

This book provides a comprehensive overview of the steps involved in the ceramic injection molding process. It provides the reader with a convenient and authoritative source of information and guidance on the use of materials, equipment and testing procedures to produce satisfactory ceramic products.

Special Injection Molding Techniques covers several techniques used to create multicomponent products, hollow areas, and hard-soft combinations that cannot be produced with standard injection molding processes. It also includes information on the processing techniques of special materials, including foaming agents, bio-based materials, and thermosets. The book describes the most industrially relevant special injection molding techniques, with a detailed focus on understanding the basics of each technique and its main mechanisms, i.e., temperature, mold filling, bonding, residual stresses, and material behavior, also providing an explanation of process routes and their variants, and discussions of the most influencing process parameters. As special molding techniques have the potential to transform plastics processing to a highly-efficient, integrated type of manufacturing, this book provides a timely survey of these technologies, putting them into context, accentuating new opportunities, and giving relevant information on processing. Provides information about the basics needed for understanding several special injection molding techniques, including flow phenomena, bonding mechanisms, and thermal behavior. Covers the basics of each technique and its main mechanisms, i.e., temperature, mold filling, bonding, residual stresses, and material behavior. Discusses the most relevant processing parameters for each injection molding technique. Presents a variety of techniques, including gas and water assisted injection molding, multi-component injection molding, hybrid injection molding, injection molding of bio-based materials, and techniques for thermoset

Experiments processes that affect more than 70 percent of consumer products ranging from computers to medical devices and automobiles, this reference presents the latest research in automated plastic injection and die casting mold design and manufacture. It analyzes many industrial examples and methodologies while focusing on the algorithms, implementation procedures, and system architectures that will lead to a fully automated or semi-automated computer-aided injection mold design system (CADMDS). This invaluable guide in this challenging area of precision engineering summarises key findings and innovations from the authors' many years of research on intelligent mold design technologies.

This book covers a wide range of applications and uses of simulation and modeling techniques in polymer injection molding, filling a noticeable gap in the literature of design, manufacturing, and the use of plastics injection molding. The authors help readers solve problems in the advanced control, simulation, monitoring, and optimization of injection molding processes. The book provides a tool for researchers and engineers to calculate the mold filling, optimization of processing control, and quality estimation before prototype molding. From classroom aids to corporate training programs, technical resources to self-help guides, children's features to documentaries, theatrical releases to straight-to-video movies, The Video Source Book continues its comprehensive coverage of the wide universe of video offerings with more than 130,000 complete program listings, encompassing more than 160,000 videos. All listings are arranged alphabetically by title. Each entry provides a description of the program and information on obtaining the title. Six indexes -- alternate title, subject, credits, awards, special formats and program distributors -- help speed research.

"Micro Injection Molding" meets the need for a dedicated book dealing exclusively with micro injection molding and overcoming the challenges of managing and processing polymers at ultra-small scales is the primary process for the mass production of polymer components with the dimensions in the sub-millimeter range; however, it is not just a simple downscaling of conventional injection molding, and specific material-process-product interactions must be understood in order to achieve near zero-defect net-shape micro molded products. Micro molding is typically associated with ultra-high accuracy and superior process capabilities. Micro molded products have dimensional tolerances down to the single-digit micrometer range and surface finish with roughness from the sub-micrometer down to a few nanometers range. Micro and nano-structured tool surfaces are reproduced with very high replication fidelity onto the polymer products. Micro injection molding is highly suitable for the manufacture of multifunctional micro components such as micro implants, microfluidic systems, polymer micro optical elements, and micro mechanical systems. This book provides engineers, project managers, researchers, consultants, and other professionals involved in precision polymer processing and micro manufacturing with a comprehensive, up-to-date, and detailed treatment of the main topics related to micro molding, from material and process technology to tooling, to key-enabling technologies, and multimedia process variations. Contents: Part 1 - Polymer Materials and Processing Micro Technology: micro injection molding machines technology, micro molding process monitoring and control; polymer materials structure and properties in micro injection molding parts; surface replication in micro injection molding • Part 2 - Tooling Technologies for Micro Mold Making: micro machining technologies for micro injection mold making; ultra-precision machining technologies for micro injection mold making; surface treatment of mold tools in micro injection molding • Part 3 - Micro Molding Key-Enabling Technologies: vacuum-assisted micro injection molding; modeling and simulation of micro injection molding; metrological quality assurance in micro injection molding; additive manufacturing for micro tooling; micro part rapid prototyping • Part 4 - Multimaterial Micro Processing: micro powder injection molding; multimaterial micro injection molding
The all-encompassing guide to total quality process control for injection molding. In the same simple, easy-to-understand language that marked the first edition, Total Quality Process Control for Injection Molding, Second Edition lays out a successful plan for producing superior plastic parts using high-quality controls. This updated edition is the first of its kind to zero in on every phase of the injection molding process, the most commonly used plastics manufacturing method, with an all-inclusive strategy for excellence. Beginning with sales and marketing, then moving forward to cover finance, purchasing, design, tooling, manufacturing, assembly, decorating, and shipping, the book thoroughly covers each stage to illustrate how elevated standards across individual departments relate to result in the creation of a top-notch product. This Second Edition: Details ways to improve plastic part design and quality. Includes material and process control procedures to monitor quality through the entire manufacturing system. Offers detailed information on machinery and equipment and the implementation of quality assurance methods—content that is lacking in similar books. Provides problem-analysis techniques and troubleshooting procedures. Updates include that cover Sigma, ISO 9000, and TS 16949, which are all critical for quality control; computer-guided process control techniques; and lean manufacturing methods. With proven ways to problem-solve, increase performance, and ensure customer satisfaction, this valuable guide offers the vital information today’s managers need to plan and implement quality process control—and produce plastic parts that not only meet, but surpass expectations.

