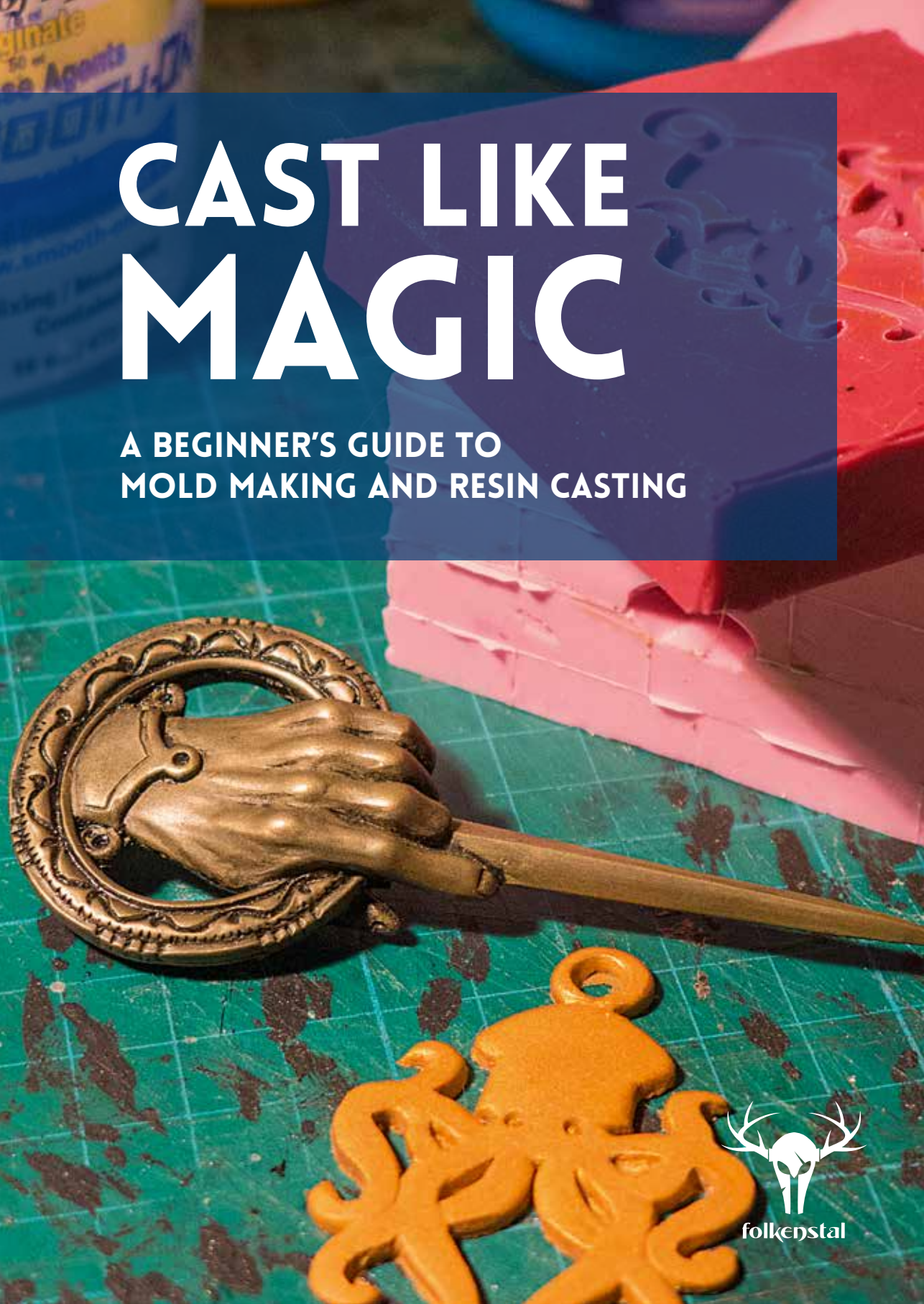
CAST LIKE MAGIC

A BEGINNER'S GUIDE TO MOLD MAKING AND RESIN CASTING



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FOREWORD

Welcome! Thank you for buying this book.

