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Making a Mold Using Alginate *Why Alginate?*

By David E. Parvin, A.L.I.

About 20 years ago, life-casters on the cutting edge began experimenting with alginate for directly molding the human form. Up until that time, most had used plaster. Plaster has at least two disadvantages. Esthetically, its ability of capturing detail is minimal. But more importantly, applied directly to skin, plaster can be hazardous to the subject's health. Alginate, whose principal ingredient alginic acid is extracted from seaweed, has long been used by dentists to make impressions of teeth (see the following article for more information on the history of alginate). Able to capture the finest detail while being harmless to both the castor and the castee, alginate has become the standard mold material for life casting. But taxidermists may find alginate a very useful substance for mold making as well.

Compared to other flexible mold materials such as the various types of rubber compounds, alginate has definite advantages. One is cost. For example, most quality silicone rubbers cost around \$10 per pound. But a pound of alginate mixed with water is 1/3 to 1/4 that. Secondly, alginate is completely nontoxic to skin contact and has no harmful fumes; it's even odorless. It's also a cinch to mix. While silicone rubbers are not temperamental, most urethanes are. Critical care must be taken in measuring and in thoroughly mixing to prevent soft spots that never cure. Certainly there are optimum alginate/water ratios for particular applications, but it mixes easily and as long as it's wet, it will set-up. Because it's water soluble, clean up is a piece of cake. Alginate doesn't stick to anything though it will tangle in hair, feathers, fuzzy cloth, etc. unless coated with a release (more about this later). Perhaps its greatest advantage is that its setting time varies from as little as a minute to 8 or 9 minutes allowing for something to be very quickly molded. O.K., so what's the bad news? The only negative is that it's fragile and generally an alginate mold can only be used once or at best only a few times and will quickly dry out and cannot be stored for future use.

MAKING A MOLD

Anyone who has ever made a rubber mold will have no difficulty in making an alginate mold. But even someone who have never made a mold should have no difficulty if he/she simply follows the steps below: Make sure that you have everything that you will need such as some alginate. Alginates differ in consistencies, setting times, strength, etc. depending on the brand. My personal favorites are Moldgel Regular Set and Slow Set made by Artmolds, Inc. (I explain why later in this article). The amount needed is dependent, of course, on the size of the mold, but a couple of pounds will be sufficient for most small molds. Next you will need something for an outer or "mother" mold such as a Tupperware container or a milk carton. A scale accurate to a half-ounce or so and several small plastic containers will suffice for measuring and mixing. Some sort of a mixer such as one used for paint and attached to an electric drill; or even a whisk will do for small batches using up to a couple of pounds of water. Parts of thin plastic pill trays, while not essential, will make two halves of a mold fit together more precisely. Any number of things could be used for the final casting of the positive such as plaster, hydrocal, urethane resin, etc. The last and most important thing needed is something to cast. For this article we'll use a fish.

I estimated how much mixed alginate it would take to fill the plastic food

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Assemble everything you will need before starting the project.

storage container (hereafter known as the "mother mold") to a depth of about 1 inch by putting the empty mother mold on the scale and weighing how much water it took to get the 1 inch. (Note: mixing the alginate into the water hardly increases the volume). In this case, 2 pounds of water was just about right. I poured 2 pounds of cold tap water into one of the mixing containers. (Another note: the gelling time of alginate is inversely proportional to the water temperature. Since I wasn't concerned about comfort for the dead fish, cold water provided several more minutes working time than warm or hot water would have). The consistency you want for the mixed alginate is about that of thick pancake batter. While water/alginate ratios vary with different brands, 5 ounces of alginate per pound of water is probably going to be pretty close in most cases. I weighed 10 ounces of Moldgel Regular Set Alginate into another container.

I dumped the alginate into the water and mixed with the electric mixer for about one minute. Remember to always mix powders to liquids and not the other way round or all you will get is gooey lumps. I then poured the mixed alginate into the mother mold and leveled it with my fingers. I placed the fish on its side and gently pushed it half way into the alginate. Since the fish and the alginate mixture have about the same specific gravity, the fish showed no tendency to sink or float up. I took several pieces of the plastic pill tray and pushed them into the alginate. These will act as keys to ensure the mold halves will fit align precisely when casting. These did tend to float up so I held them in place for just a couple of minutes until the alginate gelled. I then pulled out the plastic pieces.

By just looking, I estimated that it would take about twice as much mixed alginate to fill the mother mold to the top as I had mixed for the first layer. I measured 4 pounds of water and 20 ounces of alginate, mixed them, and poured them into the mother mold filling it almost to the brim. I took the lid to the mother mold and, turning it upside down, pressed it in the mother mold until it touched the alginate. This last step

probably wasn't necessary but it did make a sixth side to the mother mold.

After about three minutes the alginate had gelled. I waited several more minutes to allow the top layer to gain additional strength and then took the mold apart. The top just lifted off. It can be a problem to get the alginate out of the mother mold because it is held in by suction. The best solution is to drill a small hole in the bottom of the mother mold and blow in compressed air. Once I had the "brick" of alginate in my hand, I gently pulled the top from the bottom; they separated easily and cleanly. I removed the fish and rinsed out the mold with water.

