidpur runway, the flight went uneventful. Soon after (3-4 seconds) the nose wheels rolled over the runway, both the flight crew experienced severe vibration and judder followed by the aircraft tendency to swing to the right. The nose gear tyres of the aircraft made zigzag marks on the runway surface covering an approximate distance of 4800 feet until came to a stop. The aircraft engines were switched off on the runway by the flight crew and the Air Traffic Controller (ATC) was informed accordingly. All passengers and crew were safely evacuated unhurt.</p> <p>(b) The preliminary investigation revealed that after about 3-4 seconds of lowering and touching down of the nose wheel, both the nose wheels turned 90-degree perpendicular to the center line of the runway which could not be controlled by the nose wheel steering from the cockpit. As the aircraft rolled down after landing, the nose wheels continued to drag on the runway surface at 90-degree position. Both the tyres got ruptured and flattened. Nose wheel drum was severely damaged from the friction of the runway. On further inquiry, it was ascertained that the nose wheel torque link '<b>PIN</b>' (Part No D64724) got separated from the link, which was found on the right shoulder of the runway, approximately 1900 feet from runway threshold 34. The detached <b>PIN</b> (Part No D64724) permitted both arms of the torque linkage to move freely.</p> <p>(c) It may be mentioned that the torque link consists of two arms, the upper arm and the lower arm which are connected by a <b>PIN</b> that helps the torque link not to pivot rather maintain the functional integrity of the nose wheel steering.</p> <p>(d) Absence of the <b>PIN</b> permitted the nose wheels to rotate at its own and at some point/ time the wheels became perpendicular to the centre line of the runway.</p>

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(e) Reconstruction of the significant portion of the flight path



3.1.1.8 Location (latitude, longitude, elevation) 25°45'33"N, 088°54'31"E, 125 ft

3.1.1.9 Time of the accident/serious incident/ Investigable Incident (Local or UTC) 1255 UTC

3.1.1.10 Whether day or night Night

3.1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
3.1.2.1 Fatal	No	No	No
3.1.2.2 Serious	No	No	No
3.1.2.3 Minor	No	No	No

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### 3.1.3 Damage to Aircraft (Brief Description)

3.1.3.1 Destroyed	No																																																						
3.1.3.2 Substantially damaged	<table><tr><th>SL NO</th><th>Items Found Damaged and Missing</th><th>Part Number</th></tr><tr><td>1.</td><td>Nose Landing Gear:</td><td>D22698172-106</td></tr><tr><td></td><td>(a). Washer Locating</td><td>282101</td></tr><tr><td></td><td>(b). Lock Washer</td><td>SL61WTM12P</td></tr><tr><td></td><td>(c). Washer</td><td>D56860</td></tr><tr><td></td><td>(d). Pin</td><td>D64724</td></tr><tr><td></td><td>(e). Washer</td><td>D49691</td></tr><tr><td></td><td>(f). Washer</td><td>D56855</td></tr><tr><td></td><td>(g). Pin- Torque Link</td><td>D63819</td></tr><tr><td></td><td>(h). Extractor</td><td>H47757</td></tr><tr><td></td><td>(i). Casing</td><td>D61535-10</td></tr><tr><td></td><td>(j). Special nut</td><td>SL40358P, (missing)</td></tr><tr><td></td><td>(k). Washer-lock</td><td>SL 40359, (missing)</td></tr><tr><td></td><td>(l). Washer</td><td>D49692, (missing).</td></tr><tr><td>2.</td><td>Nose Landing Gear Drag Brace</td><td>D22703072-1</td></tr><tr><td>3.</td><td>Fuselage Outer Skin Dent (15 mm X 12 Mm)</td><td>Between Frame 7 And 9</td></tr><tr><td>4.</td><td>Two Nose Wheel Hub</td><td>C20589000</td></tr><tr><td>5.</td><td>Two Nose Tyres (Michelin)</td><td>026-545-0</td></tr></table>	SL NO	Items Found Damaged and Missing	Part Number	1.	Nose Landing Gear:	D22698172-106		(a). Washer Locating	282101		(b). Lock Washer	SL61WTM12P		(c). Washer	D56860		(d). Pin	D64724		(e). Washer	D49691		(f). Washer	D56855		(g). Pin- Torque Link	D63819		(h). Extractor	H47757		(i). Casing	D61535-10		(j). Special nut	SL40358P, (missing)		(k). Washer-lock	SL 40359, (missing)		(l). Washer	D49692, (missing).	2.	Nose Landing Gear Drag Brace	D22703072-1	3.	Fuselage Outer Skin Dent (15 mm X 12 Mm)	Between Frame 7 And 9	4.	Two Nose Wheel Hub	C20589000	5.	Two Nose Tyres (Michelin)	026-545-0
	SL NO	Items Found Damaged and Missing	Part Number																																																				
	1.	Nose Landing Gear:	D22698172-106																																																				
		(a). Washer Locating	282101																																																				
		(b). Lock Washer	SL61WTM12P																																																				
		(c). Washer	D56860																																																				
		(d). Pin	D64724																																																				
		(e). Washer	D49691																																																				
		(f). Washer	D56855																																																				
		(g). Pin- Torque Link	D63819																																																				
		(h). Extractor	H47757																																																				
		(i). Casing	D61535-10																																																				
		(j). Special nut	SL40358P, (missing)																																																				
		(k). Washer-lock	SL 40359, (missing)																																																				
		(l). Washer	D49692, (missing).																																																				
2.	Nose Landing Gear Drag Brace	D22703072-1																																																					
3.	Fuselage Outer Skin Dent (15 mm X 12 Mm)	Between Frame 7 And 9																																																					
4.	Two Nose Wheel Hub	C20589000																																																					
5.	Two Nose Tyres (Michelin)	026-545-0																																																					
3.1.3.3 Slightly Damaged	No																																																						

