

REPORT

**ON ACCIDENT TO
M/S KINGFISHER AIRLINES ATR-72 AIRCRAFT
VT-KAC AT MUMBAI ON 10.11.2009.**

**AIR SAFETY DIRECTORATE
O/o DIRECTOR GENERAL OF CIVIL AVIATION
OPP. SAFDARJUNG AIRPORT, NEW DELHI**

Foreword

This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts and laboratory examination of various components. The investigation has been carried out in accordance with Annex. 13 to the Convention on International Civil Aviation and under the Aircraft Rule 71 of 1937. The investigation is conducted not to apportion blame or to assess individual or collective responsibility. The sole objective is to draw lessons from this accident which may help to prevent future accident or incident.

GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

AAI	:	Airports Authority of India
ATCO	:	Air Traffic Control Officer
ASDA	:	Accelerated Stop Distance Available
ATC	:	Air Traffic Control
ATPL	:	Airlines Transport Pilot License
CPL	:	Commercial Pilot License
CRM	:	Crew resource Management
DATIS	:	Digital Automatic Terminal Information Service
DME	:	Distance measuring equipment, gives aircraft distance from the facility
LDA	:	Landing distance available
MDA	:	Minimum descent altitude
m.	:	Meters
NOTAM	:	Notice to Air Man
NM	:	Nautical Miles
QRH	:	Quick Reference handbook
IST	:	Indian Standard Time
TODA	:	Take Off Distance Available
TORA	:	Take Off Run Available

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|-----|---|--------------|--|
| 1. | Aircraft | Type | : Aircraft |
| | | Model | : ATR 72-212 A. |
| | | Nationality | : Indian. |
| | | Registration | : VT-KAC. |
| | Engine | Type | : Turbo-prop. |
| | | Model | : PW 127 F |
| 2. | Owner | | : M/s KF Aero, Paris, France. |
| 3. | Operator | | : M/s Kingfisher Airlines, Mumbai |
| 4. | Date of accident | | : 10 th November, 2009. |
| 5. | Time of accident | | : 16:40 IST. |
| 6. | Last point of departure | | : Bhavnagar |
| 7. | Point of intended landing | | : Mumbai |
| 8. | Geographical location of the site of accident | | : Lat. N 190519.5
: Long E 0725056.9 |
| 9. | Type of Operation | | : Scheduled Flight. |
| 10. | Phase of Operation | | : During landing. |
| 11. | Type of accident | | : Aircraft Skidded off R/W 27 A after landing. |

(All timing in IST)

SYNOPSIS:

M/s Kingfisher Airlines ATR-72-212-A aircraft VT-KAC while operating flight IT-4124 (Bhavnagar -Mumbai) was involved in an accident as it skidded off the runway 27A during landing at Mumbai Airport. There were 36 passengers, 2 Infants and four crew members on board the aircraft

As per the NOTAM, Runway 14/32 was under permanent maintenance on every Tuesdays since 10/11/2009 runway 27 was available only after runway intersection as runway 27A. To carry out operations on this reduced runway 27 a NOTAM 'G' No. G 0128/08 was issued by AAI on the same day of accident i.e. 10-11-2009 and designated as runway 27A for visual approach only. As per the NOTAM Landing Distance Available (LDA)/take off Distance available (TODA) was 1703 m. The weather conditions prevailing at the time of accident was winds 070/07 knots visibility 2800 m with feeble rain. Prior to Kingfisher aircraft, Air India aircraft IC-164, Airbus 319 had landed and reported to ATC that it had aquaplaned and broken two runway edge lights. The ATC acknowledged it and sent runway inspection vehicle to inspect the runway. The ATC person was not familiar with the terminology of 'aquaplaning' and not realizing the seriousness of it, cleared kingfisher aircraft for landing. At the time of accident there were water patches on the runway. ATC also did not transmit to the Kingfisher aircraft the information regarding aquaplaning reported by the previous aircraft. The DFDR readout revealed that kingfisher aircraft was not on profile as per localizer procedure laid down in NOTAM 'G' and was high and fast. The aircraft landed late on the runway and the runway length available was around 1000 m from the touchdown point. In the prevailing weather conditions this runway length was just sufficient to stop the aircraft on the runway. During landing the kingfisher aircraft aquaplaned and did not decelerate even though reversers and full manual braking was applied by both the cockpit crew. The aircraft started skidding toward the left of center line. On nearing the runway end, the pilot initiated a 45 ° right turn, after crossing 'N 10' Taxi track, the aircraft rolled into unpaved wet area. Aircraft rolled over drainage pipes & finally came to a stop near open drain. There was no fire. All the passenger safely deplaned after the accident.

The accident occurred due to unstablized approach and decision of crew not to carry out a 'Go-around'.

1. **FACTUAL INFORMATION.**

1.1 **HISTORY OF THE FLIGHT**

Kingfisher Airlines ATR-72-212 A aircraft VT-KAC was schedule to operate flight IT-4123 Mumbai-Bhavnagar and IT-4124 (Bhavnagar –Mumbai) on 10.11.2010. Prior to operating the flight IT-4123 both the crew underwent the pre-flight medical examination and carried out self briefing in the despatch. Self briefing was done by the commander covering the NOTAM's and prevailing weather conditions and short runway operation out of Mumbai TORA, TODA, LDA and ASDA holding and diversion considerations was discussed with the Co-pilot. Aircraft took off from Mumbai at 13:44 hrs and arrived Bhavnagar at 14:59 hrs. The flight from Mumbai to Bhavnagar was uneventful. At Bhavnagar crew again had briefing however as per the Co-pilot the briefing out of Bhavnagar was mainly on weather, there was general briefing for runway 27A however no specific briefing was given by the Commander for special localizer approach procedure to be followed for 27A.

After a halt of 37 minutes aircraft again took off from Bhavnagar at 15:36 hrs. There were 36 passengers 2 Infants and four crew members on board the aircraft. Kingfisher flight IT-4124 came in contact with ATC Approach, Mumbai around 17NM to touchdown. The ATC instructed KFR 4124 to continue approach.

On the day of accident, secondary runway 14/32 was under maintenance and the primary runway 09/27 was available after runway intersection as 27A. A day prior to 27A operation, Chief Flight Inspector of Flight Standard Directorate had telephonically intimated all the schedule operators and followed by written communication about the conditions required to be followed for safe operations of the flight. As per the instructions "only training captains are to be utilized for flight and the Co-pilot should have minimum 300 hours of experience on type. Further no assisted take off and landing is permitted and no operation shall take place when runway surface is wet". Also pilots are required to file debriefing report after every flight. The crew on the accident flight was not meeting the cockpit qualification required to operate the flight since the commander was not the training captain.

Considering the 27A operation AAI had issued a NOTAM GO129 dated 10 Nov.2009 for runway 27A Operations stating very clearly that ILS for runway 27A was not available. Further Final Approach Fix (FAF) was 9.5 DME in place of 10 DME and distance Vs altitude chart was given in the NOTAM for operation. The Aerodrome operating minima was given as 2800 m for CAT C aircrafts operating with performance suitable for runway 27. This procedure shall only be applicable for shortened runway 27A operation only. As per NOTAM only information for localizer approach for runway 27A will be available and the landing distance available 1703 m will be transmitted on DATIS during the operation on runway 27A. However there was no information on the NOTAM restricting the operation on wet runway.

