Given the wide topic coverage and the sometimes introductory character of the book, it is not helpful that only 21 bibliographic entries are provided for the entire book. The offer of a wider bibliography selection would significantly improve the usefulness of the book, since its topic diversity is likely to require for most readers additional reading on some of the topics.

Dr M. Sergio Campobasso
Senior Lecturer in Mechanical Engineering – Renewable Energy Systems
Department of Engineering
Lancaster University

High Temperature Materials and Mechanisms

Edited by Y. Bar-Cohen

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This book collates the work of fifty able researchers and should appeal to all studying high temperature materials and applications at the highest level. Eight material groups are identified in the Introduction, Chapter 1, preparing the way for further study.

'High-Temperature Materials, Chemistry and Thermodynamics', Chapter 2, reveals much about how high temperature materials respond to all levels of temperature up to three degrees shy of 4,000°C. 'Refractory Metals, Ceramics and Composites for High-Temperature Structural and Functional Applications', Chapter 3, covers eight high temperature groups: 1) Carbon-Carbon composites; 2) Carbon-Silicon Carbide Ceramic Matrix composites; 3) Ceramics; 4) Ceramic Composites; 5) Cermets; 6) Metal Matrix Composites; 7) Refractory Metals; 8) Superalloys. Thermal, electrical, mechanical properties and structures are fully covered.

'High Temperature Adhesives and Bonding', Chapter 4, sheds much light on chemical compositions, bonding preparations and process, epoxy/phenolic, polyimide, bismaleimide, polybenzimidazole, esters and silicon adhesives. Service temperatures rarely above 300°C are considered. 'Oxidation of High-Temperature Aerospace Materials', Chapter 5, begins with a few words on gas turbine engine design, after which the corrosive effect of high temperatures, fuels and reactive products are considered. The authors rightly see validation of materials prior to use as vital and several high tech items of apparatus, enhanced by excellent schematics Figures 5.6 – 5.10, are described. 'High-Temperature Materials Processing', Chapter 6, focuses on tantalum carbide, borides carbides, nitrides and silicides, all of which have very high melting points, lack high temperature stability and are difficult and expensive to process. Many physical and mechanical properties of sintered products are recorded and top down (chemical), bottom up (atomic) and intermediate methods of powder synthesis discussed.

'Characterisation of High-Temperature Materials', Chapter 7, covers all the laboratory scientist needs to know about microscopy, X-Rays and spectroscopy in general. Section 7.3 does in fact contain nine different types of microscopy and section 7.4, thirteen different types of spectroscopy, an excellent guide to high tech laboratory methods. 'Nondestructive Evaluation and Health Monitoring of High-Temperature Materials and Structures', Chapter 8, covers virtually all common approaches: acoustics, ultrasonics, pulsed thermography, fibre optics and eddy current technologies etc. Thermoelastic stress analysis is discussed and numerous aspects of health monitoring considered, emissions from aircraft engines and water levels in steam pipes included.

The message from ‘High-Temperature Motors’, Chapter 9, is that there are many types of electric motor, but only AC steppers – switched reluctance (SRMs) and Brushless DC motors (called BLDCs) – are suitable for high temperature operations. Low cost permanent magnet motors are definitely out and the consensus is that BLDC motors, which can run continuously at 400°C plus, currently lead the field.

‘High-Temperature Electromechanical Actuators’, Chapter 10, promotes the development of piezoelectric and electrostrictive, single crystal and ceramic materials, with space applications in mind. The authors explain how electric field induced strain or conversely strain induced electric field technologies may be used in high temperature MEMS applications. ‘Thermoacoustic Piezoelectric Energy Harvesters’, Chapter 11, explains how Sondhaus oscillations (discovered by a German glass blower in 1850) are now used to convert thermal energy into self-sustained acoustic oscillations and thence to electricity. Two harvester systems TAP and DMTAP are described. Both consist of a heat cavity, stack, resonator tube and piezoelectric diaphragm. DMTAP has a dynamic sprung mass magnifier in addition.

Nickel/Titanium (Ni Ti) and Copper alloys Ag Cd, Au Cd, and Cu Sn are said to be the most widely used and feature prominently in ‘Shape Memory and Superelastic Alloys’, Chapter 12. The authors explain how solid to solid martensitic (cold) to austenitic (hot) transformation results in very large recoverable strains, capable of driving MEMS actuators and sensors. Fabrication (including additive manufacture) is discussed and a few tricks of the trade such as biasing and antagonistic behaviour are revealed.