### 3.1.4 Other Damage:

3.1.4.1 Other Damage	NIL
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### 3.1.5 Personnel information

3.1.5.1 Pertinent information concerning each of the flight crew members regarding age, validity of licenses, ratings, mandatory checks, flying experience (total and on type) and relevant information on duty time	<b>Pilot</b> (a) Date of Birth: 20 October 1985 (b) Age: 36+ years (c) Nationality: Bangladeshi (d) License: CPL NO-800 (e) Ratings: PT-6, T-37, AN-32, C-130B, C-152, ATR 72-500 (f) Mandatory Checks: N/A (g) Flying Experience (Total): 3916:20 hours (h) License Validity: Valid (Non-Expiry)	<b>Co-pilot</b> (a) Date of Birth: 27 July 1993 (b) Age: 28+ years (c) Nationality: Bangladeshi (d) License: CPL (e) Ratings: C152-142:10 Min, S2-20-08:10 min, ATR72-500-1814:40 (f) Flying Experience (Total): 2024:05 min (g) License Validity: Valid (Non-Expiry)
3.1.5.2 Brief statement of qualifications and experience of other crew members	There were no other crew members on board the aircraft.	
3.1.5.3 Pertinent information regarding other personnel, such as air traffic services, maintenance, etc., when relevant	Not relevant.	

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### 3.1.6 Aircraft information

<p>3.1.6.1 Brief statement on airworthiness and maintenance of the aircraft (indication of deficiencies known prior to and during the flight to be included, if having any bearing on the accident)</p>	<p>(a) The aircraft had undergone 1C+2C+4C+2YE + out of phase inspection at FLYFIREFLY SDN, BHD, SAAS airport, Subang, Malaysia. These checks were carried out from 27.09.2021 to 05.11.2021.</p> <p>(b) The aircraft was released to service on 05.11.2021 and reached Bangladesh on 06.11. 2021.</p> <p>(c) During this check, functional test of nose landing gear play was carried out on 29.10.2021 as part of out of phase check.</p> <p>Note: This check to be performed at an interval of 12000 landing or 6 years (Installation time) since new or since last overhaul.</p> <p>(d) The nose landing gear assembly Part No: D22698172-106 SL No: B358 was overhauled on 01.11.2016.</p> <p>(e) The certificate of airworthiness of S2-AHF is valid till 28.03.2022.</p> <p>(f) No AD, SB was due to this aircraft.</p> <p>(g) After checks at Malaysia, the aircraft had only one weekly check on 12.11.2021.</p> <p>(h) The line checks were carried out from 06.11.2021 until 16.11.2021 every day. Pre-flight inspection (PFI) was performed on 17.11.2021 prior to departure for Saidpur, reported no discrepancy.</p> <p>(i) The aircraft completed total 47321:25 Hours and 44087 cycles since new. The aircraft has completed 65.28 flying hours and 98 landings after checks at FLYFIREFLY SDN, BHD, SAAS airport, Subang, Malaysia.</p>
<p>3.1.6.2 Brief statement on performance, if relevant, and whether the mass and centre of gravity were within the prescribed limits during the phase of operation related to the Accident/ Serious Incident/ Investigable Incident. (If not and if of any bearing on the Accident/ Serious Incident/ Investigable Incident give details.)</p>	<p>The Mass and Balancing were within permissible limits.</p>
<p>3.1.6.3 Type of fuel used</p>	<p>Aviation Fuel, JET-A1</p>

### 3.1.7 Meteorological information of VGSD

<p>3.1.7.1 Brief statement on the meteorological conditions appropriate to the circumstances including both forecast and actual conditions, and the availability of meteorological information to the crew</p>	<p>(a) Surface Wind: North/ North Westerly, 03-06 KT (b) Surface Visibility: 4000 m – 3200 m or less, Tempo 2500 m (c) Weather: Haze became mist (d) Cloud Cover: NSC</p>
<p>3.1.7.2 Natural light conditions at the time of the Accident/ Serious Incident/ Investigable Incident (sunlight, moonlight, twilight, etc.)?</p>	<p>During Night.</p>

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**3<sup>RD</sup> FLOOR CAAB HEADQUARTERS (OLD BUILDING) KURMITOLA DHAKA-1229**



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### 3.1.8 Aids to Navigation of VGSD

3.1.8.1 Pertinent information on navigation aids available, including landing aids such as ILS, MLS, NDB, PAR, VOR, visual ground aids, etc., and their effectiveness at the time	(a) ARP Co-ordinates- 254537.35N 0885430.49E (b) MAG VAR- 52' West (c) Types of traffic permitted IFR/VFR- IFR/VFR (d) NDB VOR was available and effective during the incident
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### 3.1.9 Communications.

