



**EASA**  
European Aviation Safety Agency

# Publications

Safety Emphasis Items for Structures, SIBs and Cert. Memos

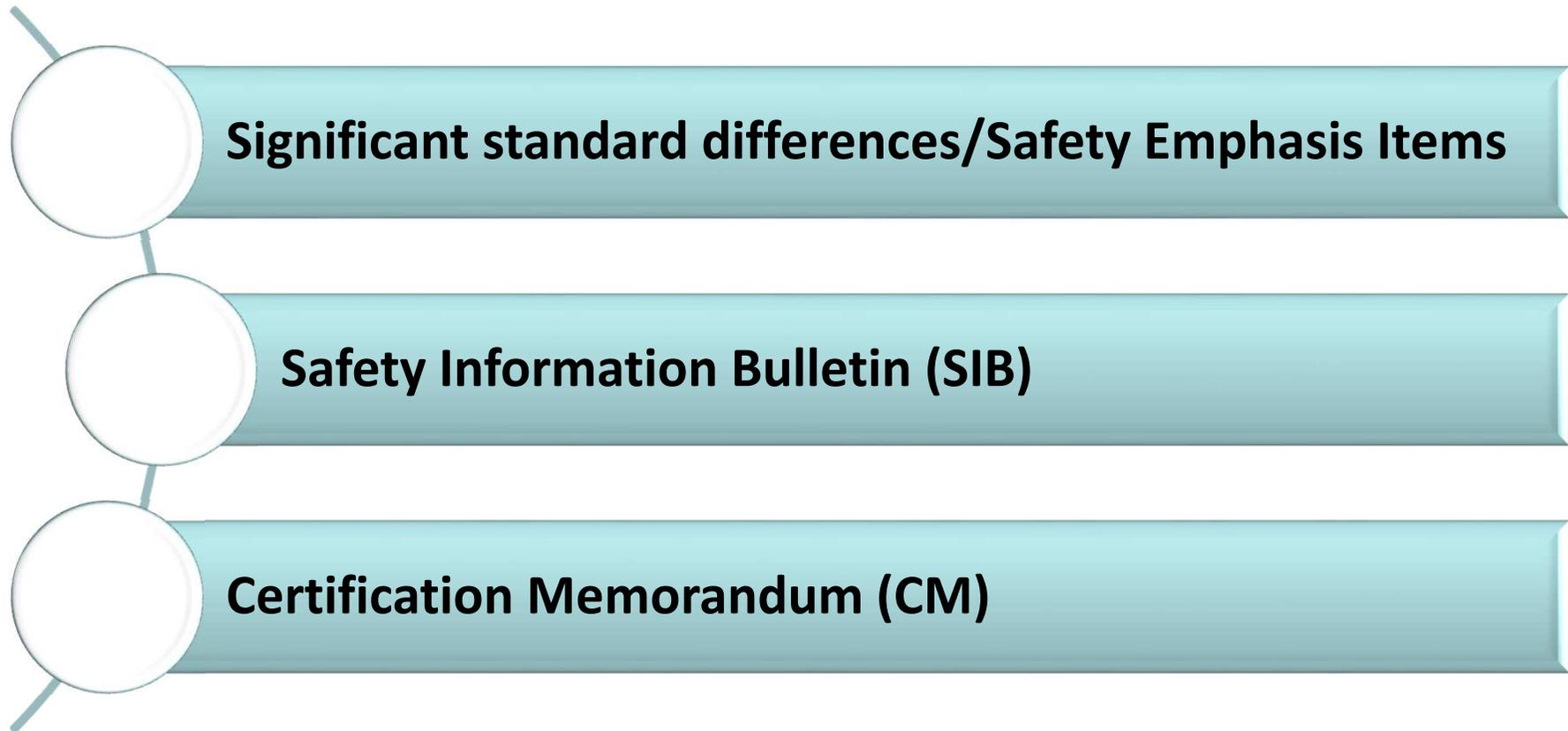
Herdrice HERESON

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



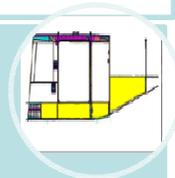
- Metallic structures
- Composite structures

## 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

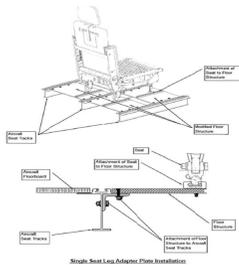
- # Selection of the design conditions (nominal and failure conditions, including jamming) for flight control segments located between the servo-actuators and the blades.
- (§27/29.395(b2&3))



