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BOOK REVIEWS

Herbert Rees: Understanding Injection Molding Technology. 132 pages, 76 figures, 6 references. Hanser Publishers Munich, Vienna, New York, 1994. Soft cover: DM 32,- / US $ 19,95/£ 13,-. Hanser/Gardner Publications (ISBN 156990-130-9) Hanser Publishers (B-446-17728-0)

To satisfy the needs of newcomers to various fields of polymer science and plastics engineering Hanser Publishers invited a number of scientists and engineers, experts in their field of activity and also good communicators, to write short introductory books which let the reader understand the topic rather than to overwhelm him/her with a mass of facts and data. Over the years this series "Understanding" books will provide a library of mini-tutorials on a variety of fundamental as well as technical subjects.

Understanding injection molding technology describes in broad outlines the origin and processing of earlier plastics and how injection molding evolved. The content of the book is presented in six chapters: Introduction to plastics technology (background and history of plastics, types of plastics); plastics processing (general considerations, compression-, transfer- and plunger molding, extrusion, thermoforming, screw plasticizing in transfer and reciprocaring screw machines, check valves, screw injection of thermosets, injection-compression molding); injection molding (molds, mold halves, preload, gates, heat exchange, surface finish of the mold, venting, mold strength); other features and terminology (number of cavities, alignment, runner systems, cold runner, balancing, runners for thermosets, weld lines, hot runners, distribution systems, manifold heaters, nozzles and gates, cooling and heating, injection methods, selection of materials, automatic molds, mold design, drawings, standards); injection molding techniques (stack molding, blow molding, stretch blow molding, two color-, co-injection, tusset, multiple station-, shuttle, insert molding and in – mold decoration); automatic product handling (runner removal, oriented products removal; take-off methods, controlled ejection, quality control).

The book should be of value to service personal, buyers, machine operators, moldmakers and mechanics. It gives a reliable introduction to this dynamic field of plastics activity.

H. Domininghaus (Dreieich)

Robert A. Malloy: Plastic Part Design for Injection Molding. 464 pages, 427 figures, 11 tables, 375 references Hanser Publishers, Munich, Vienna, New York, 1994. (ISBN 3-446-15956-8) Hanser/Gardner Publications Cincinnati, 1994. (ISBN 1-56990-129-5) Hardcover DM 98,-/ US $ 58,-/ £ 40,-.

Design engineers, mold makers, converters and technical engineers have to thank the Society of Plastics Engineers (SPE) for sponsoring and Hanser Publishers for publishing this book on the fundamentals on part design for injection molding. The work of the author as lecturer at the University of Massachusetts Lowell and his longtime contribution to the SPE Injection Molding Division make him eminently qualified to write with authority on this timely topic.

After an introductory chapter on thermoplastics and thermosettings, structure-property relationships, additives and general characteristics of plastics the second chapter deals with manufacturing considerations for injection molded parts (mold filling, weld lines, shrinkage, warpage, cooling and solidification, part ejection and other injection molding processes (gas-assisted injection, structural foams, coinjection and injection/compression molding).

The following chapter describes the plastic part design process, test standards for design related material properties, stress/strain, impact, fatigue and thermal behaviour, melt flow properties, materials data sources and standardization. In the chapter on structural design considerations the author gives a detail account on design methodology, quantifying the design problems and as samples beams, plates, shells, pressure vessels, columns, torsional and dynamic loads. Details on prototyping and experimental stress analysis as well as kind a selection of the appropriate method of assembling of parts.

The book is an invaluable help to all that are looking for practical orientation.

H. Domininghaus (Dreieich)

Paul, A. Tres: Designing Plastic Parts for Assembly. 242 pages, 190 figures, 6 tables, 135 references Hanser Publishers, Munich, Vienna, New York, 1994. Hanser/Gardner Publications, Inc. Cincimati, 1994 Softcover DM 64,-/US $ 39,95/ £ 26,-. (ISBN 3-446-175594-6)

This practical book is an outgrowth of the like-named University of Wisconsin-Madison course which is now offered nationally. The author provides a detailed yet simplified discussion of material selection, manufacturing techniques and assembly procedures.

