Attachment 14

To Operations Group Factual Report

DCA15FA085

Slippery Runway Landing Performance

Glide path angle also affects total landing distance. As the approach path becomes flatter, even while maintaining proper height over the end of the runway, total landing distance is increased.

Non-Normal Landing Distance

Because of the higher approach speeds and the possible degraded capability of deceleration devices (spoiler, brakes, reversers) associated with the non-normal landing condition, the actual landing distance is increased. The Abnormal Configuration Actual Landing Distances table in the ODM shows VREF and landing distances for various non-normal landing configurations and runway conditions.

Slippery Runway Landing Performance

When landing on slippery runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. Stopping distances for the various autobrake settings and for non-normal configurations are provided in the ODM. Pilots should use extreme caution to ensure adequate runway length is available when poor braking action is reported.

Note: Consider delaying thrust reverser deployment until nose wheel touchdown, so that directional control is not affected by asymmetric deployment.

Slippery/contaminated runway performance data is based on an assumption of uniform conditions over the entire runway. This means a uniform depth for slush/standing water for a contaminated runway or a fixed braking coefficient for a slippery runway. The data cannot cover all possible slippery/contaminated runway combinations and does not consider factors such as rubber deposits or heavily painted surfaces near the end of most runways.

Refer to the Vol. 1, SP.16 and the AM, OPS-4WX.3.

Landing on Wet or Slippery Runways

CAUTION: Reverse thrust above 1.3 EPR may blank the rudder and degrade directional control effectiveness. However, as long as the aircraft is aligned with runway track, reverse thrust may be used as necessary (up to maximum), to stop the aircraft. Do not attempt to maintain directional control by using asymmetric reverse thrust.

CAUTION: Anticipate low friction when approaching touchdown zone at far end of runway due to heavy rubber and oil deposits.

When it has been established that a safe landing can be made, the airplane must be flown with the objective of minimizing landing distance. The approach must be stabilized early. Precise control over drift and approach speeds is mandatory. Execute a missed approach if zero-drift condition cannot be established prior to touchdown. When making the transition to visual reference for landing, continue to utilize glideslope and VASI information to control the glidepath as wet windshields and snow-covered surfaces may distort depth perception. The airplane should be flown firmly onto the runway at the aiming point. Avoid holding off. Be prepared to manually deploy spoilers if automatic deployment does not occur as wheel spinup may be delayed.

On touchdown, take positive action to lower the nose wheel to the runway and maintain moderate forward pressure on control column to assist in directional control. Avoid excessive forward control column pressure in order to retain maximum braking effectiveness and to reduce possibility of nosewheel spray. Hydroplaning may cause delayed Auto Spoiler deployment. Be prepared to quickly manually deploy the spoilers. Simultaneously apply brakes and reverse thrust smoothly and symmetrically, as appropriate to the braking action and runway length available to ensure a safe stop. On wet, contaminated, or slippery runways, immediately after nose gear touchdown, maximize anti-skid braking operation by applying full brake pressure smoothly and symmetrically while applying reverse thrust to the idle reverse detent. After reverse thrust symmetry is verified, gradually increase reverse thrust as required. Reverse thrust should be applied smoothly and symmetrically to 1.3 EPR as soon as possible since the reverse thrust effectiveness is greatest at higher speeds. Full brake pressure, and reverse thrust, should be maintained until a safe stop is assured. If auto brakes are used, consider selecting the MAX setting.

The use of reverse thrust may cause a visibility problem from blowing snow forward as ground speed decreases. Take action as appropriate for braking effectiveness and runway length available. Avoid rapid return to forward thrust when engine RPM is high. Resultant forward thrust may be high enough to cause airplane to accelerate. Avoid large abrupt steering inputs. Maintain directional control primarily with rudder pedals. Use differential braking as needed. Be alert for drift toward downwind side of the runway.

The rudder required in strong crosswinds may cause the nose gear to turn to an angle which could induce skidding. Therefore, it may be necessary to hold the nose gear steering wheel centered while controlling steering with rudder and brakes to maintain tracking.

If a skid develops, especially in crosswind conditions, reverse thrust will increase the sideward movement of the airplane. In this case, release brake pressure and reduce reverse thrust to reverse idle, and if necessary, to forward idle. Apply rudder as necessary to realign the airplane with the runway and reapply braking and reversing to complete the landing roll. It is not necessary to immediately correct to runway centerline as this may delay deceleration efforts and aggravate skid conditions. Use as much runway as necessary to slow the airplane. Do not attempt to turn off a slippery runway until speed is reduced sufficiently to turn without skidding. Consider that braking effectiveness in the last 2,000 feet of the runway may be further reduced by painted surfaces and by accumulation of fuel, oil, and rubber. Consider leaving engines in idle reverse until ability to stop, or clear the runway, is assured.

Wheel Brakes

Braking force is proportional to the force of the tires on the runway and the coefficient of friction between the tires and the runway. The contact area normally changes little during the braking cycle. The perpendicular force comes from aircraft weight and any downward aerodynamic force such as spoilers.

The coefficient of friction depends on the tire condition and runway surface, (e.g. concrete, asphalt, dry, wet, or icy).

Automatic Brakes

Use of the autobrake system is recommend whenever the runway is limited, when using higher than normal approach speeds, landing on slippery runways, or landing in a crosswind.

For normal operation of the autobrake system select a deceleration setting.