Preface

Writing a foreword or preface for the *Materials Selection and Design* book is indeed a pleasure. Today we are living in the world of materials and hence the applications of materials for serving mankind have increased. Of more than 1,00,000 engineering materials, we are enjoying more than 60,000 metallic materials and close to 40,000 non-metallic materials. The implication from the above is that it is highly important to focus on the selection of materials for engineering design and parts. But to really obtain very specific and most appropriate material that will lead to the prevention of unanticipated failure of the engineering structure or components, this book presents topics on the basics of materials selection and design which will give a better understanding of the selection methods and then find suitable materials for the applications. This book draws the simple and straightforward quantitative methods followed by the knowledge-based expert system approach with real and tangible case studies to show how undergraduate or postgraduate students or engineers can apply their knowledge on materials selection and design. Topics discussed in this book contain special features such as illustration, tables, and tutorial questions for easy understanding. A few published books or documents are available, hence this book will be very useful to those who use (or want to use) materials selection approach without the advantages of having had comprehensive knowledge or expertise in this materials' world.

The key feature of this book is that each chapter contains learning outcomes with step-by-step tutorials which will help the reader to learn the module/chapter quickly. A special chapter on knowledge-based expert system (KBS) has been explained for the application of KBS in materials selection. The book also elaborates numerous case studies on the materials selection of engineering components and structures, especially on how to find the most appropriate material (s) for a specific design and application.

There are six chapters in this book, with several main streams or themes such as mechanical failure of materials, design phases, materials selection processes, and knowledge-based system in materials selections. The Chap. 1 provides an overview of *Materials Selection and Design* that appears as the title of this book. Three chapters deal with the performance of materials in real applications, different stages of design, and relationship between materials' properties and design. Chapter 5 discusses elaborately the traditional or quantitative materials selection

process along with several case studies. Chapter 6 is dedicated to the knowledge-based system approach in materials selection for many engineering applications. The learning outcomes and tutorial questions are included at the beginning and end of each chapter, respectively, for easy understanding and comprehensive knowledge on each particular topic of this book.

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