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Exploring Mechanical Properties of Additive Manufacturing Ceramic Components Across Techniques and Materials

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Abstract : The field of ceramics has undergone a remarkable transformation with the advent of additive manufacturing technologies. This comprehensive review explores the mechanical properties of additively manufactured ceramic components, focusing on key materials such as Alumina, Zirconia, and Silicon Carbide. The study delves into various authors' review technology into the various additive manufacturing techniques, including Stereolithography, Powder Bed Fusion, and Binder Jetting, highlighting their advantages and challenges. It provides a detailed analysis of the mechanical properties of these ceramics, offering insights into their hardness, strength, fracture toughness, and thermal conductivity. Factors affecting mechanical properties, such as microstructure and post-processing, are thoroughly examined. Recent advancements and future directions in 3D-printed ceramics are discussed, showcasing the potential for further optimization and innovation. This review underscores the profound implications of additive manufacturing for ceramics in industries such as aerospace, healthcare, and electronics, ushering in a new era of engineering and design possibilities for ceramic components.

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