

# AGARD

ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

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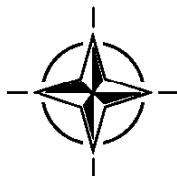
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**AGARD REPORT 823**

## **Thermal Barrier Coatings**

(les Revêtements anti-mur de chaleur)

Papers presented at the 85th Meeting of the AGARD Structures and Materials Panel, held in Aalborg, Denmark 15-16 October 1997.



North Atlantic Treaty Organization  
*Organisation du Traité de l'Atlantique Nord*

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# The Mission of AGARD\*

According to its Charter, the mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Exchange of scientific and technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
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Ceramic coatings		Thermal conductivity	
Temperature gradients		Bonded coatings	
High temperature		Reviews	
Aircraft engines			
<b>14. Abstract</b>			
<p>Thermal barrier coatings are an emerging technology which will enable either an increase in turbine inlet temperatures, or a reduction in the duty temperature of the blades and as a result, an extension of their life-cycle.</p> <p>This Workshop presented the state of the art, gave a description of the existing or emerging technologies, summarised our present knowledge of damage mechanisms, including microstructural, mechanical and thermal aspects, and reported on the benefits and drawbacks of the various families as perceived by engine manufacturers and users.</p> <p>A final discussion attempted to identify future R&amp;D requirements.</p>			

# **Thermal Barrier Coatings**

## **(AGARD-R-823)**

### **Executive Summary**

Thermal barrier coatings are an emerging technology which will allow either increasing the inlet turbine temperatures or on the other hand decreasing the working temperature of the metal of the blades and consequently increasing their life-time.

The Workshop allowed a survey of the state of the art, a description of the existing technologies or of the technologies under development, a review of the present knowledge of damage mechanisms, including microstructural, mechanical and thermal aspects, and an account of the advantages and drawbacks of the various families as perceived by engine manufacturers and users. A final discussion was held to identify the needs for further R & D.

# **Les revêtements anti-mur de chaleur**

**(AGARD-R-823)**

## **Synthèse**

Les barrières thermiques sont une technologie émergente qui permettra soit d'augmenter les températures d'entrée des turbines, soit de réduire la température à laquelle est soumis le métal des aubes et par conséquent d'en accroître la durée de vie.

L'atelier a eu pour objet de présenter l'état de l'art, de donner une description des technologies existantes ou en cours de développement, de donner une revue des connaissances actuelles sur les mécanismes d'endommagement incluant les aspects microstructuraux, mécaniques et thermiques, de rendre compte des avantages et des inconvénients des diverses familles tels que les perçoivent les fabricants et les utilisateurs de moteurs.

Une discussion finale a permis d'identifier les besoins futurs en R & D.