

A brief guide to

**MAKE A SEMI-PROFESSIONAL  
STOP-MOTION ANIMATION PUPPET**

from cold foam latex



by animation artist Jessica Koppe  
[www.einfachanimation.de](http://www.einfachanimation.de)

## ABOUT JESSICA

Hi, I'm Jessica, an animation artist from Germany. I deeply love and enjoy every aspect of hand-made animation combined with modern digital possibilities, and I never get tired of its inherent magic.

During my studies, I explored art, animation and graphic design as well as stage painting, and so today I'm involved in every aspect of the production of my films.

I regularly share my knowledge in animation workshops and classes at different institutions.

Follow my recent activities at  
<http://einfachnimation.de/>



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## THANKS!

Most of the things I know about animation today I learned from books or from the ever helpful internet. Many thanks to all the writers and people out there!

In 2007, I also attended a course called 'Model Making for Animation' at the UWE in Bristol, UK. Mary Murphy, a gifted animator and model making artist, instructed us how to make great-working puppets, and shared her knowledge generously. I can't express my gratitude for meeting teachers like her.

"It's not a question if your puppet breaks, but when."

– Mary Murphy

## IMPORTANT, SAFETY FIRST!

For the model making process as I describe it here it's necessary to work with materials that may be a threat to your health and/or may cause environmental issues.

Always work carefully and without a hurry. Read the data sheets of materials you'll be using, and always wear gloves, breath and eye protection. This also applies to the use of tools.

Please dispose your waste as the materials are labeled, and as your local waste collectors recommend or specify.

## PLEASE NOTE:

You shouldn't attempt anything mentioned without help if you aren't sure or if you do things the first time. I am not liable for any injuries or damages occurring from any attempt to follow suggestions in my tutorial.



## PREPARATION AND RESEARCH

### WHAT'S THIS ALL ABOUT?

Shelley Noble is an outstanding artist based in Los Angeles, where she works on her wonderful Halfland films. Shelley asked her friends and blog readers to contribute hand-made underwater creatures. I liked the idea of being part of such an amazing project pretty much, and so I decided to make an animation puppet for her.

Like mermaids being half fish and half human, everything in Halfland consist of at least two different elements. That was pretty much the brief.

Read more about Halfland at Shelley's blog: <http://notesfromhalfland.blogspot.com/>

### COLLECTING IDEAS

Back then I was interested in Chinese arts, and so I chose to go for something Chinese – in this case a lanternfish, which is botanically classified as Myctophiformes Draco.

I started collecting pictures of typical, or better, cliché-like Chinese artefacts like dragons, fans and Chinese lanterns from the internet, but also pictures of different kinds of lanternfishes.

With these images I developed a so-called mood board which provides a nice overview of the latter look and feel of the puppet.



## THE DRAFT

I drew several sketches to get an idea of what I've been after. I then decided which one I liked most, and for this design I defined a colour range. With both color and form I tried to stay close to the mood board. Warm colors were dominating the final drawing:



My Myctophormes has a Chinese lantern-like head, and the tail of an Asian dragon. It should also remind one of the lanternfish sculptures outside the Louvre in Paris. Its flippers should appear like stylized fans.



## THE ARMATURE

### TOOLS

Every artist has his or her favourite tools, and so have I. Sometimes it's difficult to get special tools everywhere, but thanks to the internet it becomes more and more easy to get everything you need.

Much more important than having almost everything is having tools you really enjoy to work with.

The tools I favour to work with are shown in the top picture: I normally need a drill machine with drills of different sizes, a wooden miter box and a fitting saw, some clamps, a caliper, several needle files and a pair of pliers. I don't show you other tools like scissors, rulers, hammer and so on here because I think those are kind of standard equipment.

In the picture below you see some of my all-time favourite materials for building a puppet's armature: white Milliput, Fimo soft, aluminium wire, K&S brass square tubes and epoxy glue. With both the glue and the Milliput I have to mix up two ingredients, and after some time the mixtures become rock hard. Be aware that these materials have to be used carefully and may be a threat to your health.



## CONCEPT

The most important questions are, "How is my puppet supposed to move, and what does the puppet require for that?"

The fish is probably going to swim through an underwater landscape and so the flippers and tail should be moveable. Everything that is moving in the water drift (like the tassel, for example) should be able to move delicately. I also wanted the fish to be able to blink with its eyes, and the mouth should be animatable as well.