This book provides a structured methodology and scientific basis for engineering injection molds. The topics are presented in a top-down manner, beginning with introductory definitions and the big picture before proceeding to layout and detailed design of molds. The book provides very pragmatic analysis with worked examples that can be readily adapted to real-world product design applications. This new edition will help students and practitioners to understand the inner workings of injection molds and encourage them to think outside the box in developing innovative and highly functional mold designs. This new edition has been extensively revised with new content that includes more than 80 new and revised figures and tables, coverage of development strategy, 3D printing, in-mold sensors, and practical worksheets, as well as a completely new chapter on the mold commissioning process, part approval, and mold maintenance.

This book presents the most important aspects of microcellular injection molding with applications for science and industry. The book includes: experimental rheology and pressure-volume-temperature (PVT) data for different gas materials at real injection molding conditions, new mathematical models, micrographs of rheological and thermodynamic phenomena, and the morphologies of microcellular foam made by injection molding. Further, the author proposes two stages of processing for microcellular injection molding, along with a methodology of systematic analysis for process optimization. This gives critical guidelines for quality and quantity analyses for processing and equipment design.

This work focuses on the factors critical to successful injection molding, including knowledge of plastic materials and how they interact, the role of mold design, the role of the screw, and the correct use of the controls of an injection molding machine. It seeks to provide operating personnel with a clear understanding of the basics of injection molding, resulting in more efficient processing, reduced cycle times, and better part quality with fewer rejects.

The goal of the book is to assist the designer in the development of parts that are functional, reliable, manufacturable, and aesthetically pleasing. Since injection molding is the most widely used manufacturing process for the production of plastic parts, a full understanding of the integrated design process presented is essential to achieving economic and functional design goals. Features over 425 drawings and photographs. Details rheology and pressure-volume-temperature (PVT) data for different gas materials at real injection molding conditions, new mathematical models, morphologies of microcellular foam made by injection molding. Further, the author proposes two stages of processing for microcellular injection molding, along with a methodology of systematic analysis for process optimization. This gives critical guidelines for quality and quantity analyses for processing and equipment design.

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The use of reactive polymers enables manufacturers to make chemical changes at a late stage in the production process—these in turn cause changes in performance and properties. Material selection and control of the reaction are essential to achieve optimal performance. The second edition of Reactive Polymers Fundamentals and Applications introduces engineers and scientists to the range of reactive polymers available, explains the reactions that take place, and details applications and performance benefits. Basic principles and industrial processes are described for each class of reactive resin (thermost), as well as additives, the curing process, and applications and uses. The initial chapters are devoted to individual resin types (e.g., epoxides, cyanacrylates, etc.); followed by more general chapters on topics such as reactive extrusion and dental applications. Material new to this edition includes the most recent developments, applications and commercial products for each chemical class of thermosts, as well as sections on fabrication methods, reactive biopolymers, recycling of reactive polymers, and case studies. Injection molding of reactive polymers, radiation curing, thermostoing elastomers, and reactive extrusion equipment are all covered as well. Most comprehensive source of information about reactive polymers. Covers basics as well as most recent developments, including reactive biopolymers, recycling of reactive polymers, nanocomposites, and fluoro-silicones. Indispensable guide for engineers and advanced students alike—providing extensive literature and patent review.

