

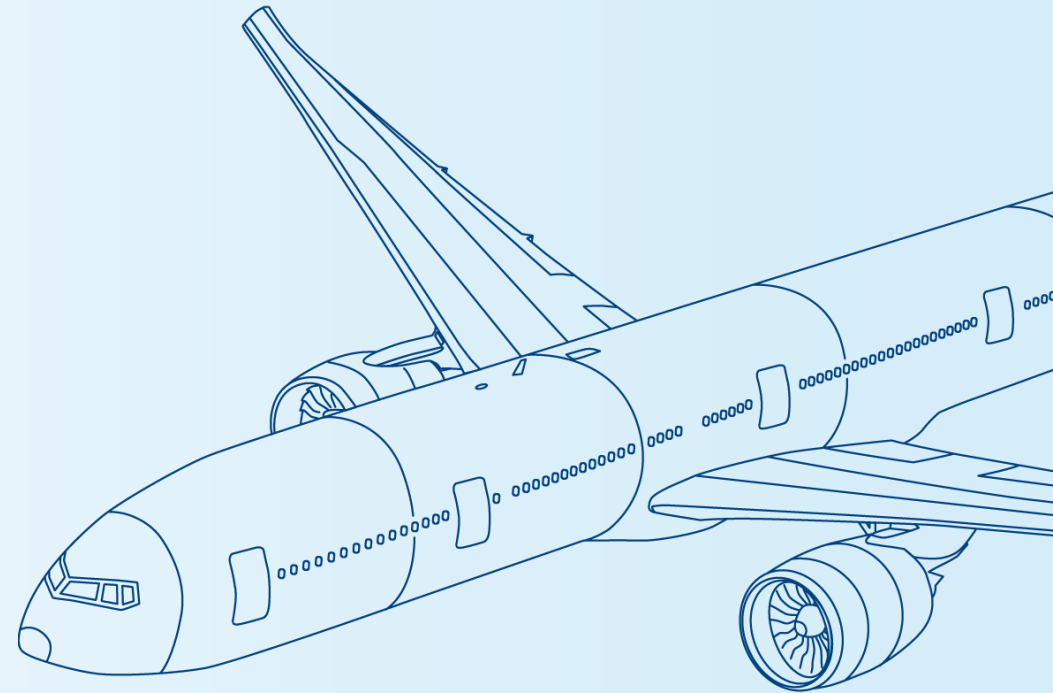
Disabled Aircraft Recovery

Introduction and lessons learned
from ARFF trainings



AGENDA

1. What is „Aircraft Recovery“?
2. Key stakeholders and responsibilities
3. Different aircraft recovery scenarios and statistics
4. Lessons learned from ARFF trainings
5. Solutions?



What is „Aircraft Recovery“?



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What is aircraft recovery?

Aircraft Recovery' is defined as any aircraft that cannot move under its own power or that of a tow tractor and the aircraft is economically repairable. This may be due to:

- Aircraft bogged down in snow or mud
- One or more landing gear off the hard surface
- One or more landing gear collapsed
- One/multiple tires burst

A successful aircraft recovery is one where no **'secondary damage'** is caused and not one is injured or killed during the recovery process



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What **is not** aircraft recovery?

An aircraft that has sustained substantial damage and the insurer considers the hull a constructive loss is considered 'Aircraft Salvage'

Even though an aircraft is considered salvage, the insurer / the airline may still want to recover valuable parts such as avionics and engines



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Why do we need aircraft recovery equipment and people trained in recovery techniques?



Key stakeholders and responsibilities



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Key stakeholders and responsibilities

- **Airport** – ICAO Annex 14 states that the airport must have:
 - An emergency plan, part of that plan should be a disabled aircraft removal plan
 - A designated aircraft recovery coordinator
- **Aircraft operator** - ICAO Annex 14 recommends that they should have a plan for the removal of a disabled aircraft. The owner or operator retains complete responsibility for the removal of the aircraft
- **Investigative authority** – Retains complete control of the aircraft until it is released for recovery. The recovery cannot commence until formal release. The investigative authority may request the removal of certain items such as FDR and CVR. ICAO Annex 13 covers investigation. In an event such as a debogging the investigative authority may release the aircraft over the phone
- **Insurance underwriter** – Whilst the aircraft operator is ultimately responsible for the removal, the insurer, normally through a representative (loss adjuster), will be involved in the recovery process as well. The adjuster can be useful as they have good recovery experience.

