

The *Art* of Mold Cutting

By Suzanne Wade

Tips from the Pros

Mold cutting sounds simple enough: Using a sharp knife and a simple tool, such as a can opener or a pair of vise grips, the mold maker separates a rubber mold into two halves, allowing the model and subsequent waxes to be removed.

But like so many seemingly simple tasks, there are intricacies to cutting a successful mold that go well beyond cutting the block of rubber into two parts. In addition to ensuring that delicate waxes can be removed without distortion, the mold cutter must cut the mold in such a way that the two halves will match up perfectly time after time, and the injected wax will fill well and require minimal cleanup.

In addition, there is no one right way to cut a mold. The only true measure of success is whether the mold produces consistent waxes that can be removed without distortion, and with any given mold there are multiple ways of achieving that goal. A technique that works for one mold cutter may be awkward or difficult for another, and an approach that works for one design may produce less desirable results on another.

“I read the basics when I first started on how to make a mold, and it was basically put in the model, cook the rubber, take a blade and cut down the side, and take the model out,” says Stuart Adelman of Artelle Designs in Plymouth, Minnesota, who has been cutting molds for nearly 35 years. “But there are lots of nuances that make it an art, and most of them are learned through trial and error.”

If it sounds like a tall order, it is, and even veteran mold cutters may have to cut several molds for a difficult design before finding one that works perfectly. Knowing the tools and tricks used by experienced mold makers can reduce the number of failed attempts, however, and make it more likely the mold will give up the wax without a struggle.



Tools

To properly cut a mold, you need the right tools for the job. The only tools that are absolutely required for mold cutting are a cutting instrument and something to hold the rubber as it is peeled back. These can vary from scalpels and can openers to curved cutting blades and specially designed mold holding systems.

Choosing a tool is largely a matter of individual preference rather than a question of right versus wrong.



The key consideration in the cutting instrument is that it must be sharp—very, very sharp. “When you use sharper blades, the molds fit together better,” says Dominic Annetta of DoPaso in

Albuquerque, New Mexico. “If you look at the cut of a dull blade, it’s very coarse. You want a smooth surface where the two layers of rubber come in contact. With a dull blade, there’s a kind of fuzzy layer. It’s like cutting bread with a dull knife: You get crumbs on the surface.”

To open the mold, cutters have traditionally used a “church key” style can opener—the kind with a triangular-shaped sharp end—mounted to the bench. This tool is still used successfully by many cutters today. They also have the option of using vise-style clamps that mount on the side of the bench. “This cutting aid especially comes in handy when cutting a high volume of molds at a time, because there is less hand fatigue,” says mold cutter Steve Straley, who works in the casting product development department at Rio Grande.

Adelman uses mini vise grips. “I like the mini vise grips because they don’t let go,” he says. “I don’t like it to slip, because that’s when you cut yourself.”

Cuts from sharp cutting tools are a perennial hazard for mold cutters, and one that cannot be completely eliminated. But ways to reduce the frequency include using sharp blades, which are replaced as soon as they become even slightly dull; wearing a puncture-resistant safety glove on the hand holding the mold; and keeping fingers out of the path of the blade. “I always plan for the knife to slip or the blade to break and make sure nothing is in the way,” says Adelman. “I wear a very heavy denim apron so if the knife falls or slips, it doesn’t do much damage.”

Finally, consider using magnification when cutting molds, recommends Straley. “One thing that can take your mold cutting to the next level is using magnification, such as Optivisors or Obrira binoculars,” he says. “Under magnification you can really be accurate in creating the optimal parting line [the line cut around the model to separate the two halves of the mold].”

Materials

The primary considerations when deciding on a mold material don’t usually include the ease in cutting it. The complexity of the mold, the detail involved, and whether the model can stand up to the heat of vulcanizing are all factors that will determine whether mold makers choose materials with greater or lesser tear strength and greater or lesser hardness, and steer them toward heat or room-temperature vulcanizing options.



But there are occasions when the demands of cutting the mold will help determine the type of mold material used. For example, complex molds that need spiral-cut cores (see “Cores,” page 41) require high tear strength and lend themselves to natural rubbers, which generally offer greater strength than silicone rubbers. (However, silicone rubbers have improved greatly in this area over the years, and in some cases come very close to the tear strength of natural rubber.)

For very complex molds that need highly precise parting lines, the mold maker may choose a transparent RTV (room-temperature vulcanizing) material, which allows him to see the location of the model in the mold as he cuts. Although this material would seem like the obvious choice for all molds, there are factors to consider besides visibility for ease of cutting: they include tear strength, mold life, and cost.

Even when the material is chosen for considerations other than cutting, the mold cutter needs to be aware of the material’s cutting qualities. “Natural rubbers are tougher and stronger, and cutting

them requires a great deal of force,” says Michael Knight of Castaldo in Franklin, Massachusetts. “It’s easier with a wet, soapy knife, but it’s still tough and hard to cut.”

By comparison, silicone vulcanizing rubbers “cut like butter,” says Knight. “The mold maker has to learn to take it easy. If you don’t, the knife will keep sliding through and the blood will flow.” In addition, the knife doesn’t require the lubrication of soapy water, because the natural silicone oil in the rubber provides ample lubrication.

Keep in mind, as well, that properly preparing the mold can make a difference when it comes time to cut it. “When you heat-cure a mold, the big thing is not to over cook it, and make sure the temperature is right,” says Adelman. “That makes the cutting properties fairly consistent. I want consistency so I can do everything the same way every time, so if there is a problem I can easily figure out what the problem is.”

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