Preface

The present book deals with fractal analysis of surface roughness in different machining processes. Surface roughness is an important attribute of any machine component. Conventionally several statistical roughness parameters are used for describing surface roughness. But surface topography is a non-stationary random process for which the variance of the height distribution of roughness features is related to the length of the sample. Consequently, instruments with different resolutions and scan lengths yield different values of these statistical parameters for the same surface. A logical solution to this problem is to use scale-invariant parameters to characterize rough surfaces. In this context, to describe surface roughness, the concept of fractals is considered. Fractals retain all the structural information and are characterized by single descriptor, the fractal dimension, D. Fractal dimension is intrinsic property of the surface and independent of the filter processing of measuring instrument as well as the sampling length scale.

Four machining processes viz. CNC end milling, CNC turning, electrical discharge machining and cylindrical grinding are considered for three different materials. The generated machined surfaces are measured to find out fractal dimension (D) of the surfaces. The experimental results are further analyzed with response surface methodology (RSM) to consider the effects of process parameters on fractal dimension. Also the effect of work-piece material variation on fractal dimension of machined surfaces is considered. It is believed that the present book will prove to add significant contribution to the existing literature from the point of view of both industrial importance and academic interest.

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