



EASA
European Aviation Safety Agency

Lessons learned

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Lessons learned

Compliance with the requirement.

e.g. Occupant protection requirement

- Fuel tank protection
- Seat

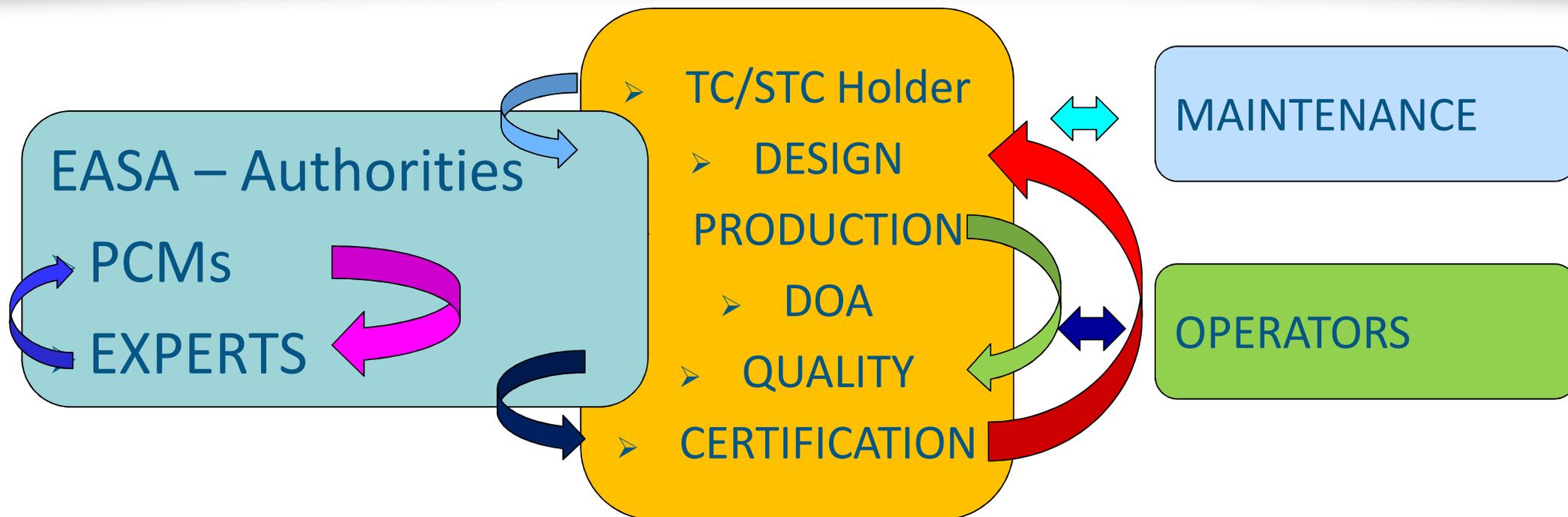


Lessons learned

- EASA is responsible to Provide Relevant regulation and guidance for Acceptable Means of Compliance
- TC/STC responsibility to adequately and correctly consider/incorporate these requirements in the design



Reporting



COMMUNICATION: TIMELY, ACCURATELY, EXHAUSTIVELY REPORTED

EVALUATION, CLASSIFICATIONS, and DECISIONS



Reporting

EFFECTIVE REPORTING - SOURCE

- In service event
- Monitoring (if installed)
- In production (concession, deviation...)
- Fleet survey

Reporting should be explored, documented, investigated

Information Flow not interrupted and well targeted

Evaluation & and verification of the assumption for certification



Reporting

TIMELY

Reporting must to be promptly considered. classification, evaluation, investigation and corrective actions

ACCURATELY

Reporting should contain detail, precise information for the evaluation

EXHAUSTIVELY

Reporting should contain all the information for the evaluation



Multiple design configurations generated by

- Modifications, options, repairs
- Corrective actions
- STCs implementation

DESIGN CONFIGURATION & TRACEABILITY

Design. Multidisciplinary activities

Rotorcraft

- MGB gears
- Actuators
- Flight by Wire

VTOL

- Interaction system and structure
- Loads directly derived from the flight control law (lift/thrust units)