3.1.9.1 Pertinent information on aeronautical mobile and fixed service communications and their effectiveness	VHF1, VHF2 communications, both were effective
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### 3.1.10 Aerodrome Information

3.1.10.1 Pertinent information associated with the aerodrome, facilities and condition, or with the take-off or landing area if other than an aerodrome	(a) VGSD, Runway 34 (b) Designation Lateral limits - Aerodrome Traffic Zone (ATZ) ATZ is an oval shaped area joining outer tangents of 5NM (9KM) radius circle centered at the runway centre and both ends of the runway (c) Vertical Limits - 4000FT (AMSL) (d) Airspace - D (e) Unit Language - Saidpur Tower, English (f) Transition Altitude 4000FT
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### 3.1.11 Flight Recorders

3.1.11.1 Location of the flight recorder installations in the aircraft, their condition on recovery and pertinent data available therefrom	(a) The Flight Data Recorder (FDR) is located in the tail section. The condition of Flight Recorder was good on recovery. Pertinent data was available. (b) Data was extracted through Quick Access Recorder (QAR). (c) It was analysed, found all the parameters were within the normal range of operations. (d) Flight Data Records are kept as Appendices. (e) Flight Recorders information are also conserved as Appendices.
3.1.11.2 Location of the cockpit voice recorder installations in the aircraft, their condition on recovery and pertinent data available therefrom	(a) The Cockpit Voice Recorder (CVR) is located in the tail section. It was analysed and found normal conversation. The condition of CVR was good on recovery. Pertinent data was available. (b) Detailed information was extracted and preserved as Appendices.

### 3.1.12 Wreckage and impact information

3.1.12.1 General information on the site of the Accident/ Serious Incident/ Investigable Incident and the distribution pattern of the wreckage, detected material failures or component malfunctions. Details	(a) The aircraft made the first contact (Main wheel touched the RWY) with the RWY approximately 1800 feet down the RWY (Reference taken from Radio Altimeter)  (b) Soon after the nose wheels touched (approximately 2200 feet down the RWY) and rolled over the runway, both the flight crew experienced severe vibration and judder followed by the aircraft tendency to swing to the right. The nose gear tyres of the aircraft made zigzag marks on the runway surface covering a distance of approximately 4800 ft (Reference taken from Radio Altimeter) down the RWY until the aircraft came to a stop. The aircraft engines were switched off at a distance of 4800 ft down the RWY (Approximately 1200 ft short of the end of the RWY) by the flight crew and the ATC was informed accordingly.
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concerning the location and state of the different pieces of the wreckage are not normally required unless it is necessary to indicate a break-up of the aircraft prior to impact. Diagrams, charts and photographs may be included in this section or attached in the appendices



**First  
Touchdown  
point of the  
nose wheel**

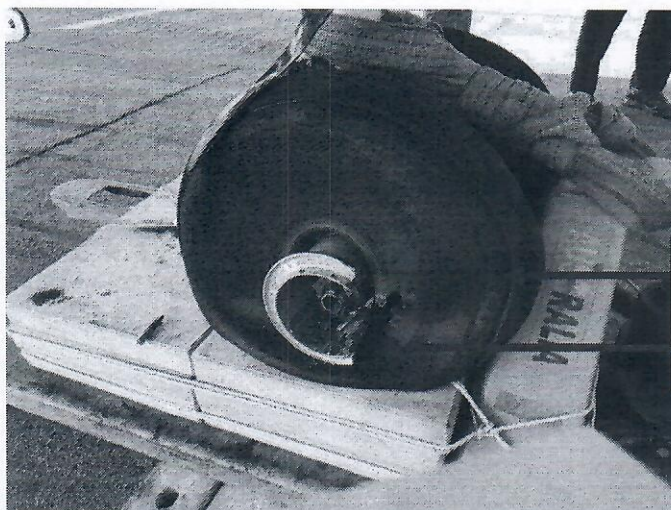
First touchdown of nose landing gear.

