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RTO AGARDograph

AG-AVT-140

Corrosion Fatigue and Environmentally Assisted Cracking in Aging Military Vehicles

(La fatigue-corrosion et la fissuration en milieu ambiant des véhicules militaires vieillissants)

This AGARDograph has been sponsored by the Applied Vehicle Technology Panel of RTO.

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RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote co-operative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective co-ordination with other NATO bodies involved in R&T activities.

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- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS System Analysis and Studies Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

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RTO builds upon earlier co-operation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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Theme

Corrosion, corrosion fatigue and many other forms of environmentally assisted cracking continue to be major cost drivers for the operators and maintenance organizations responsible for military aircraft. This document reviews some of the developments in understanding of corrosion and corrosion related problems that have occurred since NATO, through its Advisory Group for Aerospace Research and Development (AGARD), published one of its last major works on the topic in 1985 (AGARD-AG-278, Volume 1). Several other organizations have made major contributions in the field since 1985, and both AGARD and later the RTO have looked at a variety of problems related to aging aircraft and their engines. This particular publication focuses on aging aircraft and provides some of the latest information on corrosion covering costs, detection, characterization, assessment of damage, repair and avoidance. But perhaps the major development over the past 25 years has been an improved understanding of how corrosion related issues affect aircraft structural integrity and safety, and how these effects can be modelled and managed. The present publication places particular emphasis on developments in these areas. While the focus is on aging aircraft many of the issues addressed will be applicable to some degree to other types of military vehicle in use today.

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This AGARDograph has been sponsored by the Applied Vehicle Technology Panel of RTO.

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Crack growth	Modeling	Wash optimization

14. Abstract

This AGARDograph provides a comprehensive and updated state-of-the-art on corrosion fatigue and environmentally assisted cracking.

The interest of the NATO community in this specific subject can be dated back some decades ago, as shown by the publication of the AGARDograph AG-278 issued in 1985, the "AGARD Corrosion Handbook Vol. 1 – Aircraft Corrosion: Causes and Case Histories", where this issue was also jointly covered with the many other aspects of aircraft corrosion.

A long time, however, has elapsed since then and the whole scenario in which the military platforms are now operated and maintained, as well as the materials and the tools available, have completely changed. These changes have resulted in the generation of a new AGARDograph, fully devoted to this specific area – undoubtedly one of the most important among the corrosion-related phenomena; and whose consequences may seriously affect the reliability and the availability of military fleets.

This report has collected the most relevant experiences within the NATO community, accumulated over the years, on how to deal with this never ending problem. It also offers useful tools in the new fields of the modeling and the simulation.

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