CASTING THE FISH

Now All I had to do was fit the two parts of the inner mold together, slip them into the outer mold and I would have a void the size and shape of the fish with excellent surface detail that's just waiting to be filled with some permanent material. There is only one problem - there is no way into the void since the fish was completely surrounded by the alginate solution. In order to provide an inlet, I took a 3/8-inch drill bit and made a hole into the topside of the inner mold at the highest point of the fish void. The size of this hole is determined by the viscosity of the casting material. Since I was planning to use a urethane resin which pours as easily as water, the hole could be quite small. The location of the hole is at the highest point to prevent trapping air, causing voids in the final casting. For some irregular shapes, it might be necessary to drill one or more small holes to vent air which otherwise could be trapped. I then cut a larger hole in the lid so that I would be able to pour the resin into the opening in the alginate. Now I was ready to go back to the first of this paragraph and proceed.

One of the advantages to Moldgel brand alginates is that they are formulated to be compatible with fast set urethane resins allowing for a light, strong casting with excellent detail and minimal bubbles. The resin that I selected was Easyflo 60 Liquid Plastic made by Polytec. I chose this particular resin from others I keep in stock because it sets up in just a few minutes, so quickly in fact that it

doesn't have time to react with the moisture in the alginate, which would cause bubbling. To estimate the amount of material needed to fill the void, I weighed the reassembled mold, filled it with water, and



Pour the mixed alginate into the mother mold and smooth it out with your fingers.



Plastic pill tray pressed into the alginate makes good alignment keys.



With the bottom layer gelled, mix and pour a top layer, nearly filling the mother mold.



Place the fish onto the alginate bed and gently push it halfway into the alginate.



When the alginate gels, pull out the plastic pill tray keys.



Waiting several minutes after the alginate gelled, the mold could then be removed.

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weighed it again; it took 600 grams of water. At this point, I dumped out the water, disassembled the mold, and dried out the inside with a hair dryer. I guessed that 650 grams would be about right. Since Easyflo 60 consists of a part A and a part B with ratio of 100 parts A to 90 parts B by weight (or 50/50 by volume), I weighed out 342 grams of A and 308 grams of B.

Mixing and pouring is a no brainer. I just dumped them together and stirred for about 30 seconds. The two parts were so runny that they mixed easily. The same runnyess allowed filling of the mold through a relatively small hole. While filling, I tipped and shook the mold to eliminate as many bubbles as possible. Once filled, I set the mold aside for about 15 minutes. Easyflo 60 sets up in about five minutes but very thin structures, such as the tail fin because it has so little volume, takes a few minutes longer.

The last steps were to take the mold apart and remove my brand new plastic fish and do some very minor clean up of the minimal seam where the two alginate parts of the mold joined together. This whole process took less than 45 minutes even with picture taking for this article.

A FEW ADDITIONAL THOUGHTS

The mold described here is a "block" or "pour" mold. A more usual way of constructing this type of mold is to surround the object with what is to become the mother mold and pour the impression material into the void between the object and the mother mold. After the impression material has set up, the mother mold is removed and using a scalpel or Exacto Knife the mold is cut so that the object can be removed. Put the two parts of the mold back together, pour in the casting material, let it set up, take the casting out, and you have duplicated your original object.

A second type of mold is a "skin" mold, so named



Once free of the mother mold, gently pull the top from the bottom to separate the mold halves.



Use a hair blower to dry the inside of the mold.

because the impression material is painted over the object making a "skin". The mother mold is formed over the skin. Larger molds are almost always constructed this way. Alginate make excellent skin molds as well, but their construction is a subject for a future article.

While alginate doesn't stick to much of anything, it will become entangled with anything fuzzy such as feathers or fur. While any number of things can be used as a release such as petroleum jelly or cooking oil, the most convenient thing that I have found is a thick but inexpensive hair condition with a terrible marketing name, Cholesterol. Its advantage is that it is water-soluble and washes out of most anything easily. It is also a great hand cream and may be purchased at any beauty supply store.

Be aware that all alginates are not equal. I am sure that I have used in excess of ten different brands over the years and they have ranged from excellent to terrible. I have had students in my workshops proudly present some bargain alginates that they found on the Internet, which upon testing proved to be wholly inadequate. Usually the problem is that the bargain alginates set up to about the consistency of a soft-boiled egg resulting in a mold that is too fragile and cannot capture detail. While there are a number of very good

alginates available, the two I prefer are Moldgel Regular Set and Moldgel Slow Set. The only difference between the two is the setting times. White both meet the much higher demands required for serious lifecasting, perhaps their greatest advantage for molds as described in this article it that they are formulated to allow casting in urethane resins, not all alginates are.

One of the little tricks that I discovered on my own some years ago is that the tear strength of alginate can be significantly increased by mixing in a small amount of fibers. This allows for the casting of more intricate shapes. At first I was cutting up cotton to make my own fibers. Fortunately Ball Consulting (see below) found a source of 1/8th inch nylon fibers that work just fine without sacrificing any detail.

The source of the materials mentioned in this article are: Moldgels, manufactured by Artmolds Inc. at 908273-5401 or info@artmolds.com. Artmolds is the major supplier for life casting materials. Ball Consulting, Inc is a major supplier of sculpting materials including Moldgel alginates, the nylon fibers, plastic pill trays, and Polytec resins. Ball can be reached at 800-225-2673. For those of you lucky enough to live in Colorado as I do, a source for all the above is Sculpture Depot in Loveland at 970-663-5190.



Mix your favorite casting material according to directions



Fill the fish mold through the pour hole in the hole



Once extra time has allowed thin areas to set up properly, separate the mold halves and remove your plastic fish.