(The photograph is taken from the opposite direction of the landing aircraft for better visibility)



**Went to the  
right after  
touchdown**

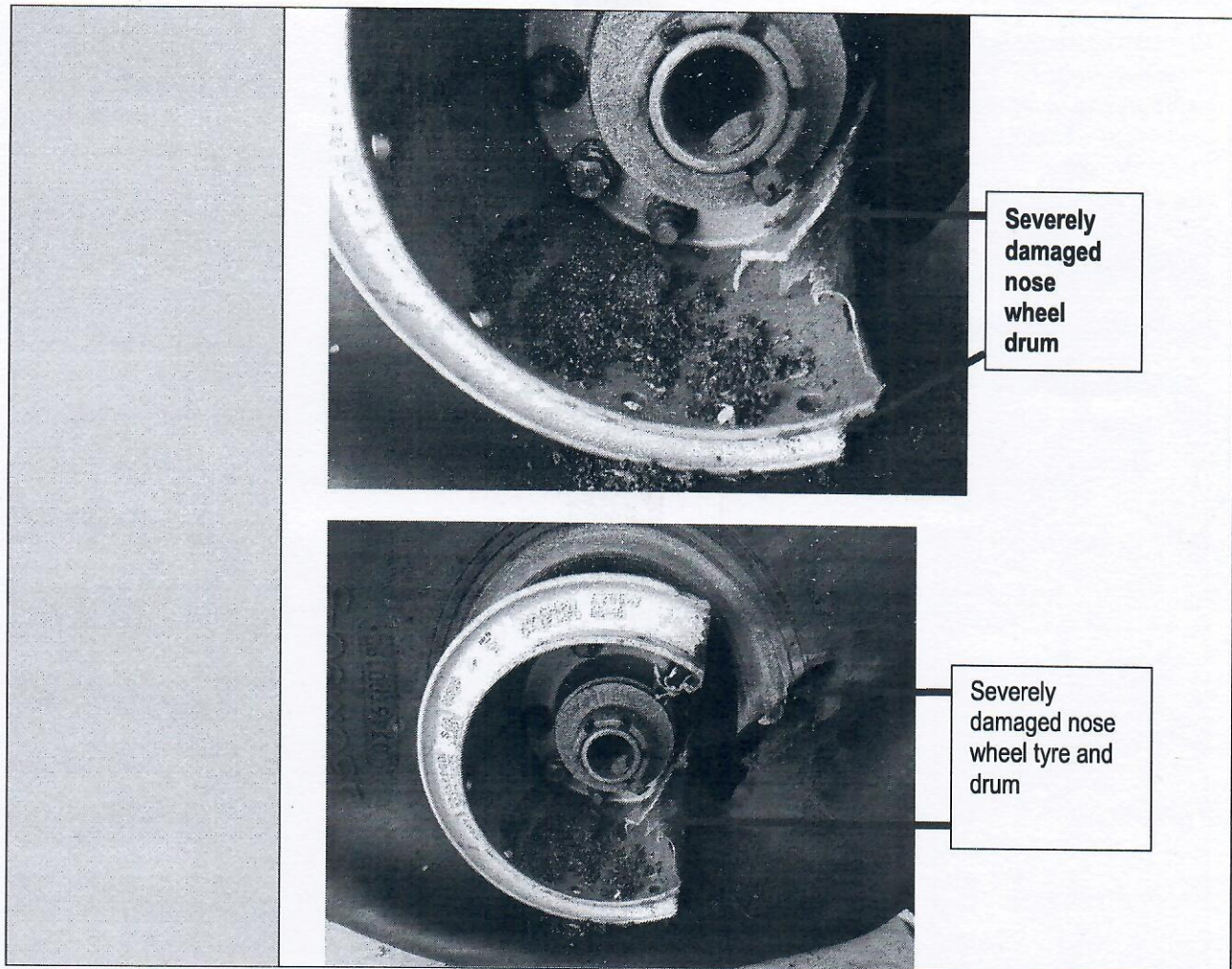
(The photograph is taken from the opposite direction of the landing aircraft for better visibility)



**Nose Tyre -  
Ruptured  
and  
flattened**

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### 3.1.13 Medical and pathological information

3.1.13.1 Brief description of the results of the investigation undertaken and pertinent data available therefrom

Medical tests were carried out, all flight crew were found in normal condition.

### 3.1.14 Fire

3.1.14.1 If fire occurred, information on the nature of the occurrence, and of the firefighting equipment used and its effectiveness

Soon after lowering of the nose wheel, several sparks were observed due to nose wheel drum friction on the runway which was reported by Air Traffic Controller. Firefighting equipment was not used as there was no visible fire.

### 3.1.15 Survival aspects

3.1.15.1 Brief description of search, evacuation and rescue, location of crew and passengers in relation to injuries sustained, and failure of structures such as seats and seat-belt attachments

All the passengers including flight crew were disembarked safely.

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### 3.1.16 Tests and research

3.1.16.1 Brief statements regarding the results of tests and research	The AAIT intended to find out the probable cause for the separation of the 'PIN' (Part No D64724). Necessary assistance was provided by the manufacturer whereby it was ascertained that 'the thread area of the PIN was corroded. Manufacturer concluded that the <b>corrosion</b> was the main contributor for the disconnection of the Pin.
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### 3.1.17 Organizational and Management Information