According to these ideas I developed the armature: I needed a big skull where all the flexible parts are plugged in and could easily be replaced if necessary. The fish's back needed a flexible spine made of twisted wire. The spine was also supposed to include some unflexible elements ("bones") that were going to be sculpted from Milliput to limit its range of possible movements. I planned to make the armature of the flippers and the tassel from untwisted aluminium wire covered with paper or other materials.

I then summed up my thoughts in a final scale drawing which lead me through the whole proecess.

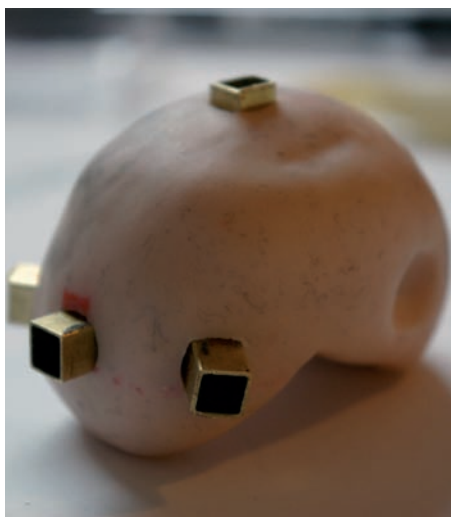


## ARMATURE DESIGN

I intended to cast the model from a foam latex that is a flexible and light material. It's a cold foam latex which means I don't need to bake it in an oven, and it's absolutely easy to work with.

First I shaped the skull from Fimo Soft following my scale drawing. Fimo is an easy but great material, too: After baking it becomes rock hard, it can be drilled and sanded but is also light weight.

After the Fimo cooled down, I placed the skull in a bench vice and drilled in four holes in which I later placed short pieces of K&S. K&S come in different sizes, and you can fit a smaller one into the next bigger size perfectly. Later I plugged the replaceable parts into the short brass tubes.



Before I did so, I cut down the K&S to the needed length (long enough to support their counterpart, and short enough to hide under the fish's skin) and glued them into the skull. For this I used epoxy glue which is mixed from two components. It becomes very strong after a few minutes, so I made sure that I worked neatly. If there's too much glue inside the K&S, the pieces probably won't match, and I couldn't plug in the flippers and the like.



## SCULPTING

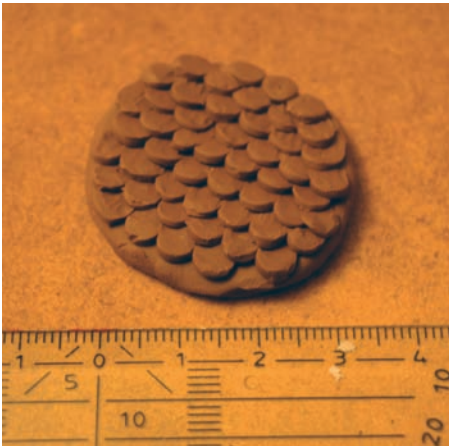


Once the armature was finished, I started sculpting the model. I worked out the final shape of the fish puppet with different modelling tools and plasticine. For the eyes I used white glass beads, and placed them on the head of the fish. I tried to cover the armature everywhere with at least 3 mm of plasticine because I didn't want the wire shine through the final latex body cast.

The next step was adding texture to the skin. To dress my Myctophiformes up nicely with a beautiful fish scale dress, I casted a texture stamp of plaster from a tiny mold of plasticine. By using the stamp, I can add a texture of scales quickly to the puppet's body. This is way more comfortable than sculpting every little lamella.

(See the next pages for illustrations.)





## MOLD-MAKING

### MORE TOOLS

When I was pleased with my model and had finished the sculpting, I started making the mold.

I used a stable board as a foundation. You should be able to move and rotate this board easily because the mold making process is much more comfortable then. It should be of a stable material because it has to carry a great deal of weight as clay and plaster contain a lot of water.

In the picture on the right you see the most important tools I generally use when making molds: a rubber mallet, chisels in different sizes, a flat screw driver, a tool to cut clay into pieces, a very soft brush, a bowl to mix plaster and a mold release agent.





## THE MOLD, PART I

For the first part of the plaster mold I started covering an area of about the size of the final mold with small handmade balls of clay (about 2 cm in diameter). In this bed of clay I carefully placed the plasticine model. (You'll see why I made this step so relatively complicated later.)

Since the puppet was designed to be axially symmetric and didn't contain undercuts, it was easy to build up the clay that later supported the first half of the plaster mold. I built the clay up to an imaginary line that cuts the model in half.

