ADVANCED AIRSHIP TECHNOLOGIES AND DESIGN APPROACHES

Learning from Past Operational and Design Lessons to Seek a More Assured Path to Practicable Gas Buoyant Air Vehicles

By P V Hunt

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Airlander 10 in flight.
Hybrid Air Vehicles.

Philip Hunt's book is a much-needed addition to the airship library. There are many books that cover the intricacies of the Golden Age of airships in the 1920s and 1930s from an historical, technical and even social and economic perspective. There are a few books that cover the modern-day engineering specifics for the graduate engineering professional. But there is a dearth of books that explain the challenges of designing modern-day airships to the educated layman. Hunt's book does exactly this.

With a burgeoning industry and many companies in many different countries designing different types of new generation lighter-than-air craft, this book sweeps through the entire spectrum, whether high altitude (stratospheric), heavy lift, long endurance rigid, non-rigid or hybrids. It summarises the designs, the advantages and disadvantages and likely capabilities of each type of craft and surveys the work that still needs to be undertaken to commercialise these aircraft types.

It is a very timely volume in that regard. As the introduction states: "The present cost of fuel is having an immense impact on the carriage of air cargo and passengers. Around 50% of airline budgets are now spent on fuel. However, looking forward to the next 20 years, aircraft makers anticipate delivering around 31,000 new aircraft to airlines. The economic growth and aspirations of the burgeoning East place new demands on the global oil supply. If ever there was a need for a transformational aviation technology to ease the demand on fuel, it is with us now. The challenge is how to carry more cargo for less fuel used and *ipso facto*, at lower cost?"

I would add that, with the cost-effectiveness of CAD designing and CFD modelling by computer, together with a huge range of new strong and lightweight materials, this is a new golden age of development of lighter-than-air technology. The green aspects and endurance capabilities of airships are also likely to see them emerge as a powerful class of aircraft within the aerospace industry, so by reading this book this should help towards a more informed industry prepared for the airship revolution over the coming years.

Mr Hunt's background is a former British Royal Navy Air Engineer who subsequently worked on the US Government's DARPA's Walrus airship as a programme manager. Walrus was DARPA's programme to try and ultimately develop a 500ton lifting airship capable of a range of 12,000nm with VTOL and the book is distinctly informed by learnings and issues on that programme.

Following an initial short couple of chapters on airship background which is a high-level summary of the different types that there have been, the bulk of the book focuses on current airship design challenges. There are short sections on areas such as ballasting, buoyancy control, trim and pitch control, survivability and weather issues. These are all useful summaries of where the industry as a whole has got, though often with the conclusion that more research needs to be undertaken (some of which has been but is commercially protected by the companies at the forefront of any particular technology).

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As befits the author's background, the book concludes with an extensive section on the programme challenges of developing new LTA aircraft and suggestions for some ways of looking at the specific issues regarding estimating timescales for entirely new classes of aircraft. The book wraps up with a clear message to (the US) Government about the support needed to co-ordinate the different approaches to maximise benefit strategically.

It is difficult to cover an entire new industry in one thin volume and this book does a reasonable job but not without some problems. Some key areas get scant attention and there are a number of sections in the book where the reader is left wanting more information (but that's maybe no bad thing). The book is entirely in US imperial units which can be a little irksome to anyone in the rest of the world that relates more easily to metric units.

With a number of independent market studies calculating there is a market for between 500 and 1,000 hybrid airships alone in the coming years, the area of airships is going to be more of interest to the entire aviation industry and this book is an excellent start to getting a fuller understanding of it.

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