I am Ana from Switzerland, but I am better known as Folkenstal. Since 2012, I have been making props, armor and weapons from various video games as well as films and TV shows. This extraordinary hobby came as a happy coincidence due to my great love for video games.

I recorded my daily work and progress online, and it turned out to be quite a success among other video game fans. No longer a single project, what was once a hobby quickly escalated to even more projects and orders from a range of clients.

I have learned to work with silicone and casting resin on my own over the years. With the increasing success of my projects, I began to get flooded with e-mails and requests regarding materials and methods. Around the start of 2015, I checked and found that there were no modern books on silicone and resin casting. Sure enough, I decided to write one myself so that I could share my experiences and the knowledge I acquired with everyone who wants to know more and start with their own projects.

I will support you step by step in this book and give you important tips and instructions that you'll need when working with silicone and resin.

Have fun molding and casting!

ABOUT THE BOOK

My book is for all casting and molding enthusiasts and hobbyists, who want more information on this subject. I have provided an easy and quick introduction to the topic. With this book, you can save a lot of time and effort of looking for information from various sources. I remember those days when I was looking for information from manufacturers or the internet and spent uncountable hours and lots of money, because I learned by trial and error. The best learning experience was, of course, practical work with materials. So, now I am in a position to guarantee that I can help you not to make the same mistakes I made as a beginner and that you'll find useful information in this book. It covers all the relevant basics you'll need as a

beginner to make your experience less stressful.

Please read the entire book carefully before you rush off to buy all the materials and tools. The topics are built up from the basics so as to ensure that you don't miss any important information that you might need later on as the book advances. But enough instructions already. Let me wish you lots of fun and success with your first projects. If you have any questions that are not covered in this book, please let me know via e-mail or Facebook.

WHAT IS MOLDING AND CASTING?

It's such a basic question, but I'm often asked what it is, so I thought I just begin with this seemingly easy question instead.

Imagine building or modelling an object and duplicating it. There are many reasons for duplication, some of which I have listed below:

- You need multiple numbers of the same part for a project
- You want to sell the copies
- The current original model is not stable enough and you want to make a sturdier version

These are some of the reasons for which silicone and casting resin can and should be used. Before we begin with the duplication, we need a so-called negative of the model. We use here silicone to make the negative. There are a number of manufacturers and products on the market. One of the following chapters deals with that in detail (Page 26: "Types of silicone").

You will mold an object with silicone, in other words, take its impression. You can either do that with only one silicone mold, or with two or even more parts, depending on how complicated your model is going to be.

Before you begin, you must decide on the type and quantity of the silicone. Let's assume you will create a silicone mold with the help of my book and are ready to cast the resin in that shape.

You must then first ask yourself the following questions before starting the project: Does the object you're making need to be hard? Or flexible and soft? Light or hollow?

Let's take a sculpture as an example

that you've perhaps modelled. It is really roughly done without much detailing, but you want a few copies made of it. Ideally, the piece should look solid and seemly sculpted from stone.

These are really important expectations that need to be kept in mind because there are different kinds of silicone for different requirements and not every silicone is suitable for every project. That's why there is a huge range available.

Once you have understood the basic principle of molding and casting and have used a couple of them yourself, you will be ready to make even more complex molds.

When your silicone mold is filled with a casting resin of your choice, your work is almost over.

You are now ready to take out your "cast" from the mold and work further on its appearance.

RESIN DAGGER

AM I PROPERLY EQUIPPED?

Like in any other new hobby, you will need the necessary things so that you can achieve what you're aiming for. I have listed the most important tools and utensils that will come handy for a lot of things and for your safety, too.

GENERAL SAFETY AND HYGIENE MEASURES

Due to safety reasons, people with extra-sensitive respiratory tracts (suffering from e.g. asthma, chronic bronchitis) must not work with synthetic resin, since part A contains isocyanate, which isn't good for you.