Once I've reached this "line", I tried to smooth the surface of the clay with a flat but flexible modelling tool. I didn't want the clay too wet, so I didn't use water during

this process. With my fingers I created little holes in the clay bed, carefully avoiding undercuts here. These holes work as lockers that hold the two halves of the mold in place when the foam latex expands.

When everything was plain and smooth I used an almost dry sponge to clean up the model and to remove all clay from it. Last I wiped the clay surface again until everything was completely plain.

Finally I built a wall around the bed of clay that must be solid enough to hold the wet plaster. I decided to make it about 1,5 cm strong. The wall should be at least a few centimetres higher than the highest point of my model. Obviously the thicker the layer of plaster covering the model is, the stronger the mold becomes.



The wet plaster is quite heavy, and so the wall needs some support. I added two triangular pieces of clay to hold up the wall. I made sure that these pillars were strong enough and well connected to the wall as well.

#### MIXING THE PLASTER

I normally use modelling plaster which is easy to handle. I took one part of water and then added two parts of plaster. For my mold I needed about 1,5 litres. I always mix a bit

more than I'll probably need because I have to fill the form at once. If I add a second layer of plaster later, the mold will certainly break. Mold making is a very laborious process, and it's very annoying if I have to go back to the beginning just because I haven't prepared enough material.

There's usually an instruction printed on the plaster bag how to mix it properly. I highly recommend to work outside and to wear breathing and eye protection since the plaster raises a lot of dust. I normally wear



thin gloves, too: I blend water and plaster by hand to prevent the mix from lumping. I also work more slowly with my hands than with other tools which helps to avoid air bubbles. These bubbles later will become holes inside the plaster, which means either the mold is becoming weak, or my cast is going to show some nasty "warts".

To avoid air bubbles (again) and to fill the clay form accurately, I slowly poured the plaster over the edge. Once the clay form was filled, I carefully shook it a little bit. The

vibration brings up the enlocked air – which is an easy way to get as much air out of it as possible. The plaster dries best over night, and sometimes it takes a few days to get all the moisture out of it.

Once the plaster has hardened, I carefully removed the clay wall from the mold, and then all the remained pieces of plaster from the clay. If I keep the clay completely clean, I can reuse it later. With a special clay-cutting tool I lifted my clay and plaster object from the board and turned it upside down.

## THE MOLD, PART II

Now you'll see why I made the bed from little clay balls: they're much easier to remove from the model. Keeping it undamaged was pretty important since I still needed to cast the second part of the mold of it. By peeling off the clay balls by hand, I didn't need sharp edged tools to take them off. The plasticine model stayed in there until the mold was completed.

Very, very carefully I removed all the sharp edges and burrs from the surface of the plaster by using the scratchy side of a kitchen sponge and some water. Without any clay around it the plaster dried another night or two.

Next, I covered the top side with a mold release agent. If I wouldn't do so, both parts of the mold would connect to each other, and I wouldn't be able to open the mold again. There are a lot of professional solutions but I simply use furniture polish. It's cheap and fairly harmless. But I always run a test study first! I only work on my main piece if I am absolutely sure how the materials will react.

When the first layer of release agent has dried, I added another few layers to make sure that every part was covered properly. While the furniture polish, eh, release agent was drying, I made corrections on the plasticine model which sustained a few injuries during the process. I also made sure that all details still hold in place.



Next I sculpted rolls of plasticine, 1 cm in diameter. I cut them into halves and placed them around my model, but made sure they didn't touch it. Once the plasticine was removed from the mold, it formed tunnels through which the waste foam latex was led away when the casting material later was expanding. I also added a spline at the edge of the form. Later I applied a lever here to

open the mould more easily after casting the puppet's body.

As I did for the first part, I built a wall of clay around the piece. Where the plaster met the clay I tried to avoid round corners because I wanted both halves as plain as possible and because I wanted to avoid undercuts.



Like I did before, I mixed up enough plaster and filled it slowly into the clay form. I carefully beat out the air again and gave the plaster a day to settle. As long as the plaster mold is still wet, it'll break much easier. The longer I wait, the more stable it becomes.

After removing the clay walls and the plasticine splint, I very, very carefully opened the mold by using a rubber mallet and a flat chisel or screwdriver. I also used the rubber mallet to very carefully tap at the mold's upside. These vibrations help to release the two parts from each other. – But this process took me about an hour. Mold making isn't a satisfying activity for impatient people in general, so especially at this point simply don't rush! Take all the time you need, and I say it again: don't rush!

My mold is a good (or bad) example of what happens if the plaster is still too wet: The lockers that should hold my mold in place accurately broke. This really sucked. That means that the two parts of the mold would

probably drift apart once the foam latex has started to expand.

