EASA
European Aviation Safety Agency

Rotorcraft Occupant Protection Rulemaking Activities.

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Road map


Rotorcraft Safety Roadmap
12 WORK STREAMS
KPI 25
GA Private / Training
SPECIALISED OPERATION
OPS, AIRWORTHINESS, ENVIRONMENT, INNOVATION
EASA MS: 7 762
ASIA: 5 363
US: 9 073
OTHER: 17 893
World 40 091
1. DATA 2. INCENTIVISING
D4S, EASA & NAA network, utilisation of Data, Incentivise Safety for airworthiness & environmental standards,....
3. SAFETY RATING 4. FINANCIAL SUPPORT
Safety rating scheme, technologies with safety benefits, financial support to implement,...
5. TRAINING 6.TRAINING DEVICES 7.CONTINUED EDUCATION
CAE, Mandatory & recurrent training, High-risk scenarios, simplifying crew prerequisite, cheap new training devices & Auto pilot
Team work with the industry, launch evaluation task,...
8. SAFETY PROM. 9. SIMPLIFY
Product safety improvement rodamap, define syste
equipment safety benefits,
21 changes, project team for CS
10. DESIGN 11.NET SAFETY BEN. 12. CS MODERNIS.
EASA
APPROVED
SAFETY
KPI 12
PRIORITY
Crashworthy fuel tank & seat
loss of control
Terrain and obstacle conflict
Crashworthy fuel tank & seats
Small operators
High risk activities
1 Rotorcraft accident every
eek in EU
Significant safety improvem
nt needed
Reduce high-risk training s
narios
Less checking / More trai
ng
Develop affordable li
rotorcraft simulators
Plan resources
Q3 Implementation plans
EPAS 2019 - 2024
Full Implementation
2019
2020
2023
2025
2029

Crash Resistance Fuel (CRFS)

Objective: To prevent post crash fire in survivable crash (No fuel leak)

CS27/29.952 Crash Resistant Fuel System (CRFS).
- Fuel Systems installation must be shown to be capable of sustaining the following loads:
- Drop test described in CS 29.952(a) for fuel tank with adjacent structure.
- Breakaway fittings
- Static ultimate inertial load factors defined in CS 29.952(b)

Crash Resistant Seat and Structure (CRSS)

Objective: To prevent/minimise injury in “survivable” crash (Seat remains attached & occupants and Items of mass restrained)

CS 27/29.561, 562, 785 Crash Resistant Seat and Structure (CRSS)

- CS 27/29.561 Items of mass and occupant must be restrained under the required ultimate inertial load factors.
- CS 27/29. 562, 785 dynamic and static requirement for Seat combined with anthropomorphic criteria (HIC) .

Fleet Status for Occupant Protection .

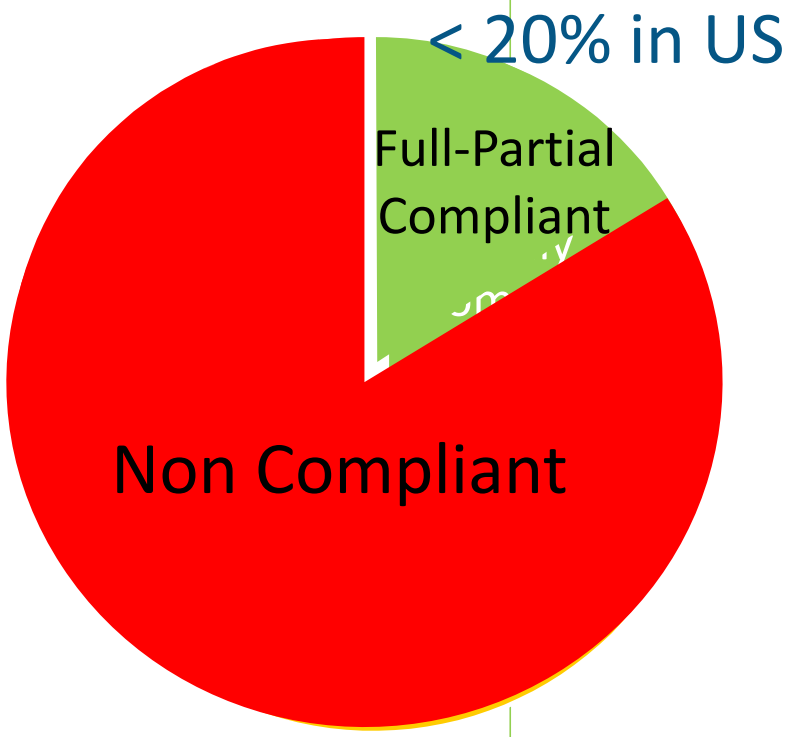
- In the 1980s and 1990s certification requirements of FAA 14 CFR Part 27 and Part 29 were amended to require newly certified rotorcraft to incorporate features to ensure occupant protection.
- rotorcraft certified with pre-amendment certification basis (for CRFS and CRSS) did not meet these improved occupant protection regulations and many are still in production today.

Low incorporation rate of the latest Occupant Protection requirements in the rotorcraft fleet. the number of fatal accidents remains high (where mitigation through an improved design for occupant protection could have prevented fatalities)

Examples. AS350 B3, A109, A119, R22, R44, BEL 206, BELL407, MD 500N.

