



Publications

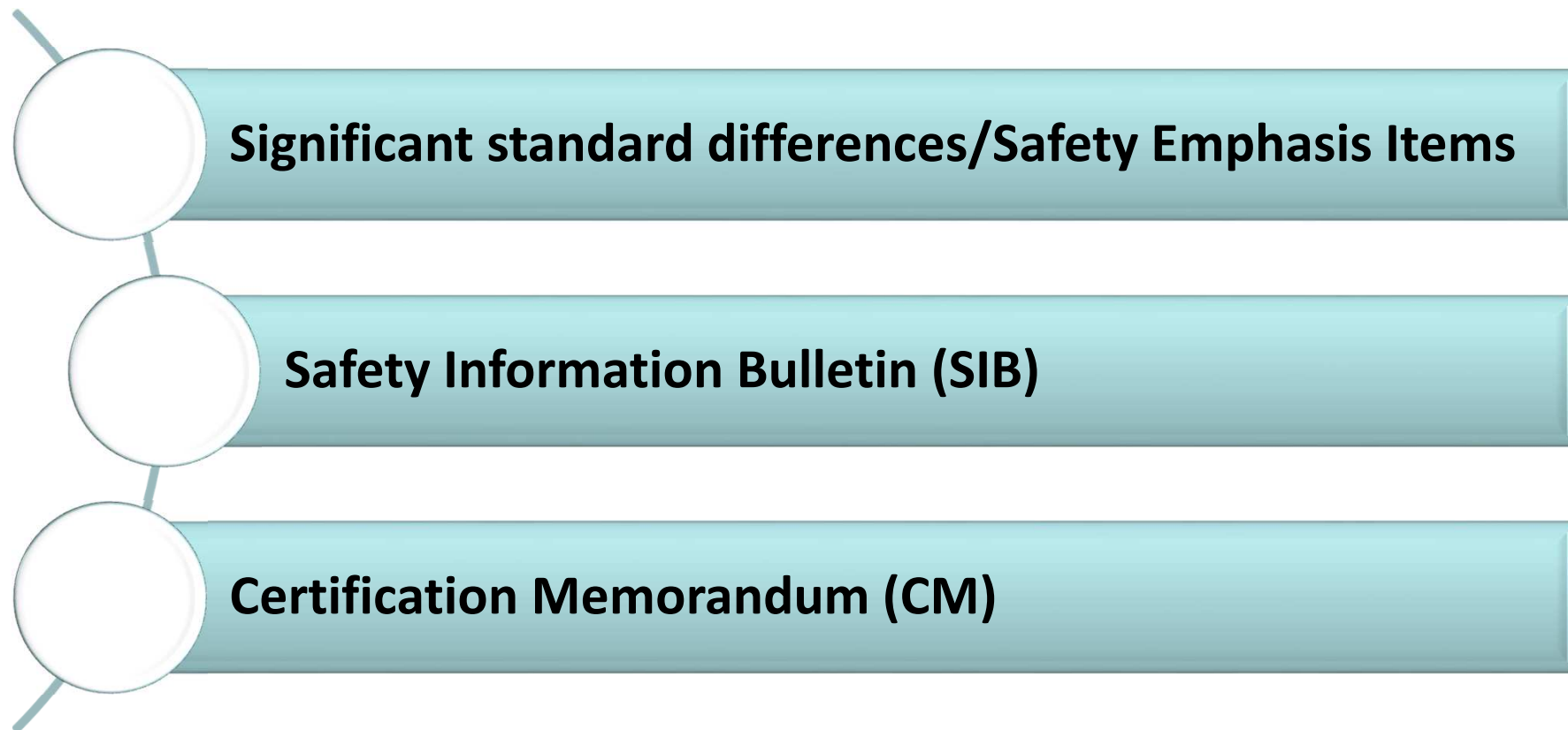
Safety Emphasis Items for Structures, SIBs and Cert. Memos

Herdrice HERESON

Rotorcraft Structures Expert CT3

Rotorcraft Structures Workshop
19-20 February 2019







TIP rev6: SSD&SEI



**Technical Implementation
Procedures (TIP) for airworthiness
and environmental Certification
signed on 22 September 2017 Rev. 6
by EASA & FAA**

SSD/SEI list
defined before
entry into force of
TIP: **March 2018**

Acceptance (i.e now Basic change &STC and TC in 2020)



Streamlined Validation(Basic)



Technical Validation(non-basic)





Definition

Significant Standard Differences (SSD)

- Airworthiness standard significantly difference (particular amendment-pair of standard) requiring type design changes, approved manual changes, additional or different demonstrations of compliance, or the imposition of operational limitations.

