Department of the Air Force
Scientific Advisory Board

DEPARTMENT OF THE AIR FORCE
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Use and Sustainment of Composites in Aircraft (USC) Study

Abstract

During the past 40 years, the Air Force has used composite materials for structural components in a number of military aircraft. Initially, these applications were limited to secondary structures such as speed brakes and control surfaces. More recently, modern aircraft such as the F-22 and F-35 are being designed and fielded with greater percentages of composite material to include primary, as well as secondary, structural components.

Currently fielded Air Force aircraft are being retained in service far beyond their initial design life expectations. Aircraft such as the C-130, A-10 and KC-135 have been in service well beyond their initial design life and are experiencing considerable maintenance and logistical challenges as a result of fatigue and corrosion of metallic components. Most of these aging aircraft were not designed for their current length of service or operational conditions and, as a result, the associated effect of aging is significant and costly.

The increased use of composite materials in modern aircraft holds the potential to greatly reduce or even eliminate the problems currently experienced with the ageing of metallic structures. The commercial aviation industry is designing the Airbus A350 and the Boeing 787 with very high percentages of composite materials. Commercial aviation manufacturers feel that there is significant benefit to be gained by the use of structures which employ composite materials. A concern exists in the Air Force, though, that composite structures in military aircraft
might experience degradation due to ageing or in-service damage and that this could result in unprogrammed resource requirements.

The *Use and Sustainment of Composites in Aircraft* study was chartered to address the issues associated with the aging of composites in current and future Air Force aircraft. The Air Force Scientific Advisory Board conducted this study in response to a request by the Secretary of the Air Force and the Chief of Staff of the Air Force.

In response to this direction, the Composites study team received several briefings from defense and commercial industry companies; Air Force research, acquisition, and logistics organizations; universities; and other military and government organizations. The study team also visited several organizations, including Ogden Air Logistics Center at Hill Air Force Base. While at Ogden, the team was able to interact firsthand with engineers and technicians who are currently supporting the sustainment of composite structures in military aircraft. The assistance and support provided by all these organizations were essential to the completion of this study.

The study team greatly appreciates the cooperation of these organizations and acknowledges the valuable efforts they made to this study.

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