## 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



## 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?

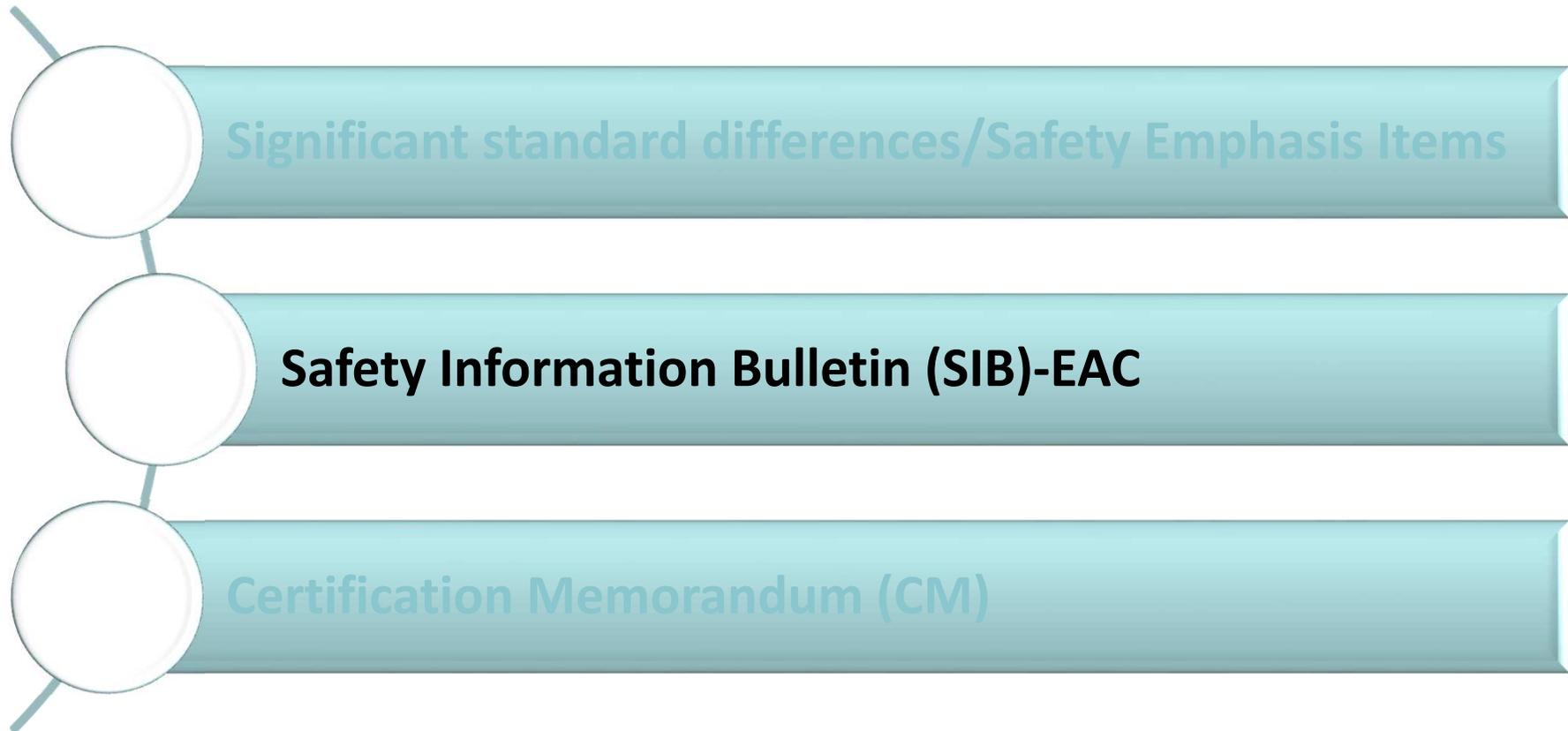
Affects :  
Derivative  
models and  
changes to TC