Safety Emphasis Items (SEI)

- Interpretive, advisory, means of compliance, or guidance materials differences.
- New VA standards or certain SSDs where VA or CA has limited past experience.
- Items identified for special emphasis by the VA in a data-driven risk assessment analysis
- Subjects linked to known safety conditions.



CARP process-Structures working group



CARP Structures
working group



Standard amendments

CS 27 Amdt. 4 vs. FAR
27 Amdt. 49

CS 29 Amdt. 4 vs. FAR
29 Amdt. 56





Outcome: 8 EASA Structures SEI- No SSD

- Yawing conditions
- Control loads
- Structural strength for ditching

Loads



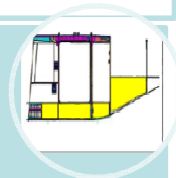
- Metallic structures
- Composite structures

Fatigue and damage tolerance



- Seat adapter plates
- Fuel tank crashworthiness with external equipment

Crashworthiness



- Standard fasteners

Material



• <https://www.easa.europa.eu/document-library/bilateral-agreements/eu-usa/easa-lists-safety-emphasis-items-sei>



Loads

Yawing conditions

- AMC 27/29.351(a) # FAA AC 27-1B and 29-2C on design criteria for components subjected in flight to significant aerodynamic loads (e.g. vertical empennage, fins, cowlings and doors).

Control loads

- # Selection of the design conditions (nominal and failure conditions, including jamming) for flight control segments located between the servo-actuators and the blades.
- (§27/29.395(b2&3))



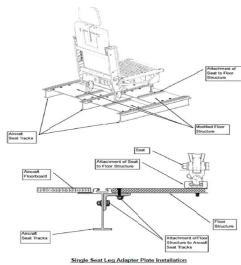
Ditching

- Selection of Limit vs Ultimate loads conditions used to substantiate rotorcraft structures in case of ditching. (§ 27/29.563/§ 27/29.801 (e))

Affects
New TCs,
Derivative models &
Changes significantly
affecting the design loads
assumed for certification



Crashworthiness



Seat adapter plate

- Use of adapter plates or plinths for the fitment of seats to the aircraft. Need to test the adapter plate / plinth as part of the seat test?

