


Material Variability Considerations for Substantiation of Interior Structures

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Title 14 CFR 25.613 – Material Strength Properties and Design Values

- Material strength properties must be based on enough tests of material meeting approved specification to establish design values on a statistical basis
- Design values must be chosen to minimize the probability of structural failure due to material variability.

Title 14 CFR 25.613 – Material Strength Properties and Design Values

- Applies to substantiation of interior structure fabricated from non-traditional materials or using non traditional fabrication techniques.
- Compliance via full scale structural testing may not include the submission of any other supporting strength data, including strength analysis and/or material properties.

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Title 14 CFR 25.613 – Material Strength Properties and Design Values

- Means of Substantiation:
 - Analysis using statistically derived material design values with the analytical reliability validated by structural testing
 - Full scale testing providing that the applicant can demonstrate testing will ensure a reliably repeatable strength level for the articles subsequently manufactured

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Title 14 CFR 25.613 – Material Strength Properties and Design Values

- Means of Substantiation:
 - Applicant may be able to utilize an overload factor in conjunction with static testing to account for material variability.
 - Determination of the overload factor should be based on an understanding of the product's material characteristics and fabrication processes relative to established materials and associated processes (i.e. comparison to conventionally fabricated aluminum structure)

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Title 14 CFR 25.613 – Material Strength Properties and Design Values

- Please contact the appropriate ACO engineer for concurrence of proposed methods of compliance.

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Seattle Aircraft Certification Office Management DER

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Presentation Objectives

- Clarify Management DER Roles & Responsibilities as defined by FAA Orders
- Clarify Seattle Aircraft Certification Office (ACO) expectations for Management DER project oversight/assistance

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Regulatory Basis for Delegation

- Title 49 US Code is the legislative instrument which governs US aviation
- Section 44702 (d) of Title 49 provides the Administrator the power to delegate qualified persons to perform certain functions for the Administrator
- Order 8100.8B, Designee Management Handbook, establishes policy and procedures for the selection, appointment, orientation, training, oversight, renewal, tracking, and termination of certain representatives of the FAA, including Management DERs.
- Order 8110.4B, Type Certification Process, prescribes the responsibilities and procedures for FAA personnel responsible for aircraft certification. Also applies to designees.
- Order 8110.37C, DER Guidance Handbook, provides guidance and procedures for administering designee program.

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Roles & Responsibilities

- FAA Order 8100.8B, Paragraph 309 states:
 - “Management . . . delegations relieve the FAA from having to do the normal project administration, technical coordination, and guidance usually associated with a certification program.”
 - “The Management DER, usually a consultant DER, performs FAA certification project management duties for the FAA. In this capacity, the DER performs duties similar to the FAA program manager. These duties include organizing the certification program, and directing, overseeing, and managing the tasks of technical assessments and finding of compliance. The DER ensures that all technical data required is reviewed and approved by the appropriate DER for compliance, except in those areas reserved for FAA approval.”

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Roles & Responsibilities

- Order 8110.37C, Paragraph 504 further defines the Management DER functions for the following areas:
 - Project Management
 - Certification Plan
 - Special Conditions, Exemptions, Equivalent Safety
 - FAA Form 8110-3
 - Coordination

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FAA Expectations

- Coordinate with FAA Advisor and FAA project manager to understand specific responsibilities required by the FAA.
- Perform FAA certification project management duties for the ACO similar to the FAA project manager. This includes:
 - Organizing the program
 - Directing, overseeing and managing the task of technical assessments and findings of compliance
 - Ensuring that all technical data is reviewed and approved by the appropriate DER, except in those areas reserved for FAA approval.
- Perform his/her functions in a professional manner.

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FAA Expectations

- Review the certification plan to ensure that:
 - The project/system description is in sufficient detail to allow FAA review/approval
 - The Certification Basis (applicable regulations, amendment levels, ADs, Special Conditions, Exemptions, ESF, etc.) is complete
 - The means of compliance/substantiation/documentations is defined for all requirements, including proposed testing
 - All requests for DER, DAR, DMIR delegation are proposed
 - The program schedule is correct
 - The location and aircraft registration of the prototype installation is identified
- Ensure proposed DER delegations are within authorization and experience levels; appointment letters must be reviewed
- Be available to answer questions, coordinate cert plan review, and attend kickoff meeting with FAA

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FAA Expectations

- Review 100% of the drawings to ensure the dates and revision levels are as listed on the Master Drawing List. In addition the DER should be checking for anything that is obviously wrong (i.e., flagnote on picture sheet that isn't defined in the flagnote section.)
- Ensure that 100% of the substantiation documentation has been reviewed for proper document control (all pages are properly identified, revision levels of the pages are correct etc.). Check for anything that is obviously wrong (all flam tests “passed”, positive margins in structural substantiation, electrical loads do not exceed generator capability, etc.).
- Verify that appropriate test article and test set-up conformity has been accomplished for all certification testing

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FAA Expectations

- The FAA expects that the Management DER will keep the ACO apprised of all changes to the approved certification plan. All changes must be FAA approved.
- Verify that regulations and documents/deliverables listed in the accepted certification plan are approved via FAA Form 8110-3s or by the FAA. Any deviations to the certification plan must be justified and coordinated in timely manner with the FAA by the cognizant technical DER and recorded in a revised certification plan or certification summary document, as agreed to by the FAA project manager.

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FAA Expectations

- Prepare Requests for Conformity and Type Inspection Authorizations and submit to the Aircraft Certification Office or, if authorized, submit directly to the Manufacturing Inspection District Office.
- Ensure that all conformity paperwork is in order: appropriate FAA Form 8130-9 authorization letters have been generated and conformity inspections have been accomplished in accordance with the pertinent Form 8120-10s. Review FAA Form 8100-1s for accuracy compared to the design data listed on the Form 8120-10s. Verify that all conformity Unsats have been dispositioned and recorded appropriately.

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FAA Expectations

- Verify that flight testing has been accomplished in accordance with the approved type inspection authorization
- Prepare and maintain a status sheet throughout the program. This list should identify all deliverables and major milestones. Provide a periodic status to the FAA in a manner agreed to with the project engineer
- All submittals to the FAA must be accompanied by a cover letter signed by the management DER. Currently, some letters of authorization, Partnership for Safety Plans, and some FAA Advisors also require FAA Forms 8110-3 from management DERs. Please be aware that the FAA is moving away from this requirement and will provide revised guidance in the future. You may continue operating per your current guidance or coordinate with your FAA Advisor and project managers.
- An FAA Form 8110-3 from the Mgmt DER is no longer required for the Certification Plan

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FAA Expectations

- At the end of the project, ensure the it has been accomplished in accordance with the FAA accepted certification plan. Ensure that compliance has been demonstrated and documented for the entire certification basis (FARs, JARs, exemptions, ESFs, special conditions, etc.) and that all documents/deliverables listed in the accepted certification plan, have been submitted to the FAA and are approved.
- Prepare a certification summary document

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FAA Expectations

- Bring the final package to the FAA in an organized manner (i.e., documents in notebooks and the drawings in a box filed in a numerical order).
- A Management DER may utilize the assistance of an Administrative DER as agreed to in the company Partnership for Safety Plan and/or Project Specific Certification Plan.

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Summary

- Regulatory Basis for Delegation
- Defined Roles & Responsibilities
- Specific FAA Expectations

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