"A book about the fundamentals and applications of injection molding"—Provided by publisher.

This book attempts to survey the state of the science and technology of the injection molding process. It represents a comprehensive, balanced mix of practical and theoretical aspects for a wide range of injection molding applications. The authors of the 21 chapters are experts and leaders in their respective areas of specialization in the injection molding field. While it is not possible to cover all aspects of such a dynamic growing field, we hope that the reader will find sufficient information and background to become acquainted, at various levels of depth, with key components of the science and technology of injection molding. With the purchase of this book, you also receive a free personal access code to download the eBook.

My heart sank when I was approached by Dr. Hastings and by Professor Briggs (Senior Editor of Materials Science and Technology and Series Editor of Polymer Science and Technology Series at Chapman & Hall, respectively) to edit a book with the provisional title Handbook of Polypropylene. My reluctance was due to the fact that my former book [1] along with that of Moore [2], issued in the meantime, seemed to cover the information demand on polypropylene and related systems. Encouraged by three colleagues (the new generation of scientists and engineers needs a good reference book with easy access to information, and the development with metalloocene catalysts deserves a new update), I started on this venture. Having some experience with polypropylene systems and being aware of the current literature, it was easy to settle the titles for the book chapters and also to select and approach the most suitable potential contributors. Fortunately, many of my first-choice authors accepted the invitation to contribute. Like all editors of multi-author volumes, I recognize that obtaining contributors follows an S-type curve of asymptotic saturation when the number of willing contributors is plotted as a function of time. The saturation point is, however, never reached and as a consequence, Dear Reader, you will also find some topics of some relevance which are not explicitly treated in this book (but, believe me, I have considered them). Metal injection molding combines the most useful characteristics of powder metallurgy and plastic injection molding to facilitate the production of small, complex-shaped metal components with outstanding mechanical properties. Handbook of Metal Injection Molding, Second Edition provides an authoritative guide to this important technology and its applications. Building upon the success of the first edition, this new edition includes the latest developments in the field and expands upon specific processing technologies. Part one discusses the fundamentals of the metal injection molding process with chapters on topics such as component design, important powder characteristics, compound manufacture, tooling design, molding optimization, debinding, and sintering. Part two provides a detailed review of quality issues, including feedstock characterization, modeling and simulation, and methods to qualify a MIM process, common defects and carbon content control. Special metal injection molding processes are the focus of part three, which provides comprehensive coverage of micro components, two material/two color structures, and porous metal techniques, as well as automation of the MIM process and metal injection molding of large components. Finally, part four explores metal injection molding of particular materials, and has been expanded to include super alloys, carbon steels, precious metals, and aluminum. With its distinguished
This outstanding reference presents an up-to-date account of investigations during the last 10 years in the area of injection and compression molding of polymers. Injection and Compression Molding Fundamentals considers simulation and experimentation of flow dynamics in the cavity and delivery system . . . discusses rheology and viscoelastic modeling clarifies fiber orientation delineates residual stresses and processing-property relationships in molded parts and details computer-aided design and manufacture of the mold. In addition, the book highlights specific features and problems related to the molding of thermoplastics, rubbers, and thermosets and reveals the current status of the science-based technology related to injection and compression molding. The most detailed and authoritative reference of its type, Injection and Compression Molding Fundamentals is an invaluable resource for plastics, mechanical, and chemical engineers; colloid, oil, and color chemists; polymer engineers and scientists; designers and manufacturers; rheologists; and materials scientists. The book will also be of value for use in graduate-level courses in plastics, mechanical, chemical, and polymer engineering, and in short courses and seminars offered by professional societies.