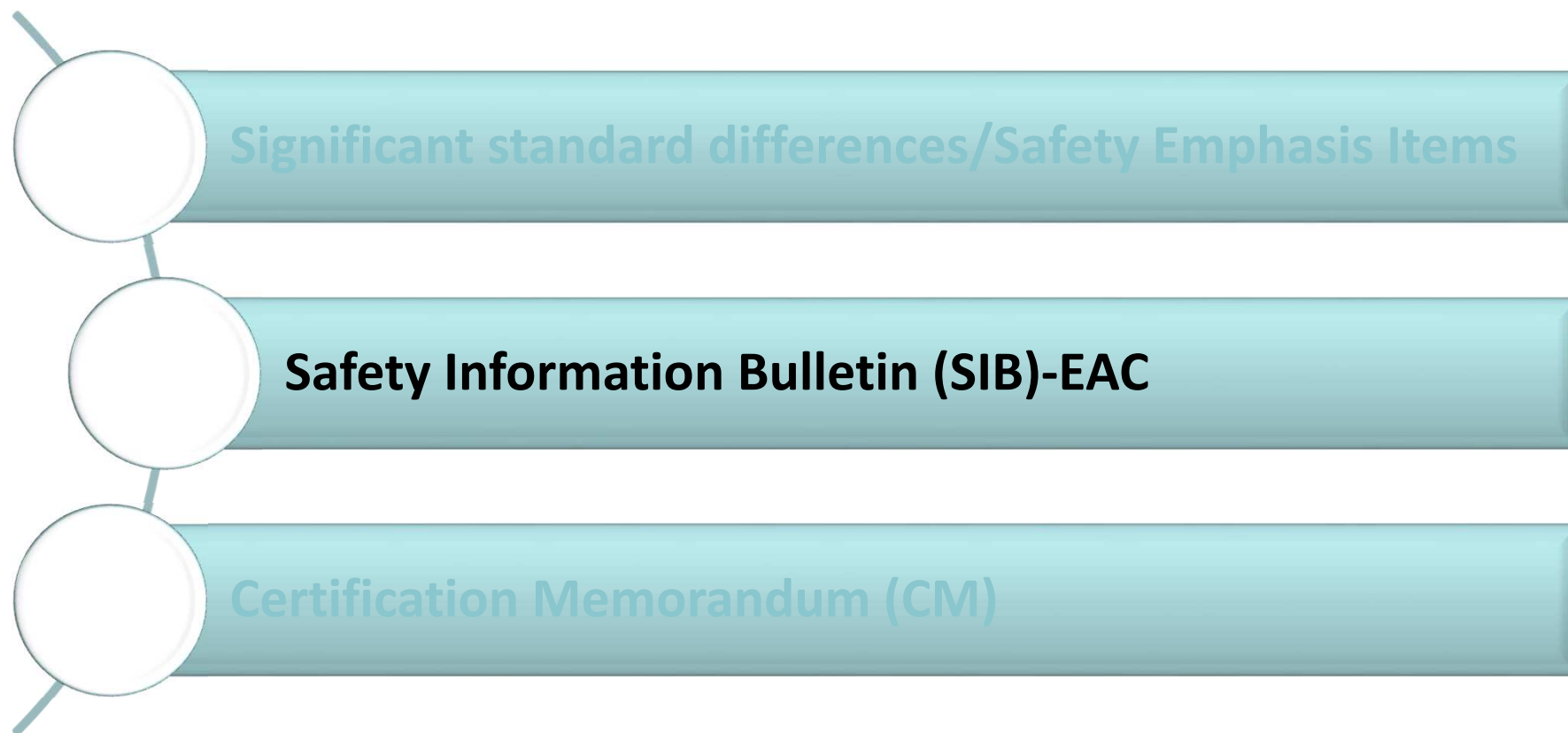
Affects :
Derivative
models and
changes to TC



Fuel tank crashworthiness with external equipment

- External installations could be part of the surrounding structure and their impacts against § 2729.952 (a)(4) need to be evaluated. As of today, harmonization among authorities on this approach has not been reached.

Affects:
new TCs,
derivative models
and
changes affecting
rotorcraft structure





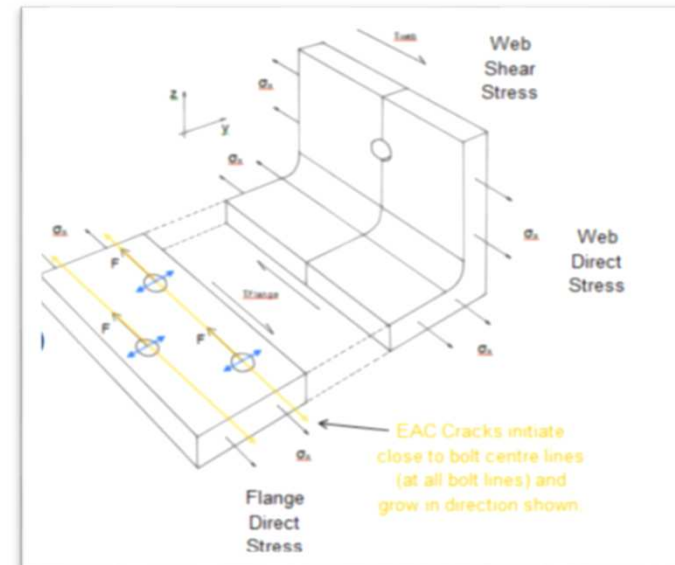
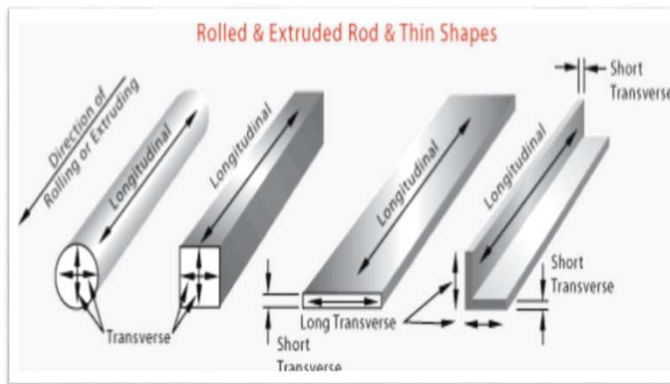
9th International Conference on Aluminium Alloys (2004)



