

Precision Injection Molding

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Preface

Without a doubt, the unprecedented advances in consumer electronics and information technology over the last three decades were greatly facilitated by innovative plastics technologies that provided the low cost and performance needed to make the new products affordable and appealing to the average consumer. The watershed event that ushered the new era in the plastics industry was the introduction of the Compact Disc (CD) in 1982 following a joint development by Sony and Philips Corporations. This product revolutionized the music industry but in order for it to be successful in the marketplace, it had to be inexpensive and rugged. This need led to a complete overhaul and reinvention of the traditional injection molding process—the manufacturing technology of choice for this demanding new product. The injection molding of Compact Discs and many components of the CD system required new ways of looking at machine design, mold design, process control, material selection, product specification, and manufacturing technology. The conventional molding process, usually associated with “low-tech” applications, had to be adapted to the demanding tolerances and specifications of the microelectronics industry. Since then many consumer and commercial electronic devices and components (e.g., cell phones, digital cameras, mass storage devices, high precision biomedical components, microfluidic systems, and various optical components among others) have relied on high-precision molding operations for cost-effective manufacturing.

In this volume we bring together leading experts to address key technical issues that are directly associated with precision injection molding. The treatment covers many aspects of the technology, including materials, process, software, and hardware. It is not, however, meant to be comprehensive or exhaustive, but rather it is intended to present the status of current understanding for a broad range of issues, both fundamental and applied, that are important in the molding of high precision components. We also make the case that precision injection molding is a distinct subclass of the conventional and heavily studied injection molding process, with well-defined design, optimization and processability criteria.

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