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Past Experiences and Future Trends for Composite Aircraft Structure

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Abstract

Applications of composite materials in aircraft products have spanned several decades. These products include small airplanes, propellers, rotorcraft, military jets, and transport aircraft. Historical perspectives on composites used in airframe structure will be presented, with an emphasis on transport aircraft. The technical challenges and barriers to new applications will also be discussed as related to career opportunities. As applications have expanded, government and industry have pursued standardization. Such efforts are needed to facilitate the training, databases and guidance required for the additional engineers, which support the applications. Some of the critical design, manufacturing, maintenance, and cost issues for composite aircraft structures will be reviewed. This will include some thoughts on product development, certification, production and service difficulties. Some specific examples of composite service experiences, including the accident investigation of American Airlines Flight 587, will be highlighted.

Speaker's Bio

Dr. Larry Ilcewicz is the FAA Chief Scientific and Technical Advisor for Composite Materials. He started work with the FAA in 1998. His duties include certification, accident investigation, regulatory developments, research oversight and technical training. He has supported many new small airplane, rotorcraft and transport aircraft certification projects, which helped him develop an international plan for composite safety and certification. This plan includes focused research, standardization and the development of composite guidance, policy and training. Technical thrust areas include material standards, structural substantiation, damage tolerance, durability, bonded joints and advanced manufacturing processes.

Dr. Ilcewicz came to the FAA from the Boeing Company, where he worked 17 years on various programs in the commercial transport aircraft division. He left Boeing as his work on the 757-300 program was coming to an end. Before that, he was the principal investigator for a large NASA-funded program, which developed cost-effective composite design and manufacturing concepts for a wide-body transport fuselage over a period of 7 years. During his tenure at Boeing, his work in composites also included stress methods (damage tolerance & environmental effects), design requirements & objectives, design cost models, and implementation strategies for future commercial airplane products. Through the years, his work supported 737, 757, 767 and 777 commercial transport aircraft in various stages of development and production. He was also a technical resource for service-related composite problems with these aircraft. Dr. Ilcewicz holds a dual Ph.D. degree in Mechanical Engineering and Wood Physics from Oregon State University. He has authored/co-authored more than 70 technical papers and is the Co-chairman for Composite Material Handbooks (Mil-Handbook-17). He is also affiliated with some U.S. and Canadian universities.

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