

Constellium Aheadd® : aluminium alloys designed specifically for laser powder bed additive manufacturing delivering key advantages for space and transportation applications

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Constellium Aheadd® additive manufacturing (AM) aluminium alloys are specifically designed for laser powder bed AM, enabling higher performance component designs as well as more cost-effective solutions through higher AM productivity and simplified post-processing. The alloys are sustainable solutions, avoiding exotic raw materials or composite blends of multiple constituents. No volatile elements such as magnesium and zinc are used, improving stability of the melt pool, reducing smoke and avoiding chemistry changes during laser processing. Aheadd® CP1 is an Al-Zr-Fe alloy which allows very high printing speeds. In the as-printed condition, the material is ductile and has low residual stress. Excellent geometric control is ensured since the straightforward post-build heat treatment does not require a quench operation. Properties are isotropic with strength levels above conventional alloys such as AlSi10Mg or 6061, while maintaining excellent levels of ductility. Thermal and electrical conductivities are very high, corrosion performance is excellent and the product is ideal for surface finishing with mechanical, chemical and electrochemical processes. Aheadd® HT1 is a high strength, high temperature material based on the Al-Mn-Ni-Cu-Zr system, targeting new component designs to replace titanium in some applications. Unlike conventional aluminium alloys, Aheadd® alloys are thermally stable for service temperatures up to around 300°C. This presentation gives results of AM process and post-process studies using several AM platforms, microstructural investigations as well as application studies in markets ranging from satellite technology to automotive applications, with projects running in France, Germany, the UK and North America.