The current weather report from DATIS was obtained 25 minutes prior to landing by the crew to confirm the weather and runway conditions .Pilot conducted the approach

briefings and the weather conditions were reviewed with runway 27A in use considering the effective NOTAMG. The ATC gave vectors for the LOC 27A and instructed Kingfisher to fly heading 230 and intercept the LOCALISER (LOC) with 17DME to touch down at that time the aircraft was at 14DME. ATC then instructed aircraft to intercept the LOC with 13 DME to touchdown. The LOCALISER (LOC) approach was made. They were cleared for the approach and intercept the LOC at 13 DME. At that point of time the aircraft altitude was 3700 ft. After intercepting LOC the crew initiated rapid descent from 3700 ft to MDA (540ft) at 10 DME. The crew set landing configuration and initiated a rapid descent after radar advised the aircraft that they were high and not on profile. The pilot disconnected the autopilot in order to descent fast by manually flying the aircraft. Flaps 15 were selected at 07 DME. At 140 kts, gear was selected down. The descent was continued and FLAPS 30 were selected down. The ATC called for confirming runway in sight. At 03 DME at 2200 ft ALT the crew confirmed runway in sight. The Pilot continued the descent and saw the PAPI's all 4 whites. Subsequently, the pilot reduced power and Condition lever were advanced to 100% OVRD in order to be on profile. At 200 ft. the crew regained 2 whites and 2 reds and continued to land i. e. on profile. Since the aircraft was high and fast, the touchdown was delayed and aircraft landed. The runway available after touchdown was around 1000 meters which was just sufficient to stop the aircraft on the runway. Standard landing call outs were given by the co-pilot. The pilot selected GROUND IDLE and maximum REVERSE came on. The Co-pilot gave 70 knots call out during the landing roll. The pilot realized that the aircraft was not slowing down and both the crew applied maximum foot braking to stop the aircraft. The Pilot realized that the aircraft was skidding and moving towards the left with little deceleration. Seeing the runway end the pilot initiated 45° right turn after crossing N 10 Taxi track and exited the runway. It rolled into unpaved wet area. Just prior to leaving the runway the pilot called out for the Condition Levers to feather/fuel shutoff. After the aircraft had stopped, the right engine kept on running though the Condition Lever was selected to 'shutoff'. The cockpit crew then pulled the right emergency handle followed by the left emergency handle but the engine failed to shutoff. The pilot then looked for the hand mike to order evacuation to the cabin crew but could not find the mike and then opened the emergency hatch. The pilot evacuated from the emergency exit and then assisted co-pilot to evacuate. The cockpit crew then went to the left side forward cabin emergency exit and assisted the cabin crew with the evacuation of passengers. All the passengers including crew evacuated safely without any injuries. There was no fire.

1.2 INJURIES TO PERSONS

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR/None	Nil	Nil	

1.3 **DAMAGE TO AIRCRAFT.**

The aircraft was substantially damaged.

1.4 **OTHER DAMAGE:**

Nil.

1.5 **PERSONNEL INFORMATION:**

1.5.1 **PILOT IN COMMAND**

He started his flying carrier in the year 1990 with the US Navy and flew King Air and the EP-3E Aires in the Navy. After relinquishing service with the armed forces, joined Delta Airlines commuter and flew ATR 72's. He joined M/s Kingfisher Airlines on 14th October 2008 & started flight in India in January 2009.

Age	: 47 yrs.
Licence	: ATP 3181582
Date of Issue	: 24 Jan 2008
Category	: ATPL
FATA No.	: 1951 valid till 31 st July 2010
Endorsements as PIC	: 24 Jan 2008
Date of Med. Exam.	: 16 th Oct. 2009
Med. Exam valid upto	: 15 th April 2010
FRTTO Licence No.	: 1951/08 issued on 07-11-2008
Valid up to	: 31 st July, 2010
Refresher Course	: 05-01-2009 to 07-01-2009
IR & LR Check	: 02-02-2009 & valid upto 01-02-2010.
Monsoon Route Check	: 01 st July 2009

Flying Experience

Total flying experience	: 7160 hrs
Experience on type	: 2241 hrs
Experience as PIC on type	: 2241 hrs

Total flying experience during last 90 days	: 129 hrs
Total flying experience during last 30 days	: 51 hrs
Total flying experience during last 07 Days	: 15 hrs
Total flying experience during last 24 Hours	: 2 hrs 24 mins.

1.15.2 CO-PILOT

Co-pilot joined M/s Kingfisher Airlines on October 2007. In February 2009 she was cleared for assisted take off and landing. She had last operated the flight on 4.11.2009. Prior to that she had operated flight on 18.10.2009. The accident flight on 10.11.2009 was her first landing on R/W 27A

Age	: 34 yrs.
Licence	: CPL 5513
Date of Issue	: 10 Sept. 2007
Valid up to	: 09 Sept. 2012
Category	: CPL
Date of Med. Exam.	: 16 Mar 2009
Med. Exam valid upto	: 15 Mar 2010
FRTTO Licence No.	: 10139
Date of issue	: 15 May 2007
Valid up to	: 14 May 2012
IR & LR Check	: 02-02-2009 & valid up to 01-02-2010.

Flying Experience

Total flying experience	: 973 hrs
Experience on type	: 613 hrs
Total flying experience during last 90 days	: 59 hrs
Total flying experience during last 30 days	: 22 hrs
Total flying experience during last 07 Days	: 7 hrs 17 mins.
Total flying experience during last 24 Hours	: 2 hrs 24 mins.

1.16 AIRCRAFT INFORMATION:

ATR72-212A aircraft is a high wing twin turbo-prop manufactured by ATR (Avionics de Transport Regional) of France. The airplane is certified in transport category, JAR 25 and ICAO Annex 16 for day and night operation under VFR and IFR, flight in icing conditions and reverse thrust taxing single or twin engine. The maximum operating height of this aircraft is 25000 feet and maximum take-off weight is 22800kgs. The structure of the aircraft is designed for a service life of 25 years and structural fatigue life of 70000 flights. Aircraft wing span is 88 feet 9 inches, fuselage length is 89 feet 1.5 inches, and overall diameter of the fuselage is 9 feet 5 inches and has overall height of 25.33 feet.

1.6.1 CONSTRUCTION:

The overall structure of aircraft is mostly made of aluminum alloy. Several composites such as Kevlar, Nomex, and Kevlar-carbon/nomex sandwich have been incorporated into the construction for a stronger and lighter aircraft. Composite parts include: wing-to-fuselage fairing, wing leading and trailing edges, engine nacelles, elevators, rudder, and the tail cone. Cargo door is on the front left side, and the Passenger door is in left side towards the rear. There is one type I emergency door opposite the passenger door, and two type III emergency exits at the front of the passenger cabin. The cockpit also has an emergency escape hatch in the roof. The passenger door is 68 inches tall by 25 inches wide. The cargo door is electric and the opening is 51 inches wide and 62 inches tall.

The ATR72-212A aircraft VT-KAC manufacturer MSM no-729, has been manufactured on 18.5.2006. The Aircraft is operated by M/s Kingfisher Airlines. Certificate of Registration No. 3384 under category A which is issued on 20.6.2006 and was valid upto 20.6.2016.

