

# **Designing high-performance and light-weight structures and materials for additive manufacturing**

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## **Abstract**

Innovative and efficient designs of structures and materials can be achieved by using topological optimisation techniques that are capable of maximising the performance of the load bearing system and minimising its weight. The bi-directional evolutionary structural optimisation (BESO) method, originally proposed by the author and his co-workers, has been well developed for this purpose. BESO is based on the simple concept of gradually removing inefficient material from a structure and, at the same time, adding material to the most needed locations. Such a simple but universally applicable technique can be used to not only significantly reduce the weight and the associated energy consumption of aircraft and motor vehicles but also produce strikingly elegant structural designs of bridges and buildings. This presentation will show how the BESO method could be effectively used to design a wide range of high-performance and light-weight structures and materials for additive manufacturing.