## 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





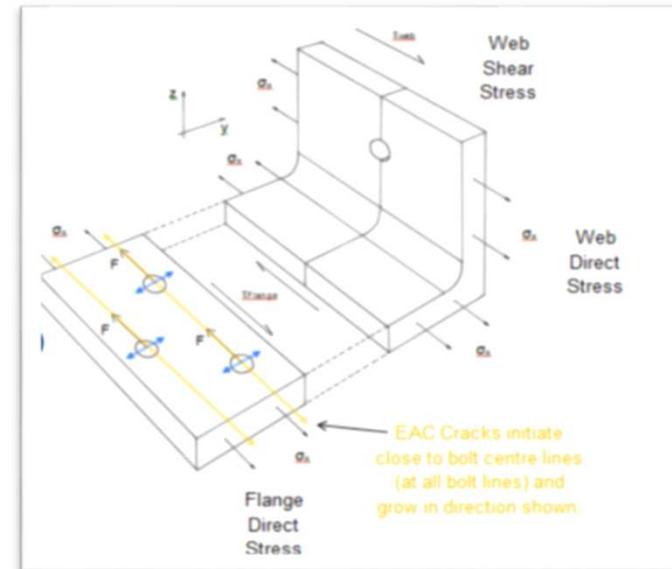
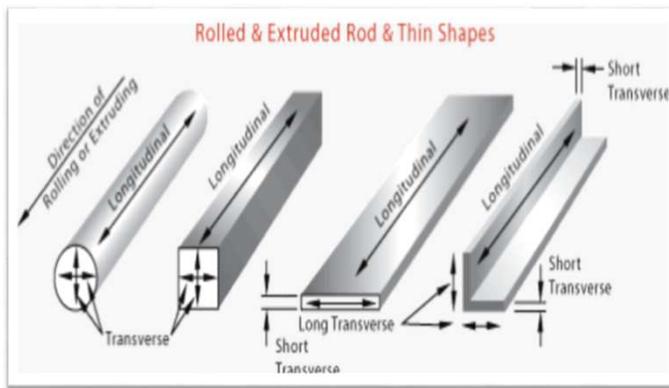
9<sup>th</sup> International Conference on Aluminium Alloys (2004)



**New generation of 7XXX thick section alloy**



# Years after TC.....First cracks found

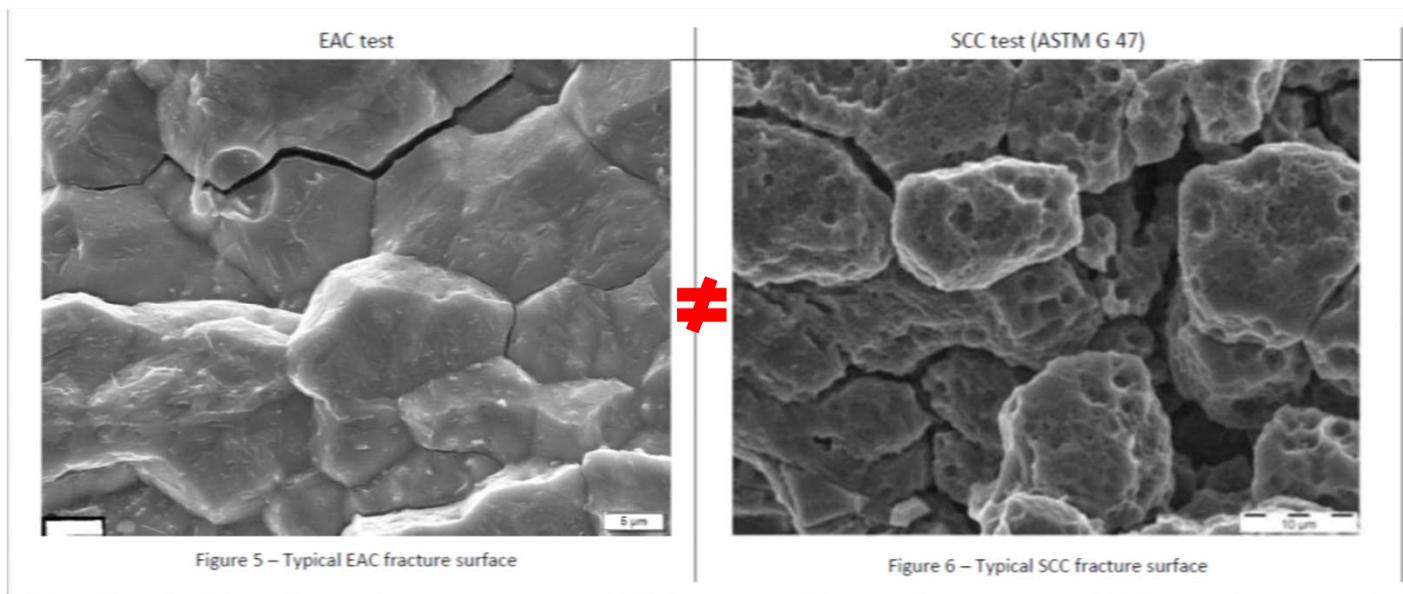


Cracking exist only when material loaded in the **Short Transverse (ST) Direction!**



