



CACRC Depot Bonded Repair Investigation – Round Robin Testing

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ABSTRACT

Composite materials have many advantages for use as aircraft structural materials, including their high specific strength and stiffness, resistance to damage by fatigue loading and resistance to corrosion. Thus, extensive use of composites should reduce the high maintenance costs associated with repair of corrosion damage associated with conventional aluminum alloys. Similarly, costs associated with the repair damage due to fatigue should also be substantially reduced, since composites do not, in general, suffer from fatigue cracking encountered with metallic structures.

As more composite materials are increasingly used on aircraft components, new challenges associated with the use of these materials are arising, with repairability being one of the most critical. These challenges are increasing in complexity due to the migration of composite construction previously utilized in control surfaces and fairings mainly, to the fuselage, wings and other safety-critical primary structures. While the necessary repair hardware and supporting resources may be accessible to the OEMs, limited repair infrastructure and expertise may be available at airline depots and maintenance and repair organizations; and while repair workshops are required to be certified, no certification is necessary for the technician that performs a repair to a composite structure. As repair and maintenance depots around the world prepare for the new generation of composite airframes, the questions related to philosophy and training necessary to ensure the quality and structural integrity of composite repairs will continue to increase.

The goals of this project are to substantiate the static and residual strength of OEM and field-bonded repairs performed at various airline depots, using CACRC-established standards and procedures; to generate a report evaluating and validating the technical value of the CACRC standards for technicians performing aircraft composite material repair and inspection and to provide recommendations pertaining to the importance of the various steps in a repair process.

Results of the investigation can be utilized to promote awareness of the critical issues related to bonded repairs, supplement existing guidelines for bonded repair, and improve training curriculum on composite repair courses.