



**FINAL INVESTIGATION REPORT
OF
SERIOUS INCIDENT TO M/S INDIGO
ATR 72-600 AIRCRAFT VT-IYD
AT HYDERABAD ON 28th MARCH 2018**

**AIRCRAFT ACCIDENT INVESTIGATION BUREAU
MINISTRY OF CIVIL AVIATION
GOVERNMENT OF INDIA**

FOREWORD

This document has been prepared based upon the evidences collected during the investigation and opinion obtained from the experts. The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under Rule 11 of Aircraft (Investigation of Accidents and Incidents), Rules 2017 of India. The investigation is conducted not to apportion blame or to assess individual or collective responsibility. The sole objective is to draw lessons from this incident which may help in preventing such incidents in future.

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FINAL INVESTIGATION REPORT OF SERIOUS INCIDENT TO
M/s INDIGO ATR 72-212A (600) AIRCRAFT VT-IYD AT HYDERABAD
ON 28/03/2018

1.	Aircraft Type	ATR 72-212A (600)
2.	Nationality	INDIAN
3.	Registration	VT - IYD
4.	Operator	IndiGo Airways
5.	Pilot – in –Command	ATPL Holder
6.	Place of incident	Hyderabad
7.	Last point of Departure	Tirupati
8.	Intended place of Landing	Hyderabad
9.	Date of incident	28.03.2018
10.	Time of the incident	1635 UTC
11.	Passengers on Board	72+1 Infant
12.	Extent of Injuries	NIL
13.	Crew on Board	02+02
14.	Extent of Injuries	NIL
15.	Phase of Operation	Landing
16.	Type of Incident:	Tyre Burst

(ALL TIMINGS IN THE REPORT ARE IN UTC)

1. Factual Information

1.1 History of Flight

ATR 72-212A (600) aircraft while operating scheduled flight (Tirupati – Hyderabad) was involved in a serious incident during landing at Hyderabad on 28.03.2018. The aircraft was under the command of a Pilot holding ATPL with a CPL holder acting as First officer. There were a total of 73 passengers and 04 crew members on board the aircraft. The incident occurred during night conditions.

The aircraft took off from Tirupati and the flight enroute was uneventful. The aircraft landed at Hyderabad airport at around 1634 hours UTC. Prior to the incident flight, the same crew had operated five sectors on the same day. The weather reported at the time of landing at Hyderabad was visibility approx. 6000 meters, winds 140/04 Knots and Temperature 28⁰C.

The touchdown was in the touchdown zone. During the landing roll, the crew experienced vibrations and had simultaneously received call from ATC that they observed fire below the aircraft. Immediately, the aircraft was stopped on runway at approximately 1550m from 09R threshold.

During touchdown, all four tyres of the main under carriage had burst shredded. Both port and starboard side wheel hubs had sustained substantial damage. On the port side, the worn out tyre material got stuck in between the axle and the ground leaving very minimal ground clearance for any direct access to position the MLG adaptor for lifting the wheel. Similarly, on the starboard side the bottom portion of the wheel-hub was heavily eroded because of its continuous rubbing on the runway surface after the tyres had burst. This again resulted in very minimal or no adequate clearance to place the MLG adaptor for lifting the wheel.

After replacement of outer wheels of the LH & RH main landing gears, the aircraft was towed from the runway under “Follow-Me” service and taken to stand 59 via taxiway A6-B5. Aircraft was on block at stand 59 at time 0225 hours/29th March 2018. A total of 30 flights got diverted from Hyderabad due to the runway blockage.

1.2 Injuries to Persons

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR / NONE	04	72+1 (infant)	Nil

1.3 Damage to Aircraft

- No. 1 main wheel tyre worn out till the hub from the bottom and No. 2 main wheel tyre got burst completely.
- No. 3 & 4 main wheel tyres worn out from the bottom including approx. 20% of hub.
- Brake hydraulic line LH side above the axle got deformed.
- LH side main landing gear door had a dent in the aft edge at root.



