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LASER MICROMACHINING OF COMPOSITES FOR AEROSPACE APPLICATIONS.AREVIEW

Abstract

Within the aerospace industry, composites reign supreme as the go-to materials for crafting a myriad of systems. Their widespread adoption is owed to exceptional characteristics such as lightweight construction and an impressive strength-to-weight ratio. However, the unique properties of composites, while advantageous, pose challenges when it comes to machining. This research delves into the intricate world of laser micromachining of composite materials, exploring various processes like drilling and cutting. This comprehensive work meticulously reviews existing literature on laser micromachining, focusing specifically on composite materials, including Polymer Matrix Composites (PMCs), Ceramic Matrix Composites (CMCs), and Metal Matrix Composites (MMCs). Laser micromachining plays a crucial role in aerospace applications due to its ability to achieve high precision and intricate details in components. This precision is essential for the intricate features required in aerospace components. The capability of laser micromachining to work with various aerospace materials and achieve tight tolerances contributes to the overall efficiency, performance, and reliability of aerospace systems. The state of art is to unfold the literature through a synthesis of experimental findings and numerical analyses conducted by researchers. The exploration begins by dissecting the nuances of laser micromachining applied to each composite material. Through a detailed examination, we unravel the intricacies of working with PMCs, CMCs, and MMCs. Researchers' experimental investigations and numerical analyses provide a deeper understanding of the challenges and opportunities posed by laser micromachining in the realm of composite materials. By scrutinizing the body of work produced by researchers, this paper contributes to a more comprehensive comprehension of laser micromachining's application in aerospace materials. The synthesis of experimental and numerical data serves as a valuable resource for engineers and researchers navigating the complexities of working with composites in the pursuit of advancing aerospace systems.

Keywords: Laser micromachining, composite materials, aerospace applications, numerical modeling, laser parameters.