New generation of 7XXX thick section alloy



Years after TC.....First cracks found

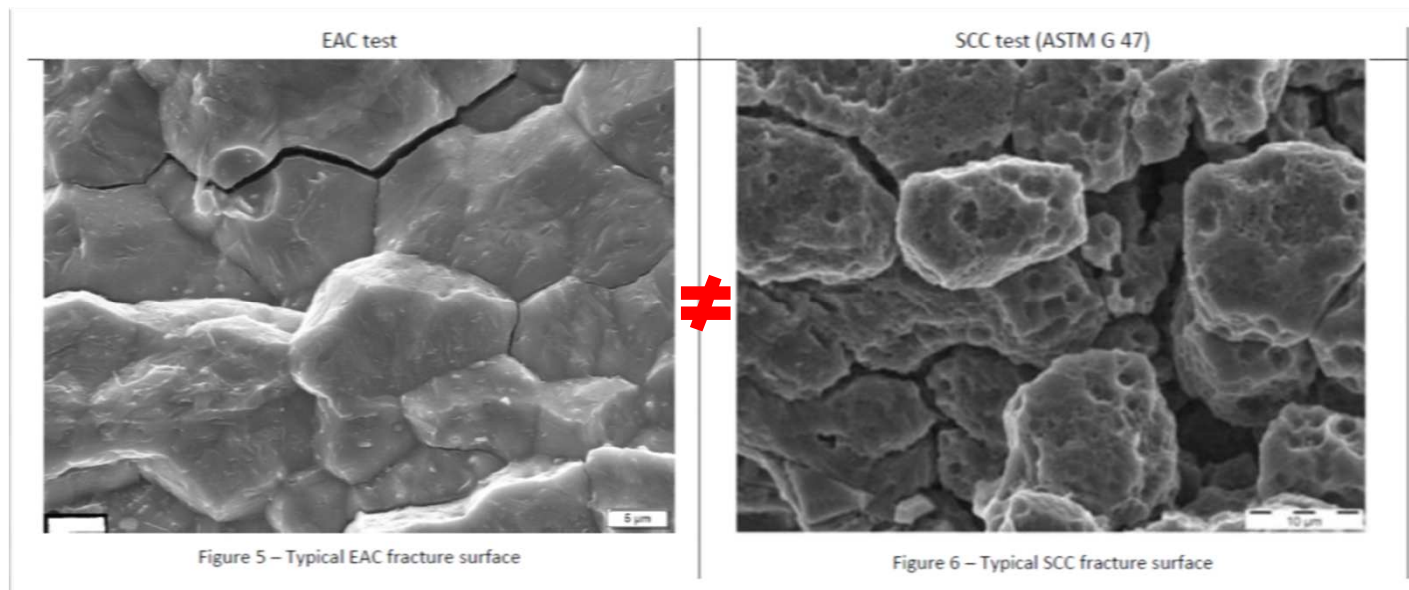


Cracking exist only when material loaded in the **Short Transverse (ST) Direction!**



Root cause: EAC hydrogen embrittlement

Environmentally Assisted Cracking (EAC): This form of EAC develop in susceptible aluminium alloys, due to hydrogen embrittlement .