Designing parts for assembly and manufacturing has always been an important task for designers, engineers, technicians and all other involved in product development. A new emphasis has been placed on design over the past few years as designing for manufacturing and assembly (DFMA) has become a significant trend around the world.

The importance of design can never be overemphasized, because the design stage represents 5% of the total product cost, yet design decides 70% of the product's production cost. The product development cycle begins with an idea: in the end a viable product is manufactured. Between these two points, the cycle passes through a number of critical stages.

The first four chapters review the physical and mechanical properties of polymers, explaining the major polymer families and their structures. The important area of safety factors employed for different designs is outlined, followed by a study of the strength of plastics. Chapter 5 offers a detailed examination of the different welding and bonding methods in modern assembling. Three comprehensive chapters deal with press fitting. Living hinges and snapfitting. Two appendices give details about FEA, including authentic output from the FEA software.

This book provides a reference for students, designers, product-, project-, research- and material engineers or anyone involved in the development and manufacture of plastics products.

H. Domininghaus (Dreieich)

Bruce, R. Gelin: Molecular Modeling of Polymer Structures and Properties. 168 pages, 76 figures, 7 tables, 161 references. Hanser Publishers Munich, Vienna, New York, 1994 (ISBN 3-446-16553-3) Hanser/Gardner Publications, 1994 (ISBN 1-56990-125-2) Hardcover DM 148,- /US $ 89,- /£60,-.

The combination of experience in molecular modeling of polymers most notably in bio/pharmaceutical applications and the availability of powerful computers makes it

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an appropriate time to consider applying molecular simulation methods in other fields such as polymers and materials. Many more chemists and scientists in other fields would use molecular modeling if it were less of a mystery to them. The goal of this book is to explore the application of molecular modeling to polymer structures and properties.

The first three chapters present the general idea of modeling as a simplification process, the development and classification of emperical force fields and how they are applied to perform basic calculations such as energy minimization and molecular dynamics. The following chapter deals with building of models of polymeric systems, followed by modeling of polymer structures and simulation of mechanical properties. The subject of chapter 7 is diffusion of small penetrants within polymeric materials (diffusion, surface phenomena and energy transfer). The following chapter shows how mechanical models can be useful in the explanation of polymer electrical properties.

The book attempts to bring the reader to the point from which independant study and evaluation of the current literature are possible.

H. Domininghaus (Dreieich)

Chi-Ming Chan: Polymer Surface Modification and Characterization 296 pages, 178 figures, 43 tables, 628 references. Hanser Publishers, Munich, Vienna, New York, 1994 (ISBN 3-446-15870-7) Hanser/Gardner Publications, Cincinnati, 1994 (ISBN 1-56990-158-9) Hardcover DM 128,- /US $ 79,95/ £ 49,-.

Polymers have been applied successfully in fields such as adhesion, biomaterials, protective coatings, friction and wear composites, microelectronic devices and thin-film technology. Mostly special surface properties such as chemical composition, hydrophilicity, roughness, crystallinity, conductivity, lubricity and crosslinking density are required for the success of these applications. It is the target of the applied surface treatments to: Produce special functional groups, to increase surface energy, hydrophobicity by hydrophilicity, to improve chemical inertness, to introduce surface crosslinking, to remove weak boundary layers or contaminants, to modify the surface morphology, to increase surface electrical conductivity or surface lubricity.

Here the main chapters: Polymer surface-modification and analysis, contact angle measurement, X-ray photoelectron spectroscopy, secondary ion mass spectroscopy, surface grafting, plasma modification, corona and flame treatments.

The book is intended for chemical engineers, polymer chemists, polymer scientists and plastic engineers as an indispensable and inexhaustable source of information.