I had two possibilities: try to make it work as it is, or start again from scratch. Since I only needed one or two models, I went for the first option. If I had a bigger production and would need more puppets of the same kind, I'd definitely rather start again (as annoying as it is).

Once the mold was open, the last step was to get the plasticine model out of it, and to clean the plaster from plasticine and clay. I also smoothed the edges of the plaster again with a scratchy sponge, but I did this very carefully again, and I didn't do it where my model sat. I didn't want to change the shape of the mold, I just wanted to avoid fractures.

A fantasitic way to clean away the last remains of the plasticine are baby wipes. Don't ask.



## CASTING



I had a close look if the mold still was undamaged. – It was, and so I started preparing the cast. I placed a piece of plasticine in the fish's jar inside the armature that I removed afterwards. With this, the fish will have an oral cavity later that looks really nice when it opens its mouth.

### MATERIALS

For a cast like this I use materials as shown in the picture above: "Flex Foam it! X" is a

material normally used in theatre or film productions. It's a foam latex which reacts best at room temperature. The final latex foam has a nice surface with only tiny pores, and it's easily processable.

Lately I did some experiments on how to dye the foam, because the company sells some highly pigmented but expensive inks. I've got one in flesh colour but wanted the fish to be bright orange. Since I can remove the highly pigmented ink with alcohol from plain surfaces, I thought that they must



be oil-based. I mixed artistry oil paint with paint thinner until it had the same consistency as the expensive ink. Instead of the professional product I then processed the thinned colours in a test piece, and it worked out perfectly.

The next step was preparing the mold and the armature for the cast. I covered the mold with an ease-release agent to get the final cast off the mold easily.

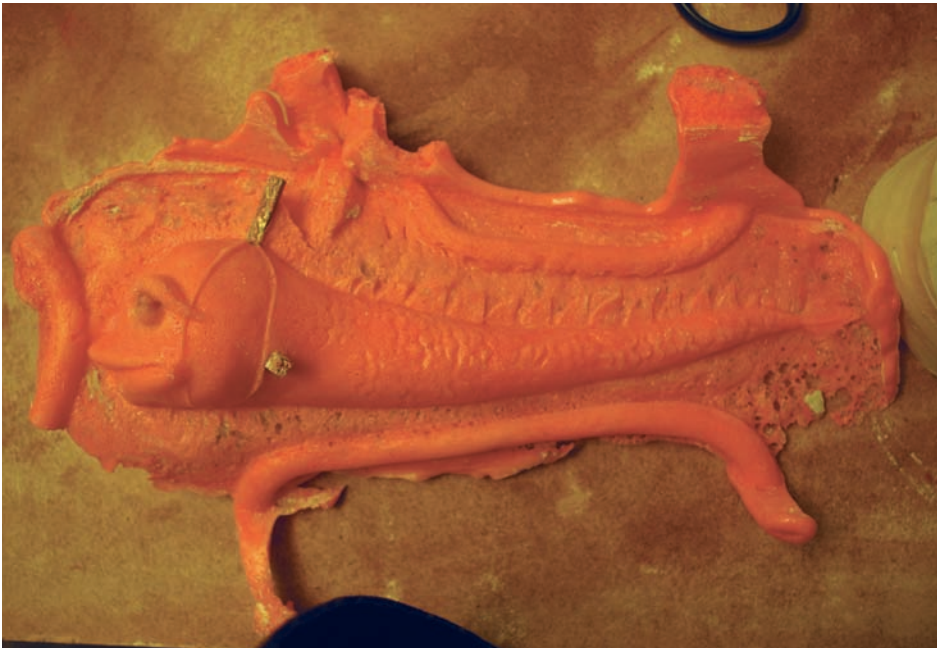
While it was drying, I prepared the right colour tone from oil paint and thinner.

I placed the clean armature into the mold and checked if all parts still fit. Since everything has to be done quickly during the cast, I prepared all tools and materials within my reach: the mold with the armature, my thinned oil colour, the two components of "Flex Foam it! X", a few huge rubber bands, baby wipes and something to stir the chemicals.

As soon as I mixed up the components of the foam latex, I had less than five minutes to get it into the mold. I poured the liquid foam over the armature and into every gap of the mold with a spoon. The foam expands to about two or three times to its current size, so I only needed to fill the bottom half of the form.

Because my lockers did break it was difficult to close the mold as precisely as planned.