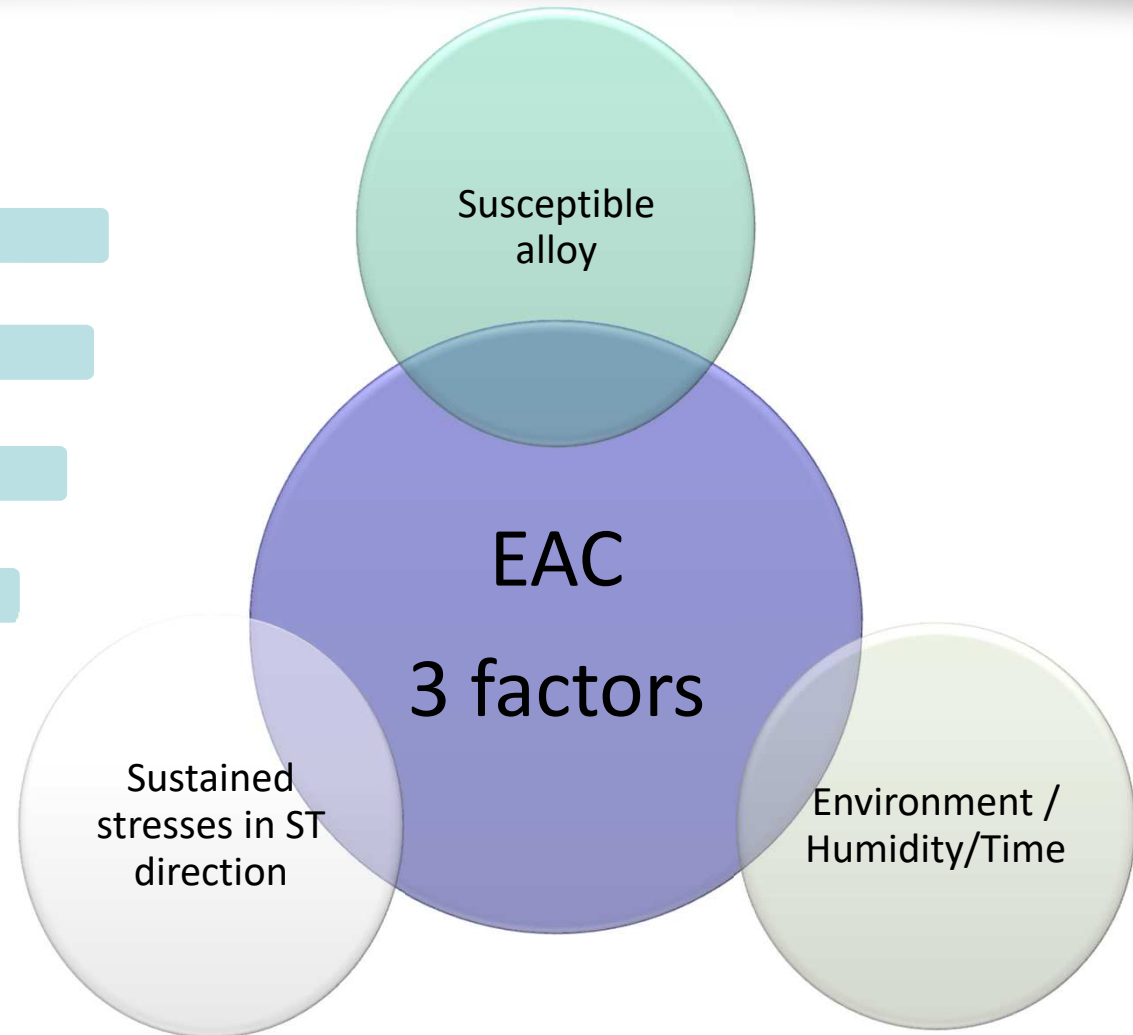
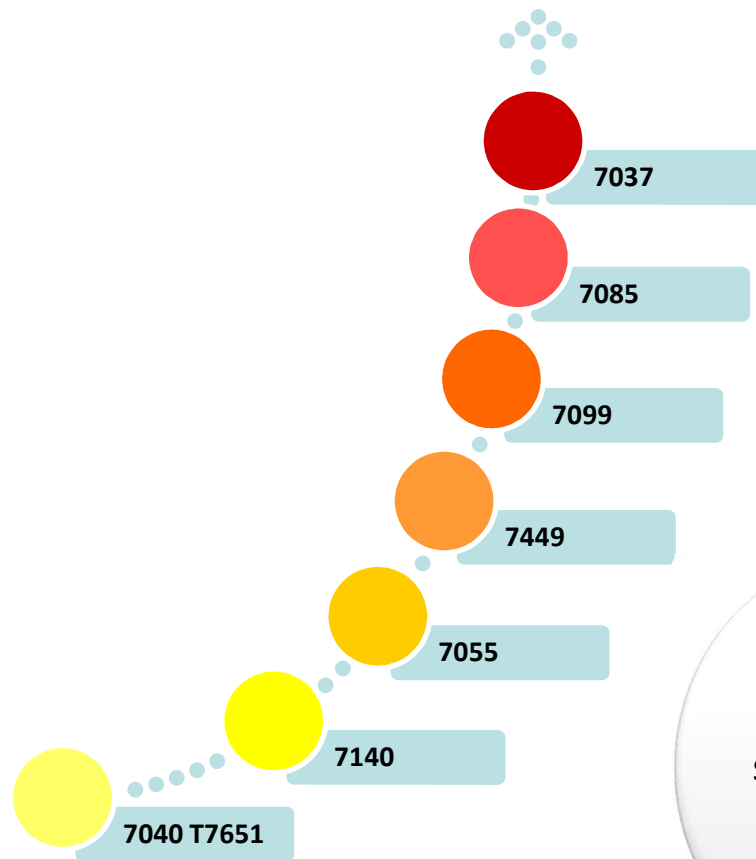