The Certificate of Airworthiness no. 2793 for the aircraft under NORMAL category, Sub-division Passenger /Goods / Mail was issued by DGCA on 21.06.2006 specifying minimum crew as Two and Maximum All Up Weight authorized as 22,000Kgs. The C of A is valid upto 18.6.2012. The aircraft was flown with Aero mobile license valid upto 31.12.2010 M/s Kingfisher Airlines operating the aircraft under scheduled air transport services vide permit No.S-12 from DGCA, the permit was valid upto 31.12.2012. The ATR72-212A aircraft VT-KAC has logged 9318:10 hrs.

The ATR72-212A aircraft, engine & propellers are being maintained under continuous maintenance as per Maintenance Planning Document consisting of calendar period based maintenance and flying hours/ cycles based maintenance as per maintenance programme approved by Regional Airworthiness Office, Mumbai.

Last Major calendar based check done is 2C+1C on 15.5.2009 , last 1A check 16th July 2009, last 2A check 13th Sept., 2009, last 400 FH on 4th October, 2009, last 3 A check 8th Nov. 2009. Subsequently transit, layover and weekly checks were carried out as & when due before the accident.

The aircraft was last weighed on 18.5.2006 at ATR France. Regional Airworthiness Office, Mumbai approved the Weight Schedule prepared on the basis of weighment. As per approved weight schedule the Empty weight is 13785 kg. Maximum Fuel capacity is 5000 Kgs. Maximum commercial load with oil and fuel tanks full is 4015 Kgs. Empty weight C.G in % of Mean aerodynamic Chord (MAC) is 23.969 %. As there has not been any major modification affecting weight & balance since last weighing, hence the next weighing would have fallen due on 17.05.2011.

As far as records of compliance of Airworthiness Directives are concerned, Status of all Airworthiness Directives as issued by DGCA through mandatory modifications for

aircraft & miscellaneous modifications checked and found all applicable & due modifications have been complied with as & when due.

As far as stores documentation is concerned after receipt the parts are examined for physical condition and accompanying documents. The stores inspector issues stores acceptance tag (AMOS Tag) which ensures the item is serviceable. Same checked and found satisfactory for installed components.

Status of all installed components checked in accordance with Time Controlled Component List approved by Regional Airworthiness Office, Mumbai and found their lives within stipulated limits. As far as removals of components are concerned they have also been replaced within their stipulated lives in accordance with the aforesaid approved document.

With regards to logbook entries it is observed that Daily Flying hours & cycles entries are computerized. Maintenance schedule accomplishment entries as per approved maintenance programme are properly signed by appropriately licensed Aircraft Maintenance Engineers and affixed. The aircraft has been maintained as per approved maintenance programme and all maintenance schedules have been accomplished within stipulated time. Components replacement entries controlled through work orders. In general up keep of logbooks meets requirements.

Scrutiny of documents revealed appropriately licensed personnel have certified the aircraft as they have sufficient manpower in all categories for certification.

Transit inspections are done as per transit card and all higher inspections including C check packages are made based on latest MPD guidelines and are done as per maintenance schedules approved by Quality Manager.

Completed schedules are verified by Quality Control Cell for ensuring that all items of inspection and accompanying work orders (off job sheets) have been signed off by appropriately licensed personnel. Scrutiny of completed schedules did not reveal any non-conformance to requirements. Scrutiny of work orders associated with AD Compliance, Component life control etc. verified and found satisfactory.

Scrutiny of records did not reveal any repetitive snag in the recent past before the accident.

Maximum permissible seating capacity of the aircraft is 71 (66 Economy class seats , 2 cabin attendant, 2 cockpit crew & 1 observer)

Fuel specification test was carried out at DGCA fuel lab on 01/12/2009. The test was satisfactory. Microbiological test was also carried at IOC, Mumbai on 23-11-2009 after accident & found satisfactory.

1.6.2 **ENGINE**

The ATR72-212A aircraft are fitted with two Pratt & Whitney (Canada) manufactured Engine Model PW127F. VT-KAC was fitted with LH Engine Sl. No. EB0262. The Engine had logged 5238:24 Hrs Time Since New (TSN) and 4722 Cycles Since New (CSN). The RH Engine installed is Sl. No. EB0322. It had logged 5676:27 Hrs. TSN and 4779 CSN.

The Major Checks were accomplished along with Aircraft. The engine has been maintained as per approved maintenance programme and all maintenance schedules have been accomplished within stipulated time. Logbook updation meets requirements.

The status of all Airworthiness Directives as issued by DGCA through mandatory modifications for engines were checked and found all applicable & due modifications have been complied with as & when due. Trend Monitoring were followed and Scrutiny did not reveal any abnormality. Oil consumption found within limits

1.6.3 **PROPELLER ASSY**

The ATR72-212A aircraft is fitted with Hamilton Sundstrand six bladed Propeller assembly Model 568F-1. LH Propeller assembly (Sl. No. FR20051251) had logged 9327.41 Hrs. TSN and 1235.47 TSO. RH Propeller assembly (Sl. No. FR20050452) had logged 9243:03 Hrs. TSN and 1132:37 hrs TSO.

The status of all Airworthiness Directives as issued by DGCA through mandatory modifications for propellers were checked and found satisfactory.

The propeller has been maintained as per approved maintenance programme and all maintenance schedules have been accomplished within stipulated time. Logbook updating meets requirements.

1.6.4 **BRAKES**

There are no Auto brakes installed on this aircraft. The only braking action effective on this aircraft is the manual breaking through antiskid system other than the reversers.

1.7 METEOROLOGICAL INFORMATION:

Mumbai Airport has Class I Met facilities. The airport is capable of providing current weather parameters to all arriving aircraft based on calibrated met instruments. The Metars are issued on an hourly and half-hourly basis. In case of any significant changes, SIGMET is also issued. On 10th Nov 2009, the TAF issued at 0530 hrs valid for the period from 08:30 to 17:30 hrs, forecasted conditions between 14:30 to 16:30 hrs as winds 090/12 kts, visibility 4000 m, clouds scattered at 1500 ft, few at 2500 ft, broken at 9000 ft. Temporarily, between 0830 and 1730 hrs, visibility may reduce to 1500 meters with thunder storms & rain with clouds CBs at 3000', overcast at 8000' and scattered clouds at 1500' & 1000'. The forecast was accurate enough and the METAR issued at 16:10 IST shows visibility 2800 m with feeble rain with tail winds for R/W 27A at 060/05 kts , few clouds at 1200' , with few CB at 3000' . The temperature was 25° C with dew point of 22° C. Hence heavy precipitation was ruled out. The QNH was 1003 Hpa. As per CVR transcript at the time of landing Tower reported winds 070 /07kts and runway surface wet. At the time of accident, there was rain and tail wind component of 7 kts for R/W 27A. Though ATC reported that runway surface was wet, the information was not correct since the earlier aircraft Air India IC-164 reported that they had aquaplaned and skidded on the runway indicating that the runway may be contaminated with water.