Different aircraft recovery scenarios and statistics



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Different scenarios:

Runway excursion

Soft ground

Damaged wheels and Brakes

Nose Landing Gear (NLG) collapsed

Main Landing Gear (MLG) collapsed

All Gear collapsed scenario

Tail strike /Tail Tip



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Other scenarios:



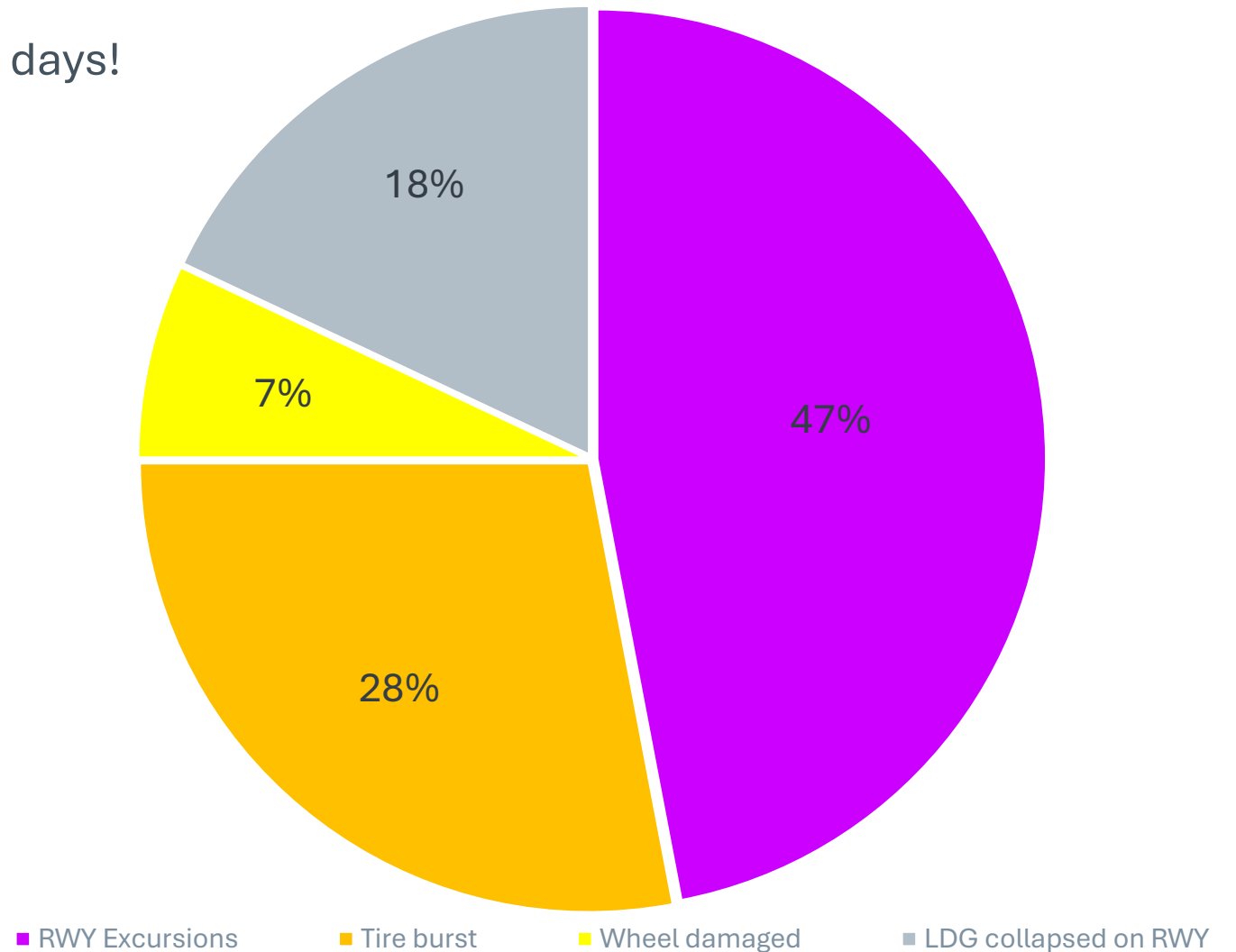
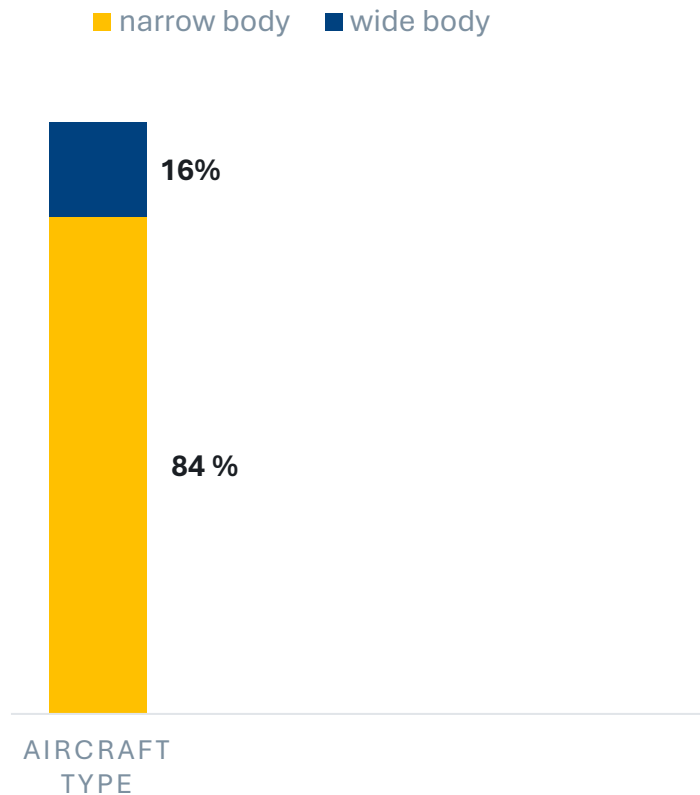
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Statistical evaluation 2024:

