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Flight Operations in raining conditions - with special reference to the Indian sub-continent

Prepared by: **Dr.M.S.Rajamurthy**
Senior Researcher Flight Safety

Approved by: **Capt.Shawki Al-Ablani**
Deputy Operations Director
Flight Safety and Quality Assurance

Flight Safety & Quality Assurance Division
Operations OZ/OE

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INTRODUCTION

In the Indian subcontinent and far-East, rain could present a hazardous situation for both take off and landing. While takeoff could be delayed to prevent encounter with this situation, there have been many fatal accidents during landing under moderate to heavy raining conditions particularly in the far-east region.

During the raining seasons of monsoon and cyclonic conditions in the bay of Bengal or in the Arabian sea, the airports in India, particularly the ones along the coasts i.e. Mumbai, Cochin, Thiruvananthapuram, Chennai and Kolkata will be subjected to heavy rain, resulting in contaminated runways. The gusty wind conditions during rains make the approach and landing risky, difficult and demanding.

This year, there were three accidents in India associated with heavy rain. Interestingly, all three occurred within a week in July and two of them occurred in Cochin.

- On July 1, 2007 night at Holkar airport, Indore, India, Jet Airways Boeing 737 (VT-JGD) flight skidded off the runway after its wheels broke while landing during heavy rains. Of the 49 onboard, Jet Airways airhostess suffered spine injury and six passengers received minor injuries.
- On July 3, 2007 night at the International airport, Cochin, India, a Boeing 737 Air Sahara flight S2-123 skidded off the runway in rainy monsoon conditions. No one was injured.
- On July 6, 2007 night at the International airport, Cochin, India, Air India Express Flt IX-454, a B737-800 (VT-AXC) with 61 passengers on board had an accident while landing in heavy rain. The aircraft at touchdown (approx. 1000 ft from the runway beginning) veered off Runway 27(45m wide) to the south into the monsoon softened shoulder. 1000ft after traveling through the grass and mud the aircraft reentered the runway destroying the runway edge lights on the south side of Runway 27. The aircraft did manage to taxi to the ramp. The nose-wheel, engines, nacelle, lower fuselage, trailing edge flaps etc. were damaged.

On Sept. 14, 2007 early morning at 2325 UTC, at the International airport, Cochin, India, KAC flight KU351 an Airbus A310-300(9K-ALC) was involved in an incident while landing under heavy rain conditions. The aircraft made touchdown to the right of centerline and veered off further to the right. The aircraft was realigned to the centerline and the aircraft was decelerated and brought to stop. Inspection by ground engineer later revealed damage to the main gear tires. Runway inspection revealed that the main landing gear had run over and damaged the runway lighting system.

OPERATIONS UNDER MONSOON CONDITIONS

The Directorate General of Civil Aviation (DGCA) of India has issued an Operations Circular 01/2004 on aircraft operations in monsoon for guidance and compliance by all air operators. While this circular addresses operations during monsoon, it is applicable in severe rain conditions. It is not uncommon for the raining conditions at the airports to rapidly degrade from moderate to heavy conditions.

The requirements stipulated in the Indian DGCA circular 01/2004 are summarized below.

A. General conditions:

1. Minimum total cockpit experience level of the PIC and co-pilot should not be less than 500 hours on type.
2. ILS approaches are to be preferred to non-precision approaches.
3. Procedures for speed control in terminal area must be followed.
4. Flight manual limitations and company SOPs must be strictly adhered to.

B. MEL requirements:

Following equipment must be serviceable during the period 1st June to 15th September for monsoon operations within India:

1. For aircraft requiring transponder and TCAS, both must be serviceable.
2. GPWS/EGPWS must be serviceable.
3. Thrust reversers must be serviceable.
4. Anti-skid system must be serviceable.
5. Wind shield wipers on both sides must be serviceable.
6. Anti-icing and de-icing must be serviceable.
7. Weather Radar must be serviceable.
8. Grooves on tires must be visible out of base stations.