1.8 AIDS TO NAVIGATION:

The aircraft made first contact with the ATC Tower at time 16:37:06 Hrs. when king Fisher flight IT 4124 reported established on the Localizer for R/W 27A. At time 16:37:12 hrs, the Tower has passed the Met conditions to the aircraft. Due to the displaced threshold of the shortened runway 27A, the glide-slope for ILS R/W 27 was switched off. The NAV aids available were only VOR and the LOC. Hence the non-precision approach aid was the Localizer. As per NOTAM G0128/09 issued by AAI for operation on 27A the Final Approach Fix was at 9.5 DME in place of 10.0 DME for the full length R/W 27 (to cater for displaced threshold). The actual vertical path followed by the aircraft was tracked on the ATC radar's video recorder and is as shown below.

DME DISTANCE	HEIGHT REQUIRED	ACTUAL HEIGHT	HIGHER ON PROFILE
9 NM	3380 FT	3600FT	220FT
8 NM	3030 FT	3400FT	370 FT
7 NM	2690 FT	3100 FT	410 FT
6 NM	2340 FT	2800 FT	460 FT
5 NM	1990 FT	2600 FT	610 FT
4 NM	1650 FT	2400 FT	760 FT
3 NM	1300 FT	2200 FT	900 FT
2 NM	950 FT	1800 FT	850 FT
1 NM	610 FT	1400 FT	790 FT

The vertical profile with respect to DME is not recorded by the aircraft in DFDR since there is no input for the LOC DME to the data capture unit. Overall, the LOC only approach carried out by the crew was within the operating minima. All required navigation facilities were functioning normally and no abnormalities were reported by any aircraft. The flight was cleared for localizer only approach from the arrival route. The same was acknowledged by the Pilot.

1.9 COMMUNICATIONS :

Kingfisher IT- 4124 VT-KAC was equipped with two VHF sets and one HF set. All R/T sets were reported to be functioning satisfactorily till the time of accident. The communications with both Mumbai approach radar and the Tower was satisfactory. Both the pilots in the cockpit had no problems in communicating with each other on the Intercom till the accident. The cockpit to cabin intercom functioning satisfactorily till the accident. The information for localizer only approach for runway 27A and the landing distance available 1703 m was continuously transmitted on DATIS during the operation on runway 27A. However no information regarding restricting the operation on wet runway was being transmitted on DATIS. In the ATC complex, the audio communications as well as the telephones utilized by the Safety Services & Tower had clarity and provided trouble-free voice exchange.

1.10 AERODROME INFORMATION:

At Mumbai, two cross runways are available; the longer 09/27 being the primary runway and 14/32 being the secondary R/W. At the time of accident, R/W 14/32 was under major repairs. R/W 27 was available only beyond the intersection and the shortened runway was designated as R/W 27A. The AAI had issued a special NOTAM G0128/09 for R/W 27A notifying the reduced TODA as 1703m. The Final Approach Fix as 9.5 DME instead of 10 DME. Further the aerodrome operating minima will be 2800m. The Glide path for runway 27 will be switched off during the 27A operation. This procedure shall be only applicable for shortened runway 27A during day only. Post accident, during inspection by the DGCA, all R/W, Taxiways and apron markings were found to be satisfactory. The last R/W friction test was carried out on R/W 27A on 10/11/09 before the operation commenced on R/W27A and the value recorded was 0.81.

1.11 FLIGHT RECORDERS:

1.11.1 CVR TRANSCRIPT SUMMARY.

CVR readout revealed that Kingfisher IT-4124 came in contact with tower around 17Nm to touchdown. The ATC instructed Kingfisher IT- 4124 to continue approach, 14 DME to touch down clear Localizer only R/W 27A, wind 070 deg, 07 kts, exercise caution men

material on the R/W intersection, report fully aligned PAPI R/W 27A, R/W surface wet. About 4 DME to touchdown ATC advised IT-4124 to check altitude since the aircraft was high and report field in sight. The same was acknowledged by Kingfisher IT-4124 field in sight, subsequently landing clearance was issued. Thereafter the sink rate warning was continuous till touch down. Captain flew the aircraft manually to adjust speed and altitude since it was high and fast. The CVR recording stopped when the aircraft speed ground speed was 54 knots.

Since the reported met conditions included rain, the Pilot in command at any stage did not ask for Windscreen Wipers to be switched ON.

1.11.2 DFDR:

DFDR analysis is tabulated below. The commander disconnected autopilot at 1817 ft and had flown the aircraft manually to come on profile.

RAD ALT FT	MAG HDG DEG	IAS KTS	VERT SPEED FT/MIN	PITCH ATT DEG	LOC DEV DOTS	AIR/ GROUND
956	275	133	-3060	-10.63	-1	AIR
601	276	138	-2040	-7.82	-1	AIR
320	272	136	-1530	-8.35	-1	AIR
92	271	129	-1530	-5.98	-1	AIR
10	272	129	-510	-1.93	1	AIR
1	272	122	0	-0.44	1	AIR
-1	271	118	0	-0.53	1	GND
-2	271	118	0	-2.55	1	AIR
-1	271	103	0	-1.93	1	GND

DFDR analysis indicates that the aircraft was much above the required profile. The pilot disconnected autopilot and went into steep nose down attitude as indicated by the pitch attitude and high rate of descent which also generated the sink rate warning in the cockpit. The DFDR also indicated that the aircraft was always above the localizer and never on the approach profile. The ground speed at the point of touchdown is 131 knots. For a second weight on wheels indicated Air then again weight on wheels indicated ground. At that moment the ground speed was 120 knots which was higher then required. As per the last radar update the aircraft was descending with a vertical speed of 1700ft per minute.

1.12 WRECKAGE AND IMPACT INFORMATION.

The accident occurred at Mumbai Airport on 10.11.2010 while aircraft VT-KAC was landing on Runway 27A. The aircraft first touched down abeam 'Y' Taxiway, 700 meters approx from the threshold of Runway 27A on the center line. The runway length available for stopping the aircraft in the wet runway condition was approximately 1000 meters which was just sufficient to stop the aircraft on the runway. As the aircraft could not be stopped on the runway and it was approaching the runway end, the pilot initiated the 45° right turn after crossing N10 Taxi track as indicated by the tire marks. It rolled into the unpaved wet area. Aircraft rolled over the closed drainage, exposed drainage pipelines and then crossed over the open drainage canal of width of 15 feet. On final rest the Aircraft was facing North - West Direction with tail on the edge of the canal, left wing touching the ground and right wing in the air. At this position aircraft was about 151m (lateral distance) from the shoulder of the Runway and 90 m (longitudinal distance) from the end of the runway 27A.

After the accident Right Hand Propeller of aircraft was rotating for some time. Fire fighting personnel reach the spot immediately & helped in evacuation process. Fire Extinguisher (Foam) was sprayed on Both the Engines to flame out #2 engine. The L.H. wing was touching the ground and aileron and wing tip got damaged. L.H. Propeller Blades were broken and damaged. The Nose landing gear was collapsed with Nose section completely damage. The Port Landing gear got detached and fell in the open canal. The right landing gear was damaged but intact with the Aircraft and the tires were burst. Nose section-bottom portion was crushed and Lower fuselage was damaged due rubbing on uneven terrain.



