Too many overruns

Overrun accidents continue to make the headlines. The fatal write-off at Malaga a year ago is one such accident to occupy the media headlines and the airworthiness professionals.

There seems to be a correlation between the probability of an overrun and thrust-reverser standard. This is the conclusion of three UK Civil Aviation Authority staff, R. Ashford, W. L. Horsley and W. R. B. Bryder. They have studied 46 "notifiable" abandoned jet take-offs and overruns in the past 20 years. Their conclusion is that the worldwide accident rate from this cause is unacceptable and requires urgent review.

We summarise the studies, which concern take-off overruns only (see table). The authors exclude landing overruns.

The list of take-off overrun accidents, when related to number of flights, produces a total overrun accident rate of 0.30 per million flights. The fatal proportion is about one-third of this. If the accidents which are not performance-related are eliminated, the rate is still 0.18 per million flights. Such levels are disturbingly high, in airworthiness terms, for a single "performance-phase". The authors point to a number of contributory factors in addition to lack of adequate reverse thrust.

There is little doubt that overrun accidents are much more likely to occur when the runway is wet or slippery. To the CAA it is surprising that the American and European FAR/JAR 25 performance requirements do not require wet-runway accountability. In the 33 accidents for which information is available, 19 were associated with wet or slippery conditions -41 per cent of the total overrun accidents. The UK CAA is the only airworthiness authority to require wet runway accountability.

The study shows that aircraft fitted with "good" thrust reversers had a measurably lower (better) overrun accident rate than aircraft with "poor" reversers or no reversers at all. Yet there is a disturbing trend away from good reversers on many modern aircraft, particularly the widebodies.

A good reverser is one that gives a retardation of 0.1 g at 100kt in standard conditions and at a typical landing weight. The authors consider that both fan and core flows need to be deflected to achieve good reverse - as on the BAC One-Eleven and Boeing 737. The reversers now generally fitted to the widebodies deflect only the fan stream, a result of early unreliability of the core (hot) stream reversers. Retardation is relatively poor.

Some aircraft have no reverse thrust, relying on low speeds and effective lift-dump and brakes (air and wheel) to offset the need for reversers - for example F.28 and BAe 146, and most of the popular business jets - although some have reverse as an option.

Given the airworthiness gain of fitting "good" reversers, the authors view the recent trend away with some concern. They argue that airworthiness performance credit for good reverse would lead operators to press for better reversers and hence safer runway performance. At the moment, only the UK CAA gives credit for effective thrust-reversers.

Summary: The airworthiness engineer's target for the overall fatal accident rate from airworthiness causes is in the region of 10^-7 per flight. The contribution from accelerate-stop overruns alone appears to be close to 10^-7 and is not improving to any marked degree.

This rate is sufficiently high to call for a review of the international airworthiness requirements. Certification standards should take account of wet runways and should give appropriate credit to aircraft fitted with "good" reversers.

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Above Even clear overruns, like those of Gibraltar (seen here) can pose survivability problems - though not as severely as overruns bordered by man-made obstructions (below)