HANSER

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Injection Molding Machines

A User's Guide

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Preface

Foreword

The list of books-in-print on plastics processing and injection molding in particular is long. Most of them are primarily aimed at specialists who have a scientific background, but are often unconcerned with the practical aspects of running a molding shop. Hence the need for an expert with that rare combination of both qualities.

This remains the case even after all the years since the publication of the first edition of this book. Although in the meantime no great changes have taken place in the basic technology, there has been considerable progress in certain process applications that make special demands on machinery and their control functions in particular. The most interesting such instances have been selected and included in this fourth edition.

After completing a degree at the Institute for Plastics Processing in Aachen (IKV), Germany, the author has spent several decades designing injection molding machines, managing molding plants and training their operators. The present book could only have been written by someone with such extensive experience. It joins the small number of standard reference books for the industry which have a solid foundation in both theory and practice. It is exhaustive yet easily understood and thus a "Guide" in the true sense.

The author provides an elegant, succinct description of the injection molding process. By concentrating on a few key parameters, such as pressure, temperature, their rates, and their influence on the properties of moldings, he gives his reader a clear insight into this technology. The subsequent comprehensive presentation of technical data relating to individual machine components and performance is unique and will be especially appreciated by machine manufacturers.

It goes without saying that the entire book represents the state of the art.

This book is a valuable tool for both trainees and students pursuing degrees at technical institutes, as well as for specialists involved in designing and processing. It will almost certainly become required reading for everyone involved in the vast field of injection molding.

The interested reader will certainly not want to put it down before reaching the last page.

Aachen, March 2007 Prof. Dr.-Ing. G. Menges

Preface to the Fourth Edition

"*The future of plastics and that of injection molding as well – has just begun*"

Polymers and plastic parts are at the heart of current industrial developments. Worldwide per capita consumption is expected to just about double in the next 15 years. The lion's share of this will fall in industrially developed countries. This will be the case, even if growth there will amount to only approx. 30% and, in terms of percentage, will be clearly exceeded in the rest of the world. Growth in industrialized countries will add to an already high level of use.

Machine manufacturers and injection molders, as well, will have to realign themselves strategically as globalization quickens. Taking proven technology as their basis, they will have to create and provide their customers, the injection molding processors, with global marketing concepts and comprehensive customer service.

Production methods keep getting more complex and flexible. Quality and design demand ever more accurate injection molding machines capable of handling even the most special injection molding jobs. This implies an increasing number of machine versions. The number of system solutions for machines and peripheral equipment keeps on growing. Support for the injection molder is of utmost importance. But this is not the road to progress.

These might then appear to be difficult times. On the other hand, such situations set the stage for new impulses, new ideas and entrepreneurship.

"*Current developments are often inspired by the polymer.*"

"*Success is achieved by using machine technology intelligently*"

Looking over company images in the market place, we see clearly that the ones that stand out are also innovators when it comes to machine and mold development, as well as to the mechanical know-how required for special techniques. The trump card for these companies is the strength of their developmental and application-technical departments. Without them, innovation comes to naught.

"*Today's most convincing showroom is a smooth-running pilot plant*"

The fourth edition of "Injection Molding Machines" is now going to print. This edition has been clearly expanded in some areas to provide the reader with more information. At the same time, it is no secret that there is often a discrepancy between the machines offered and the possibilities for using them. Nor is there any attempt to cover up weaknesses. For another thing, processes are described that have been tested, but have not found application for reasons of suitability. This makes for some interesting hindsight, which is significant, since many an "invention" has been made since the start of our retrospective in 1960 that we today recognize as having been a simple recapitulation. The most famous of these is the invention of the screw in 1943: its patent application was turned down with reference to previous patents from 1905. In machine technology, and drive technology in particular, comparable situations have also arisen regarding direct electrical drives that were in use prior to 1956.

Such repetitions go to show that print records of the state of technological development have their justification. A visit to the library is worth one's time. That is one way to avoid repetitions that usually cost a pretty penny.

Virtually all machine manufacturers and their writers regularly list all the positive features of a given machine technology when presenting it. Prospectuses and articles tend to gloss over the disadvantages. But advantages are often hard to conceive of without some measure of comparison. This book attempts to provide that measure of comparison whenever one may be available. To be sure, it is not in the nature of the undertaking to be able to offer absolute standards of comparison. You, dear reader, are invited to include your own experience for evaluation purposes, since actual conditions differ from one application to another. As the author, I am curious to know your reactions, since the book does not exist that cannot be improved by reader input in later editions.

Friedrich Johannaber Lohmar, Germany, June 2007

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Special thanks are due to my wife, Monica, for her patience with me during the completion of this work.

"Injection molding is a creative and exciting technology"