Aircraft in the final resting position



Rear view



Point from where aircraft turned into unpaved wet area

Inspection of the wreckage indicated the following:

a) Fuselage

- Nose landing gear had folded and got embedded rearward into the aircraft fuselage damaging the floor and caused floor in the cockpit to lift up and central pedestal to displace towards the right side. Floor was also found lifted and damaged between seats 1C and 1D. Cockpit Crew escaped through overhead hatch.
- Nose Radome was found scrapped at lower edge position and the forward bulkhead observed bent inside. The Weather Radar Antenna was damaged. Skin below the cockpit was found wrinkled and sheared off.
- There was continuous circumferential crack around the fuselage from right to left side just forward of the wings. The skin along with the stingers/longitudinal members had ruptured.
- The fuselage bottom side skin was damaged with multiple dents due rubbing with the ground.
- The aircraft was in one piece and resting on its belly. The wing fuselage attachment was intact. There was no damage to the tail portion/empennage.

b) Position of controls in the Cockpit:

- Both fire handles were found pulled out.
- Battery switch was found in OFF position.

- Parking brake lever in ON position.
- Power lever at Ground Idle.
- RH Condition lever was found at Auto.
- Flap lever position at 30 degree.
- Landing gear lever was in down position.

c) Position of Circuit Breakers

Circuit breakers behind Co-pilot's seat were found damaged.

d) Landing Gear

- ***Nose Gear***
Nose landing gear had broken and got detached from the drag brace. It folded backward and got lodged in the bottom portion of the fuselage.
- ***Main Gear***
LH main landing gear had extensive damage and the gear was broken at several areas and had detached from the fuselage. The fairing was damaged and extensive damage was seen to hydraulic system components, L/G attachment and L/G structure.

RH main landing gear had extensive damage and the gear was broken at several areas and had not detached from the fuselage.

f) Main Plane

Both the wings were attached to the fuselage and there was no apparent damage to wing fuselage attachment. Damage was observed on the LH wingtip due to rubbing. Also aircraft wreckage was resting on LH wing tip on ground in final position of wreckage. The aircraft in final position resting on the LH wing tip

g) Tail Plane:

No damage was observed in the tail plane area. Rudder and elevator control surface were observed in the neutral position.

h) Engines and propellers:

Both the engines were found attached to the respective wings.

- **Starboard side:**
 1. The propeller blades were not damaged.
 2. Propeller was free to rotate
 3. External visual inspection was carried out and no damage was observed.
 4. There was no evidence of overheat/fire.

- **Port side:**
 1. Propeller was free to rotate
 2. Propeller was damaged (broken midway) due to propeller strike on ground
 3. Engine lower cowl sustained minor abrasions damage.
 4. There was no evidence of overheat/fire.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION:

Prior to flight both the cockpit crew attended the pre flight medical and were reported fit by the doctor to operate the flight. This was a quick turn around flight from Bhavnagar and there was no post flight medical examination carried after the accident. There was no injury to any of the occupants on board the aircraft.

1.14 FIRE:

There was no fire.

1.15 SURVIVAL ASPECTS:

The accident was survivable. The aircraft had gone out of runway & had stopped near the open drain. The right engine was still running though the Condition Lever was found 'shutoff'. The cockpit crew then pulled the right emergency Fire handle followed by the left emergency handle but the engine failed to shutoff. The pilot then looked for the hand mike to order evacuate to the cabin crew but could not find the mike and then opened the emergency hatch. The pilot evacuated out through the emergency exit and then assisted Co-pilot to evacuate. The cockpit crew then went to the left side forward cabin emergency exit and assisted the cabin crew with the evacuation of passengers. All the passengers including crew evacuated safely without any injuries.

1.16 TESTS AND RESEARCH:

- 1.16.1 Since the #2 engine did not shut down after pulling the fire handle after the accident, the detailed test/examination on the system was carried to find out the circumstances for Engine No.2 not shutting down with the Fire Handle pulled. The review of Schematic 28-24-00 SCH 01 P 101-Fuel Distr/LP Fire SO Control Engine 1(2) revealed that there are two different power supplies(28V D.C) for the Fuel LP Shut Off Valve(that remains normally open). Valve is equipped with two DC motors in order to close the valve. If any one of the motor is supplied with 28V DC valve will close. The power supply for LP valve motor is from:

- (a) 28 V DC BUS2 from gen2
- (b) 28 V EMER BUS from hot Emer BAT bus with BAT Sel S/W to 'ON'

A test was performed on an in-service aircraft VT-KAR to shut down Engine with Fire Handle, during Engine Run-up. It was observed that with battery switched off and fire handle pulled, Engine No.2 did not shut down.

1.16.2 FUEL SAMPLE REPORT

Fuel samples from RH and LH tank of the aircraft were taken and tested in the Fuel Lab of DGCA . As per the examination, report received there was no abnormality in the sample and it passed all the specification tests.

1.16.3 INSPECTION OF WHEEL, BRAKES AND TYRES

Tire inspection showed signs of partial aquaplaning. All the four brake assembly were inspected at Kingfisher wheel and brakes shop & no discrepancy was observed.



Tyre indicating signs of partial aquaplaning

1.16.4 ANALYSIS OF THE VIDEO RECORDING R/W 27A

Prior to operation on R/w 27A, DGCA had instructed MIAL that all landing on R/w 27A will be video graphed to monitor the operations. It recorded the landing of Air India flight IC-164 and the accident flight. Air India IC-164 had landed prior to kingfisher Airlines aircraft. Video recording indicated that Air India aircraft was skidding on the runway. The kingfisher aircraft landed late and the point of touchdown was available on the video.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION:

M/s Kingfisher Airlines is a schedule airline and is engaged into both Domestic and International operation. The airline was established in May 2005 and maintains a good safety record with no accident/accident since inception. The airlines have a fleet of around 68 aircrafts. The airlines have wide range of aircrafts, A319, A320, A321, A330, ATR-72-500 and ATR-42-500. Airline operating permit S-12 for scheduled airline was valid at the time of accident.

1.18 ADDITIONAL INFORMATION:

Prior to landing of Kingfisher ATR 72 aircraft IT -4124, Air India A319 aircraft IC-164 landed on runway 27A. The Air India A319 aircraft aquaplaned on the runway after landing and skidded on the runway broke the runway edge lights but the pilot was able to keep the aircraft on the runway. The pilot immediately informed the ATC that during landing roll the aircraft had aquaplaned and had skidded due which runway edge lights have broken and asked ATC to inspect the runway. The ATC asked the ground runway safety jeep to inspect the runway. The runway was inspected and informed that two runway edge lights were broken but runway was cleared for operations. The ATC controller admitted in his statement that he was not familiar with terminology used by the pilot that they have aquaplaned, not understanding the seriousness of it; he cleared the Kingfisher aircraft for landing.

Since this was the first day of operation on R/w 27A, the DGCA Chief of Flight Standard Directorate had deputed one Flight inspector, DGCA to be present in the ATC to monitor the operations. As per the statement of the ATC controller at the time of accident the Flight Inspector was in the ATC with WSO monitoring the operation, however the ATC controller further mentioned that there was no such instructions from the Flight Inspector to stop the operation due wet runway.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES:

Prior to operation on R/w 27A, DGCA had instructed MIAL that all landing on R/w 27A will be video graphed to monitor the operation. It recorded the landing of Air India flight IC-164 and the accident flight. Analysis of the video recording helped in understanding the two landings. In fact the IC-164 which landed prior to kingfisher airlines, the video was available and it showed how the aircraft was skidding on the runway. The kingfisher aircraft also landed late and the point of touchdown was available on the video.

