# The Comparison of Conventional and Additive Manufacturing Technologies for Manufacturing of Ti6Al4V Structures in the Aerospace Industry

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Ti6Al4V alloy is known as the most popular titanium alloy due to its high strength, low density, high fracture toughness and good corrosion resistance [1]. Ti6Al4V alloy with its excellent mechanical properties is used in aerospace industry since 1950s [2]. The main manufacturing challenge however represents its poor thermal conductivity, strain hardening and high oxygen affinity [3,4]. Conventional manufacturing technologies of Ti6Al4V parts, such as forging, casting, rolling and machining, involve large material waste, higher costs and less time efficiency [5].

To meet the increasing demands of the market and to overcome the challenges of Ti6Al4V alloy production, additive manufacturing (AM) has emerged as a promising manufacturing process for geometrically complex components [6–9]. Many different AM processing technologies for metallic materials are already known [10,11]. One of the most promising AM technologies is selective laser melting (SLM). The main advantages of SLM are high dimensional accuracy and excellent mechanical properties of finished parts, however, the duration of printing is time consuming. The second most commonly used AM technology is directed metal deposition (DED). DED enables faster printing times at the expense of lower resolution, which results in poorer dimensional accuracy of final printed parts. Compared to conventional technologies, AM is rapid manufacturing process that offers the freedom of shape and design combined with high performance, low cost and less material waste [12,13]. It enables recycling of unconsumed powders up to almost 100 %, which makes the technology more cost-effective and environmentally friendly [14]. Furthermore, the AM Ti6Al4V alloy with a buy-to-fly ratio of approximately 20:1 shows a significant improvement compared to conventional manufacturing of aircraft titanium parts [7].

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