Important:

- Always read the hazard and safety instructions on the packaging before starting work.
- Make sure there is sufficient ventilation, especially while working in closed areas.
- Avoid contact with eyes and skin.
- If mixed resin or its components come in contact with eyes, rinse eyes immediately for 10 to 15 minutes with cold water and then consult a doctor.
- Wash off any accidental splashes on skin and remove with soapy water.
- Immediately change clothes if soaked.
- Do not drink, eat or smoke while working.
- Always close the containers completely after using them.

BREATHING MASK

Silicone and resin vapors are harmful. Even when you cannot smell or see the vapors, they are still there and can damage one of your most important organs, the lungs. So, please wear a professional breathing mask while working. Take a product expert's advice, since the market offers various types of masks.

VINYL GLOVES

Silicone and resin contain hazardous substances. Protect your skin with disposal vinyl gloves usually available in packs of 100. Gloves made of other materials such as latex become brittle and crack and consequently do not offer protection.

Always remember:

- Only use good-quality gloves!
- Never wear gloves on dirty or moist hands!
- Never wear gloves that are damaged, wet or dirty on the inside!
- Change gloves as often as necessary; use one glove for one process!

Putting on dirty gloves can cause skin contact with the material. Practice removing the gloves.

SAFETY GOGGLES

There may be some splashes while mixing the components, so safety goggles with complete protection is a must. They are easily available in larger hardware shops.

SAFETY CLOTHING

It's best to use long-sleeved work clothes, since there may be allergic reactions upon contact with the skin.

PLASTIC CONTAINER

To protect the work surface or floor from splashes or spilled casting resin, use a plastic container as a collecting vessel.

MIXING CUPS IN DIFFERENT SIZES

Try to use cup sizes that match the amounts of silicone or synthetic resin you are using. Specialised shops have a good selection of measuring cups in different sizes. Alternatively, you can also use regular plastic cups from the supermarket. Normally, these are only marked with 1, 2, or 3dl and do not have any further sub-divisions. However, they're quite all right for small projects. I often use these bargain varieties since the professional measuring cups are much more expensive. Though their range of various sizes is bigger.

SULPHUR-FREE MODELLING CLAY

Modelling clay is for embedding the model when making the silicone imprint and registration keys (from Page 74: registration keys). Modelling clay should be sulphur-free, because otherwise the silicone will not cure completely and will obviously undo your entire effort. The embedded model also needs to be removed again, so the clay itself should not harden. My personal recommendation is "*Chavant NSP Sulfur-Free Plasteline*".

RELEASE AGENT AS SPRAY

A release agent needs to be used so that the silicone does not adhere to the model. We will be talking more about applying the release agent soon. The release agent is also used to protect the silicone mold from the resin while casting, since, depending on the type of the casting resin, it can be extremely adhesive and will remain attached to the silicone mold (and can only be removed with a lot of difficulty, possibly damaging your mold).

A universal release agent that I like using is *Mann Ease Release® 200*, which separates silicone from silicone and silicone from resin. Another good release agent is *Ease Release® 2831* and will be needed when you use polyurethane foam with a silicone mold.

PRECISION SCALES

Precision scales are made for use in the laboratory or in commercial industries, as the scales provide exact measurements. Since many silicone or resin components cannot be mixed in a 1:1 ratio, we need exact weight measurements in grams.

DISPOSABLE BRUSHES

You'd want to get a couple of dozen of these, since they are only used once and then thrown away. Hardened silicone or resin cannot be removed from the brush and that is why you will need a new one for each session.

STICKS FOR MIXING

Various wooden sticks (like the ones seen in cafés or doctor's tongue depressors) can be used to mix and stir silicone or casting resin. You can easily get them online as bulk. Wooden sticks of approx. 18 cm are sufficient for projects of approx. 1–3 dl. For larger quantities of casting resin or silicone, you'll need broad, sturdy wooden sticks from a hardware store or mixing rods in a specialised store.