Incidents in 2024: > 120

Overall closure time: approx. 646.5 h = 26.9 days!

source: www.avherald.com and others



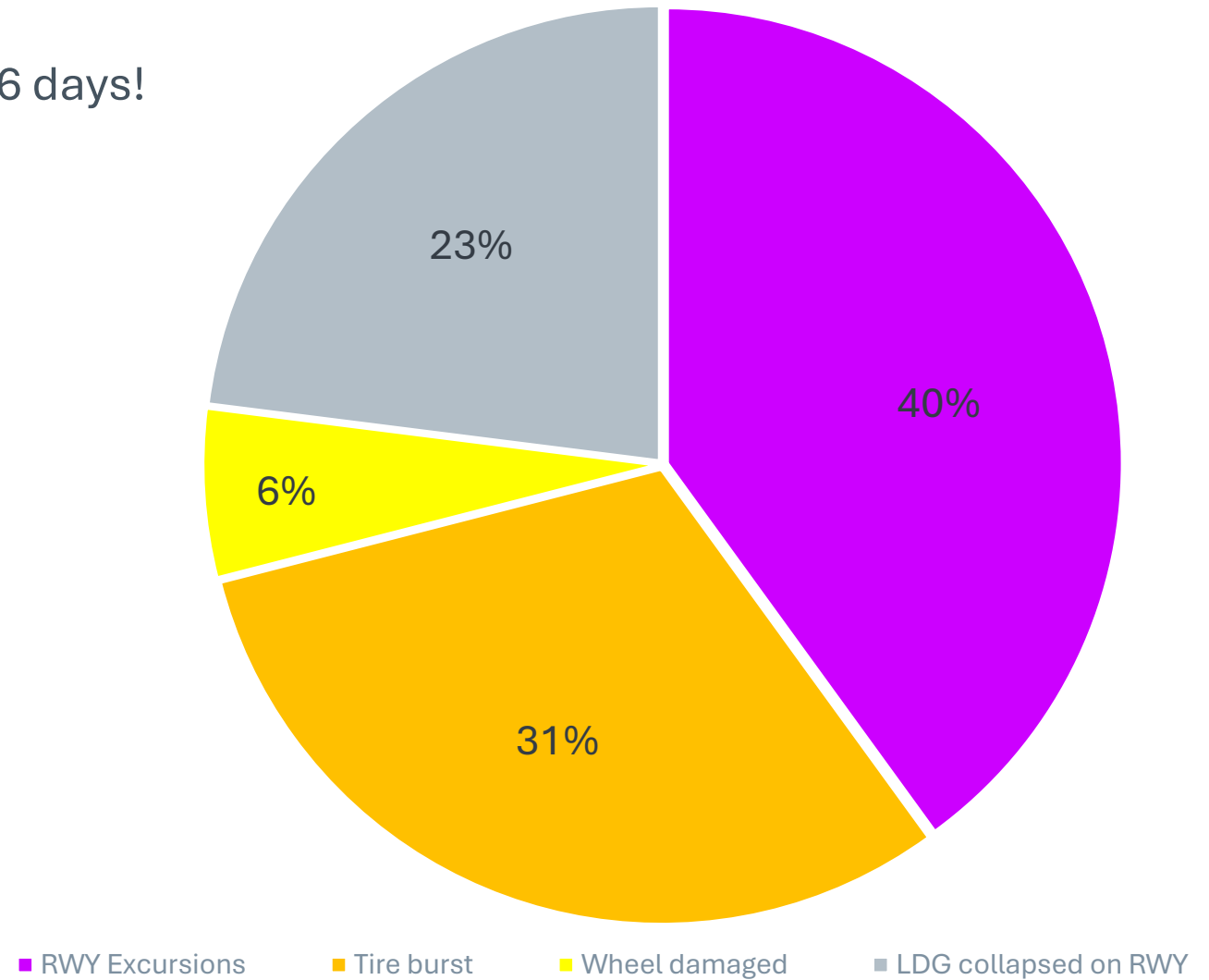
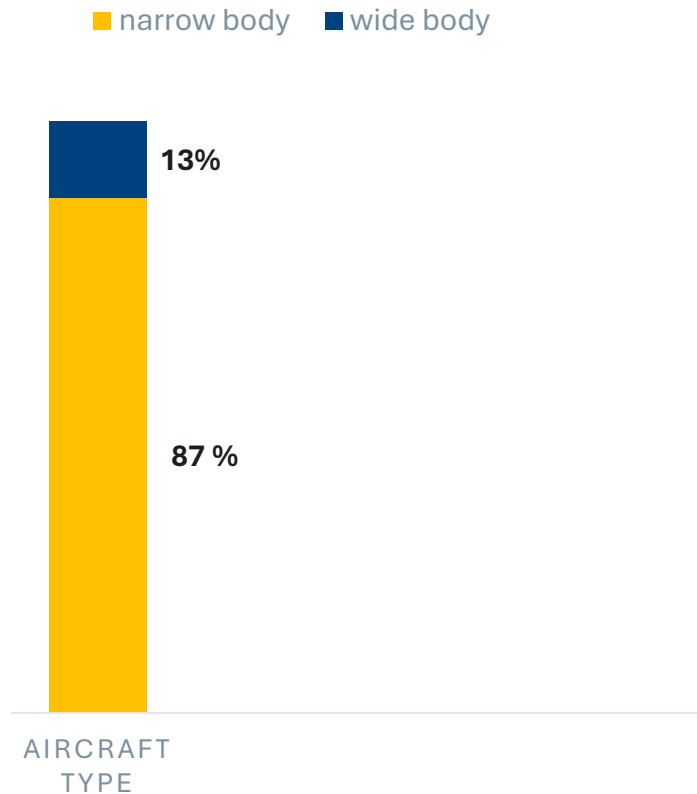
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Statistical evaluation 2025:

