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AMRECAL - ADDITIVE MANUFACTURING OF RECYCLED ALUMINIUM ALLOYS

Abstract

In the frame of ESA's "Clean Space" programme Airbus Defence and Space and inspire AG have studied the potential of re-using materials from disused space crafts on a material level in the GSP study "Sustainable Materials Concepts". It was assumed that several unmanned missions to the moon would have to be conducted before a fully manned station can be operated, leaving numerous landing structures at the landing site which will be no longer used anymore. Re-utilisation of the Al resources was proposed to be realised by an Additive Manufacturing (AM) process after shredding the dis-assembled structures. However, the composition of the Al is not homogeneous; the main constituents are 50 In order to verify the proposed concept of a re-utilisation of the disused space crafts on the moon, Airbus and inspire AG have performed basic investigations on the feasibility of this concept. First, a respective basic mixture of the mentioned Al alloys has been prepared and specimens for density and tensile strength measurements have been manufactured from the corresponding powders following the powder-bed technique. Material densities of around 99The study showed that the processing of such alloy mixtures is feasible using an Additive Manufacturing technology, despite of the known poor weldability of each of the base alloys and the presence of different contaminants (moon dust, stainless steel). Moreover, the achieved mechanical performance was comparable to that of casting Al-alloys such as AlSi12. The study suggests an approach on how the use of recycled resources processed by advanced manufacturing technologies could play a role in the establishment and development of an economically sustainable lunar base.