3.1.17.1 Pertinent information concerning the organizations and their management involved in influencing the operation of the aircraft. The organizations include, for example: the operator; the air traffic services; airway, aerodrome and weather service agencies; and the regulatory authority. The information could include, but not be limited to, organizational structure and functions, resources, economic status, management policies and practices, and regulatory framework?	<p>(a) NOVOAIR was established in 2007 with a vision of "Excellence in Aviation". It launched commercial operation on 9 Jan 2013 with Embraer 145 jet aircraft. Later the Embraer fleet was replaced with ATR 72-500 turboprop aircraft. The airline currently operates to all domestic destination of Bangladesh with regional destination to Kolkata, India.</p> <p>(b) The Managing Director (MD) is the Accountable Manager of the company. Each of the post holders, such as the Chief of Safety, Quality Security, FOQA, DFO, DE, CAMO, Airport Operation Managers reports directly to the MD. These post holders are selected and approved as per the qualification and experience mentioned in the ANO of the CAA, Bangladesh.</p> <p>(c) According to MD, Novoair flight safety holds the paramount place in operational philosophy and goal of NOVOAIR. As stated by the MD, Airline Board of directors are committed and concerned to ensure safe operation of aircraft. Company's safety program is set out within the "Company Safety Management Manual".</p> <p>(d) Safety Policy is signed by the Managing Director and distributed throughout the company in the form of display boards. It is also published in the company Safety Manuals. According to the Company Policy, the management is committed to:</p> <ol style="list-style-type: none"> <li>(1) Provide an accident-free workplace, including no harm to people, no damage to equipment, environment and property and the necessary resources to deliver a safe and sustainable business in support of the policy;</li> <li>(2) An open and just culture of reporting of all safety hazards in which management will not initiate disciplinary action against any personnel which, in good faith, discloses a safety occurrence due to unintentional conduct;</li> <li>(3) Ensure that all levels of management are answerable for safety performance. Safety is everybody's responsibility. All employees are to maintain a safe-work environment by following company policies and procedures;</li> <li>(4) The Company conducts regular review of safety policies and procedures. It monitors and ensures industry best safety practices in the organization.</li> </ol>
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### 3.1.18 Additional information

<p>3.1.18.1 Relevant information not already included in 3.1.1 to 3.17.1</p>	<p>While conducting the investigation, the AAIT tried to find out whether there was any previous Torque Link PIN disconnection of NLG or not. Therefore, team studied all the previous document of ATR and found out OIM (Operators Information Message) on the same issue which is appended below:</p> <p><b>Subject</b></p> <p>ATR (Ref: OIM 2014/003 issue 2, October 31<sup>st</sup>, 2014) brought out the OIM (Operators Information Message) for NLG (Nose Landing Gear) torque Link Pin failure.</p> <p><b>Purpose</b></p> <p>The purpose of the OIM is to recommend a one-shot inspection at the earliest of the median torque link pin in NLG.</p> <p><b>Background</b></p> <p>In service aircraft the torque link pin disconnection was recovered and sent to laboratory for inspection.</p> <p><b>Status</b></p> <p>a. Torque link investigations have evidenced corrosion on torque link pin threaded area, nut and washer.</p> <p>b. Material loss due to corrosion was responsible for thread profile reduction. This reduction results in increased load on the remaining threads leading to their deformation and allowing the retaining nut to become separated from the pin.</p> <p>(1) The origin of the corrosion is not fully identified. (2) The one-shot inspection aims at:</p> <p>(a) Prevent new cases (b) Gather feedback from operators.</p> <p><b>ATR Recommendations</b></p> <p>(a) ATR recommended therefore one-shot inspection in accordance with MBD SB 631-32-221 (b) For brand new NLG or for fresh overhauled NLG, the one-shot inspection can be carried out after one year from installation of the concerned NLG on A/C, provided that no torque link pin disconnection has been performed for maintenance purpose during the one-year period.</p>
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### 3.1.19 Useful or effective investigation techniques

<p>3.1.19.1 When useful or effective investigation techniques have been used during the investigation, briefly indicate the reason for using these techniques and refer here to the main features as well as describing the results under the appropriate subheadings 3.1.1 to 3.18.1?</p>	<p>So far, no new useful or investigation technique has been merged at this stage of the investigation.</p>
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### 3.2 ANALYSIS

[The following analysis have been made based on the information documented in 'Factual information' and which is relevant to the 'Determination of Conclusions' and 'Causes and/or Contributing Factors']