PROOF OF STRUCTURE

- Test vs Analysis
- Similarity vs Looks like
- Robust criteria for similarity



PROOF OF STRUCTURE

Test

- Validation of the production process
- Capture only the first failure mode of the loading considered



Design & single “Failure”

MAINTENANCE

Objective: No Catastrophic failure following single maintenance Error

- One inspection missing possible or
- Make mistake-error not possible
- Direct visual inspection vs indirect inspection (e.g. play, clearance)
- well defined, simple & quantifiable criteria for acceptance or rejection



FATIGUE

Approach for DURABILITY & FATIGUE TOLERANCE EVALUATION

- Threat assessment
- Flaw tolerance – damage tolerance Evaluation
- Visibility – Accessibility – Detectability
- Reporting
- Validation of the Assumption (post TC certification)

CS 27 Safe life issue

Scrapped life limited parts before or at SSL with no reporting





Design & single “Failure”

NO SINGLE (STRUCTURAL) FAILURE CATASTROPHIC ?



ACCESSIBILITY - INSPECTABILITY - DETECTABILITY ?



Assemblies

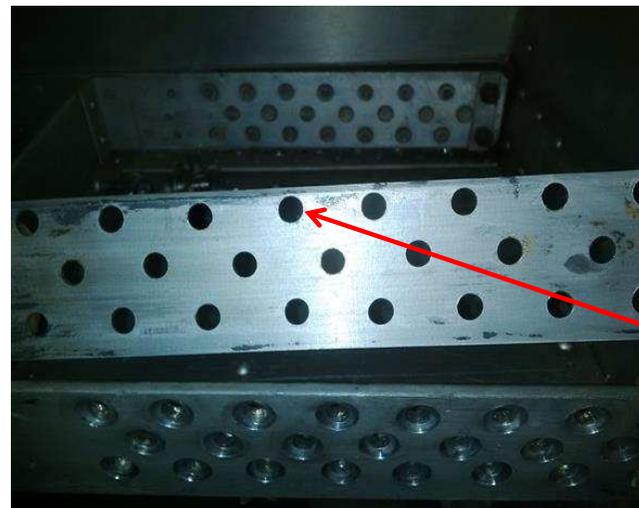
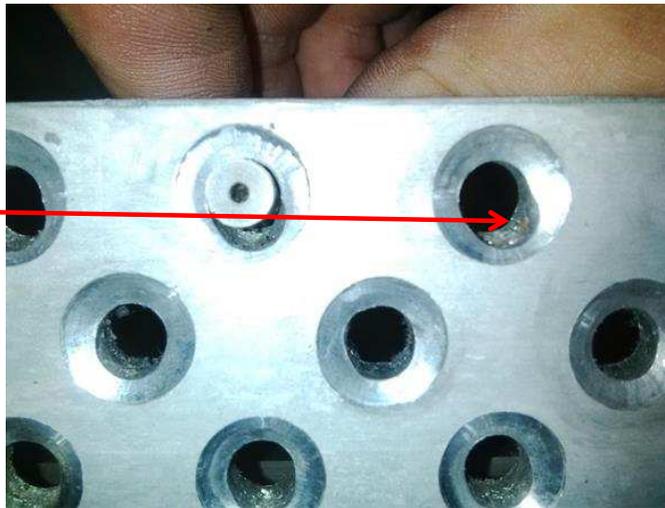
- Torque Loss of torque (partial)
- temperature effect to be considered for fatigue evaluation
- (Double) Locking device



Manufacturing issues and Quality control

- holes, deburr, bore
- Countersunk

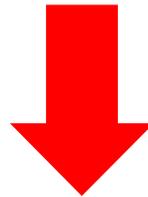
Countersunk
manufacturing
quality issue



Countersunk
Short edge
margin



New technology and New configuration



New Failure mode to be anticipated



Conclusion

- Certification Objectives and requirements.
- Reporting & validation (CIVP intent)
- Configuration & traceability
- Multidisciplinary activities / expertises
- Proof of structure & Similarity
- Single “failure” catastrophic to be prevented (maintenance, load path)
- Assumption for assemblies
- Manufacturing & Quality control
- Future challenge: Capture any degradation scenario and all failure modes.



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Thank you for your attention!

Any questions....?

Your safety is our mission.

An agency of the European Union 