Polypropylene: The Definitive User’s Guide and Databook presents in a single volume a panormaic and up-to-the-minute user’s guide for today’s most important thermoplastic. The book examines every aspect, including technology, engineering, properties, design, processing, applications of the continuing development and use of polypropylene. The unique treatment means that specialists can not only find what they want but for the first time can relate to and understand the needs and requirements of others in the product development chain. The entire work is underpinned by very extensive collections of property data that allow the reader to put the information to real industrial and commercial use. Despite the preeminence and unrivaled versatility of polypropylene as a thermoplastic material to manufacture, relatively few books have been devoted to its study. Polypropylene: The Definitive User’s Guide and Databook not only fills the gap but breaks new ground in doing so. Polypropylene is the most popular thermoplastic in use today, and still one of the fastest growing. Polypropylene: The Definitive User’s Guide and Databook is the complete workbook and reference resource for all who work with the material. Its comprehensive scope uniquely caters to polymer scientists, plastics engineers, processing technologists, product designers, machinery and mold makers, product managers, end users, researchers and students alike.

This introductory book covers the entire spectrum of the plastics technology/engineering, from raw material to finished plastic products. It is intended not just for university college students in plastics technology and other engineering disciplines but also for beginners to the field in general. The interconnectivity between the different relevant knowledge areas of plastics technology, such as materials engineering, processing technology, and product development, is emphasized. A chapter “Plastics and the Environment” is also included, covering a topic (rightly) often of great concern to students and newcomers to the field. Also includes numerous videos, conveniently linked via QR codes, to better demonstrate key processes visually.

Liquid moulding technologies such as RTM and SRIM are increasingly used for manufacturing composites in a variety of industries. Most interest stems from the automotive industry in the continuing search for weight savings, manufacturing economics and vehicle refinement. Liquid Moulding Technologies provides a unique insight into the development and use of such processes with a comprehensive description of the material, process variants, equipment, control strategies and tooling techniques used. Procedures for materials characterisation, preform and mould design are also described and the text is augmented by a number of case studies for prototype and production parts. This book is an invaluable source for both industrial moulders and those working in research and development.

This book provides a clear and direct explanation of injection moulding processes and equipment to empower people in plastics manufacturing to solve problems and avoid costly errors. Packed with useful, fundamental information for learning and optimizing your injection-molding operation, you’ll gain a complete working knowledge of the process.

This outstanding reference presents an up-to-date account of investigations during the last 10 years in the area of injection and compression molding of polymers. Injection and Compression Molding Fundamentals considers simulation and experimentation of flow dynamics in the cavity and delivery system . . . discusses rheology and viscoelastic modeling clarifies fiber orientation delineates residual stresses and processing-property relationships in molded parts and details computer-aided design and manufacture of the mold. In addition, the book highlights specific features and problems related to the molding of thermoplastics, rubbers, and thermosets and reveals the current status of the science-based technology related to injection and compression molding. The most detailed and authoritative reference of its type, Injection and Compression Molding Fundamentals is an invaluable resource for plastics, mechanical, and chemical engineers; colloid, oil, and color chemists; polymer engineers and scientists; designers and manufacturers; rheologists; and materials scientists. The book will also be of value for use in graduate-level courses in plastics, mechanical, chemical, and polymer engineering, and in short courses and seminars offered by professional societies.

Many variations of injection molding have been developed and one of the rapidly expanding fields is multi-material injection molding. This review looks at the many techniques being used, from the terminology to case studies. The three primary types of multi-material injection molding examined are multi-component, multi-shot and over-molding. The basic types of multi-material injection molding, the issues surrounding combining different types of polymers and examples of practical uses of this technology are described.

This book covers the most recent and important developments in advanced injection molding technologies, such as intelligent process control; technology innovations and computer simulation for emerging special injection molding processes like microinjection molding, microcellular injection molding, water-assisted foaming, water-assisted injection molding, and variable mold temperature technologies; conductive polymer foams and composites; injection molding of optical products; and an automated mold design navigation system with integrated knowledge management capability. It is intended to be used as a textbook for both introductory and advanced injection molding courses, as a reference for engineers and management wanting to keep abreast of the latest, of technological developments and applications, and in libraries to serve interested readers from both academic and industrial communities as well as the general public. With chapters written by an international team of experts, this book provides a broad and insightful coverage, complementary to other books on injection molding.