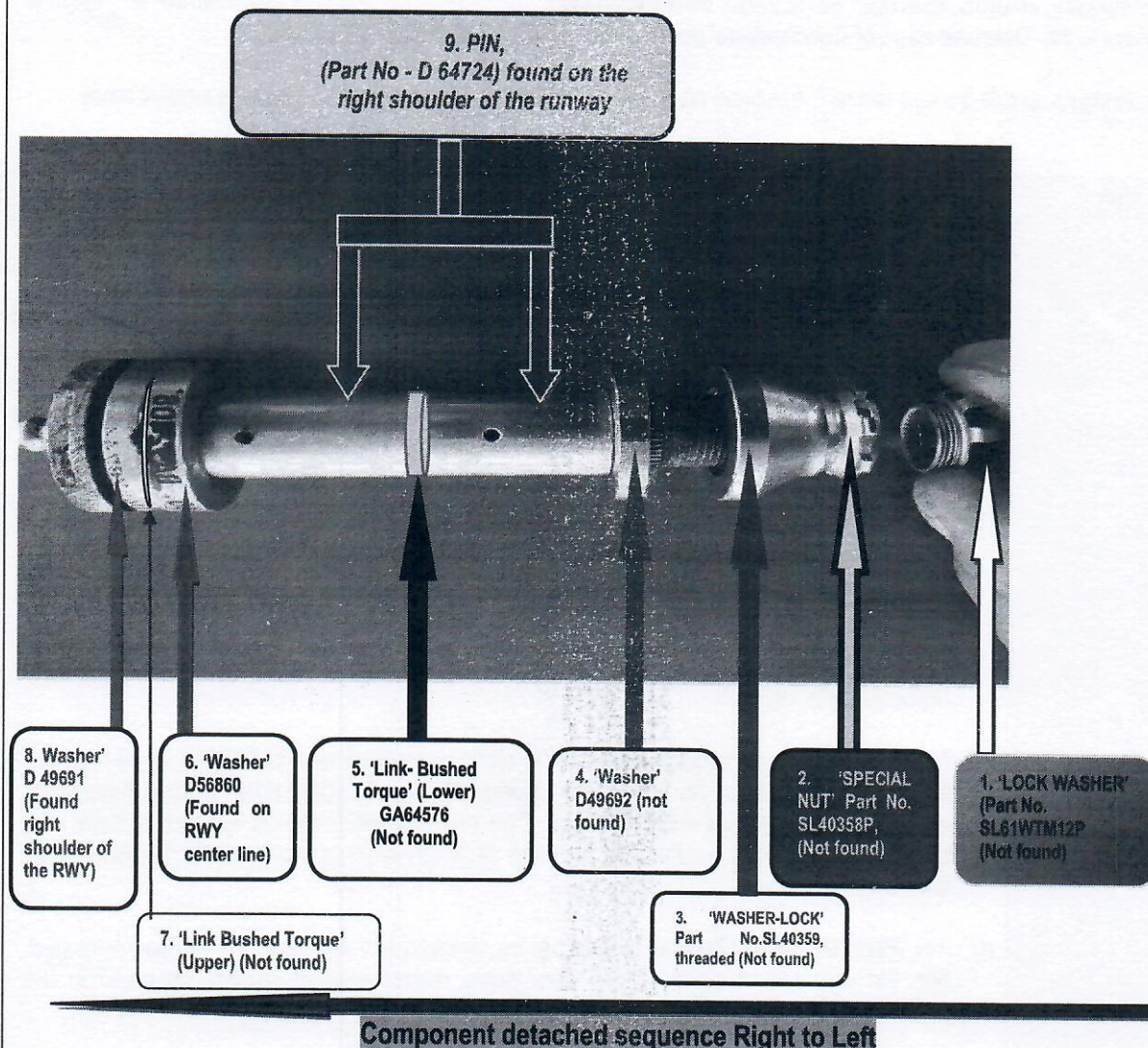
The 'Analysis' of this Serious Incident' has been compiled through the assessment of the following subject areas:

3.2.1 Man	<p>(a) As per ATR Job Card, Line Maintenance -VQ7-ATR72, page 6 of 14, SI No 19, Rev Date: 01/2021- 'Do a check of <b>nut and pin</b> for any damage and corrosion. If any, please discard them'.</p> <p>(b) As per the task card, component list whether the <b>Nut and Pin</b> were checked or not it is not evident from the initial document of Firefly.</p> <p>(c) The process/method of abovementioned check of <b>Nut and Pin</b> was also not mentioned by Firefly.</p> <p>(d) In the Task Card (TC) performance document, in the column of '<b>component/material used</b>' the following 4 items were consumed/replaced:</p> <p>(1) Washer D49692 (2) Lock Washer SL40359 (3) Washer MS9581-14 (4) Sealant PR 1826A2</p> <p>(e) As per the Job card requirement of ATR manual, removal and installation of NLG shock absorber, page # 14 of 14, and a <b>lock Washer PT No. SL 61WTM12P should have been removed and installed with new one</b>. The Investigation team did not find removal and installation of this lock washer Part Number- SL 61WTM12P in the FLYFIREFLY SDN, BHD documents.</p> <p>(f) <b>PIN (Part No - D 64724)</b> was required to be checked and if needed be, replaced/changed, The Pin was not changed. There were some discrepancies/anomalies observed in the document of Firefly. On clarification, further unclear document was produced.</p>
3.2.2 Machine	<p>'PIN' (Part No D64724) with 'WASHER' (Part No. D49691) which was found on the right shoulder of the runway is locked by 'LOCK WASHER' (Part No. SL61WTM12P, missing) with 'SEALANT' (Part No. PR1826A2, missing) overlapped. After 'LOCK WASHER' there is a 'SPECIAL NUT' (Part No. SL40358P, missing) which holds the 'PIN'. After the 'SPECIAL NUT' there is a 'WASHER-LOCK' (Part No.SL 40359, missing) which also restricts the movement of 'PIN' and a 'WASHER' (Part No. D49692, missing). After the 'WASHER', the Upper and Lower torque links are installed separated by a 'WASHER' (Part No. D56860, which was found on the center line of the runway).</p>