1.4 Other Damage

None

1.5 Personnel Information

1.5.1 Pilot-in-Command

Age	38 years
License	ATPL holder
Date of Issue	07.12.2015
Valid up to	06.12.2020
Class	Single/Multi Engine, Land
Category	Aeroplane
Endorsements as PIC	ATR72-600
Date of Med. Exam	19-01-2018
Med. Exam valid upto	18-01-2019
FRTTO License.	Valid
Total flying experience	5653:00 hours
Experience on Type	5083:21 hours
Experience as PIC on type	1845:32 hours
Total flying experience during last 06 months	218:52 hours
Total flying experience during last 30 days	109:18 hours
Total flying experience during last 07 Days	28:15 hours
Total flying experience during last 24 Hours	07:00 hours

The PIC joined the organisation as type rated captain as he was a rated commander with flying experience of more than 2500 hrs. During the selection, detailed Pilot Performance analysis was carried out using the Pilot performance model which the operator has developed.

1.5.2 First Officer

Age	28 years
License	CPL holder
Date of Issue	11.03.2015
Valid up to	10.03.2020
Class	Single/Multi Engine, Land
Category	Aeroplane
Endorsements as PIC	Nil
Date of Med. Exam	05-10-2017
Med. Exam valid upto	04-10-2018
FRT0 License.	Valid
Total flying experience	1381:06hours
Experience on Type	1097:06hours
Total flying experience during last 06 months	213:06 hours
Total flying experience during last 30 days	78:19 hours
Total flying experience during last 07 Days	24:40 hours
Total flying experience during last 24 Hours	12:03 hours *

The First Officer joined the organisation as first officer with flying experience of 1224 hours out of which 952 hours were on ATR 42/72.

* The flying hours includes hours flown on the full previous day also.

1.6 Aircraft Information

The ATR 72-212A (600) is a subsonic, civil transport aircraft. The aircraft has two turboprop engines manufactured by M/S Pratt & Whitney. The aircraft is designed for operation with two pilots and has passenger seating capacity of 74.

The maximum operating altitude is 25,000 feet and maximum take-off weight is 23000 Kg. The Maximum Landing weight is 22350 Kg. The Aircraft length is 27.166 meters, wingspan is 27.050 meters and height of aircraft is 7.72 meters. The distance between main wheel centres is 4.100 meters. The Engine Ground Clearance is 3.19 meters.

Landing Gear

The landing gear has a forward retracting nose gear and two retractable main gears mounted partially in the side pods and partially in the fuselage. They are hydraulically operated and electrically controlled. Gear doors enclose the landing gear bays. The main landing gear supports a three section door to restore fairing contour when gear is up and locked. Each main gear assembly has an oleo pneumatic shock absorber and is equipped with two wheels. Each main wheel is fitted with brakes and antiskid. The brakes are equipped with an automatic adjuster, a wear indicator pin, and an overheat detector. The main gear wheels are fitted with three fusible plugs (overheat protection) and one pressure relief valve (overpressure protection). In case of hydraulic or electrical power supply failure, the landing gear can be extended by gravity.

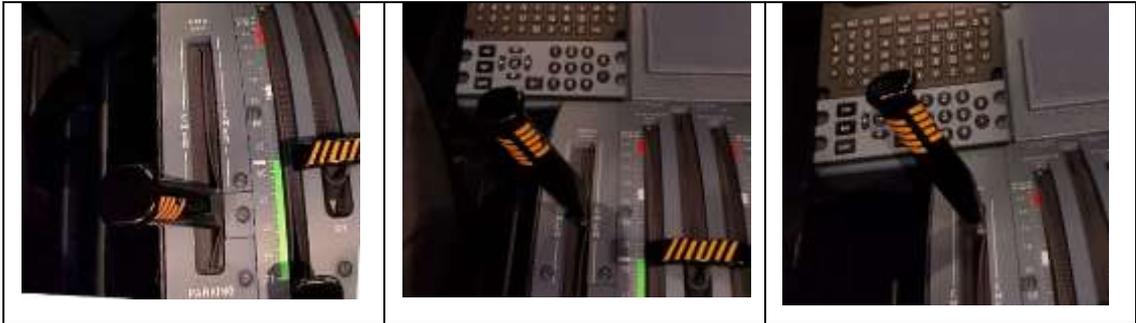
Emergency and Parking braking

The flight crew controls the normal braking via the brake pedals. Depending on the pedal deflection, the pressure supplied to the brakes can go up to 3000 psi. The pressure applied to the brakes is further controlled by the antiskid system which keeps the main wheels to the limit of skid, preventing the wheel lock.

