HANSER

Hot Runner Technology

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ISBN 3-446-40584-4

Preface

The development of hot runner technology dates back to the early 1930s in the US. These efforts to establish a new technology for the processing of thermoplastics served first of all and exclusively the following economical goals:

- For the molding process to run largely automatically,
- Avoiding post-processing operations by replacing conventional injection molds with sprues with sprueless molding
- Making the molding process more economical and – most importantly – to save money.

Quickly, the advantages of the hot runner technology were discovered. A rapid development process started and has reached a high level of technical know-how today. As with many technical inventions breaking new ground, it was a long and thorny way. For a long time, at least some of the hot runner suppliers expected the resin suppliers to make sure to offer the appropriate plastic grade for their specific hot runner system. The unfortunate results were hot runner systems causing thermal degradation of the melt and thus giving rise to major discussions and criticism.

It therefore did not come as a surprise that the application engineers on the resin supplier's side began to develop their own hot runner systems, not the least for marketing purposes. These efforts resulted in the clamping nozzle (BASF), the insulated runner (DuPont), and the indirectly heated thermally conductive torpedo (Hoechst), which provided important impulses to the development and improvement of the hot runner technology.

Today it is common practice for the designer, mold maker, hot runner supplier, molder, and the raw material producer (who knows his materials best) to join forces and exchange their experience in order to avoid or at least to minimize risks. It would be the wrong to place the burden of responsibility on only one of the players. Rather, the development of new technologies and applications is a matter of partnership and mutual exchange.

The fundamental research conducted at universities has also made essential contributions to today's state-of-the-art of the technology.

This book deliberately will not focus on the "state-of-the-art" in hot runner technology. When studying particularly older technical literature it is amazing to realize how many of the most progressive ideas and designs were already exploited in the past, but were forgotten or not appreciated for a long time. On the other hand, some erroneous trends lead to failures because of lack of experience. The author discusses these topics to emphasize the old rule "Learning by Experience". Gathering experience means first of all analyzing failures to draw relevant conclusions. Therefore, the reader should not be surprised to find "old fashioned" or out-dated designs covered in this book. This is just another way to preserve and convey experience, as much as possible. Without hands-on experience it is hard to come up with new developments and inventions.

Other topics related to hot runner technology, such as thermal aspects, plastic-specific behavior, corrosion, notch effect, etc., are also described and critically acknowledged. For other specific topics, such as numerical balancing of hot runner manifold blocks, the reader is referred to special and comprehensive literature.

The comments, reports, and theoretical considerations stated in this book may not always be congruent with those of other experts due to the large number of different applications. The author therefore encourages the readers to share their experience with him to make sure that future editions of this book will reflect the current state of knowledge.

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