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Corresponding author: CLAUSS Margot

e-mail of corresponding author: margot.clauss@ltu.se

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Title

Circularity and Sustainability in Aerospace: The Case of Spacecraft Materials

Authors

Margot Clauss ¹, Bernd Weiss ², René Laufer ³, Anna Öhrwall Rönnbäck ⁴

¹Luleå University of Technology, 98192 KIRUNA, Sweden, margot.clauss@ltu.se

²Luleå University of Technology, 971 87 LULEÅ, Sweden, bernd.weiss@ltu.se

³Luleå University of Technology, 98192 KIRUNA, Sweden, rene.laufer@ltu.se

⁴Luleå University of Technology, 971 87 LULEÅ, Sweden, anna.ohrwall.ronnback@ltu.se

Abstract

Sustainability and the need for material circularity are the main challenges the industries are facing and not only the ones on the ground. [1][2]. Indeed, the aerospace industries are currently investigating solutions to implement sustainability and circularity [1][7]. The aviation sector implemented concepts related to refurbishment of engines, aircraft parts, and the repurposing of whole planes from passenger transport to cargo and freight logistics. While the space industry is still in need to develop missing technologies to enable circular material flows or to reuse spacecraft materials in space [1].

The space industry may be late regarding the implementation of sustainability compared to other sectors. Nevertheless, it can certainly learn from other sectors, particularly from its closest sibling: the aviation industry.

The aviation industry is ahead of the space industry regarding sustainability and circularity [3][4][5], even though concepts as reusing, repairing, recycling are already fundamental to crewed space missions and to some special missions as the Hubble Space Telescope [6]. It will become even more crucial when humanity will to explore deep space going farther and farther away from Earth, from its resources and from a potential rescue mission [1].

Therefore, to succeed in the implementation of circularity in space, this paper aims investigate from previous technology spin-off, to understand and analyze how the aviation and the space industry learnt from each other and to present the best practices, and to extract the best practices to succeed the implementation of circularity in space by identifying what can be transferred from aviation.

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