Use of technology to mitigate overrun aftermath
Overview

- The Overrun Problem
- Runway End Safety Area Requirements
- Use of Technology to mitigate overrun aftermath
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    - Known as Engineered Material Arrestor System (EMAS)
  - Benefits of Arrestor Beds, a technology to consider
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- Global Aviation Safety Roadmap:
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Overrun Accidents Disastrous Consequence

The Overrun Problem

- Many Runway End Safety Areas (RESA) do not meet ICAO RESA SARPS
- Overruns involving air transport category aircraft averaged 3.6 events per month
- Data indicates:
  - Approximately 90% of all runway overruns occur at exit speeds of 70 knots
  - Most come to rest between the extended runway edges, within 300m of the runway end

IATA Accident Data

- IATA Accident Data over a 6 year period (2004-2009) reveals that 46% (75 of 164) runway excursions were overrun events
- 256 fatalities as a result of overrun accidents
Runway End Safety Areas (RESA) Requirements

ICAO Annex 14:

- Per Annex 14, An area ... ... ... primarily intended to reduce the risk of damage to an aircraft undershooting or overrunning the runway.
- Standard - A RESA shall be at least twice the width of the runway and extend 90m from the end of runway strip.
- Recommend Practice - A RESA should be the width of the graded portion of the runway strip and extend 240 from the end off the runway strip.
Runway Safety Areas (RSA) Requirements

FAA:

- The FAA published an order that requires either a 1000ft (300m) RSA at each runway end or, in its place, an EMAS for all (FAR part 139) airports in the United States by 2015.
Technology for mitigating overrun aftermath

What is EMAS

- A bed of cellular cement blocks placed at the end of a runway to decelerate an overruning aircraft in an emergency
- Passive system that will reliably & predictably crush under the weight of an aircraft
Benefits of the Arrestor Bed System

The Arrestor Bed System technology provides:

- Safety benefits in cases where land is not available to meet standard RESA requirements or
- Where it would be very expensive for the airport sponsor to buy the land off the end of the runway or where it is otherwise not possible to have the standard 1,000-foot overrun (FAA standard) and 240m from end of runway strip (ICAO recommended).
  - This 240m, plus the 60m required from end of runway to end of runway strip, is the distance of 300m to end of RESA, which is the equivalent to the 1000 feet of RSA called for in FAA rules.
- Helps to slow or stop an aircraft that overruns the runway
- Excellent results even under worst-case scenario (bad weather, poor braking and/or zero reverse thrust)
Theory of Operation

- Material designed to crush during overrun (like driving into quicksand)
- Designed to stop aircraft at entry speed of 70kts or less
- Engineered to avoid damage to aircraft and passengers
General Configuration
Standard EMAS

NOTES:

- 600 feet minimum reduction applies only to runway ends with vertical guidance for approaches.
- The width of the EMAS bed is the width of the runway plus any sloped area along the sides required for safe ingress/egress and movement of ARFF equipment operating during an emergency.
- The EMAS bed is designed to stop the design aircraft that exits the end of the runway traveling at 70 knots

Size of arrestor bed will vary depending on many factors
History proves: EMAS Successes:
EMAS Arrests vs. Overrun Accidents

(2004-2010) accident data

* There have been five incidents where the technology has worked successfully to arrest aircraft which overrun the runway and in several cases has prevented injury to passengers and damage to the aircraft.

* From 2004 - 2010, a total of 3 accidents were arrested by EMAS.
Global Aviation Safety Roadmap: EMAS Enhances Airport Safety

The implementation of the ICAO Global Aviation Safety Roadmap recommends an EMAS be installed where runway configuration does not allow for the provision of a RESA as recommended by ICAO (Annex 14).
IATA’s Position

recommends deployment of arrestor systems such as EMAS

- IATA recommends a minimum 240m RESA for all runways with a code number 3 or 4.
  - If this is impractical, then IATA recommends a runway arrestor system that is designed to protect aircraft and passengers, such as EMAS, that is engineered to stop an overrunning aircraft at 70 knots or less
- Supports installation of arrestor bed systems at commercial airports that do not provide 240m RESA for runways with a code number 3 or 4 as recommended by ICAO Annex 14
Current EMAS Installations

- 48 Beds at 32 Airports:
  - 44 runway ends at 30 airports in the United States, with plans to install 4 EMAS systems at 4 additional U.S.
  - 2 runway ends at one airport in China
  - 2 runway ends installed in Madrid, Spain
Conclusion

- Evidence confirms that in overrun situations, an arrestor bed system is successful in preventing injury to passengers and limiting damage to aircraft.
- More arrestor beds installation is required around the world.
- Aerodrome charts to depict EMAS installation.
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