The flight crew controls the brakes via the emergency and parking brake handle. Each brake is equipped with an automatic adjuster, a wear indicator pin, and an overheat detector. The main gear wheels are fitted with three fusible plugs (overheat protection) and one pressure relief valve (overpressure protection).

Emergency Parking Brake Handle is used to apply brakes in emergency and parking braking mode through the emergency and parking metering valve. This valve is spring-loaded to the OFF position.

In emergency and parking braking, the antiskid is bypassed. When the lever is in emergency position, the brakes are supplied with 870 psi. When the lever is in parking position, the brakes are supplied with 3000 psi



- EMER** : A metered pressure is applied to the brakes.
PARKING : Full pressure is applied to the brakes

The subject aircraft (MSN 1480) was issued with Certificate of Airworthiness Number 6987 under "Normal category" subdivision Passenger/Mail/Goods by DGCA on 21 Feb 2018. The specified minimum operating crew is two. At the time of incident, the Certificate of Airworthiness was current. This aircraft was operated under Scheduled Operator's Permit No S-19 which is valid up to 2nd August 2022. As on 28th March 2018, the aircraft had logged 280:30 Airframe Hours and 264 cycles.

The aircraft and its engines are being maintained as per the maintenance program consisting of calendar period/ flying hours or cycles based maintenance as per maintenance program.

On -600 type of aircraft, if the parking brake is at "OFF" position, there is no indication as during the flight the parking brake has to be in the OFF position only. However, if the parking brake is "ON" the indication, "USE EMER BRAKE, PARKING BRAKE ON" will appear in AMBER colour.

The “Before Landing” normal checklist requires that Flaps has to be “checked”

BEFORE LANDING

CABIN CREW.....	ADVISED
LDG GEAR.....	3 GREENS
FLAPS.....	CHECK
PWR MGT	TO
TLU LO SPEED.....	CHECK
ICING AOA LIGHT.....	AS RQRD
EXT LIGHTS	ON

The location of the Flaps indication in the cockpit is just below where the indication of “USE EMER BRAKE, PARKING BRAKE ON” will appear in AMBER colour. The two situations are as shown.

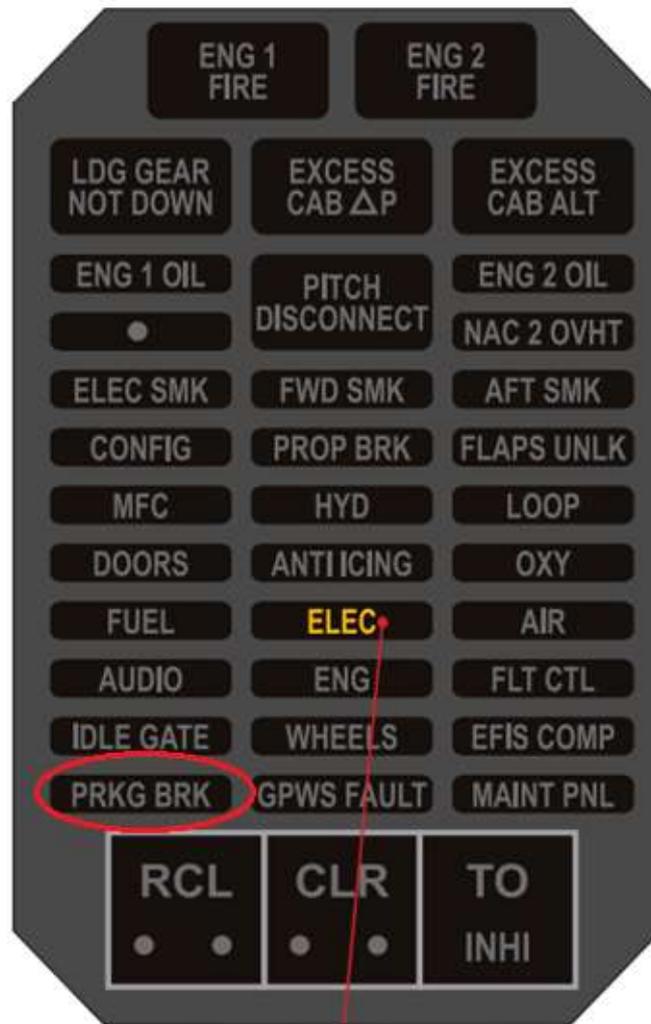


PARKING BRAKE OFF (72-600)



PARKING BRAKE ON (72-600)

In -500 aircraft, there used to be an indication as below and in case the Parking Brake handle was not in OFF position, then PRKG BRK will illuminate.