I've drawn marks on the outside to find the right position for a clean cast (but it took me three failed and annoying attempts to do so). But eventually I brought the mold together perfectly, and locked it with strong rubber bands. These rubber bands fastened the mold together firmly. The foam is very strong while expanding, and I didn't want it to open the mold during the reaction. The waste material drained through the little tunnels I made before.



After 30 thrilling minutes I opened the mold carefully and took the puppet out of it (with a great amount of sensitivity) to see if everything has worked out successfully. It did. The oil paint connected perfectly with

the foam, and the cast had no defects. With a sharp pair of scissors and a cutting knife I cut down all unnecessary material, and I also opened the mouth and took out the chunk of plasticine.



## THE FINISH



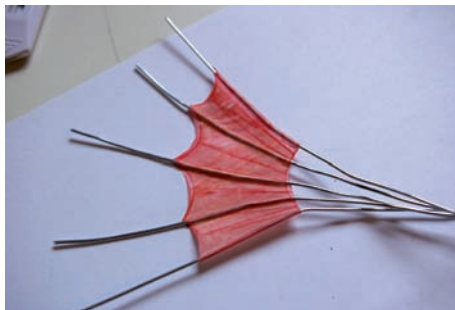
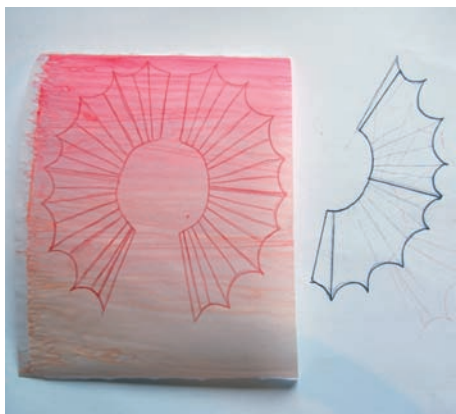
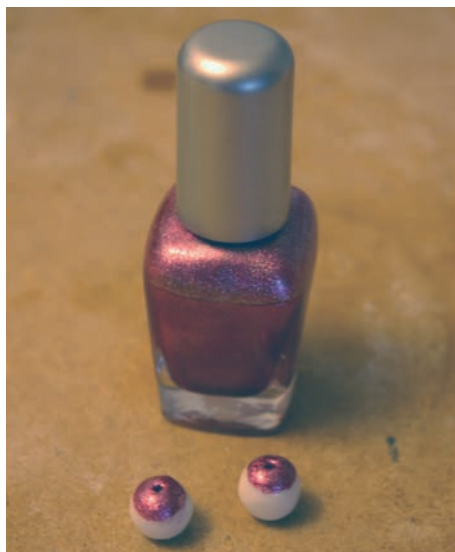
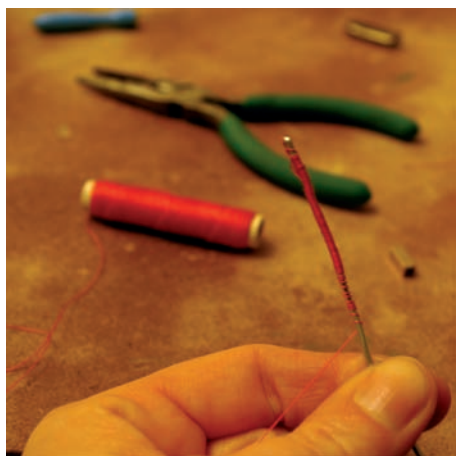
For the eyes I used two white glass beads, and painted them with frosted violet nail polish and black acrylics. With a thin layer of very dry oil paint I added a few colour accents on the Myctophiformes' skin, its back flippers and its lips.

While the paint was drying, I made its flippers from paper. I first drew a template of how they should look like. I cut each of them out twice, and glued some wire between the two layers to keep the paper animateable. I used a waterbased white glue that becomes translucent when dried. Last I twisted the wire strings together and glued them into a

short piece of K&S that fit into the one in the body. Again I used the epoxy glue here.

At last, I added another detail: a tiny tassel attached to the top of its head. The tassel is made of sewing yarn, and some white glue keeps it in shape: I plugged a small plastic bead to a short piece of wire and wrapped this wire into a thin coat of the same yarn I used for the tassel. Again I attached a K&S piece, and plugged it into the fish's head.

(See the pictures on the next page for illustrations.)





Finally, I tested the fish in front of the camera, and since I was very pleased with the result, I sent it to its new home in L.A.!

Have a look at it at:

[http://einfachanimation.de/blog/  
myctophiformes-draco/](http://einfachanimation.de/blog/myctophiformes-draco/)