Incidents in 2025: > 95

Overall closure time: approx. 687 h = 28.6 days!

source: www.avherald.com and others



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Consequences of not having correct equipment and trained personnel:

- Extended airport closure times
- Secondary damage to the aircraft
- Flight delays and cancellations at incident airport and knock on effect at other airports
- Financial losses for airport and airline
- Significant extra work for all airport and airline staff
- Loss of reputation – airline and airport
- Damage to the environment and possible financial penalties
- Damage to airport operating surfaces
- Injury to personnel



Lessons learned from ARFF trainings



04/2026

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Lessons learnt from ARFF trainings:

Regular training is essential:

- Initial aircraft recovery training and constant refresher trainings are extremely important to keep all personnel trained
- Often no regulations for aircraft recovery training
- Training content must cover all theoretical and practical aspects of aircraft recovery, ideally performed on a real aircraft to simulate realistic incidents
- Standardized trainings are a great way to validate training quality



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Lessons learnt from ARFF trainings:

Disabled aircraft removal plan:

- A detailed, up-to-date disabled aircraft removal plan is often not in place or lacks significant information required to be prepared for an incident
- ICAO Annex 14 includes a recommendation on how the plan should look like and what it should be based on (as of now)
- It is most important that such a plan gets checked regularly to ensure that all information are still correct (procedures, contacts etc.)



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Lessons learnt from ARFF trainings:

Problematic availability of Aircraft Recovery Manuals (ARM):

- ICAO Doc 9137 Part 5 is clearly stating that the **Aircraft Recovery Manual** needs to get consulted **prior to initiating the recovery process** to avoid secondary damage
- Officially, the ARM is only available to the aircraft owner / operator
- ARFF teams who will perform the actual recovery do not have an official access to the documents required to perform a successful aircraft recovery

ARM : A350 : R/I 11 : 20250901



A350

AIRCRAFT RECOVERY MANUAL

ARM

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Solutions?



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Lessons learnt from ARFF trainings:

Solution? Proposed Amendments by ICAO!

- The proposed amendments to Annex 14 and Doc 9981, envisaged for 25th November 2027, address these problems:
- New amendments highlight the importance of **trained personnel**, the **availability of the relevant documentation** (ARMs) and demand airports to have a **more detailed disabled aircraft removal plan**
- Good approach to support airports and ARFF teams in terms of preparation and during disabled aircraft recoveries



ICAO

➔ **Changes and the resulting actions have to be clearly communicated to the airports, and the implementation needs to be monitored**

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THANK YOU!