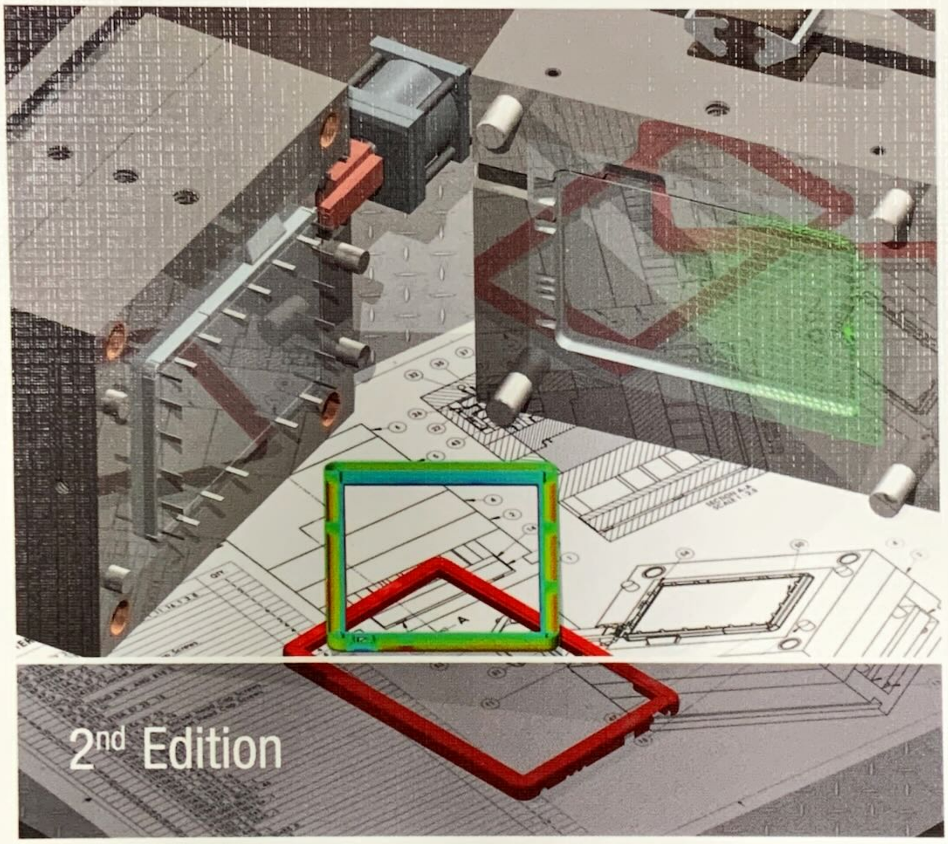
David O. Kazmer

Injection Mold Design Engineering



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Contents

1 Introduction

Injection molding is a common method for mass production and is often preferred over other processes, given its capability to economically make complex parts to tight tolerances. Before any parts can be molded, however, a suitable injection mold must be designed, manufactured, and commissioned.

The mold design directly determines the molded part quality and molding productivity. The injection mold is itself a complex system comprised of multiple components that are subjected to many cycles of temperature and stress. There are often trade-offs in mold design, with lower-cost molds sometimes resulting in lower product quality or inefficient molding processes. Engineers should strive to design injection molds that are "fit for purpose", which means that the mold should produce parts of acceptable quality with minimal life cycle cost while taking a minimum amount of time, money, and risk to develop.

This book is directed to assist novice and expert designers of both products and molds. In this chapter, an overview of the injection molding process and various types of molds is provided so that the mold design engineer can understand the basic operation of injection molds. Next, the layout and components in three of the more common mold designs are presented. The suggested methodology for mold engineering design is then presented, which provides the structure for the remainder of this book.

1.1 Overview of the Injection Molding Process

Injection molding is sometimes referred to as a "net shape" manufacturing process because the molded parts emerge from the molding process in their final form with no or minimal post-processing required to further shape the product. An operating injection molding machine is depicted in Fig. 1.1. The mold is inserted and clamped between a stationary and moving platen. The mold typically is con-