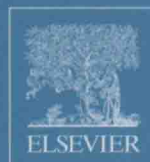


Handbook of Adhesives and Surface Preparation

Technology, Applications and Manufacturing

Edited by
Sina Ebnesajjad



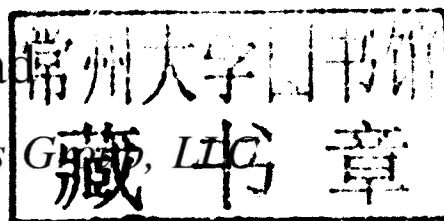
HANDBOOK OF ADHESIVES AND SURFACE PREPARATION

Technology, Applications and Manufacturing

Edited by

Sina Ebnesajjad

President, FluoroConsultants Group



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Sina Ebnesajjad
Chadds Ford, Pennsylvania

Dedicated to the memories of my dear friend
William Andrew Woishnis
Who left the world too early, too young.

Preface

A basic industrial process is the bonding of similar and dissimilar materials to each other. Bonding using an adhesive has proven to be an effective means of attaching materials together.

There are numerous books about adhesives. Several excellent books are available that deal with the subject of adhesives from various viewpoints. Some have looked at adhesives from the perspective of synthesis, chemistry, or bonding techniques. Others have treated the subject from a practical standpoint. Of these, most are attempts to describe adhesion in relation to a variety of materials, including plastics, metals, wood, and so on. A few books regarding applications of adhesives are highly specialized in particular industries, such as metals and construction.

What is different about this book? The present book is focused on practitioners of adhesion technology from an end-user's perspective, thus covering most substrates, such as plastics, metals, elastomers, and ceramics. The information is aimed at allowing readers to select the right adhesive and successfully bond materials together. Other than the choice of the appropriate adhesive, surfaces must be pretreated according to specific methods and prior to the application of adhesives. By including generous selections from the recent back catalog of both Elsevier and William Andrew publishing (now part of Elsevier), I aim to provide to an audience of engineers and other professionals working with adhesives, a wide-ranging and practical handbook.

This book describes treatment methods that must be applied to a material surface before successful adhesive bonding is possible. There are numerous examples, ranging from wallpaper in a house and paint on surfaces to parts used in the construction of aircraft. The aim of the contents is to explain, in an accessible yet complete manner, all that is required to achieve successful adhesion bonding of different materials.

Fundamental material considerations have been given priority to facilitate the use of the contents of this book in different industries. The book is both a reference and a source for learning the basics. Additionally,

it is useful for all involved in the product value chains, and it offers information helpful to engineers, chemists, students, and all others involved in material adhesion and processing.

Every attempt has been made to enhance the accessibility of the information to create a reader-friendly text. In the balance of practical and theoretical subjects, practical has been given definite precedence. This is a trade-off that the author readily acknowledges. There are numerous good books and sources for the study of the theory and science of adhesion and adhesives.

The references listed at the end of each chapter serve as both bibliography and additional reading sources. Most of the basic practical technology of adhesives was developed decades ago. Older references have been retained wherever they represent the preferred source of information for a specific topic. Readers can find a wealth of information and reports that have been declassified by the Defense Technical Information Center (www.dtic.mil), most of which date to the 1960s.

The book consists of four parts. Part I contains two introductory chapters that describe the fundamental concepts of surface treatment and adhesion. Part II is comprised of chapters that describe surface tension (energy) concepts, surface characterization techniques, and surface preparation methods for metals and thermoplastics, thermosets, and elastomers.

Part III describes the characteristics of adhesives from the standpoints of chemical structure and application. Heat-resistant and UV-cure adhesives are discussed in separate chapters because of their importance to the adhesive industry.

Part IV of the book describes the applications of adhesives with respect to special adherends. Applications of adhesives in aerospace, electronic, and medical/dental have been described in separate chapters because of the importance and breadth of adhesion use in these industries. There are few, if any, adhesives that are not used by these industries, thus rendering the information in the chapters useful to nearly any other

industry. After all, the aerospace industry has been a pioneer in the use of structural adhesive bonding in critical applications.

Appendix A discusses Safety, Environmental, Economic Aspects, and Future Trends. Appendix B provides an exact copy of the FDA Guidance for Tissue Adhesive for the Topical Approximation of Skin issued in May 2008. A glossary section rounds off the book.

I hope this book is useful to those who practice the art of adhesion as a profession. None of the views or

information presented in this book reflect the opinions of any of the companies or individuals that have contributed to the book. If there are errors, they are an inadvertent oversight on the part of the author. A note indicating suggestions or specific errors to the publisher, for the purpose of correcting future editions, would be much appreciated.

Sina Ebnesajjad
Chadds Ford, Pennsylvania

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