2. ANALYSIS

2.1 SERVICEABILITY OF THE AIRCRAFT:

The ATR72-212A aircraft VT-KAC was manufactured on 18/5/2006 with MSM no-729. The Aircraft is operated by M/s Kingfisher Airlines. The Certificate of Registration was first issued on 20.6.2006 and was valid upto 20.6.2016. The Certificate of Airworthiness of the aircraft was first issued on 17/6/2006 and was valid till 18.6.2012. M/s Kingfisher Airlines operating the aircraft under scheduled air transport services vide permit No. S-12 from DGCA. The permit was valid upto 31/12/2012. The ATR72-212A aircraft VT-KAC has logged 9318:10 hrs Airframe since induction. The aircraft was last weighed on 18.5.2006 at ATR France. The next weighing would have fallen due on 17/5/2011.

Scrutiny of the records revealed that the aircraft, engine & propellers were being maintained under continuous maintenance as per Maintenance Planning Document consisting of calendar period based maintenance and flying hours/cycles based maintenance as per maintenance programme approved by Regional Airworthiness Office, Mumbai. The Last Major calendar based check is 2C+1C which was done on 15.5.2009. Subsequently transit, layover and weekly checks were carried out as and when due before the accident.

All Airworthiness Directives as issued by DGCA through mandatory modifications for aircraft & miscellaneous modifications were found complied with as and when due. Status of all installed components checked in accordance with Time Controlled Component List approved by Regional Airworthiness Office, Mumbai and found their lives within stipulated limits. Components have been replaced within their stipulated lives in accordance with the aforesaid approved document.

Maintenance schedule accomplishment entries in the logbooks as per approved maintenance programme were properly signed by appropriately licensed Aircraft Maintenance Engineers. The aircraft has been maintained as per approved maintenance programme and all maintenance schedules have been accomplished within stipulated time. Components replacement entries controlled through work orders. Further completed

schedules were verified by Quality Control Cell for ensuring that all items of inspection and accompanying work orders (off job sheets) have been signed off by appropriately licensed personnel. Scrutiny of completed schedules did not reveal any non-conformance to requirements. Scrutiny of work orders associated with AD Compliance, Component life control etc. verified and found satisfactory. Scrutiny of records did not reveal any repetitive snag in the recent past before the accident.

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

2.2.1 FAILURE OF ENGINE NO. 2 TO SHUT DOWN

After landing just prior to leaving the runway the pilot asked for the Condition Levers to feather/fuel shutoff. After the aircraft stopped the right engine was still running though the Condition Lever was shut off. The crew then pulled the right emergency handle followed by the left emergency handle but the engine failed to shutoff.

Since the #2 engine did not shut down after pulling the fire handle after the accident, the detailed test/examination on the system was carried to find out the circumstances for Engine No.2 not shutting down with the Fire Handle pulled. The review of Schematic 28-24-00 SCH 01 P 101-Fuel Distr/LP Fire SO Control Engine 1(2) revealed that there are two different power supplies(28V D.C) for the Fuel LP Shut Off Valve(that remains normally open). Valve is equipped with two DC motors in order to close the valve. If any one of the motor is supplied with 28V DC valve will close. The power supply for LP valve motor is from:

(c) 28 V DC BUS2 from gen2

(d) 28 V EMER BUS from hot Emer BAT bus with BAT Sel S/W to 'ON'

A test was performed on an in-service aircraft VT-KAR to shut down Engine with Fire Handle, during Engine Run-up. It was observed that with battery switched off and fire handle pulled, Engine No.2 did not shut down.

Further in the aircraft VT-KAC , the open circuit between pin '16' of fire handle connector 'B' and pin 'h' of connector 110 VC could have caused interruption of electrical supply to motor / connector 'B' of Engine 2 LP valve. The exact circumstances of open circuit between pin '16' of fire handle connector 'B' and pin 'h' of connector 110 VC could not be established. However, there is a possibility that the open circuit could have been caused due to impact during the event or shifting of the aircraft after the accident. The Emergency bus Circuit Breaker 4QG, which was found tripped, could have caused interruption of electrical supply to motor / connector 'B' of Engine 2 LP valve. As Engine 1 got shut down before Engine 2, there is a possibility that supply was not available at DC Bus 2 and Motor/Connector 'A' of LP valve. There is a possibility that as pulling of fire handle causes immediate cutoff of Engine generator, supply from 28 V DC BUS 2 and could be one of the probable reason for Engine No.2 not shutting down with the fire handle.

2.3 WEATHER:

On 10th Nov 2009, the TAF issued at 0530 hrs valid for the period from 08:30 to 17:30 hrs, forecasted conditions between 14:30 to 16:30 hrs as winds 090/12kts, visibility 4000 m, clouds scattered at 1500 ft, few at 2500' feet, broken at 9000 ft. Temporarily, between 0830 and 1730 hrs, visibility may reduce to 1500 meters with thunder storms & rain with clouds CBs at 3000ft., overcast at 8000 ft. and scattered clouds at 1500ft. & 1000ft. The forecast was accurate enough and the METAR issued at 16:10 IST shows visibility 2800 m with feeble rain with tail winds for R/W 27A at 060/05kts, few clouds at 1200 ft, with few CB at 3000'. The temperature was 25° C with dew point of 22° C. Hence heavy precipitation was ruled out. The QNH was 1003 Hpa. As per CVR transcript at the time of landing Tower reported winds 070/07kts and runway surface wet. At the time of the accident, there was rain and tailwind component of 7kts for R/W 27A. Though ATC reported that runway surface was wet, the information was not correct since the earlier aircraft Air India IC-164 reported that they had aquaplaned and skidded on the runway indicating that the runway was contaminated with water.

As per CVR transcript at the time of landing Tower reported winds 070/07kts and runway surface wet with feeble rain. Prior to Kingfisher aircraft landing, Air India Aircraft operating flight IC-164 landed and reported to ATC that the aircraft had aquaplaned. The ATC controller not understanding the terminology of aquaplaning cleared the kingfisher aircraft for landing. The kingfisher aircraft also aquaplaned after landing and skidded on the runway and eventually resulted into the accident.

From the foregoing it is evident that weather is a factor to the accident.

2.4 RESTRICTED OPERATION ON RUNWAY 27A:

On the day of accident, secondary runway 14/32 was under maintenance and the primary runway 27 was also available only after runway intersection as 27A. Runway 27A will be operational only on Tuesdays when repair work will be carried out at the intersection area and the NOTAM 'G' will be in vogue and the operation on 27A was only limited to day operation. In order to avoid total closer of operations in Mumbai, AAI had issued a special NOTAM GO129 dated 10 Nov.2009 for runway 27A operation. As per the NOTAM

ILS for runway 27A was not available. Further Final Approach Fix (FAF) was made 9.5 DME in place of 10 DME and DME Vs Altitude chart was given in the NOTAM for this special operation. The Aerodrome operating minima was fixed as 2800m. for CAT C aircrafts operating with performance suitable for runway 27. This procedure shall only be applicable for shortened runway 27A operation only. It was the responsibility of the tower supervisor to ensure by confirming with WSO that the glide path for runway 27A is switched off during the operation. Only information for localizer approach for runway

27A will be available. The landing distance available 1703 m will be transmitted on DATIS during the operation on runway 27A.

