
Introduction

The expanding range of materials and manufacturing processes open to the product design engineer has made material and process selection more complex and demanding.

At the same time, important changes in process technology have created valuable new options for product designers. This is particularly true in the case of die casting production. Fully understanding these options is important for all designers and producers of functional and decorative products, if improved cost and performance goals are to be achieved.

Capitalizing on High-Tech Die Casting

This manual presents a logical structure in which to pursue product improvement and cost-reduction programs, applicable to both new product concepts and the upgrading of existing component production. The principles and sequence outlined are generic to any strategic approach to product development and engineering. They are integral to today's emphasis on "simultaneous engineering," or "design for manufacturability."

This sequence begins with the examination of a product's working environment, where significant advantages for alternative processing options can be identified. Eight topics essential to product design and development are systematically addressed, concluding with a discussion of prototyping.

At each stage of product development, opportunities for the designer to capitalize on the capabilities of high-technology die casting are presented. Subsequent sections supplement the design discussion with updated information on all of the most widely used die casting alloys and the die casting production processes.

A final section presents detailed case studies of components die cast in aluminum, magnesium, zinc and ZA alloys. They illustrate how the principles developed in this manual have been employed in real-world applications to reduce product cost and improve performance. Some case examples show how the restrictions normally imposed by published performance data have been successfully exceeded. Many clearly demonstrate the contribution the die caster can make in optimizing the final product design, especially when brought into the design process early.

How to Use This Sourcebook

What the designer should gain from a review of this manual is a

shorter route to development of the optimum end product in any process. A full reading and use as a continuing reference will bring a working understanding of current die casting technology and allow the designer to enhance his or her range of options for final product design decision-making.

The Comprehensive Table of Contents on the pages immediately preceding presents a complete overview of the manual's organization and content. Its detail will simplify later reference, with illustrations and tables listed separately. An extensive index is provided. A glossary of die casting terms used by designers, materials engineers and die casters provides sufficient information to enable the designer to communicate effectively with die casting and materials personnel. The Appendix contains additional important reference material for die casting product design, assembled together for the first time.

The range of information presented on the utilization of advanced die casting and related processes in all of the most widely used alloys—focusing on the concerns of the product design engineer—is here available in a single, easily accessible volume.

The materials evaluation table in Chapter 3 contains the most comprehensive materials properties data on die casting alloys available in a single chart, listing comparative as-cast mechanical and physical properties for aluminum, magnesium, zinc and ZA die casting alloys. The die casting alloy cross-reference charts in this chapter have been expanded and updated.

In addition to consulting *NADCA Product Specification Standards for Die Castings*, 1997 edition, published by the North American Die Casting Association, and other relevant publications listed in the bibliography (Chapter 7), design engineers can benefit from attending one of the regional North American "Product Design for Die Casting" seminars conducted by the DDC.

These intensive OEM presentations on optimizing component designs for die casting production provide a valuable personal opportunity to build design-for-manufacturing knowledge, expand your design options and avoid design pitfalls that can lead to higher-cost components.

For upcoming seminar dates and locations, contact a DDC custom die caster, the DDC Website (www.diecasting.org/ddc), or the DDC directly (see p. ii).

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