Book Review

Runner and Gating Design Handbook – Tools for Successful Injection Molding

By John P. Beaumont

In the opinion of many Plastics Experts, the design of the runner and gates is one of the most important yet often neglected and least understood features in successful injection molding of plastic parts. Traditionally, both part and tooling designers have avoided addressing the issue of sizing and properly balancing the runners and mold makers have followed their own intuition and relied on the past experience. Today, more than ever before, molders must recognize the fact that the only way to achieve the quality goals such as Six Sigma is to develop a clear understanding of the molding principles and mainly the melt delivery system and its effect on molded parts.

The recently published *Runner and Gating Design Handbook: Tools for Successful Injection Molding by John P. Beaumont* is an outstanding contribution to the plastics industry and provides a valuable resource for proper design and troubleshooting techniques for both hot and cold runner systems, and methods to successfully solve engineering and processing issues. This first-of its-kind processing handbook is intended to provide the reader a better understanding of the rheological properties of polymer melt and melt delivery system consisting of nozzle, sprue, runner, and gate. Also explained in a clear and concise manner, the shear induced melt

variations, key differences between hot and cold runner molds, gating locations and molding problems related to gates and runners. The book starts with brief introduction and orientation of basic runner types and their influence on gate design and gating location. The author has done an excellent job of simplifying somewhat difficult to understand subject of rheological characteristics of plastics in the subsequent chapter. In order to assist the reader in establishing an optimum gating and molding strategy, an in-depth analysis of the development of the melt conditions within the cavity and its relation to molded parts is carried out. Chapter four discusses important considerations in the positioning of gates. The effect of gate placement is explained in detail along with examples and illustrations. Of particular interest is the effect of gate placement on parts made with integral hinges such as pill boxes and containers. The next chapter deals with the core subject of melt delivery system. The topics covered are: runner design fundamentals, melt flow through nozzle, sprue, runner and gate, pressure drop through melt delivery system, effective use of mold filling analysis, formula for sizing runners and runner layouts. How often have you seen an expensive mold designed and built by an experienced tool maker with geometrically balanced runners and precisely machined gates only to find that the parts are significantly imbalanced? Two full chapters are devoted for the purpose of explaining the sources of mold filling imbalances and how to manage shear-induced melt variations for successful molding. Here, the reader benefits from author's unparallel knowledge of melt rotation technology, his patented Melt Flipper® technology and its successful application in providing means for balanced filling in molds. The application of melt rotation technology in hot runner molds and melt rotation for controlling two stage injection processes is also discussed.

Chapter eight covers cold runner molds including runner shapes, sizes, runner ejection, and various gate designs. According to recent statistics, the use of hot runners in molds has increased to approximately 30 percent of all new molds. Chapters 9 through 13 provide a close look at the design of hot runner systems and their unique capabilities and challenges. Advantages, disadvantages and limitations of hot runner molds are discussed along with the mechanics and operation of hot runners. The process of designing and selecting a runner system is summarized in chapter 14. Colorfully illustrated last chapter on trouble-shooting with contribution from industry experts such as John Bozzelli and Brad Johnson compliments all the hard work and effort put in by the author throughout the book. To increase the versatility, author may want to consider adding an appendix section with the list of equipment manufacturers, addresses and web sites along with some useful charts and tables for ready reference in the next edition of the book.

Overall, *Runner and Gating Design Handbook* is an excellent technical reference manual, written in easy-to-understand and easy-to-read format, with numerous colorful illustrations, photographs and charts. Hanser Gardner Publications has done a salient job of producing this book, allowing author to clearly demonstrate his point with the use of full color 3-D graphics and photographs throughout the book.

The book is a must for all designers, tool makers, and molders and will prove extremely valuable to anyone wishing to further enhance the plastics engineering knowledge. Author John P. Beaumont is Professor and Department Chair at the Plastics Engineering Technology Program at Penn State Erie and President of Beaumont Technologies, Inc.

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