H. Domininghaus (Dreieich)

Shalaby W. Shalaby (ed.): Biomedical Polymers (Designed-to-Degrade Systems). 272 pages, 86 figures, 44 tables, 1024 references. Hanser Publishers, Munich, Vienna, New York, 1994 (ISBN 3-446-16531-2) Hanser/Gardner Publications, Cincinnati, 1994 (ISBN 1-56990-159-7) Hardcover: DM 188,- /US $ 113,-/£59,80

Interest in absorbable polymers, and particularly the synthetic ones, which are sometimes referred to a erodible, bioabsorbable, resorbable or biodegradable, has grown considerably over the past two decades. This is primarily because of their transient nature when used as biomedical implants or drug carriers. Examples of these polymers include the vanishing surgical sutures or staples for wound repair without the need for removal as the augmented tissues regain their normal properties. Some of the intensively explored developments are: novel delivery systems for controlled release in the stomach, synthetic grafts for replacement of blood vessels, laboratory grown plugs as substitutes for parts of vital organs (e.g. liver, cartilage and bones) as well as artificial tendons and ligaments.

Here some of the main chapters written by twenty-three experts: Synthetic absorbable polyesters, poly(orthoester), polyanhydrides as carrier of drugs, bioabsorbable poly (ester-amides), amino acid derived polymers, polyphosphazenes as new biomaterials, bacterial polyesters; structural variability in microbial synthesis, bio-synthetic polysaccharides, chemical modification of proteins and polysaccharides and its effect enzyme – catalyzed degradation.

The book is most useful to polymer scientists and plastic engineers actively involved in new polymer materials R & D for biomedical applications. Surgeons and clinicians are well-informed about a broad range of up-to-data most important types of biologically transient materials.

H. Domininghaus (Dreieich)

Peter C. Powell: Engineering with Fibre-Polymer Laminates. 441 pages, 337 figures, 122 tables, 73 references, Chapmann & Hall, London, Glasgow, New York, Tokyo, Melbourne, Madras, 1994 Paperback: £ 26.99 (ISBN) 0-412-49610-0)

This book has its origins in a Master's course in Polymer Engineering at Manchester as well as in courses in teaching to students of engineering and of polymer technology. There are some modest prerequisites for this text. It is assumed that the reader can perform elementary integration and differentiation of simple functions and can handle simple matrix algebra operations.

The first chapter provides an introduction to composites whilst the second one gives an introduction to solid body mechanics, followed by a chapter on the stiffness behaviour of single ply. Laminates based on isotropic plies are dealt with in chapter 4 and those based on unidirectional plies in the next one. Chapter 6 explores some of the factors which cause failure due to exceeding stresses. The effects of change of temperature to the behaviour of simple plies and laminates are treated in chapter 7. Chapter 8 is a simple view of how adapt the principles in earlier chapters to the design of thin-walled sections for stiffness.

An outstanding feature of the book is the presentation of a wide range of problems with respective answers at the appendix.

This textbook offers an appreciated help to engineers and students of mechanical engineering interested in the correct application of polymer composites.

H. Domininghaus (Dreieich)

D. Fennel Evans, Hakån Wannerström: The Colloidal Domain (Where Physics, Chemistry, Biology and Technology Meet) 515 pages, 226 figures, 27 tables, 169 references. VCH Weinheim, New York, Basel, Cambridge, Tokyo, 1994 Hardcover DM 98,- (ISBN 1-56081-525-0)

In despite of the use of colloids since the earliest time of civilization the traces of the establishment of colloid science are to be found not earlier than in the mid-nineteenth century. Since that time fundamental developments paralleled increasingly sophisticated industrial use of colloidal systems: thinking about paints, inks, emulsions, polymerization, sprays, high impact plastics, inhalation of pharmaceuticals and an endless number of manifold applications.

The introductory chapter underlines the importance of collodial systems, followed by chapters on solutes and solvents, surface chemistry and monolayers, electrostatic interactions in collodial systems, structure and properties of micelles, forces in colloidal systems, bilayer systems, polymers in colloidal systems, colloidal stability and colloidal sols, phase diagrams as well as micro-and macroemulsions. The book's treatment focusses on molecular self-assembly revealing the interplay between forces that govern molecular behaviour. Concept maps are an useful help to readers encountering these topics for the first time. Tables of content summerize the principle concept.

