
Book Review

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Machining Composite Materials

by J. Paulo Davim (Ed.)

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In recent years, the application of composite materials has increased in various areas of science and technology due to their special properties, namely for use in the aircraft, automotive, defence, aerospace and other advanced industries.

One of the main composite type, the carbon fibre reinforced plastics (CFRP) are widely used in the airframe of commercial airplanes, for example in the case of the Airbus 380 (25%), the A350 (52%) and the B787 Dreamliner (50%). Structural parts (wings, keel beam, cowlings, J-nose, etc.) are mainly made in multilayer composite sheets. The components are conformed to the final shape, but after the composite construction all parts must be trimmed to the right dimensions and shape, using milling as the main process. Currently, other techniques such as abrasive waterjet (AWJ) are in study, but not enough data about the possible material damage are still enough available. A limitation of AWJ is when the waterjet cuts through one composite face but the jet also may damage the unprotected part surface on the other side. Drilling of CFRP has been studied in depth by several authors, specially taking into account the composite delamination. Orbital milling is a well-defined process, useful for large diameter holes, where milling tools making helical interpolation produce fine holes.

Machining composite materials is quite a complex task owing to its heterogeneity, and to the fact that reinforcements are extremely abrasive. In modern engineering, high demands are placed on components made of composites in relation to their dimensional precision as well as their surface quality. Due to these potential applications, there is a great need to understand the questions associated with machining composite materials.

This book aims to provide the fundamentals and the recent advances in the machining of composite materials (polymers, metals and ceramics) for modern manufacturing engineering. The three parts of the book cover the machining of polymeric, metal and ceramic matrix composites.

The book contents are the following

- mechanics and modelling of machining polymer matrix composites reinforced by long fibres
- machinability aspects of polymer matrix composites
- drilling technology
- abrasive water jet machining of composites

- machining metal matrix composites
- machining ceramic matrix composites.

This book can be used as a text book for the final year of an undergraduate engineering course or for those studying machining/composites at the postgraduate level. It can also serve as a useful work of reference for academics, manufacturing and materials researchers, manufacturing and mechanical engineers, and professionals in composite technology and related industries.

As conclusion, the general view of composite machining offered by the book edited by J. Paulo Davim is useful for PhD students, but also for technicians working on this emerging industry. After the first reading, the opportunities opened for researchers and manufacturers will be clear and well defined.