European Union Aviation Safety Agency

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EASA perspective on seat Certification by Analysis

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EASA perspective on seat Certification by Analysis

- Use of simulation for seat certification projects
- Simulation pilot projects
- Major issues
- future steps

Use of simulation for seat certification projects

- EASA supports the use of Modelling and Simulation for the design and certification of seating systems.

- Integration of Modelling and Simulation in the seat design process can contribute to increasing of the level of performance of seating systems while reducing at the same time the rate of failures in dynamic testing.

- Although simulation cannot substitute dynamic testing (required explicitly by 25.562), it can allow a significant reduction of the number of certification tests to be performed.

Use of simulation for seat certification projects

- Initial and Continuing evaluation of capability/performance of design organizations using the CBA process will have to be addressed at APDOA/DOA level:
  - Procedures/Specifications
  - Personnel
  - Tools (software, hardware, material cards, etc.)
  - CBA data archiving system ensuring reproducibility of simulation output

- EASA expects to be contacted before the application for a certification project is submitted.

Use of simulation for seat certification projects

- In an initial phase, the use of simulation will support the showing of compliance with CS 25.562(c)(1), (2) and (7).
- Simulation output will be used to reduce the number of dynamic tests by establishing a ranking of criticality between the different seat families in a cabin layout.
- EASA will monitor performance of applicants to establish if the scope of CBA can be expanded to cover other requirements (e.g. HIC).

Use of simulation for seat certification projects

- EASA expects applicants to follow FAA AC 20-146A and SAE ARP5765A.

- For seat installation project, a MOC CRI is needed to allow the use of simulation to support the showing of compliance with CS 25.562(c)(1), (2) and (7).

- For ETSO projects: the applicant must request a deviation from ETSO C-127b requirements (the CRI content will be used as a reference to process the content of the deviation).

CBA in ETSO projects

How does EASA process requests for deviations?

If the article design deviates from the requirements of the applicable ETSO standard the applicant needs to request an approval of a deviation in accordance with Commission Regulation (EU) No 748/2012. On the ETSO authorizations page we have listed all previously approved and rejected deviations sorted by ETSO standard. If the deviation in question has already been approved by EASA earlier please indicate so in the corresponding section of Form 34. If your request is regarding a new deviation you need to provide a deviation request to EASA. To get the deviation request accepted the applicant needs to provide a substantiation showing an “equivalent level of safety”.

The responsible project certification manager (PCM) will check this document. Before the final decision is taken the following steps must be completed:

1. The PCM includes all relevant information in a consultation paper.
2. The consultation paper is sent to the applicant for verification.
3. The consultation paper is sent out for internal consultation in accordance with the Management Board decision N° 07-2004.
4. Taking into account the comments received from this internal consultation, the PCM modifies the consultation paper for public consultation on the EASA website. The commenting period is 3 weeks.
5. Received comments are collected in a Comment Response Document (CRD) which will be published with the list of approved or rejected comments.
6. The deviation is either accepted or rejected and will be included in the corresponding list. In case of an accepted deviation the ETSO certificate is issued once compliance with all applicable requirements is demonstrated.

CBA in ETSO projects

Essential project deliverables related to CBA:

- Dynamic Simulation Plan (DSP)
- Dynamic Simulation Validation Test Plan
- Dynamic Simulation Validation Test Report
- Validation Analysis Report (VAR)

Essential project deliverables related to certification dynamic testing:

- Dynamic test plan
- Dynamic test report

CBA in ETSO projects

The Dynamic Simulation Plan and the VAR should address and include:

- Evidence of Code Verification
- Conformity of the model (based on the drawing list used to develop the model)
- Justification of deviations from the applicable procedures related to the CBA process
- Full traceability of all validation tests (test plans and reports)

