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Bekir Sami Yilbas

Laser Drilling Practical Applications



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Laser Drilling

Practical Applications

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*To my mother Ayse, my wife Zahide,
and my daughters Ayse and Merve*

Preface

Machining is one of the important areas in the engineering discipline. To meet today's challenges, it is necessary to incorporate advanced machine tools in manufacturing processes. Laser drilling is considered to be one of the advanced machining processes filling the gap in the advanced manufacturing systems because of their precision, low cost, localized processing, and high speed of operation. In laser drilling applications, a laser beam is used as a heat source increasing temperature rapidly to the melting and evaporation temperature of the substrate material. Since the arrangements of the optical setting for the laser beam are very precise, the localized heating can be controlled easily. With recent advancement in laser technology and computations power, laser drilling application has become almost an integral part of the aerospace, power, electronic, and sheet metal forming industries. In laser drilling operations, the physical processes are complicated in nature and they require a deep understanding of the process to secure improved end-product quality.

In laser drilling processes, the end-product quality is very important from the manufacturing point of view. The quality assessment of the end product, such as drilled hole, can be possible through examining the geometric features of the laser drilled hole section. One of the methods associated with the quality assessment is the factorial analysis; in which case, the affecting factors are varied randomly or with increments to generate the random blocks. Through the statistical testing of the measurable responses, the significant levels of the affecting parameters can be identified.

In this book, laser drilling operation is introduced and analysis related to the drilling mechanisms is presented in [Chap. 2](#). The qualitative and quantitative analysis of laser drilled holes is accomplished in [Chap. 3](#) to assess the end-product quality. [Chapter 4](#) deals with the above surface phenomena, which influence the end-product quality. In the last chapter concluding remarks are included for the laser drilling process.

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