

## Aircraft as friction measuring device

### Background

Industry research and scientific projects are currently assessing the feasibility of determining runway friction coefficients through real-time transmission of braking efficiency data from landing aircraft. Whilst this method would provide valuable runway status information to other runway users, ATC and airport authorities, the design and operating philosophy of such equipment must be safe and suitable for normal line operations.

When an aircraft is used as a friction measuring device, IFALPA believes that the following requirements must be met:

### Reliability across aircraft types

Such measuring should be reliable for various aircraft types, weights and runway contaminations. The manufacturer's braking data should be in line with the device outcome. Indeed, there is a huge variety of CS/FAR25 certified aircraft, and friction measured/ reported by an aircraft should be comparable to another aircraft type and harmonized with the measuring aircraft performance data. For example, the data received from a 737NG should be relevant to a CRJ (no autobrake) and an aircraft with multi truck landing gear should provide useful information to a A319 or even an ATR. Reverse thrust effects should be taken into account in the measurements returned.

### Availability of ground-based braking action measuring

Ground-based braking action measuring devices should remain in use. There are several reasons:

- ▶ There might be a lack of regular or recent aircraft-based data at airports where traffic density is low or where traffic is forbidden at night.
- ▶ There is a need for braking action measurement following runway maintenance/blowing before next landing.
- ▶ Ground-based measurements provide back up and maintain redundancy.
- ▶ An aircraft-based system can only measure braking action on the part of the runway the aircraft has used from touchdown to the taxiway, leaving some areas without measurements: the runway area before the touchdown zone, the stop end (aircraft seldom use full runway) and the other parts of the runway not used during the landing roll.
- ▶ The cost of fitting a braking action measuring device to an aircraft might limit the number of aircraft equipped, in particular if it is not a certification requirement.

### No compulsory use of autobrake or maximum braking

Measuring should be possible with normal braking for the following reasons:

- ▶ Manual braking is always available. A flight cannot be dispatched without it. Landing on a contaminated runway using autobrakes may be advisable, but it cannot be required
- ▶ Some aircraft have no autobrakes
- ▶ Brake-limited landings are very rare
- ▶ Although there are advantages to autobrakes, manual braking should remain available as a normal way of braking (not only as a back-up).
- ▶ Brake wear should not be excessive
- ▶ Runway traffic fluidity is also a factor

### High safety standards

The design and operating philosophy of a friction measuring device on an aircraft should be safe and suitable for normal, day to day, line operations. The device should be certified with the highest safety standards and be non-intrusive, ie not add to the already high workload of the flight crew during landing. It should not generate any additional procedures.

## Suitable display of information

Information sent out by an aircraft should be available to its operating flight crew (post landing readout). This will enable them to detect clearly false values and provide them with useful data on the relation between aircraft deceleration with different runway contaminations and computed friction values.

Similarly, measuring information received by other aircraft should be displayed to the flight crew (eg via ACARS) in a usable, universal format in good time before landing, so that the performance calculation can be made.

## Conclusion

Using aircraft as a friction-measuring device can be a safety enhancement provided the flight crew fully understands what the system is designed to do, how it will do it, how it affects operations and lastly, how the data generated will be used (status of the info etc). Such a system may be part of the solution to the non-standardized friction measuring devices currently operating, and improve the relation between measured braking action and actual deceleration of aircraft, but its implementation should ensure that it does not create an additional level of complexity.