(ATR 72-500 AIRCRAFT)

1.7 Meteorological Information

The following is the METAR information for Hyderabad Airport, of the date of incident.

Time (UTC)	Wind Dir (Degree)	Speed (kts)	Visibility (meters)	Temp (°C)	QFE (hpa)	QNH (hpa)
1600	130	04	6000	28	0940	1012
1630	140	04	6000	28	0940	1012
1700	150	04	6000	27	0940	1012
1730	150	04	6000	27	0940	1012

1.8 Aids to Navigation

All navigational aids were available and working on the aircraft as well as at the airport.

1.9 Communications

There was always two way communications between the aircraft and ATC.

1.10 Aerodrome Information

There is one single runway 09/27 available at Hyderabad international airport. The ILS is available for approach for runway 27. DVOR is also available at HIAL. The ATC is controlled and manned by Airport Authority of India.

1.11 Flight Recorders

The Cockpit Voice Recorder (CVR) data and the Digital Flight Data Recorder (DFDR) data were downloaded for investigation.

CVR: Make: L3, Part No. 2100-1225-22, S/N: 001242725

DFDR: Make: L3, Part No. 2100-4245-00, S/N: 001149901

1.12 Wreckage and Impact Information.

The aircraft landed in the touchdown zone and during the landing roll stopped on runway at approximately 1550m from 09R threshold. As per the runway skid marks, it was observed that the aircraft after touch down veered to the right and thereafter turned toward the runway center line.



The final rest position of the aircraft was diagonal to the runway center line. All four wheels of the main under carriage had burst and the tyres were shredded.



DAMAGE TO PORT MAIN WHEEL ASSEMBLY



DAMAGE TO STARBOARD MAIN WHEEL ASSEMBLY



STARBOARD WHEEL/ RIM RUB MARKINGS ON RUNWAY

1.13 Medical and Pathological Information

Both cockpit crew and all cabin crew had undergone Breath analyser check during the pre-flight medical check prior to the flight at Delhi and were found negative. After the incident, the breath analyser test was carried out and same was found to be negative.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The incident was survivable.

1.16 Tests and Research

Nil

1.17 Organizational and Management Information:

The aircraft is owned by a scheduled airline. It operates flights on domestic and international sectors. The Company is headed by a CEO assisted by a team of professionals heading each department. The Chief Pilot (Standards and QA) is responsible for Flight Crew Standards and Quality Assurance of Flight Crew Training.

1.18 Additional Information

After the incident, the only runway available at Hyderabad was blocked and there were around 30 diversions to domestic and international scheduled flights. The runway was not available from 2200 hrs. IST of 28/03/2018 to 0210 hrs. IST of 29/03/2018. Deeper investigation of the aspect was therefore carried out by looking at the regulation/ requirements, availability of infrastructure at airport, Emergency Response Plan of the operator etc.

1.18.1 As per Annex 14 — Aerodromes, Volume I on “Aerodrome Design and Operations”, **each aerodrome must draw up a comprehensive plan for the removal of a disabled aircraft on or adjacent to, the movement area and appoint a coordinator designated to implement the plan, when necessary.**

The removal plan should include the following: -

- a) a list of equipment and personnel available on or in the vicinity of the aerodrome;
- b) a list of additional equipment available from other aerodromes on request;
- c) a list of nominated agents acting on behalf of each operator at the aerodrome;
- d) a statement of the airlines arrangements for the use of pooled specialist equipment; and
- e) a list of local contractors (with names and telephone numbers) able to supply heavy removal equipment on hire.