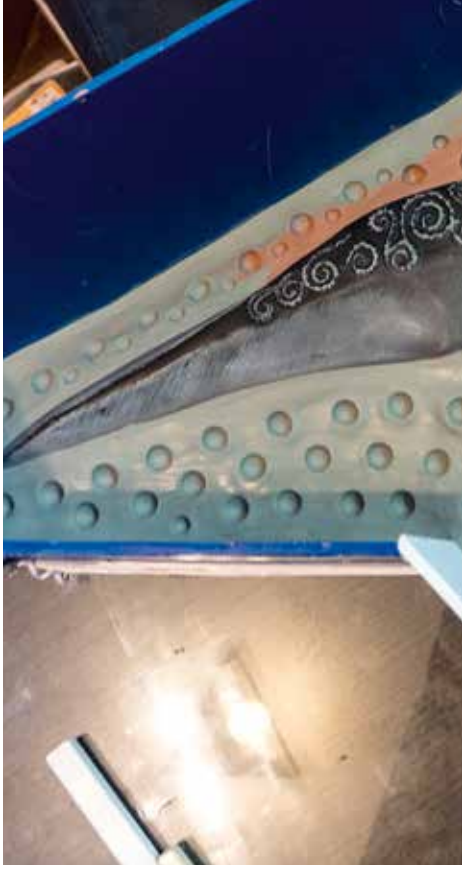
PAPER TOWELS

A roll of paper towels will go a long way in making your experience a more pleasant one, since it is not uncommon for a couple of drops to splatter here and there while working with resin or silicone.

Don't throw the used paper into the toilet, but into the kitchen waste bin!


Smooth-Cast
COLORMATCH
Mix ratio is 1A:1B by volume
SHAKE PARTS A AND B VIGOROUSLY
THIS IS PART
Net Wt.: 1.00 LBS. (0.45 KGS.)
Smooth-Cast
COLORMATCH
Mix ratio is 1A:1B by volume
Net Wt.: 0.90 LBS. (0.41 KGS.)
THIS IS PART
Mind Blowing Materials For A World of Applications
SMOOTH-ON
TEXAS INSTRUMENTS
TI-503SV
SALTER
ON-ZERO-OFF
UNIT
Max 5000g x 1g
Max 11lb x 0.1oz

THE MOLD BOX



The mold box is a container in which you embed your model on a couple layers of modelling clay and fill in the silicone to get an imprint of the model. Since you'll be molding various sizes of models, you will obviously need a box that can accommodate various sizes. Take a look at a couple of the basic ones I've mentioned here.

PVC SHEETS AND HOT GLUE

Large sheets and containers to hold several litres of silicone can be made with PVC sheets **[1]** from hardware stores. You can build a mold box quickly with hot glue. Just make sure that all the edges are completely sealed with hot glue so that there is no leakage later. Also glue on weaker joints with it once again.

PLASTIC BLOCKS

You can easily make smaller mold boxes using plastic blocks (e.g. Lego) **[2]** and since the blocks are always in a right angle, your mold box will never be crooked.

OTHER CONTAINERS

I like using containers found at home for my castings. Think of plastic basins, lids, small cups or other practical containers that can all become your custom mold box. It can be, for example, a spray can cover or a metal can for sweets. You can reuse some containers this way, and it's quite legit to do so!

INDEPENDENT

There are models that do not need any mold boxes, such as those with brush-on silicone applied by brush which sticks to the model. Just take a PVC board or mount to attach the model onto. Since this brush-on silicone acts like a paste, it will stick to the model and doesn't run. This subject has its own chapter in this book! See Page 80: Brush-on silicone.

SEALING YOUR MODEL

Remember a couple of points to prepare your model or master correctly for molding. Depending on the surface structure and material, there may be some problems.

Always use a release agent like the universally usable *Mann Ease Release® 200* for molding your master. However, to prepare your master correctly, it must be sealed properly otherwise silicone will leak through the surface structure and latch on to the model.
It's important to use the right sealant for different materials and surfaces.

SONITE® WAX

This wax paste is used to seal porous surfaces so that the silicone does not leak and ruin the model. Also, always use another release agent such as *Ease Release® 200* when molding.

SUPERSEAL®

This is a quick-dry sealant ideal for surfaces such as plaster, stone, wood and cement. The structure's details are not lost and you can then make a silicone print easily. A release agent is recommended here as well!
It's extremely important to use a release agent before casting silicone. Since certain surface sealants such as shellac contain alcohol, they will also mix with silicone. Allow the sealant to dry out completely before you make a silicone mold. It should be completely cured and hardened so as to avoid any problems with the silicone or release agent because of residual moisture.