However there was no information on the NOTAM restricting the operation on wet runway. A day prior to 27A operation, Chief Flight Inspector of Flight Standard Directorate had telephonically intimated all the schedule operators and followed by written communication about the conditions required to be followed for safe operations of the flight. The instructions are

Only training captains are to be utilized for flight and the Co-pilot should have minimum 300 hours of experience on type. Further no assisted take off and landing was permitted and no operation shall take place when runway surface is wet. Also pilots are required to file debriefing report after every flight.

Further investigation revealed that though the crew of the accident flight was not meeting the cockpit qualification required to operate the flight for 27A operations since he was not a training captain. Also he was not aware that the operation was restricted for wet runway.

2.5 PILOT HANDLING OF THE AIRCRAFT:

2.5.1 APPROACH AND LANDING

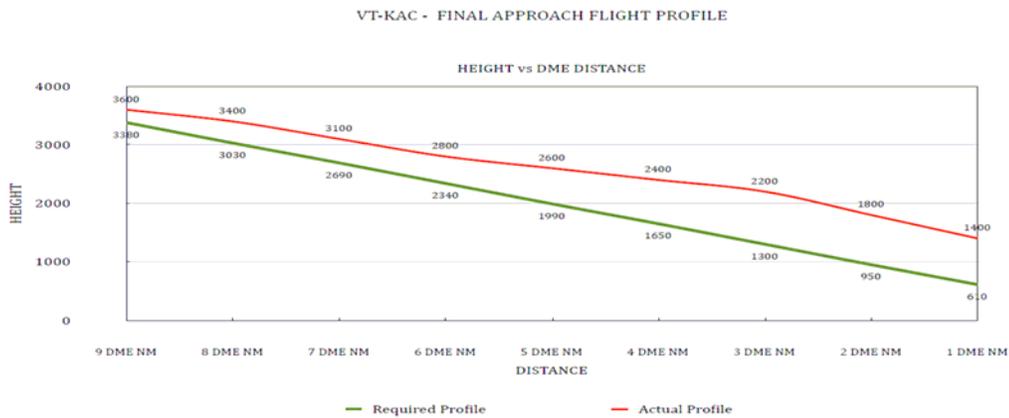
Both the pilots are holding current and valid license on the type of the aircraft.

During approach for R/w 27A, they carried out approach briefing and reviewed the weather condition for landing at the R/w 27A. The aircraft was given radar vector for the LOC 27A. In the Special NOTAM issued by the Airports Authority of India regarding the use of R/w 27A, they had prescribed the approach profile based upon DME distances. For landing the glide slope was not available however, the localizer was available.

Review of radar display indicates that the aircraft was always above the descent profile suggested in the special NOTAM. Correspondingly aircraft maintained higher speed. To align with approach profile aircraft initiated rapid descent and maintained negative pitch angle. When aircraft was at the radio altitude of 1012 ft the pitch angle was -11.07 degrees. The maximum rate of descent reached was -2550 ft/min. The aircraft landed in the normal configuration. However, the 'g' value at the touchdown was 1.32g.

The final approach is a critically important phase of the flight. Its stabilization is important for making a safe landing. Regulatory authority through Air Safety Circular 1 of 1991 has emphasized the need to carry out a 'go-around' than to salvage a marginal approach in all such cases wherein final approach was not stabilized under the conditions of obscured vision, excessive height and/or speed, not having being established on correct approach path etc. Company's "Operations Manual Part A Chapter 25" has stipulated following criteria for a stabilized approach:

- *The aircraft is on the correct flight path.*
- *Deviations from the VOR/Localizer/Glide Slope are within one dot, or within 5 degrees of the final course in an NDB approach, or the LOC/GS scales are not flashing in LVP approaches.*
- *Only minor changes in heading/pitch are required to maintain the correct flight path.*
- *Indicated Airspeed: For Airbus aircraft, indicated airspeed shall not be less than VAPP TARGET – 5 knots and not greater than VAPP Target + 10 knots.*
- *The aircraft is in the correct landing configuration.*
- *Sink rate is no greater than 1,000 feet per minute. If an approach requires a sink rate greater than 1,000 feet per minute due to approach design or due to a speed increment required by an aircraft malfunction, a special briefing shall be conducted.*
- *The thrust is stabilized above idle, to maintain the target speed on the desired glide path, and*
- *All briefings and checklists have been completed.*



The crew had felt that although the speed was high, they corrected the speed using the condition lever in the full forward position and that correction were adequate enough to make a normal landing and stop the aircraft. Even below 500 ft the rate of descent was high and a maximum value of -2040 ft/min was reached at the radio altitude of 291 ft. The high sink rate warning was continuous till touchdown. The aircraft was high on the approach profile as at one DME from Touch down actual height was 1400 ft against the required height of 610 ft. At 4 DME , ATC had advised the crew to check altitude as they were high. Thus decision of the crew to continue was not in accordance with requirements of the company’s operations manual and regulatory instructions.

Though aircraft managed to touchdown with a speed of 103 kts but it consumed almost 700 meters of the landing distance before touchdown. The crew was left with only 1000 meters of landing distance against the required distance of 960 meters. Considering the weather condition and condition of R/w it was not appropriate decision of the crew to continue and land.

2.5.2 BREAKDOWN OF CRM PRINCIPLES

The co-pilot possessed total flying experience of 973 hours and 613 hours on the type. Co-pilot was not aware of the special requirements of R/w 27A. As per the Co-pilot the briefing out of Bhavnagar was mainly on weather, there was general briefing for runway 27A however no specific briefing was given by the Commander for special localizer approach procedure to be followed for 27A.

It appears that special NOTAM was not discussed in its entirety during the briefing sessions at Mumbai and Bhavnagar even though co-pilot had not landed on R/W27A earlier. The aircraft was high on approach and aircraft was making steep descent at high rate of descent. Even below 500 ft, the rate of descent was high and there was warning generated for high sink rate. However, there was no input from the co-pilot to abort the marginal approach and make a 'go-around'. **Thus there was a failure of crew resource management principles** on part of the pilot for not carrying out adequate briefing regarding the approach procedure and R/w conditions of R/W 27A and on Part of Co-pilot in not intervening to abort the unstablized approach and make a "Go Around".

2.6 SEQUENCE OF EVENTS:

On 11.11.2009 Kingfisher Airlines ATR-72-212A aircraft VT-KAC was scheduled to operate flight on Mumbai-Bhavnagar –Mumbai sector. Before departure from Mumbai, self briefing was carried out by the Commander covering the NOTAM's holding & diversion considerations, prevailing weather conditions, short runway operations, TORA, TODA, LDA and ASDA. Aircraft took off from Mumbai at 13:44 hrs and arrived Bhavnagar at 14:59 hrs. The flight from Mumbai to Bhavnagar was uneventful. At Bhavnagar crew again had briefing for landing at Mumbai regarding availability of R/W 27A. After a halt of 37 minutes, aircraft again took off from Bhavnagar at 15:36hrs. The aircraft came in contact with ATC, Mumbai around 17NM to touchdown. The ATC instructed the aircraft to continue approach.

The crew calculated the required landing distance required, using the parameters for the NOTAM R/w 27A, with the visibility at 2800 meters, winds 070/07 knots, in wet runway conditions. As per the calculations based on QRH with thrust reversers for 07 knots winds, the aircraft required 700 meters dry runway, for wet runway 854 m & for contaminated 1054 m to land and stop safely. The crew monitored the weather report from DATIS, twenty five minutes prior to landing, to confirm weather and runway conditions and ensure that their previous calculations briefings were accurate.