# Root cause: EAC hydrogen embrittlement

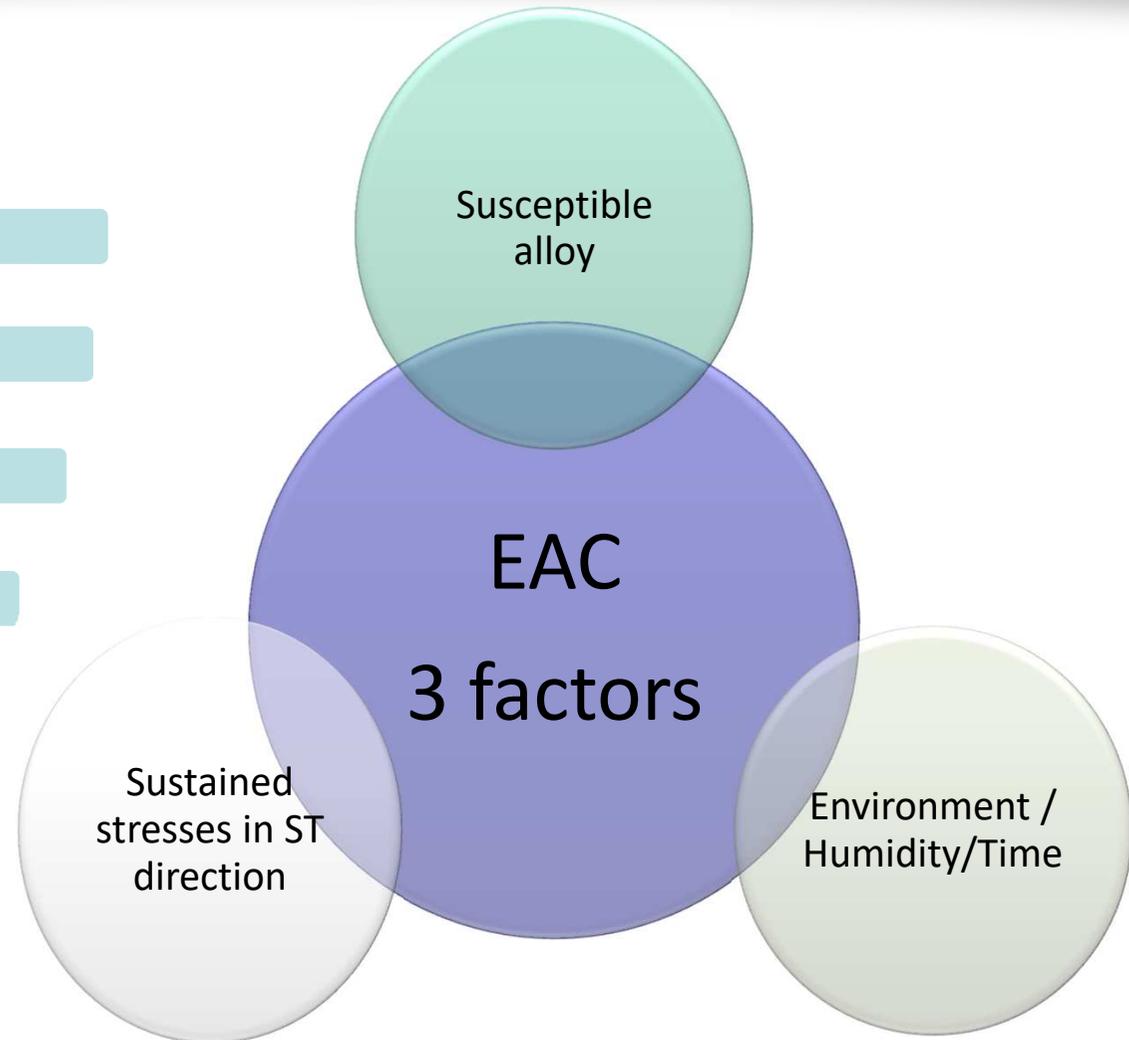
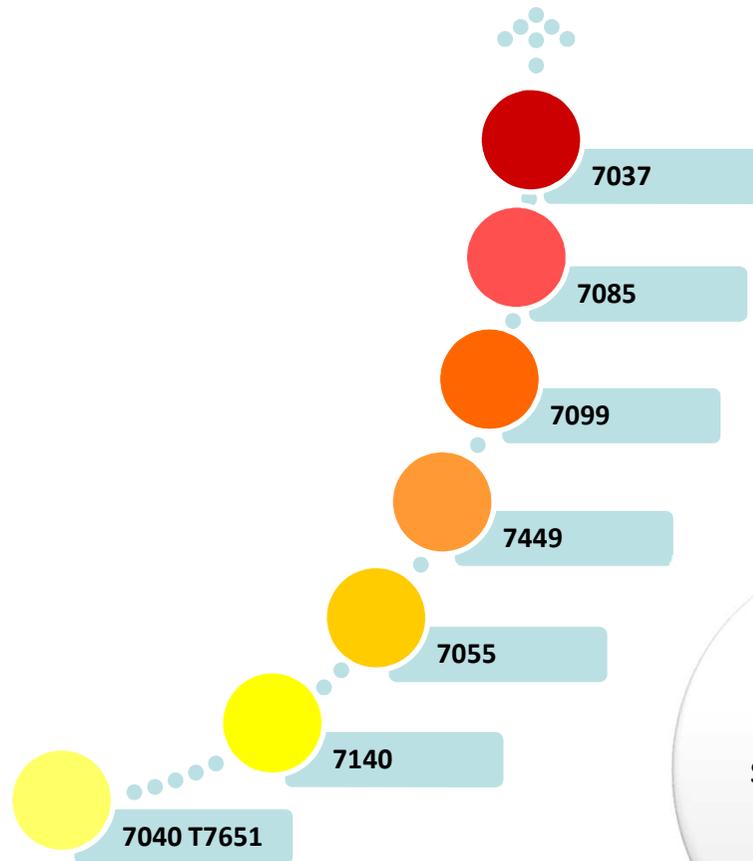
Environmentally Assisted Cracking (EAC): This form of EAC develop in susceptible aluminium alloys, due to hydrogen embrittlement .



