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Outline of Lattice Structures: Morphology, Manufacturing, and Material Aspect

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Abstract

Additive manufacturing technologies possess the capability to produce products according to customer demands, which make these technologies as the best option for lightweight technology. Another advantage is the design complex intricate shapes can be easily manufactured by rapid prototyping technologies to include lattice structures in automobile applications like the body panels of the car, the engine's intercooler, or gas tank with the aim of weight and strength optimizations. There are various techniques available for manufacturing lattices. This paper presents an outline of lattice structure with respect to different morphologies, various manufacturing methods for it, and different materials available to produce lattice structures. It discusses how the variation of characteristics can improve the lattices' performance significantly, from a mechanical and application point of view. The characterization of lattice structures and the recent developments in finite element analysis models are studied. Many authors compared conventional techniques with additive manufacturing; it was found that manufacturing defects induced in Micro-Lattice Structure manufactured via additive manufacturing were less. With the help of additive manufacturing, complex morphologies can be easily developed by using CAD software. The simple, rapid, and