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Full image of the PIN (Part No - D 64724) with its relevant components, including the sequence of detachments of all components, is shown below:



1. 'LOCK WASHER', Part No. SL61WTM12P, -----At first the Lock washer with Sealant went off
2. 'SPECIAL NUT', Part No. SL40358P -----Then the Special Nut opened
3. 'WASHER-LOCK', Part No.SL40359 -----Thirdly the threaded washer opened and went off
4. 'WASHER', Part No. D49692 -----Then one of the washers went off
5. 'Link Bushed Torque' (lower), Part No. GA64576 ----- Unfastened and went off
6. 'WASHER', Part No. D56860 -----Then another washer opened, found center line of the runway
7. 'Link Bushed Torque' (Upper), ----- Unfastened and went off
8. 'WASHER', Part No. D49691 ----- Next Washer opened, found on right shoulder of the runway
9. 'PIN', Part No D64724, (On top) ----- At last the PIN opened, found on right shoulder of the runway

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3.2.3  
Environment

(a) The Aircraft Accident Investigation Team (AAIT) intended to find out the probable cause for the separation of the 'PIN' (Part No D64724). Necessary assistance was provided by the manufacturer whereby it was ascertained that 'the thread area of the PIN was corroded. Manufacturer concluded that the corrosion was the main contributor for the disconnection of the Pin'.  
(b) Corrosion is an environmental factor.

3.2.4 Combination of Man and Environment.

Block diagram of sequential events leading to the SERIOUS INCIDENT in combination of Man and Environment.

**Block Diagram of Sequential Events Leading to the Serious Incident**

The aircraft had undergone 1C+2C+4C+2YE + out of phase inspection at FLYFIREFLY from 27.09.2021 to 05.11.2021

The aircraft was released to service on 05.11.2021

The line checks were carried out from 06.11.2021 everyday

The aircraft started its commercial flight from 07. 11. 2021 and since then, it flew 107 flights

Pre-Flight Inspection (PFI) was performed with no discrepancy on 17.11.2021 prior to departure for Saidpur.

At Saidpur the Incident took place on 17 November 2021

On initial inquiry, it was revealed that the nose wheel Torque link 'PIN' (Part No D64724) got separated from the link. Separation of the torque link PIN allowed the nose wheel to rotate freely at its own and at some point, it became perpendicular to the centre line of the runway, resulting into serious damage to the nose wheel assembly.

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### 3.3 Conclusions

Appended below are the **Findings, Causes and/or Contributing factors** established in the investigation.

