Introduction to Injection Molding Part Design for Dummies

We live in the Age of Plastic. Consumer items, medical devices, and pretty much all other types of products you can think of contain plastics. Plastics form structural components or provide a personal touch to consumer goods, making product feel smooth and light in your hand.

That’s all well and good. The problem is that I can take forever to get a plastic part made. First, you have to know how a plastic part is supposed to be designed; next, you have to find a company that can make the parts; then you have to wait until that company has time in its manufacturing schedule to start your job. After you’ve waited a few months, you may discover that you didn’t know as much about designing plastic parts as you thought you did. Worse, sometimes the people who made your parts let you know what was wrong with your design after the mold has been cut. (If you’re lucky, the people who make the part also cut the mold, so there’s a small chance that fixing the mold will be a priority – but either way, you’re likely paying a price for it.)

This scenario is a scary one, isn’t it? It’s about enough to make you want to find a woodcarver who can whittle your parts for you.

About this Book

This is a sampling of the book “Injection Molding Part Design For Dummies, Protomold Special Edition”, which provides insight into the Protomold process that makes it possible for you to get plastic parts made not in weeks but in as little as one day. In this book, I give you tips on how to design your parts to make them better and easier to manufacture. I also tell you about the design options that allow even complex parts to be made quickly. Further if all that material isn’t enough, I provide an overview of some of the materials available and show how you can make your parts look like a million bucks without spending that much or waiting forever.

Chapter 1 Wrapping your Head Around Injection Molded Parts

No matter where you turn, you see things made out of plastic, and most of those things are composed of plastic parts. Clearly people have been making plastic parts for a long time, gathering a lot of expertise along the way, and now manufacturers, can make those parts quickly and well. If you’re reading this book, you’re probably thinking about getting some plastic parts made, and you want to know how you, too, can do so quickly and well.

Most plastic parts are created in a process called injection molding, which involved injecting molten plastic in to an open space in a device called a mold. The name injection molding isn’t going to win any originality awards, but the process itself is creative because it helps people turn incredible ideas into real
Knowing how injection molding works makes it easier to design parts for the process. This chapter gives you that understanding.

**Getting Grounded in Injection Molding**

For all of the big-brained science involved in injection molding, the process can be broken down into a few basic steps:

1. Melt the plastic pellets.
2. Inject the melted plastic into the mold.
3. Let the molded part cool.
4. Eject the finished part out of the mold.

This section gives you a broad overview of these steps. For more detail, see “Breaking Down the Part-Making Process” later in this chapter – and the rest of this book.

**Making the part**

The injection molding process starts with feeding pellets of plastic resin into the hopper of an injection molding machine, which melts those pellets through a combination of heat and pressure. The heat comes from electrical bands on the outside of the barrel. The pressure comes from a variable pitch screw in the barrel.

This screw drives the pellets from one end of the barrel toward the mold. The ram, similar to the hydraulic cylinders you might see on an earth-moving machine, builds the pressure needed to force the plastic into the mold. When the molten plastic resin is soft enough, the ram pushes the screw forward, driving the plastic through a small nozzle into a cavity in the mold, where the part takes shape.

After the mold is filled, it’s left to cool.

Finally, when the plastic has cooled long enough for the part to harden, the mold is opened, and the part is ejected.

**Keeping Design in Mind**

Most of the work of designing an injection mold focuses on what happens between two points:

- When ram moves forward
- When the mold is opened to produce the part

Most of this book focuses on the how you can make sure that what comes out of the mod is what you need it to be. Keeping the mold in mind while you design a part helps you find ways to create high-quality parts cost-effectively.
Tip: If a part is designed in a way that allows it to be high quality in a prototype tool in low quantities, it’s also going to be high quality when you want to process a million of them. Also, understanding how a part will be used can save a dramatic amount of time by allowing you to look at various approaches.

In the following chapters I’ll be covering the following topics:

- Chapter 2: Pinning Down Your Job Needs
- Chapter 3: A Beginner’s Guide to the Perfect Part
- Chapter 4: Going Beyond a Straight-Pull Mold
- Chapter 5: Adding the Finishing Touches
- Chapter 6: Ten Ways to Give Your Parts the Protomold Edge

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Your free copy of Injection Molding Part Design for Dummies will be mailed to you within 2-4 weeks.