It further requires that the above information should be contained in the relevant aerodrome disabled aircraft removal plan. Furthermore, **aerodrome authorities are required to make available to the appropriate aeronautical information service units information on the capability to remove a disabled aircraft on or adjacent to the movement area.** This may be expressed in terms of the largest type of aircraft that the aerodrome is equipped to remove. This capability should be based on the equipment available at the aerodrome and on equipment which, according to the disabled aircraft removal plan, can be available at short notice. Should the plan take into account an airlines pooling arrangement, the capability to remove a disabled aircraft should also take into consideration the specialized aircraft recovery kits available (at nearby airport).

Responsibilities for the removal of a disabled aircraft lie not only with the aircraft operator, but also with the State and the aerodrome operator. The aerodrome operator must have an officer designated to coordinate the aircraft recovery operation and a disabled aircraft removal plan available. In addition, copies of the aircraft operator's removal plan for every regular user of the aerodrome should also be available.

- **However, the registered owner or aircraft operator retains complete responsibility for the removal.**

1.18.2 GMR Hyderabad Disabled Aircraft Removal Plan:

The Disabled Aircraft Removal Plan of GMR Hyderabad mentions that the primary responsibility for removal of the disabled aircraft is that of the concerned aircraft operator and therefore they shall make all possible efforts with available resources to commence removal operations at the earliest.

In case, specialized lifting equipment i.e., pneumatic lifting bags and jacks etc. are considered essential for removal operation, the aircraft operator shall contact Air India which has specialized equipment positioned at Mumbai under the IATA pooling arrangement. It also requires that the operator will designate one representative with authority to take all necessary technical and financial decisions for removal of the aircraft and who in association with the airport coordinator would develop a comprehensive plan for removal of the aircraft.

1.18.3 Operator's Emergency Response Plan

During the investigation, the operator was requested to provide the Emergency Response Manual particularly the disabled Aircraft removal plan for Hyderabad airport. A single page was provided which covers the procedure for hiring the aircraft removal kit from Air India, captioned Directory for Aircraft Disability Removal.

As per the procedure mentioned in this "Directory for Aircraft Disability Removal", of the operator, Air India is responsible to provide the Aircraft disabled removal kit to them along with Engineers. The list of equipment of removal kit has been shared by Air India with the operator. During the process, aircraft engineers of the operator will provide support services.

On the day of incident, after the aircraft was stuck on the runway, initial assessment for aircraft recovery was carried out by the engineering team of the operator. All four main wheels had burst and there was no provision to perform main wheel replacement using main wheel jack adapter and main wheel axle jack. Initial assessment was shared with MCC for action plan.

At that time, there was no experienced ATR personnel available in the MCC. It was decided to lift the main wheels from its main landing gear jack pad using axle jack & its adapter and replacement of main wheels for towing. The special adaptor, however, was not available. In the process of jacking, it was observed that main wheel tyre carcass was obstructing the positioning of jack adapter. To gain access, carcass was cut using electrical power tools.

Special tool (jack adapter) was procured from other operator to get access for jacking the aircraft from main landing gear jack pad. After jacking up the aircraft, main wheel no. 1 was replaced. Using the same jack adapter, main wheel no. 4 was also replaced.

1.18.4 Specific Tools Recommended by M/s ATR

Every aircraft manufacturer provides a list of Specific Tools which the aircraft operator should have at the places where the aircraft is operating in order to quickly remove that type of aircraft if disabled. ATR has proposed specific tools designed for both ATR 42 and ATR 72 that can be useful during the aircraft recovery operation. These tools are referenced in the Aircraft Recovery Manual. These are special tools for lifting, shoring, jacking, cradles, tow bars, tugs, anti-tipping devices, mooring kits and special tools for defueling. Some of these tools were not available at the airport either with the operator or any other agency.

1.18.5 Pilot Induction and Their Training

The operator has devised an elaborate Pilot Performance Model which is used at the time of selection of the various levels of flight crew members, which covers not only the psychological parameters and the individual profile but also the challenge areas according to which the interviews can be held. The reports are provided to the interview board covering all aspects of selection.

As per the Operations Manual Part D – Flight Crew Training Programme of the Operator, in addition to other things operator's conversion policy requires familiarisation training. The type rated pilots joining from other company are subjected to induction training including differences between the aircraft previously operated and the aircraft operated by the company. The amount of training required by the operator's conversion course is determined after information is taken from the flight crew member's previous training records.