The following items even though unserviceable, could be accepted "to return to base station basis"

1. Transponder / TCAS (not in RVSM airspace).
2. GPWS / EGPWS - subject to all other instrumentation to correlate position being serviceable and flight crew to have satisfactory terrain awareness.
3. Thrust reversers- subject to additional margin of minimum *1000Ft* to field length requirements for take-off and landings.
4. Anti-skid system - subject to performance limitations.
5. Wind shield wipers - subject to the PIC side (LHS) being serviceable.
6. Anti-icing and de-icing - subject to performance limitations.
7. Weather Radar – at least one being serviceable.

Note: Clubbing of (3) and (4) is not permitted.

The above waivers to the MEL restrictions will in any case never be applied if the MEL/other regulatory requirements are not permitting the same for any other specific operations.

C. Crew Familiarization:

All flight crew are to familiarize themselves with precautions to be taken for Aquaplaning, turbulence and thunderstorms.

D. Pre-flight checks:

1. Check destination, enroute and alternate weather.
2. Observe wet runway limitations.
3. Strictly adhere to Company filed weather minima.
4. Pre-flight inspection should be carried out.
5. At enroute stations, a member of the flight crew & maintenance engineer will decide on the serviceability of the tires.

E. In-Flight checks:

1. Taxi at slow speed so that the aircraft is in control.
2. All take offs must be in accordance with Standard Instrument Departures wherever applicable. No intersection or tail wind takeoffs are permissible unless an adequate performance margin exists.
3. Bird activity increases during monsoon season. Therefore necessary precautions should be taken in this regard.
4. Circumnavigate all radar returns.

Storm cells shall be cleared by at least -

- 10NM when OAT is warmer than freezing

- 15NM when OAT is cooler than freezing
 - 25NM when at or above 25,000 ft.
5. Do not hesitate to hold for improvement in weather
 6. A 'Go-Around' is your best option if the approach is unsuccessful or unsatisfactory.
 7. Auto Brakes if available are to be used for all landings and Auto Brakes 3 or higher to be used under the following conditions.
 - a. Non Normal Landing configurations & speeds.
 - b. When the landing runway is wet or slippery.
 - c. When runway length is less than 6000'.
 - d. When there is a tail wind / crosswind.
 - e. Auto Brakes are an optional part of the Aircraft Braking System and can be carried forward under MEL.

F. EGPWS & SOPs:

Flight crew should pay special attention to all EGPWS warnings and take action as per the Standard Operating Procedures.

FLIGHT SAFETY FOUNDATION (FSF) APPROACH AND LANDING ACCIDENT REDUCTION (ALAR) BRIEFINGS

FSF ALAR task force found that runway excursions and runway overruns were involved in nearly approach and landing accidents and serious incidents. Wet runway conditions, wind shear, and cross wind are factors contributing to runway excursions and overruns. Even though a stabilized approach is made during rainy conditions, an abrupt weather change or deterioration like a moderate rain becoming heavy and wind being gusty during the final landing phase could contribute to runway excursions.

The policy to prevent this is to promote readiness and commitment to go-around, particularly when adequate reserve fuel is available for holding till the conditions at the airport improves.

The presence of water on the runway adversely affects the braking performance by reducing the friction between the tires and the runway surface; and creates a layer of fluid between the runway and tires which reduces the contact area and could lead to hydroplaning.

Directional control should be maintained on a contaminated runway by using rudder pedals and differential braking, as required; nosewheel steering should not be used at speeds higher than taxi speed because the nose wheels can hydroplane.

Alternately diverting to an airport with better runway conditions with better surface wind conditions should be considered.

CONCLUSIONS & RECOMMENDATIONS

For safe operations in the Indian sub-continent and far east, during monsoon and rainy conditions due to cyclonic activity in the Arabian sea and the bay of Bengal, it is necessary to consider the ALAR tool kit and the recommendations made in the Indian DGCA circular on monsoon operations.

Awareness of possible weather conditions at the destination and its updates will be a vital guide in preparing for a possible landing with contaminated runway under gusts or cross wind conditions.

When the weather conditions for landing are not conducive, it is safer to consider holding till the weather conditions improve.

REFERENCES

1. FSF ALAR TOOL KIT
2. "Monsoon Operations" , Operations Circular 01 of 2004, DGCA , Govt. of India, May 28, 2004.