Aerospace Europe Conference 2023
Joint 10th EUCASS – 9th CEAS Conference

Abstract #XXX *(to be filled by the organizers)*
Preferred Topics: AEROST / CLINAV / SUSTAV (3 *maximum from the list of topics)*
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Type: Oral
Status of corresponding author: Regular

Title

Technical and Regulatory Hurdles for the use of Hydrogen in Lighter-Than-Air carriers

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Abstract

For many initiatives employing lighter-than-air technology (LTA), the use of hydrogen as a lift gas is highly attractive in view of its low weight, lifting power, renewable nature (zero or extremely low CO_2 emissions if produced via renewable electricity-driven electrolysis), low cost (compared with He), and the possibility to produce it at remote sites. As a lifting gas, its alternative, helium, is more conventionally used, however helium is very expensive, sometimes hard to obtain and has a heavy CO_2 footprint. In addition, He is twice heavier than H_2 and has less lifting power[1]. On the other hand, hydrogen has an emotionally charged meaning for LTA platforms, because of the Hindenburg accident, which still has its echo in the development of LTA technology and its use of hydrogen. However, as the materials now available for envelopes, frames and gas bags are of a much better quality, and sensors for monitoring key processes are easily available, in addition to the capabilities for safe unmanned flight, hydrogen has become a more viable and attractive option to revisit[2]. Current regulatory frameworks though, for the use of Hydrogen in aerial vehicles, besides balloons, are not available. The contribution of this article to the existing literature on LTA carriers will be the recommendations, based on the undertaken study, to overcoming some of the key technical and regulatory barriers for the use of hydrogen in lighter-than-air carriers in the European Union and associated states, and to improve the acceptance of hydrogen for use on board airships and LTA carriers.
As an information basis, three case studies flying from Europe will be used, based on experiences with LTA demonstrators meant for surveillance and cargo functions.

Keywords: Airships, Hydrogen, Flying regulations

References

[1] Hunt V., Allen N. (editor in chief) (2015), Advanced Airship Technologies and Design Approaches, p. 27. Helium has 92 % lifting power of hydrogen but is twice as heavy.
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