Experts in rheology and polymer processing present up-to-date, fundamental and applied information on the rheological properties of polymers, in particular those relevant to processing, contributing to the physical understanding and the mathematical modelling of polymer processing sequences. Basic concepts of non-Newtonian fluid mechanics, micro-rheological modelling and constitutive modelling are reviewed, and rheological measurements are described. Topics with practical relevance are debated, such as linear viscoelasticity, converging and diverging flows, and the role of multiphase systems. Approximation methods are discussed for the computer modelling of polymer melt flow. Subsequently, polymer processing technologies are studied from both simulation and engineering perspectives. Mixing; crystallization and reactive processing are also included. An integrated and complete view of polymer processing and rheology, important to institutions and individuals engaged in the characterisation, testing, compounding, modification and processing of polymeric materials. Can also support academic polymer processing engineering programs.

This book details the factors involved in the injection molding process, from material properties and selection to troubleshooting faults, and includes the equipment types currently in use and machine settings for different types of plastics. Material flow is a critical parameter in moulding and there are sections covering rheology and viscosity. High temperature is also discussed as it can lead to poor quality mouldings due to material degradation. The text is supported by 74 tables, many of which list key properties and processing parameters, and 233 figures; there are also many photographs of machinery and mouldings to illustrate key points. Troubleshooting flow charts are also included to indicate what should be changed to resolve common problems. Injection moulding in the Western World is becoming increasingly competitive as the manufacturing base for many plastic materials has moved to the East. Thus, Western manufacturers have moved into more technically
difficult process some machinations to provide enhanced added value and maintain market share. Technology is becoming more critical, together with innovation and quality control. There is a chapter on advanced processing in injection moulding covering multiamaterial and assisted moulding technologies. This guide will help develop good technical skills and appropriate processing techniques for the range of plastics and products in the marketplace. Every injection moulder will find useful information in this text, in addition, this book will be of use to experts looking to fill gaps in their knowledge base as well as those new to the industry. ARBURG has been manufacturing injection moulding machines since 1954 and is one of the major global players. The company prides itself on the support offered to clients, which is exemplified in its training courses. This book is based on some of the training material and hence is based on years of experience.

This book covers fundamental principles and numerical methods relevant to the modeling of the injection molding process. As injection molding processing is related to rheology, mechanical and chemical engineering, polymer science and computational methods, and is a rapidly growing field, the book provides a multidisciplinary and comprehensive introduction to the subjects required for an understanding of the complex process. It addresses the up-to-date status of fundamental understanding and simulation technologies, without losing sight of still useful classical approaches. The main chapters of the book are devoted to the currently active fields of flow-induced crystallization and orientation evolution of fiber suspensions, respectively, followed by detailed discussion of their effects on mechanical property, shrinkage and warpage of injection-molded products. The level of the proposed book will be suitable for interested scientists, R&D engineers, application engineers, and graduate students in engineering.

Eliminate the guesswork from critical mold aspects such as gate location, shape and size. And discover how to establish proper venting so you can prepare ideal mold venting - before the first shot is made. Both newcomers and experienced practitioners in the area of thermoplastics will benefit from its concise explanations of the methods and equipment used, the components necessary for smart mold design, a checklist for designing a mold, and the variety of finishes and textures available and how they are applied.

Metal injection molding combines the most useful characteristics of powder metallurgy and plastic injection molding to facilitate the production of small, complex-shaped metal components with outstanding mechanical properties. Handbook of Metal Injection Molding, Second Edition provides an authoritative guide to this important technology and its applications. Building upon the success of the first edition, this new edition includes the latest developments in the field and expands upon specific processing technologies. Part one discusses the fundamentals of the metal injection molding process with chapters on topics such as component design, important powder characteristics, compound manufacture, tooling design, molding optimization, debinding, and sintering. Part two provides a detailed review of quality issues, including feedstock characterization, modeling and simulation, methods to qualify a MIM process, common defects and carbon content control. Special metal injection molding processes are the focus of part three, which provides comprehensive coverage of micro components, two material/two color structures, and porous metal techniques. Finally, part four explores metal injection molding of particular materials, and has been expanded to include super alloys and precious metals. With its distinguished editor and expert team of international contributors, the Handbook of Metal Injection Molding is an essential guide for all those involved in the high-volume manufacture of small precision parts, across a wide range of high-tech industries such as microelectronics, biomedical and aerospace engineering. Provides an authoritative guide to metal injection molding and its applications Discusses the fundamentals of the metal injection molding processes and covers topics such as component design, important powder characteristics, compound manufacture, tooling design, molding optimization, debinding and sintering Comprehensively examines quality issues, such as feedstock characterization, modeling and simulation, common defects and carbon content control

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