Simulation pilot projects

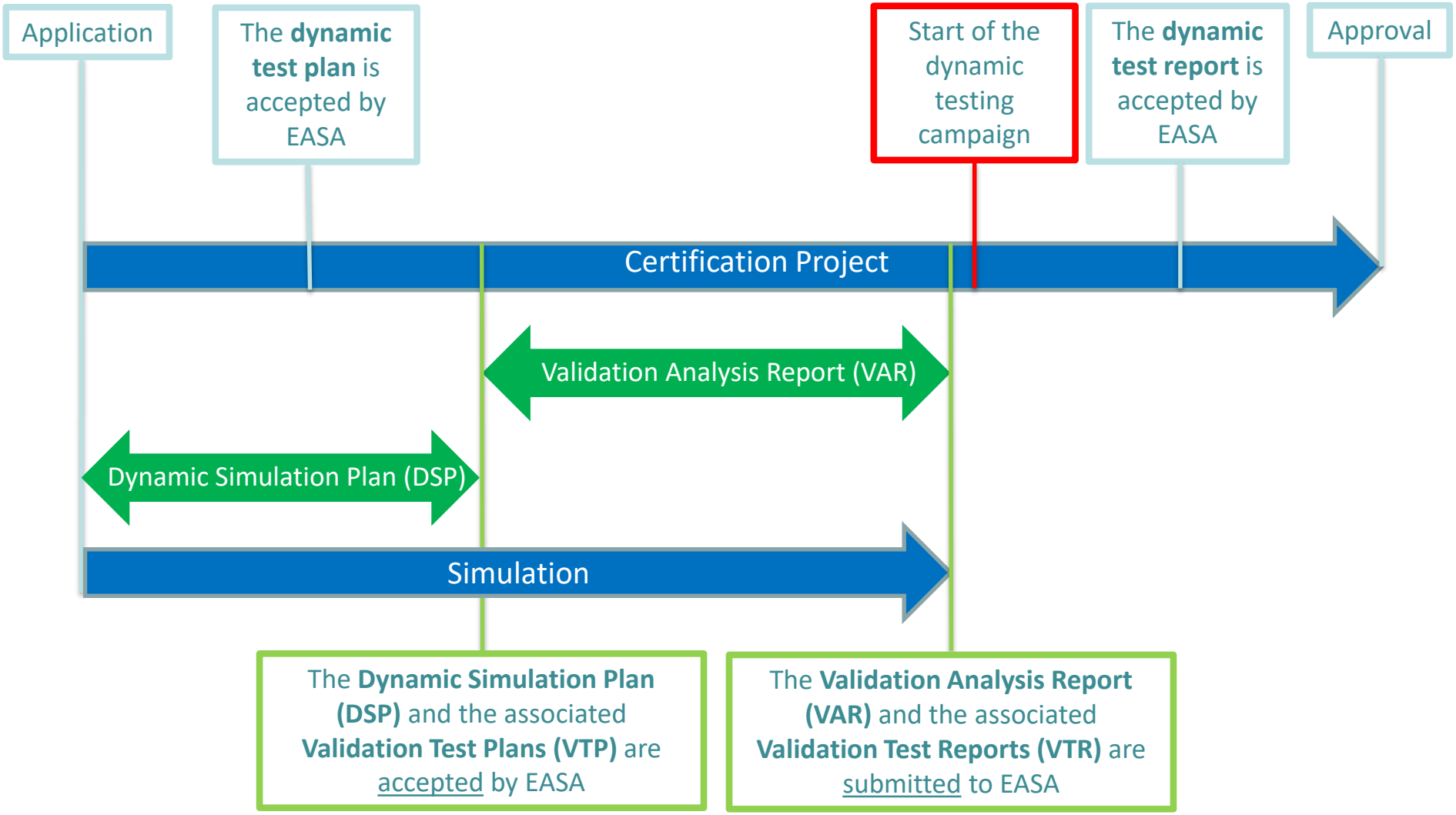
- The performance of applicants is evaluated through pilot projects (combination of seat supplier and seat design) in which simulation is used in parallel with the standard compliance approach based on dynamic testing.

- EASA requests that the deliverables related to simulation (DSP, VAR, etc.) are be submitted before the start of the dynamic testing campaign.

- Only the Dynamic Simulation Plan needs to be accepted before the start of the testing campaign.

- No pilot project has been successfully completed so far.

Simulation pilot projects



Overview on EASA projects related to seat CBA

- Installation projects are on-going with Large Aeroplanes TC holders (Airbus, Boeing)
- No ETSO project is currently active
- Cushion replacement projects for passenger seats:
  - Technical Advice Contract (TAC) projects: 1 (closed in 2018)
  - STC projects: 1 (on-going)

Major Issues

- (Initial and Continuing) Evaluation of the capability and the performance of seat suppliers involved in the CBA process.
- Impact of evolution of hardware/software on archiving of certification data.
- Acceptance of materials database and their traceability from certification documents.

Major issues

- Definition of the minimum content of the certification package
  - Evidence of code verification
  - number, type and content of the deliverables.
- Definition of criteria for the classification of design changes and for the delegation of the compliance finding.
- Significant coordination effort is required to have full harmonization with the FAA (to ensure level playing field and to streamline delegation).

Future steps

- New guidance to be developed in cooperation with the FAA:
  - Structure of the CBA certification package: number, type and content of the deliverables.
  - Code verification
  - Acceptable deviations from what specified in the AC
- Revision of FAA AC 20-146A and of SAE ARP5765A.
- Use of CBA to cover other addition 25.562 requirements (e.g. HIC) and special conditions.

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Questions?

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