3.3.1 Findings	<p>(a) 'PIN' (Part No D64724) with 'WASHER' (Part No. D49691) which was found on the right shoulder of the runway is locked by 'LOCK WASHER' (Part No. SL61WTM12P, missing) with 'SEALANT' (Part No. PR1826A2, missing) overlapped. After 'LOCK WASHER' there is a 'SPECIAL NUT' (Part No. SL40358P, missing) which holds the 'PIN'. After the 'SPECIAL NUT' there is a 'WASHER-LOCK' (Part No. SL 40359, missing) which also restricts the movement of 'PIN' and a 'WASHER' (Part No. D49692, missing). After the 'WASHER', the Upper and Lower torque links are installed separated by a 'WASHER' (Part No. D56860, which was found on the center line of the runway).</p> <p>(b) On the basis of the OIM (Operators Information Message), it is revealed that in the past the torque link PIN disconnection have been experienced in a number of in-service ATR aircraft.</p> <p>(c) According to the aircraft manufacturer, twenty additional cases have occurred on in-service ATR aircraft since 2010. (Reference ACCREP)</p> <p>(d) While conducting the investigation, the AAIT found some discrepancies/variances in the documents which are appended below:</p> <p>(1) The installed Nose Landing Gear was overhauled in RUAG Switzerland Ltd division Aviation on 01 Nov 2016. This inspection was included because of remaining 1227 LD to complete 12000 LD. The Functional test of NLG play was carried out in Fly firefly on 29 Oct 2021 vide ref 325110-FUT-10000-1.</p> <p>(2) While scrutinizing the Task Card (TC) performance document, in the column of '<b>component/material used</b>' the following 4 (four) items were consumed/replaced:</p> <p>(a) Washer D49692 (b) Lock Washer SL40359 (c) Washer MS9581-14 (d) Sealant PR 1826A2</p> <p>(3) All the above 4 items had Authorized Release Certificate (ARC) and serviceable label (as per initial document). As per the Job card requirement of ATR manual, removal and installation of NLG shock absorber, page # 14 of 14, <b>a new lock Washer PT No. SL 61WTM12P should have been removed and installed with new one.</b> The Investigation team did not find any document in terms of removal and installation of this <b>lock washer Part Number- SL 61WTM12P</b> in the FIREFLY SDN, BHD documents.</p> <p>(4) After the incident of 17 November 2021, on query from the AAIT, Firefly produced <b>amended</b> documents with the following information:</p> <p>"(a) Incomplete information and supporting document (ARC) in paper work of TC 316. (b) Record of material issuance from their materials store (c) Record of their stock of lock washer (PN: SL61WTM12P) prior and during the check"</p>
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	<p>(5) Firefly also itemised 5 (five) components in the <b>amended</b> task card page of description column '<b>Component /Materials used</b>'</p> <p>(a) Washer, D49692, (Serviceable Label attached with the amended document)</p> <p>(b) Lock Washer, SL40359, (Serviceable Label attached with the amended ed document)</p> <p>(c) Washer, MS9581-14 (Serviceable Label <b>not</b> attached with the amended document)</p> <p>(d) Sealant PR 1826A2, (Serviceable Label attached with the amended document)</p> <p><b>(e) Lock washer, SL61WTM12P, (Serviceable Label attached with the amended document).</b></p> <p>(6) The above No. <b>(e) Lock washer, SL61WTM12P</b> was the last component added by FIREFLY SDN -in <b>amended</b> document. In initial document this <b>Lock washer, SL61WTM12P</b> was not included in the column of '<b>component/material used</b>'.</p> <p>(7) On scrutiny it was found that the date of GOODS RECEIVED NOTE of <b>Lock washer, Part No. SL61WTM12P</b> was 23 Sep 2021 and the date of STORES REQUISITION of the same component (Lock washer, Part No. SL61WTM12P) was 28 Oct 2021.</p> <p>(8) The PO number 4000243745, (date: 25/06/21, Location: FY store in the serviceable label) of <b>Lock washer, SL61WTM12P</b> did not correspond with the PO 4000246165 of Goods Received Notes', Serial Number 9.</p> <p>(9) The certificate number mentioned in Svc label of Lock washer (4100218651000010001 EASA form 1) did not correspond with the Certificate Number (M 749760/21) of Goods received Note of Lock washer (Part No. SL61WTM12P)</p> <p>(10) The PO number 4000243745, (date: 25/06/21, Location: FY store in the serviceable label) of Lock Washer also did not correspond with the PO number (4000246165) of Lock washer of 'Incoming goods Inspection Report'.</p> <p>(11) As per the amended document, the serviceable label of <b>Lock washer, SL61WTM12P</b> was issued on <b>25 June 2021</b> but the <b>Lock washer, SL61WTM12P</b> received date was on <b>23 Sep 2021</b> (as per the Goods received note). The same <b>Lock washer, SL61WTM12P</b> was inspected on <b>23 Sep 2021</b> as per the incoming goods inspection report. It is incomprehensible that how the lock washer was issued with serviceable label on 25 Jun 2021 before the receiving date that is 23 Sep 2021.</p>
3.3.2 Causes	<p>(a) The main cause of this serious incident was 'Environmental Factor' wherein; eventual loss of median torque link 'PIN' (Part No D64724) due to the corrosion of the thread of the PIN and,</p> <p>(b) Probably the 'Nut' (Part No. SL40358P, not found) causing the loosening of the nut leading to the loss of steering function.</p> <p>(c) Material loss due to corrosion was responsible for thread contour failing. This failing results in increased load on the remaining threads leading to their deformation and allowing the nut to become detached from the PIN.</p>

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	(d) In view of Findings, the AAIT is in the opinion that lock washer Part Number- SL 61WTM12P was not discarded/changed. As such, the old lock washer could not grip/hold the lock nut properly which augmented the loosening of the retaining nut and allowing the retaining nut to be separated from the PIN.
3.3.3 Contributing Factors	<p>(a) The thread area of the APEX PIN was corroded and probably corrosion was also present on the 'Nut' (Part No.SL40358P, not found). These were concluded to be the main contributor for the disconnection of the Pin.</p> <p>(b) Lock washer Part Number- SL 61WTM12P was not changed during the major inspection by Fly firefly in Malaysia. This was also another contributing factor.</p>

### 3.4 Safety Recommendations

3.4.1 Intermediary Safety Recommendations	An Intermediary Safety Recommendation was forwarded to CAAB on 07 June 2022 with an advice that all ATR aircraft operators (Pax and Cargo) of Bangladesh should conduct at least one-time Inspection of the nose wheel torque link 'PIN', in addition to routine and periodic inspection of the same, to prevent similar recurrence.
3.4.2 Safety Recommendations	<p><b>NOVOAIR and all other ATR Air Operators (Pax and Cargo) of Bangladesh should:</b></p> <p>(a) Take appropriate environmental protection and anti-corrosive measures to prevent decay of the thread area of the NLG PIN of ATR aircraft.</p> <p>(b) Perform repetitive inspection of the NLG PIN in accordance with the instructions of SLS VSB (Vendor Service Bulletin) 631-32-221 Rev 3 and OIM (Operators Information Message) 2022/008 issue 1.</p> <p>(c) Firmly adhere to the instructions of SB (Service Bulletin) and OIM (Operators Information Message) iro NLG of ATR aircraft.</p>

## 4. APPENDICES

4.1 All statements, evidences, documents, images/photographs etc. have been Preserved in the 'File'.

End

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