SEALING SURFACES

Your model is made of:	Recommended sealant:
Water-based modelling clay	Schellac
Sulphur-based modelling clay	Schellac
Sulphur-free modelling clay	not required
Apoxie Sculpt, Super Sculpey, FIMO	not required
Wax	not required
Rigid foam	Sonite® Wax
Wood, bark	Sonite® Wax or SuperSeal
Non-porous plastic	not required
Putty, plaster	Sonite® Wax, Schellac or SuperSeal
Stone, cement	Sonite® Wax or SuperSeal


SCROLL MADE WITH RESIN

SILICONE AND RESIN 101

A beginner can easily get lost in this world, with the mind-boggling range of materials. It is for this reason I want to talk about the basics of silicone and casting resin and show you my personal approach.

WHAT IS SILICONE?

You've probably heard of silicone used in the construction industry or plastic surgery for breast implants, for instance. The base substance in silicone is silicium (Si), which is the second most abundant substance on Earth after oxygen (O).

Various types of silicone are used for molding models. You create an imprint of the original. The finished silicone mold is later filled with resin to make a copy of the model. There are different consistencies (from liquid to paste) that vary according to requirements and manufacturers, and are used for specific types of imprints. Silicone is also used in the special effects industry for latex applications for face and body. This book, however, only covers the silicone range used for casts in propmaking.

The biggest advantage of silicone is a perfect imprint of your master. Silicone mirrors structures precisely, helping work out the details to perfection. Its disadvantage is the sometimes long curing time that can last up to 24 hours. My tip: Prepare silicone on the previous evening and fill in the mold box so that you can work with it the next day.

TYPES OF SILICONE

There are addition cure and condensation cure silicone types where the names are somewhat self-explanatory. Condensation cure silicones are normally mixed with a small amount of (approx. 2-10%) hardener. Once the hardener is added, the curing process starts immediately. Since chemical by-products occur and vaporise during the curing, the total amount is slightly less at the end (the silicone shrinks!). Condensation cure silicones are convenient and also come handy in many mold-making projects.

In addition cure silicones, their components A and B are normally mixed together in a ratio of 1:1 or 1:10. This silicone type does not produce any by-products (no shrinking!).

WHAT IS RESIN?

Resin is a mixture of two components and is sold in two containers. It is measured, mixed either by weight or volume, and poured into the finished silicone mold. The resin requires a curing time that can vary from 15 minutes, or a few hours, to 24 hours. Depending on the resin, it can be bought either transparent, white, or colored. You can color synthetic

casting resin with the right pigments and so create new, exciting effects.

The biggest advantage of synthetic casting resin is of course the quick reproduction of models. If you want to create 30 identical models, this process (molding and casting) is an excellent option because who wants to make the same master (original sculpture) x-times by hand? Also, depending on the resin, you can get really quick results when you select a product that doesn't require more than 30 minutes of curing time. Its disadvantages are in its sometimes extremely short mixing times in which you only have about 30 seconds to mix the casting resin and pour in the mold before it begins to cure. Thankfully, only some specific resins have this property. We'll discuss them more later (from Page 32: Synthetic casting resin – an overview)

I must mention here that some casting resins can only be used outside or in very well-ventilated industrial areas. But I haven't mentioned those here.

HOW MUCH MATERIAL DO I NEED FOR MY PROJECT?

There's nothing more annoying when you go all out and order your silicone or casting resin and notice too late that you have ordered either too little or too much. You can avoid this by roughly calculating the volume of your mold box in advance. Measure the inside length, width and height of the box and multiply them together and you'll get the required volume for the silicone (e.g. 15cm × 3cm × 4cm = 180cm^3 = 180ml).

Sure you can't calculate so accurately while using brush-on silicone. For that, you'll have to more or less estimate the amount of material you will need. Better buy a bit more than less.