The ATC gave vectored the aircraft to fly heading 230 degree and intercept the LOC at 17 DME to touch down. At that time the aircraft was at 14DME. ATC then instructed

aircraft to intercept the LOC at 13 DME. The aircraft intercept LOC at 13 DME at an altitude of 3700 ft. After intercepting the LOC, the crew initiated rapid descent from 3700 ft to MDA (540ft) at 10 DME. The crew set landing configuration and initiated a rapid descent after radar informed them that they were high and not on the approach profile. The pilot disconnected the auto pilot in order to descent fast by manually flying. The pilot initiated descent at 10DME as per the procedure. Flaps 15 were selected at 07 DME. At 140 kts, gear was selected down. The descent was continued and FLAPS 30 were selected Crew confirmed runway in sight to ATC at 03 DME, 2000 ft. The Pilot continued the descent and saw the PAPIs all 4 units white (above slope). Subsequently, the pilot reduced Power and Condition lever were advanced to 100% OVRD in order to be on profile. As per pilot statement he saw 2 unit white and 2 unit red (on slope) at 200 ft. and continued to land.

As the aircraft approaches above slope with high speed the touch down was late , midway between taxiway 'T' and 'R', just at the beginning of taxiway 'N'. The runway available after that was around 1000 meters to stop the aircraft. Standard landing call outs were given by the Co-pilot. The pilot selected GROUND IDLE and maximum REVERSE came on. The Co-pilot gave 70 knots call out during the landing roll and at that stage the pilot realized that the aircraft was not slowing down, both the crew applied maximum foot breaks to stop the aircraft. The runway had water patches. The Pilot realized that the aircraft was skidding and moving towards the left with little deceleration. The aircraft had aquaplaned on the runway due water contamination and did not decelerate.

The increase in landing distance on water-affected runways is primarily due to reduced coefficient of friction between the tyres and the runway. The reduced coefficient of friction can effect deceleration and directional control. The extent of reduction depends on the depth of water, the aircraft ground speed and type of aquaplaning. Reverted-rubber aquaplaning occurs when a wheel 'Locks up' (or stop rotating) is dragged across a wet surface, generating steam. The steam pressure lifts the tyre off the runway surface. Heat from the steam causes the rubber to revert to its unvulcanised state, leaving a black, gummy deposit of reverted rubber on the tyre. Reverted-rubber aquaplaning will also typically leave distinctive marks on the runway, with black marks on the edges of the contact patch and clean section in the middle where the runway surface have been effectively steam cleaned. Inspection of the tyres and the runway indicates that due to full brake application by the crew Reverted-rubber aquaplaning took place.

Seeing the runway end, the pilot initiated 45 ° right turn after crossing N10 and exited the runway. It rolled into unpaved wet area. Just prior to leaving the runway the pilot asked for the Condition Levers to feather/fuel shutoff. After the aircraft stopped the right engine was still running though the Condition Lever was shut off. The crew then pulled the right emergency handle followed by the left emergency handle but the engine failed to shutoff. Crew came out from the emergency hatch and then went to the left side forward cabin emergency exit and assisted the cabin crew with the evacuation of passengers. All the passengers including crew evacuated safely without any major injuries. There was no fire.

3. CONCLUSIONS:

3.1 FINDINGS:

- 3.1.1 The Certificate of Airworthiness of the aircraft was valid on the date of accident.
- 3.1.2 All maintenance schedules for the aircraft were found to be complete.
- 3.1.3 All mandatory modification status have found to be complied with.
- 3.1.4 There was no major defect/snag pending on the aircraft prior to this accident flight.
- 3.1.5 The licenses for both the crew were valid to operate the flight.
- 3.1.6 As per DGCA circular for operation on 27A, the Pilot in command should have been a Training Captain & the first Officer should have a minimum 300 hrs on type. **The commander however was not meeting this laid down conditions.**
- 3.1.7 The AAI had issued a special NOTAM one day prior to operation restricting the operation on 27A. The Final Approach Fix was made at 9.5 DME instead of 10 DME. Only VOR-Localizer approach was permitted on 27A since the runway length was restricted to 1703 m.
- 3.1.8 Prior to Kingfisher aircraft, Air India flight IC-164 operated with A319 aircraft landed and aquaplaned during landing. Same was reported to the ATC. The ATC controller did not understand the terminology 'aquaplaning' and its seriousness, cleared the Kingfisher aircraft for landing which also aquaplaned after landing and resulted into an accident.
- 3.1.9 The ATC while giving the landing clearance to the kingfisher aircraft **did not mention that the earlier aircraft had aquaplaned during landing and also that runway had water patches on the runway.**
- 3.1.10 Kingfisher aircraft during approach was **not on profile and was high and fast**, the ATC advised them that they were not on profile and report when runway in sight. The commander disconnected autopilot early and carried out a very steep descent with high rate of descent **generating sink rate warning in the cockpit to come on profile.**
- 3.1.11 The decision of the crew to continue a unstablized approach was not in accordance with requirements of the company's operations manual and regulatory instructions.
- 3.1.12 **There was a failure of crew resource management principles** on part of the pilot for not carrying out adequate briefing regarding the approach procedure and R/w conditions of R/W 27A and on Part of Co-pilot in not intervening to abort the unstablized approach and make a "Go Around".
- 3.1.13 The aircraft floated a bit and landed late on the runway. The runway length available after touchdown was around 1000m which was just enough for the aircraft to stop on the runway.
- 3.1.14 After touch down the pilot applied reversers but felt that the aircraft was not decelerating and the aircraft was skidding to the left. Both the pilots applied maximum foot pedal brakes but the aircraft kept on skidding realizing that the aircraft will not stop on the runway the pilot initiated a right turn and entered into unpaved surface and finally came to rest in the soft ground.

- 3.1.15 Neither the ATC nor the operating Crew of the Kingfisher were aware that the operation was to be suspended under wet runway conditions.
- 3.1.16 Both the cockpit crew and the all the passengers evacuated the aircraft safely without any injury.
- 3.1.17 No.2 engine did not shut down even after pulling the fire handle.

3.2 PROBABLE CAUSE OF THE ACCIDENT:

The accident occurred due to unstabilized approach and decision of crew not to carry out a 'Go-around'.

Contributory Factors:

- i) Water patches on the R/w 27A
- ii) Inability of the ATCO to communicate the aircraft about aquaplaning of the previous aircraft
- iii) Lack of input from the co-pilot.

4. SAFETY RECOMMENDATIONS:

- 4.1 Corrective training may be imparted to the involved crew in view of the lapses brought out on their part in the report.
- 4.2 AAI may bring it to the notice of all concerned that while giving the landing clearance to the aircraft the characteristics of **aquaplaning or water patches on the runway, if any, should be mentioned.**
- 4.3 Kingfisher should evolve a system of disseminating the information affecting the safety of aircraft operation to all concerned immediately.
- 4.4 Non shutting-off, the engine even after pulling down the fire handle may be referred to Aircraft Manufacturer for analysis.

Place: New Delhi
Date: 25 .11.2010

(Bir Singh Rai)
Inspector of Accident (VT-KAC)