The authors of ‘Thermoelectric Materials and Generators; Research and Applications’, Chapter 13, point out that the higher the temperature difference the higher the Carnot efficiency and it is here that the Seebeck and Peltier effects come in. The suitability of bismuth telluride, nanoparticles, flakes, wires and rods is investigated and TEG powered cell phones, hearing aids and harvesting body heat, are cited as examples.

Precision hammer drilling tools for geophysical and robotic space surveys are considered in ‘High-Temperature Drilling Mechanisms’, Chapter 14. Drills, we are told, are currently fashioned from CPM-3V tool steel, which degrades above 300°C, but tungsten carbide WA2 and diamond cutting/core sampling tools are being developed. Other projects discussed include thermal-spalling, melting and vaporisation. SRM and BLDC drives (see Chapter 9) are also considered. The authors of ‘High- Temperature Electronics’, Chapter 15, identify and discuss at length the harm caused by the self-heating/self-harming I2R power loss effect, which in complex systems necessitates the addition of quite large, elaborate and expensive cooling systems. The full effect of temperature on semi-conductor devices and passive components, such as capacitors is well covered. ‘Ultra-High Temperature Ultrasonic Sensor Design Challenges’, Chapter 16, emphasises the challenges faced by those working on geo-technical, space, nuclear and gas turbine problems. Environmental limitations and materials selection are discussed, followed by a fair amount on thermal expansion and methods of compensation.

‘High-Temperature Materials and Mechanisms Applications and Challenges’, Chapter 17, is basically a summary of views already expressed several times over (Chapter introductions are repetitive throughout the book) and one is reminded of the old preachers' dictum: "*First I tells em. Then I tells em. Then I tells em, what I tells em*". Otherwise this is an excellent text – ideal for higher study, reference and research.

Peter C. Gasson CEng, MIMechE, FRAeS

Introduction to Flight Mechanics: Performance, Static Stability, Dynamic Stability, Classical Feedback Control and State-Space Foundations – Second edition

T. R. Yechout

American Institute of Aeronautics and Astronautics, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344, USA. 2014. Distributed by Transatlantic Publishers Group, 97 Greenham Road London N10 1LN, UK. (Tel: 020-8815 5994; e-mail:- mark.chaloner@tpgltd.co.uk). 700pp. Illustrated. £90 (20% discount available to RAeS members on request). ISBN 978-1-62410-254-7.

Having reviewed the First edition of this book it was interesting to see how the book has evolved after ten years in service. It is evident that the book has been well received over the years, so it is not surprising that the content remains more or less the same, but it is clear that the material has been revised to improve its appeal as an undergraduate course text. The style and quality of presentation is excellent, having been given a make-over to give it a modern appearance. Two colour printing is used, black and blue, where blue is used for emphasis to both text and figures and to enhance navigation through the material. Each chapter opens with a useful bullet point summary of content, section titles are picked out in blue and the many worked examples are highlighted in blue to distinguish them from the main text. A nice feature of the book, carried over from the First edition, is the use of Historical Snapshots to conclude each chapter and in which 'real world' examples are used to illustrate the application of the foregoing material.

The first three chapters of the book cover basic aircraft aerodynamics, propulsion and performance respectively. Together, these chapters provide a comprehensive introduction to aircraft flight mechanics and an excellent foundation on which to build the later topics covering aircraft stability and control. The theoretical development is set out clearly, is well illustrated and, importantly, includes numerous worked examples to show the application of the material. Chapter 4, which is quite brief, deals with the definition of aircraft axis systems and the development of the 6DoF equations of motion, using the standard vector algebra approach and the notational style commonly used in North America. Chapter 5 presents a comprehensive discussion of longitudinal and lateral-directional static stability. This material follows the familiar approach and explains the flight physics well. Significantly, the role of the relevant aerodynamic stability derivatives is explained in determining the stability and control properties of the aircraft. This chapter is very well illustrated and includes a number of worked examples. Chapter 6 describes the familiar development of the linearised equations of motion. A useful and fairly detailed discussion of the derivation of