To scientists and engineers in the chemical, petroleum, agricultural, ceramics, coatings, food and forestry industries this book is of great help to better understanding of colloidal science in practice and science.

H. Domininghaus (Dreieich)

R.P. Wool: Polymer Interfaces Structure and Strength. 512 pages, 263 figures, 50 tables, 650 references, Hanser Publishers Munich, Vienna, New York 1995. Hardcover DM 178, -/US$ 128, -/£ 72, 50 (ISBN 3-446-16140-6)

Polymer interfaces are ubiquitous and play a critical role in controlling the properties and function of a broad range of materials. In this book are discussed model polymer interfaces in terms of their structure and strength. The results are applied to practical applications such as melt processing, weld lines, injection molding, composite lamination, particle sintering, rubber tack, blends, compatibilizers, adhesion and fracture. The strength is related to the interface in terms of microscopic deformation mechanisms involving disentaglement and bond rupture of polymer chains.

The book deals with a wide variety of interface pairs involving polymers and materials with different composition, crystalline and amorphous content, molecular weight distributions, additives and surface chemistry. The structure of welding interfaces is described in terms of chain dynamics interface roughness and the thermodynamics of chemically interacting monomers. The fundamental formulae for strength are compared with suitable spectroscopic and fracture experiments on polymer interfaces.

This book will be highly helpful to readers with experimental and theoretical backgrounds in chemistry, physics, materials and engineering as well as to readers with interests in material surfaces, interfaces, manufacturing, melt rheology, polymer dynamics, fractals, percolation, material design, fracture, fatigue, crack healing, welding and high performance plastics of all kind. It contains many solved problems, exercises, comments and research suggestions.

H. Domininghaus (Dreieich)

M.S. Welling: Parat Dictionary of Plastics and Rubber Technology (Wörterbuch Kunststoff-und Kautschuktechnologie) 193 pages, VCH Weinheim, New York, Basel, Cambridge, Tokyo (1994) DM 168, - (ISBN 3-527-28210-6 VCH Weinheim), ISBN O-7273-0412-7 Pentech Press)

The second volume of this dictionary provides the German equivalent of about 19.000 English terms directly or indirectly related to plastics and rubber technology. The field has been covered extensively, including the physics and chemistry of high polymers, properties, manufacturing, products and uses. It also includes the latest terminology relating to plastics recycling, environmental technology, quality assurance, CAD/CAM/CAE and computer controls, Often there is more than one German equivalent for an English term. In this case the examples given in the German-English volume may well help the translater to choose the most appropriate term needed in a particular context.

H. Domininghaus (Dreieich)

A.E. Woodward: Understanding Polymer Morphology. 140 pages, 41 figures, 4 tables, 314 references. Hanser Publishers Munich, Vienna, New York, Barcelona, 1995. Paperback DM 38, -/ÖS 297, -/ US$ 19,95/£ 16, -(ISBN 3-446-17431-1)

Various textbooks and monographs containing descriptions of some of the polymer morphologies known up to the 1980s have appeared e.g. the recent "Atlas of Polymer Morphology" (Woodward, Hanser). However a book designed to introduce and explain the various aspects of polymer morphology to scientists who are not specialists in this important field has not appeared to date. "Understanding Polymer Morphology" is an attempt to fill that need.

A brief introduction to polymer science principles, a short description of microscopic methods used to study morphology and a discussion of crystallizable polymers are given. The following chapters deal in more detail with the morphology of crystallizable, liquid crystalline morphologies, the morphology of blends, blockcopolymers, composites and laminates as well as the morphologies associated with processing, deformation and fracture and the effects on polymer properties. This book will be an appreciated help to many science and engineering students as well as to those people preparing or studying polymeric materials but who are not yet specialists in this field.

H. Domininghaus (Dreieich)