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Nota di contenuto	Preface; Acknowledgement; Contents; 1 Introduction; 2 Protective Thermal Barrier Coatings; 2.1 Structure of TBCs; 2.2 Development and Application of New Coating Materials; 2.3 Conclusions; References; 3 Thermal Loads; 3.1 Numerical Methods-Application of Finite Elements Method (FEM) [1, 2]; 3.2 Deformation and Stress in Structural Elements, Caused by Thermal Loads [1, 2]; 3.3 Numerical Analysis of Temperature Fields in Critical Elements of Turbo-Engines by CFD (Computational Fluid Dynamics) with Application of FLUENT Program; 3.4 Conclusions; References; 4 Mechanical Loads 4.1 Preparation of Model for Simulation 4.2 Analysis of Results; 4.3 Blade Vibrations Resonance; 4.4 Conclusions; Reference; 5 Environmental Loads; 5.1 Corrosion; 5.2 Erosion; 5.3 Thermally Growth Oxide (TGO) Layer Growth; 5.4 Author's Own Tests of Moving Blade Surface, Including Chemical Analysis; 5.5 Conclusions; References; 6

State of Arts in Experimental Testing of TBCs Systems-Literature Analysis; 6.1 Review and Analysis of Currently Utilised Tests; 6.2 Conclusions; References; 7 Proposed Experimental Investigations of TBCs Systems; 7.1 Sample Ageing  
7.2 Uniaxial Stretching of Dumbbell Samples with TBC Layers-Author's Own Tests  
7.2.1 First Batch of Samples Not Subjected to Ageing; 7.2.2 Second Batch of Samples Subjected to Ageing; 7.3 3-Point Bending of Beam Samples with TBC Layers-Author's Own Tests; 7.4 Conclusions; 8 Numerical Analysis of Cracks Propagation Process in Turbine Blades TBCs Systems Under Thermo-Mechanical Loading Based on Experimental Results; 8.1 Formulation of FEM Approach and Brittle Damage of the TBCs System; 8.1.1 Brittle Damage Model; 8.1.2 Cohesive Degradation Model; 8.1.3 Simulation Results  
8.2 Application of Submodeling Technique and X-FEM Methods for Detailed Analysis of Cracking Process in Turbine Blades TBCs  
8.2.1 Submodeling; 8.2.2 X-FEM Method Basics; 8.2.3 Preparation of Model for Simulation; 8.3 Analysis of Results; 8.4 Conclusions; References; 9 Summary

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Sommario/riassunto

This book discusses complex loadings of turbine blades and protective layer Thermal Barrier Coating (TBC), under real working airplane jet conditions. They obey both multi-axial mechanical loading and sudden temperature variation during starting and landing of the airplanes. In particular, two types of blades are analyzed: stationary and rotating, which are widely applied in turbine engines produced by airplane factories.

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