

Future Directions in Computational Simulation to Enable Certification and Qualification by Analysis

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Flight testing for airplane regulatory certification is one of the largest non-recurring cost drivers in a commercial airplane development program. Today, certification is an intense, approximately year long process involving many aircraft and a large team of people for aircraft and technical support. The approximate cost of the certification effort is over \$1B. Generally speaking, flight science disciplines set about 50% of flight testing requirements, depending on the complexity of the aircraft model (simple derivative to all new). Currently, flight testing and flight representative ground testing are accepted means to show compliance with regulatory requirements. Alternate means of compliance (MOC) using analytic methods are considered, and have been accepted, on a case by case basis. Computational Fluid Dynamics (CFD), as an alternate MOC, is expected to play an increasingly significant role in achieving dramatic reductions in airplane test costs.

This talk will focus on a general framework and requirements for Certification/Qualification by Analysis (CQbA), specifically using computational simulation as an alternate MOC. A recent test case utilizing simulation (CFD in particular) to reduce test costs will be highlighted. Shortcomings in CFD predictive capability, particularly as they relate to the potential future impact of CQbA on test cost reduction, will be discussed. Finally, efforts are underway within the aerospace community to develop guidance on how computational simulation could be more generally accepted by the regulatory agencies. Progress in this area will be also be discussed.