There is no mention in the Flight Crew Training Programme of the detailed pilot performance analysis report which is obtained for every pilot joining the organisation and has got details about the strengths, weak areas, behavioural traits, assertiveness, manageability, attitude, decisiveness etc. Neither this report is available with the training department.

1.18.6 Maintenance Control Centre (MCC)

Maintenance Control Centre (of the operator) serves as the focal point for all maintenance operations. The centre coordinates with line maintenance activities by maintaining continuous communication links with operating stations, operating aircraft and the concerned departments. The centre coordinates with line maintenance requirements and flight schedule changes with Flight Operations/OCC/Planning department.

It is centrally located at Delhi and manned 24x7 days. MCC has been provided with sufficient number of facilities for two-way communication. All aircraft, engine & vendor technical documents are available in MCC in soft copy. MCC is equipped with maintenance software like AMOS, Airman, etc. and monitors aircraft status on real time basis through ACARS.

Maintenance Control Centre responsibilities include the implementation, coordination and control of technical support and coordination between various departments and **delay management**

MCC support also includes, coordinating and authorizing maintenance whenever an in-service airplane with a technical difficulty is en-route to, **at**, or inbound from outstation. Coordination also is to be done so that all necessary resources (spares, skilled manpower, facilities and equipment etc.) are available at out stations to promptly return the aircraft to service which are having technical difficulties.

1.18.7 Flight Recorders & Pilot Interview (During Investigation)

The CVR was replayed and it was observed that there was discussion among the flight crew members about the application of parking brake. Flight crew were aware of the same and were asked to give the details of these discussions. In the subsequent statement, the Pilot-in-Command informed that during the flight he has shown the first officer the two positions of the brake handle i.e. the parking position and emergency position. He also stated that the handle was actually taken to these positions. After this discussion among themselves during the flight, the crew were busy with the preparation for the descent and approach and PIC was not able to recall at what position the

parking brake handle was left. The subject flight was the 6th sector flown by the flight crew on that day.

The first officer has mentioned that during the landing roll, when he felt there was a tyre burst and ATC advised them of fire on the main landing gear, he noticed that the parking brake was in emergency position which he immediately released and advised the Pilot-in-Command also of the same.

The DFDR read out revealed that at the time of touch down, the Pitch and Roll were 2.1° and 1.5° respectively; vertical acceleration was 0.96 g which went upto a peak value of 1.05 g. No significant lateral acceleration has been recorded during the landing. Also, the pressure at each brake was about 1000 PSI which indicates parking brakes were active at the point of touch down. Antiskid system was not active. This brake pressure got released when the brake handle was released.

1.19 Useful or Effective Investigation Techniques

Nil

2. Analysis

2.1 General

- ✚ Both operating crew were appropriately licensed and qualified to operate the flight. Their preflight Medicals were valid. They have undergone all refresher trainings and nothing was wanting as per the requirements.
- ✚ The aircraft had a valid Certificate of Airworthiness at the time of incident. The Aircraft held valid Certificate of Release to Service. The Aircraft was holding a valid Aero Mobile License. Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications has been complied with. Transit inspections were carried out as per approved transit inspection schedules and all higher inspection schedules including checks/inspection as per the manufacturer's guidelines.
- ✚ The weather at the airport at the time of incident was fine and is not a contributory factor to the incident.
- ✚ According to the DFDR readout, at the time of touchdown, the Pitch was 2.1°; Roll was 1.5°; vertical acceleration was 0.96 g which went up to a peak value of 1.05g. No significant lateral acceleration was recorded during the landing. All these indicate that as far as flight is concerned, it was perfectly fine till touchdown.
- ✚ From the time of touchdown up to the time brake handle was released, the pressure at each brake was about 1000 PSI (which is slightly above the Emergency Handle position) and the anti-skid system was not active. This led to bursting of all four main wheels tyres. This was followed by skidding of the rims causing abnormal heating of main structural items (wheel axle, trailing arm, and barrel).

2.2 Induction of Experienced Crew and Training

During investigation, based on multiple why concept, the main question was why the parking brake handle flight was moved away from 'off' position even for explaining the movement of the handle. It should not have been touched in flight, whatever the reason might have been there.