( Fig 5)-Hydrogen absorbed by solid metal at the grain boundary .  
Linked to chemical composition of grain boundary precipitates -> Zinc, Magnesium, Copper

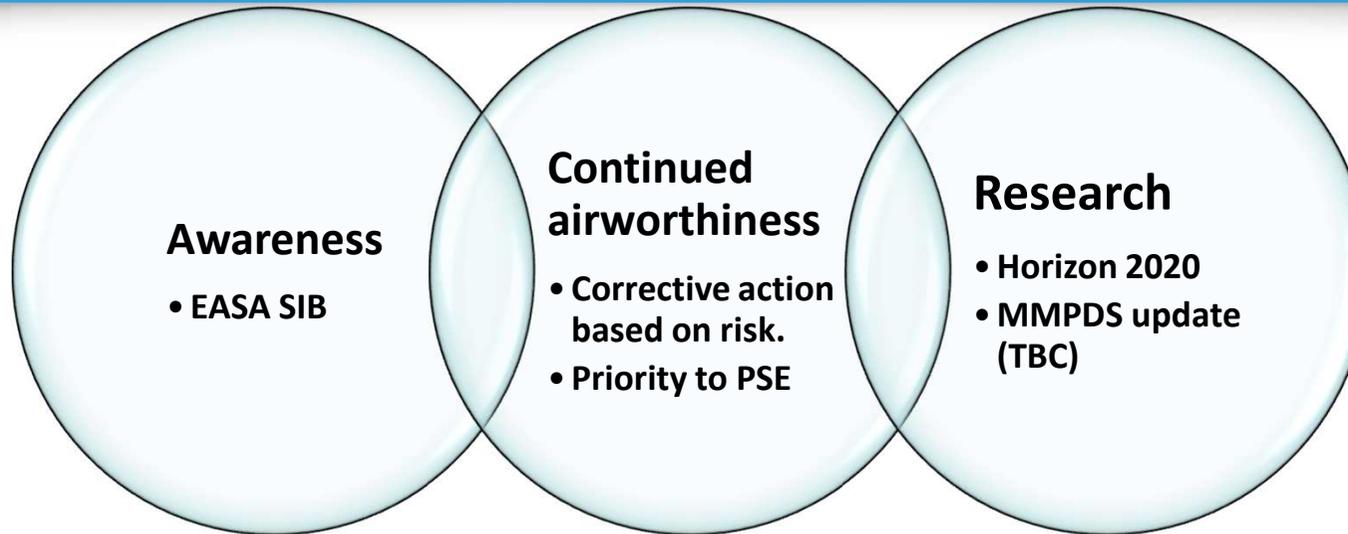