(Fig 5)-Hydrogen absorbed by solid metal at the grain boundary .

Linked to chemical composition of grain boundary precipitates -> Zinc, Magnesium, Copper

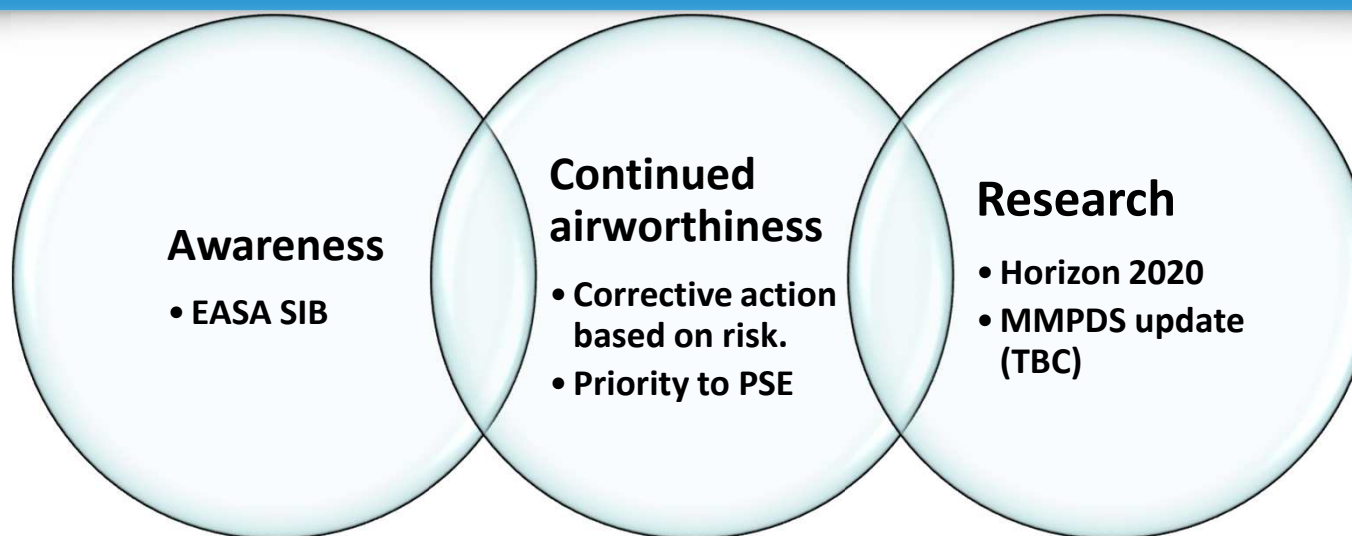


Investigation: Material affected





EAC risk management



02440087.pdf

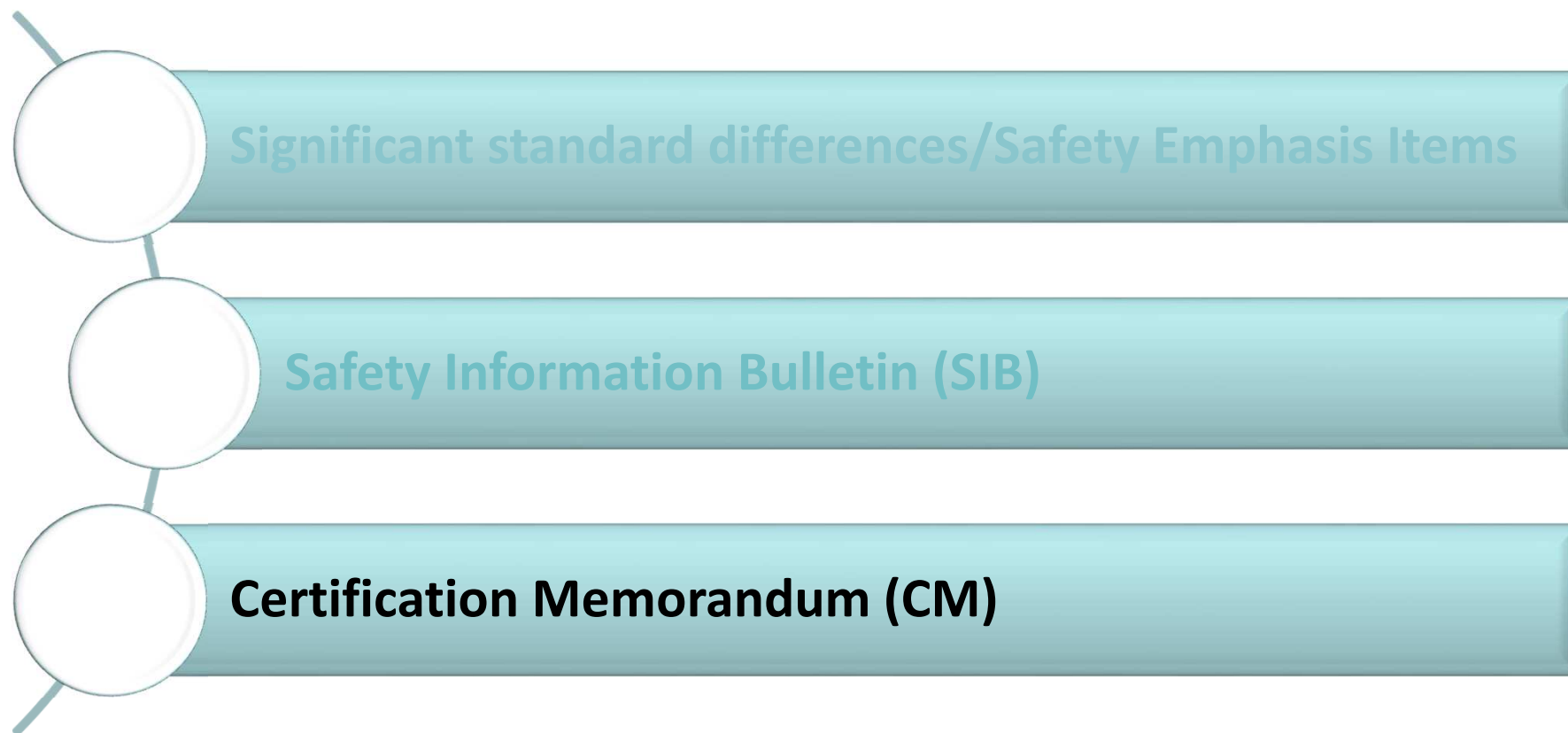
Several affected products – final situation TBC

3 EU Large Aeroplanes

2 EU rotorcraft

2 foreign validation product

Military products





Certification Memoranda: what is new?

Published

- CM-S-001: CS-25 Bird Strike Requirements(*).
- CM-S-002: CS 25.561 (c)(2) 1.33 'Wear and Tear' Factor(*).
- CM-S-003: Standard Fasteners (nuts and bolts).
- CM-S-004: Composite Materials - Shared Databases.
- CM-S-005: Bonded Repair Size Limits.
- CM-S-007: Certification Actions to Verify the Continued Integrity of Rotorcraft Critical Parts
- CM-CS-005: H/C External Loads Personnel Carrying Device System.
- CM-S-010: Composite Materials - The Safe Design and Use of Monocoque Sandwich Structures (PSE)
- CM-HS-004: CS 27/29.865 CM-HS-004: CS27/29.865-Safety considerations covering External Loads

To be published

- CM-S-009: Cabin Interior Abuse Loads.
- CM-S-008: Additive Manufacturing_draft.
- CM-S-XXX: Compliance to CS27/29.952 a(4) for changes affecting surrounding structure.
- CM –S-XXX: STC External equipment
- CM-S-XXX: Bearings

• <https://www.easa.europa.eu/document-library/public-consultations/certification-memoranda>

• *Large Airplane CM, recommended on Rotorcraft



EASA

European Aviation Safety Agency

Thank you for your attention!

Any questions....?

Your safety is our mission.

An agency of the European Union