The PIC joined the organisation as type rated captain as he was a rated commander with flying experience more than 2500 hrs.

The First Officer joined the organisation as first officer with flying experience of 1224 hours out of which 952 hours were on ATR 42/72. Both crew members fulfilled all requirements for operating the flight.

Deeper analysis revealed that the operator has devised an elaborate Pilot Performance Model which is used at the time of selection of the various levels of flight crew members, which covers not only the psychological parameters and the individual profile but also the challenge areas according to which the interviews can be held. The reports are provided to the interview board covering all aspects of selection.

As per the Operations Manual Part D – Flight Crew Training Programme of the Operator, in addition to other things operator's conversion policy requires familiarisation training. The type rated pilots joining from other company are subjected to induction training including differences between the aircraft previously operated and the aircraft operated by the company. The amount of training required by the operator's conversion course is determined after due observations have been taken of the flight crew members previous training records.

There is no mention in the Flight Crew Training Programme of the detailed pilot performance analysis report which is obtained for every pilot joining the organisation and has got details about the strengths, weak areas, behavioural traits, assertiveness, manageability, attitude, decisiveness etc. Neither this report is available with the training department.

The whole essence of the pilot performance analysis report is lost if various attributes of the individuals captured in the report are not utilised for improvement purposes during training, e.g. one may have lesser willingness to follow Standard Operating Procedures which can be improved upon during the training. The flight crew fulfilled all regulatory requirements and professional competence but the Pilot- Performance-Analysis report would have made an individual aware of the pitfalls during flying which he should avoid.

The issue is not an isolated case but a systemic one.

2.3 Disabled Aircraft Removal.

After the incident, the runway was blocked and there were around 30 diversions to domestic and international scheduled flights. The runway was

not available for more than 4 hours. The time of closure and number of diversions could have been reduced. Though comprehensive plan for the removal of a disabled aircraft on or adjacent to, the movement area was available but there was no integration of the same with the ERP of the operator particularly from the availability of resources and co-ordination point of view.

During investigation, the issue of responsibilities for the removal of a disabled aircraft cropped in. The regulations no doubt require that the primary responsibility lie with the aircraft operator, but the aerodrome operator has an equal role to play in a proactive manner, if the removal is unreasonably delayed. The aerodrome operator should also have information for coordination of the disabled aircraft removal. This was missing as the aircraft operator was not having any practical plan for the removal of aircraft resulting in avoidable delay.

In addition to the coordination for the maintenance activities, MCC (of the operator) also coordinates between various departments for **delay management**. It is manned 24x7 days. Coordination also is to be done so that all necessary resources (spares, skilled manpower, facilities and equipment etc.) are available at out stations to promptly put the aircraft back to service which are having technical difficulties.

On the day of incident, after the aircraft was stuck on the runway, there were no experienced ATR personnel available in the MCC. The special adaptor for lifting the main wheels was not available. All tools as per the requirement of Specific Tools recommended by the manufacturer were also not available.

It has been observed that the operator could have been better prepared with resources and manpower at Hyderabad itself as far as removal of aircraft from the runway was concerned.

2.4 Circumstances leading to the Incident

The flight was 6th in succession by the flight crew on the day of incident. Previous 5 flights and the incident flight till touchdown was uneventful. The touchdown was in the touchdown zone. During the landing roll, the crew experienced vibrations as all main wheels had burst and the aircraft skidded on the rims.

The wheel track markings on the runway and the significant erosion of both side wheel hubs of the main undercarriage assembly indicated that starting from the touchdown till the final halt of the aircraft, the wheels didn't rotate. Initial wheel markings showed continuous unbroken rubber marks and after about another 100 m distance, the surface marks by metal component (wheel-hub contacting the ground) were seen along with the rubber markings.

The starboard side markings were highly prominent till the stop position. There was corresponding damage to the wheels and hubs. The port side wheel marks on runway surface were initially faint with traces of rubber deposits which gradually increased in prominence and became significant during the last 50 meters of the skid. Shortly before the stop position, the aircraft gradually drifted towards the right side from the runway centerline and the aircraft swung to the left just prior to coming to halt.