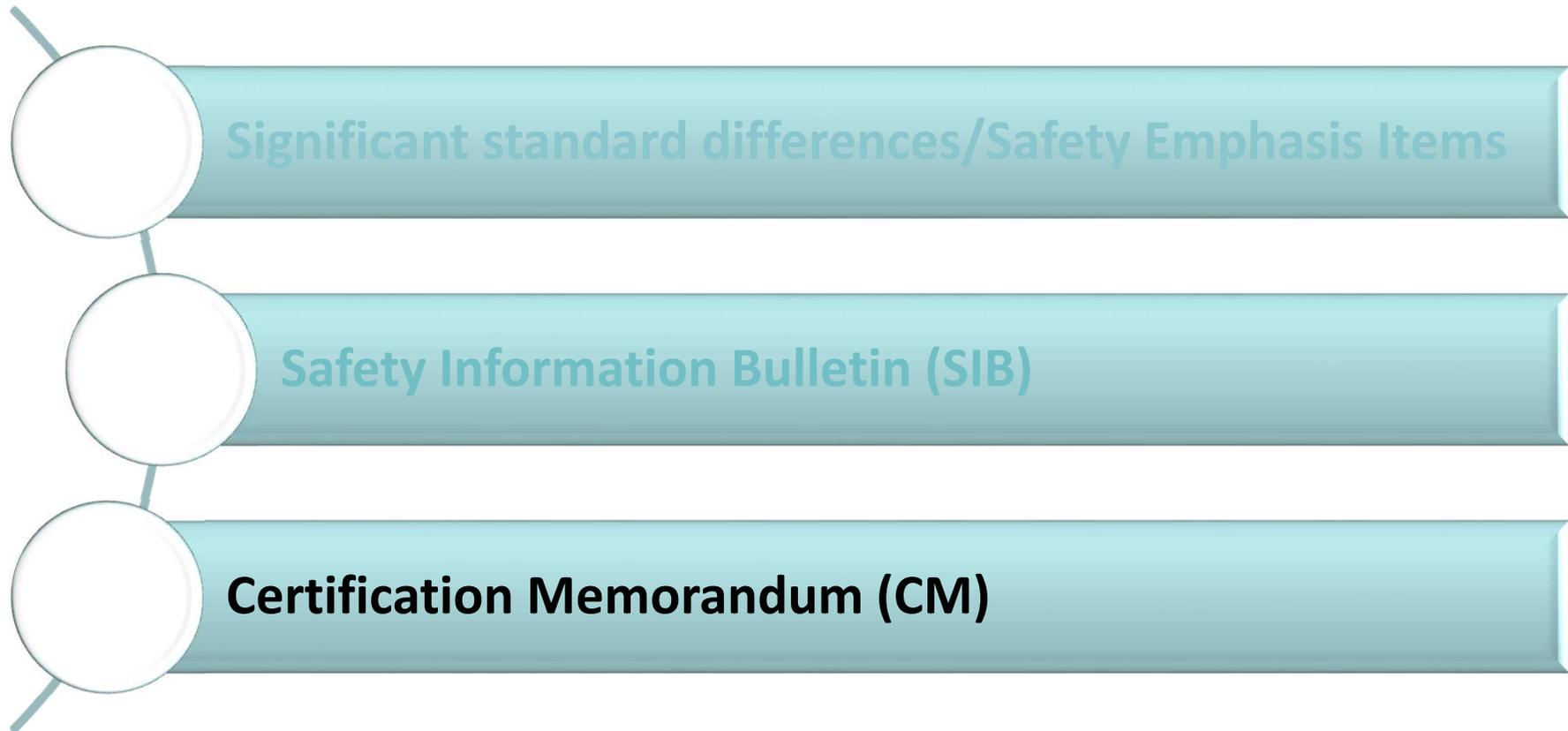
# Investigation: Material affected





# EAC risk management







# 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