For casting resin, I calculate the volume with my water trick. I close and secure the silicone mold as if it were ready for the resin. Let's assume your silicone mold holds approx. 3dl of resin. I constantly pour 1dl water into the mold until it’s almost full and check the

amount shown on the measuring cup. Then I take a smaller cup and see how much of that I'd need to completely fill the mold. Add all the amount you used to get the volume in millilitres or deciliters (whatever works for you). Write down the quantity in a notebook for reference and measuring the correct quantity of resin for the next time. This my trusted method to measure volume without having to guess too much.

The water trick works for projects that require up to about 500ml. For larger volumes, I'd rather get a casting resin that behaves like polyurethane foam to avoid heavy weights. This way you'll get a lightweight cast. Lighter objects are more convenient when building props.
Now empty the water from the silicone mold and let it dry out completely before filling it up with your resin of choice.

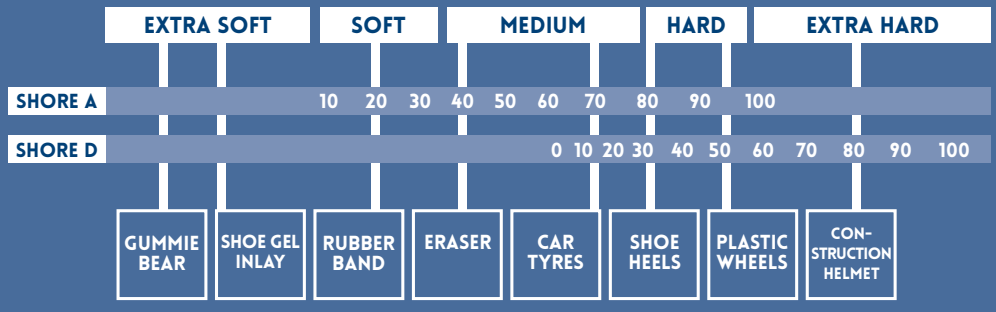
TYPES OF SILICONE: AN OVERVIEW

Silicones come from different manufacturers, have different areas of use and curing time. Your project decides the type of silicone to use.
I'll describe some silicone types here that I work with and you can use them for your projects without any concern.

SHORE HARDNESS

Shore hardness, named after Albert Shore, is a measurement of hardness.
Silicone and synthetic resin are also measured with their Shore hardness. The indentation depth of the material tested is a measure for Shore hardness, calculated on a scale of 0 Shore (2.5 millimetre indentation) to 100 Shore (0 millimetre indentation). Remember: The smaller the Shore count, the softer the material.
While Shore A hardness is given to soft and medium hard silicones (that normally give in to fingernail pressure), Shore D hardness is important for synthetic casting resin. Conventional rubber bands are approximately indicated with Shore A hardness 20 while car tyres have Shore A hardness 70. Shore hardness is particularly important for molding because corresponding silicone should be used to suit the master. The silicone should come off without much effort from your model.
Imagine you have a stone sculpture and want to mold it. The silicone here should be softer than your model otherwise you will not be able to free the differentiations and parts that stick out and might even damage the model. Very hard silicone is often used in cement construction where the flexibility of silicone molds is not that important. But this doesn't matter for your projects now.

SHORE A AND D HARDNESSES



One of my favourites is the *Mold Max®* series by Smooth-On Inc. They are condensation cure silicones and harden at normal room temperature. You can cast wax, plaster, low melting point metals, polyurethane, epoxy resin and polyester. For my projects, I use different hardness grades in this series.

MOLD MAX® 40

A silicone that I love using is the *Mold Max® 40* Smooth-On Inc. It has a Shore A hardness 40, which is something close to the hardness of an eraser. I mostly use it to make one or two-part negative molds. The curing time is 24 hours and is used in a ratio of 100A:10B by weight. Depending on the projects, I vary between hardness levels 30, 40 and 60 and use them normally for one part or two part silicone molds, since they can be made quickly. Since *Mold Max®* has a "tear propagation stop" and therefore prevents the silicone mold from further damage, these are also very long-lasting. I've been able to even make 100 copies, with a few of my molds. *Mold Max®* can be used well with thinners and thickening agents (from Page 30: Additives for silicone