During the flight, there was discussion among the crew members on application of the parking brakes and Pilot-in-Command explained how the parking brake handle has to be taken out of the groove for applying the brakes in case of emergency / parking.

The brake handle was actually taken to the parking position and emergency position. After this discussion among themselves during the flight, the crew were busy with the preparation for the descent and approach and the parking brake handle was left in the "EMER" position. There was an ATC call which required attention of the flight crew and the crew forgot to bring back the parking brake handle to OFF position.

During the landing roll, ATC advised the flight crew of fire on the main landing gear. At that instance, the First Officer noticed that the parking brake was in emergency position which he immediately released and informed the Pilot-in-Command about the same.

3 CONCLUSIONS

3.1 Findings

- i. The aircraft was having valid Certificate of Registration and Certificate of Airworthiness. The ARC was also valid. All maintenance schedules, mandatory modifications and checks were carried out as per the requirements. There were no defects / snags pending rectification.

- ii. The weather reported at the time of landing was fine with a visibility of 6000 meters.
- iii. The aircraft was under the command of an appropriately licensed ATPL holder with a CPL holder as the First Officer. Their medical was valid and both pilots had undergone pre-flight medical checks including BA test which was negative.
- iv. The flight was 6th in succession by the flight crew on the day of incident. Previous 5 flights and the incident flight till touchdown was uneventful.
- v. The touchdown was made in the touchdown zone. Vibrations were experienced during landing roll.
- vi. After touchdown, the aircraft veered to the right and thereafter turned toward the runway center line. The final rest position of the aircraft was diagonal to the runway center line.
- vii. All four wheels of the main under carriage got burst and shredded.
- viii. The airport was closed for more than 4 hours. A total of 30 flights got diverted from Hyderabad due to the runway blockage.
- ix. During the flight, there was discussion among the crew members on application of the parking brakes. Pilot-in-Command demonstrated to his first officer as to how the parking brakes handle has to be taken out of the groove for applying the brakes in case of emergency / parking.
- x. The brake handle was actually taken to the parking position and emergency position during the flight.
- xi. The crew then got busy with the preparation for descent and approach.
- xii. The flight crew forgot to bring back the parking brake handle to OFF position and left slightly above the emergency position.
- xiii. The aircraft touchdown with the parking brakes slightly above the emergency position and resulted in consequential damages to wheels and hubs.
- xiv. Pilot performance analysis report which is obtained for every pilot at the time of joining the organisation is neither made available to the training department, nor it is utilised for individual's improvement during training.
- xv. The airline operator could have been better prepared with resources and manpower at Hyderabad for removal of disabled aircraft from the runway.

3.2 Probable Cause of the Incident

“During flight, the crew had put the parking brakes to emergency position, while Pilot-in-Command explained and demonstrated its (parking brake) working to the First Officer. Both of them forgot to put the parking brakes back to “OFF” position. As the parking brakes continued to be at ‘EMER’ position during touchdown and landing roll, this resulted in consequential damages during touchdown and landing roll.”

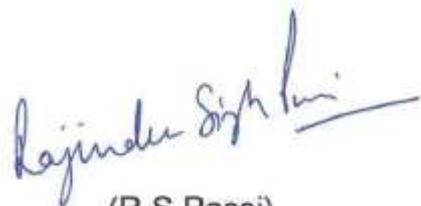
4 Safety Recommendations

- I. All airlines should ensure that the pilot performance analysis report (relevant portion) which is obtained for every pilot at the time of joining the organisation is made available to the flight crew training department to be utilised for individual’s improvement during training.
- II. Notwithstanding that the primary responsibility of the disabled aircraft removal is of the aircraft operator, DGCA should evolve an amicable mechanism, which ensures that the airport operators are able to ensure the availability of minimum infrastructure and manpower required to remove disabled aircraft and restart smooth operations with minimum possible delay.
- III. DGCA may ensure that all airlines have a robust and working Emergency Response Plan with defined responsibilities of the individuals in case of an occurrence. This Plan should be fully integrated with the Airport Emergency Plan.



(Shilpy Satiya)
Investigator

Aircraft Accident Investigation Bureau



(R S Passi)
Investigator-in-Charge

Aircraft Accident Investigation Bureau

Date : 20.05.2019

Place : New Delhi