Book Reviews

How Spacecraft Fly: Spaceflight Without Formulae

G. Swinerd

Copernicus Books, Springer Science + Business Media, 233 Spring Street, New York, NY 10013, USA. 2008. 268pp. Illustrated. £15. ISBN 978-0-387-76571-6.

Rocket science is by definition difficult – right? In the early years of the space age, my then-employer TRW produced a pocket-sized booklet that was intended to allow an engineer to design a space mission, at least in outline. The TRW Space Data booklet became something of a legend in the industry and I must admit I do still refer to it occasionally, if only because it condenses the mathematics and science of rockets and space into diagrams and tables.

The challenge of making rocketry and spaceflight understandable to the layman is the even more daunting challenge addressed by Professor Swinerd in this new and attractively produced book. The author has benefited from developing a training course for the non-technical staff (lawyers, accountants, secretaries etc.) of the European Space Agency, which allowed him to fine tune the presentation of the various topics on a real audience. The book does what it says on the cover – guiding the reader through the intricacies of orbits, spacecraft and rockets without an equation in sight. He makes frequent use of diagrams, many quite complicated, but they are certainly a lot less daunting than complex mathematics.

Written in a friendly style and extensively illustrated with images and graphics, the book is well-structured and indexed. It is likely to find a role as a light-hearted reference work, at least as much as a cover-to-cover read. I could imagine it being an excellent complement to the course that Professor Swinerd offers to non-technical audiences – some of the more complicated diagrams would probably benefit from an animated slide show presentation, with elements of the diagram being introduced one by one. The author's background in industry as well as academia shows throughout, with the examples being chosen from a wide range of applications – avoiding the focus on exotic space missions that many academics adopt.

For the non-specialist, as well as the non-technical, this is a novel and interesting starting point for an armchair journey into space.

Pat Norris MRAeS, Chairman of RAeS Space Group

Sailplane Design: Design Elements, Aerodynamics, Static and Dynamic Stability Calculations, CS22 and OSTIV Rules, Air Loads on Wing, Fuselage and Tailplane, Static Tests and Flight Test, Calculation Examples

V. Pajno

Macchione Editore, via Salvo D'Acquisto 2, 21100 Varese, Italy. 2006. 455pp. Illustrated. Euros 51.50. ISBN 88-8340-274-X.

Vittorio Pajno is to be congratulated not only as a successful sailplane designer and builder, but as someone with the stamina and courage to undertake the documentation of the whole process. This weighty volume (455 pages) should not put off a reader without design aspiration as it offers an attractive insight to anyone interested in how an aircraft is designed, with all the multiple processes that have to be woven together to create a successful airframe. True, there are lengthy tracts of mathematics and aero-mechanics in this book, where a little background knowledge and perseverance will be rewarded, but equally these are balanced by more documentary chapters on the physical significance of the analysis.

This wide appeal is slightly constrained by the translation into English, which must be forgiven and in places the type setting which is also unfortunate. On the positive side the illustrations, diagrams and photographs are exceptional. The book's relevance carries to any fixed wing aircraft, provided one accepts a healthy obsession with drag and its reduction and of course, the lack of a motive power and all its implications. Possibly a single chapter on sailplane power installations could have been accommodated but this is already a substantial volume.

As the subtitle suggests, this is a reference volume for students and intending designers and this is where this book really comes into its own. The individualism of designers makes it an impossible task to provide a single volume that provides the full balance of emphasis that is desired for a given project, but this book offers comprehensive coverage and an abundance of respected references. Close relevance to design standards is maintained throughout, including the recognition of the early pioneering work of BCAR Section E and OSTIV.

There are two areas of sailplane design which currently defeat the simple approach, being aeroelasticity and fatigue. Here Pajno has to draw a line before the red mist of computing descends, but even so he offers a number of analytical tools which aid insight for preliminary design. These form part of a wider set of example calculations, in a final chapter, that is the 'icing on the cake' for the would-be designer. Here, as throughout, he identifies anticipated parameter ranges that can be expected to lead to a successful design. This could make this book your 'first off the shelf' reference book for sailplane design issues.

Howard Torode, Chairman of the British Gliding Association Technical Committee

Corrosion Control in the Aerospace Industry

Edited by S. Benavides

Woodhead Publishing, Abington Hall, Abington, Cambridge, CB21 6AH, UK. 2008. 312pp. £135. ISBN 978-1-84569-345-9.

Books on Corrosion are relatively rare and a new book which deals exclusively with corrosion in aerospace is likely to be well received. The editor sees the work of his 18/19 fellow contributors as, 'a conduit for moving beyond the basics of standard corrosion principles' (page 1), presumably meaning electro/chemical/galvanic action, as taught in undergraduate courses.

One author describes corrosion as (a complex of) 'insidious synergies, which render the expected safe life and crack growth life (of an aerospace vehicle) irrelevant' (page 43). Another author identifies current concerns by stating: 'the current industrial standard for corrosion management is the 'find and fix' approach which is enormously expensive and may do more harm than good in certain structures' (page 57). The general consensus is that: maintenance costs are unacceptably high and a more rigorous holistic approach to corrosion is needed. Such a method already exists. It is known as the Holistic Structural Integrity Process (HOLSIP) and this is a recurrent theme. Of immediate concern is the ageing USAF fleet of aircraft (average 23·6 years) and B-52s, now almost 50 years old, which are scheduled to fly until 2040. The cost of all this is 20 billion dollars per annum.

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