Fleet Status for Occupant protection

- Rotorcraft newly manufactured
  - non compliant
  - fully compliant
  - partially compliant
- In service rotorcraft
  - non compliant
  - fully compliant
  - partially compliant



EASA Rulemaking Objective.

EASA Objectives

Rulemaking process to implement full or partial Occupant Protection requirements or any other alternatives to the

- future manufacturing of old Type design having no incorporated the latest Occupant Protection requirements
- existing in service fleet and

AD, Part 26…

ARAC Activities Summary (TOR)

Newly manufactured rotorcraft

Existing rotorcraft fleet

- Improve or adapt the existing occupant protection standards (CFRS & CRSS) 27.561, 27.562, 27.785, 27.952, 29.561, 29.562,29.785, and 29.952 or
- new alternative performance based (e.g. Operational)

ARAC Activities Summary.

Newly manufactured rotorcraft

- Task #1 & #2. Evaluation of the efficiency (cost/benefit) of the existing requirements (full compliance)
- Task #3 & #4 . preliminary recommendations for incorporating CRFS regulations into newly manufactured legacy rotorcraft.
- Task #5. Recommendations for incorporating crash resistant fuel systems (CRFS) and all or part of Crash Resistant seat and structure requirements into newly manufactured rotorcraft

Existing rotorcraft fleet

- Task #6. recommendations for rulemaking and other actions to improve occupant crash protection in previously manufactured helicopters. .

ARAC Activities Summary. Tasks #1 and #2

Newly manufactured rotorcraft

Develop a 10 years cost-benefit analysis report for incorporating the existing occupant protection standards.

- Fuel tank protection 27/29.952 (even partially) shown efficient to prevent post crash fire.
- Estimated benefits of compliance with 27/29.561, .562, and .785 (CRSS) have a high degree of uncertainty
- Lack of impact conditions and occupant protection in the accident investigation render occupant protection analysis difficult

ARAC Activities Summary. Task #5 & 6

ARAC Recommendations (high priority)	Newly manufactured	Previously manufactured	EASA position
27/29.952(a)(1)(2)(3)(5)(6), 27/29.952(f), and 27.963(g)/29.963(b): The FAA should require, in all rotorcraft, the installation (retrofit) of crash resistant fuel bladders that meet the requirements of the 50-foot fuel cell drop test **in or out of structure**, and that demonstrate a minimum of **250 lb puncture resistance**. Note: Some potential exceptions to this rule are discussed in the main body of the report.	Recommended	Recommended	Partially Supported

ARAC Activities Summary. Task #5 & 6 previously manufactured helicopters

ARAC Recommendations	Newly manufactured	Previously manufactured
27/29.562(b)(1): Dynamic seat testing, Vertical Direction	Recommended	Not recommended
27/29.562(b)(2): Dynamic seat testing, Horizontal direction	Recommended	Not recommended
27/29.785: Seats, berths, litters, safety belts, and harnesses	Recommended	Not recommended

ARAC Activities Summary. Task #5 & 6 previously manufactured helicopters

ARAC Recommendations (high priority)	Newly manufactured	Previously manufactured
27/29.785(c) and (g): The FAA should require installation (retrofit) and proper usage of **upper torso restraints (shoulder harnesses) in all rotorcraft** seating positions in all rotorcraft.	Recommended	Recommended
27/29.785: The FAA should mandate the use of appropriate restraints for all occupants of rotorcraft, **regardless of the age of the occupant.** "Lap Children" should not be permitted in rotorcraft.		Recommended
27/29.561(b)(3): Restraint of occupants and items of mass in cabin	Recommended	Not recommended

EASA position CRFS

EASA supports the ARAC recommendation for the installation of **fuel tank bladder crash resistance**.

However discussion foreseen for compliance with 27/29.952(a)(4)

"The tank must be enclosed in a surrounding structure representative of the installation unless it can be established that the surrounding structure is free of projections or other design features likely to contribute to rupture of the tank"

EASA position CRSS

85 CS 27 rotorcraft fatal accidents, with 175 fatalities for 2006 to 2015 period. Full Compliance with 561, 562 and 785 has been estimated to provide 30 percent reduction in fatalities:

52 fatalities could have been prevented if full compliance implemented.

The recommendation for the installation at least of the upper torso restraints is supported, **but not found sufficient to reach 30% reduction in fatalities** determined for CS 25.562/785 implementation.

EASA Position

Technical Implementation.

- Complex on existing (in service) rotorcraft
- Very challenging for some rotorcraft configuration

Implementation time.

- To be determined (long term rulemaking process >2025)
- Applicable to Existing and newly Manufacturing?
- Partial or full compliance

EASA Conclusions

- Start the rulemaking activity considering the ARAC recommendations.
- Partial compliance if demonstrated efficient can provide an acceptable approach.
- Operational limitations or Alternative recommendations to be considered (ARAC recommendations)
- Implementation time for In service and newly manufactured rotorcraft (long term process)
- Convergence between EASA and FAA is essential.

- Exemption, reversion granted in past certification did not help…

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Questions ?

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