MOLD MAX® STROKE

From the same series as *Mold Max®* 40, this is brush-on silicone best used for vertical applications. It can be applied with a brush and mirrors the smallest details beautifully. *Mold Max® Stroke* is mixed in a ratio of 100A : 10B and you have about 20 minutes to brush the mixture on the model. Brush on a fresh layer every 45 minutes until you have let the last layer cure for 16 hours. *Mold Max® Stroke* is a good choice when you want to go easy on the silicone or if the model has many complicated parts which cannot be made with the conventional two-part silicone molds. For successfully making this silicone mold, you'd need a jacket I'll talk later about (Page 80: Brush-on silicone)

REBOUND® 25, 40

Another silicone that is brushed on and requires a jacket is *Rebound®*. Being extremely elastic and crack-resistant and with hardly any shrinking, it is a heavy-duty silicone. Parts A and B are relatively liquid while using them. Use *Rebound®* when you know that a silicone mold will be required and you need to produce a larger number of copies.

POYO® SILICONE PUTTY

This silicone is a putty-like silicone, that has a Shore A hardness of 40. It also comes as two-component silicone and it's mixed by weight or volume, where I prefer mixing it by volume. Always mix the putty with gloves on and kneed the dough until the color becomes a light pink mass. Immediately press it onto your model, because it only has a potlife of 5 minutes and you can see how fast it cures. It's fully cured in 30 minutes, but sometimes I already remove it after 15 minutes when I'm in a hurry.

Because it's easy to make a one-part mold with the putty, it can be used for small applications, such as rivets, gems, flat pendants, and projects where fast curing putty is needed.

SAFETY DATASHEET

When purchasing the silicone and resin, the manufacturer or seller will always provide a safety datasheet. Do read it very carefully. It contains important information for handling the materials and detailed usage instructions. You will also find a list of contents and warnings that you should not ignore!

ADDITIVES FOR SILICONE

Additives can be very helpful, depending on the usage scope of the silicone. Please always remember to check whether the additives are suitable for condensation cure or addition cure silicones!

THICKENER

Thi-Vex® is a silicone thickener used for brush-on silicones such as *Mold Max*® *Stroke* and *Rebound*®. After the first vertical silicone layer, you will perhaps notice that the material does not remain on the model, but rather runs down on it. This is because no *Thi-Vex*® has been mixed under the silicone. This thickens the silicone and allows it to adhere better to vertical surfaces and undercuts (see Page 80: Brush-on silicone) and can be easily filled in. While mixing the silicone, you can simply add a couple of drops of *Thi-Vex*® and mix it all thoroughly.

The more *Thi-Vex*® you add, the thicker the mixture will be. It is suitable both for addition and condensation cure silicones.

THINNER

Smooth-On also offers a silicone thinner by the name of *Silicone Thinner*® which is suitable for all silicones. The silicone will thin out, which can be an advantage while working with finer details because the silicone will then flow into all finer points of the model. That will mean that the Shore A hardness will decrease and the silicone will no longer have the same hardness. But the datasheets that you get with the silicone will always give you detailed information about this.

ACCELERATOR

For impatient artists or those working under a deadline, there is also a curing accelerator for silicone. For an addi-

tion cure silicone like *Rebound*® there is *Plat-Cat*®, which increases its curing speed. For condensation cure silicones, there is *Accel-T*®.

You must remember in this case that the processing time will also go down correspondingly. So, you'll have to work more quickly. Fast workers should be able to handle that!

COLOR PIGMENTS

Pigments such as *Silc Pig*® can be used to color silicone in applications such as costume and prosthesis making (skin colors). Coloring, of course, is not essential. But when you have about 20 different silicone molds in your cupboard and every one looks roughly the same, then different colors come in handy and you can then handle and organise your collection better. Before mixing the two components, add *Silc Pig*® to A part of silicone and mix until you achieve a homogeneous color tone. *Silc Pig*® is suitable for all silicones.

RESIN
AN OVERVIEW

Out of the many casting resins offered on the market, it can be difficult to select the right one. Since I mainly work with Smooth-On products, I'll tell you about my favourites. Hopefully, that will make deciding on a product for your project easier.

Smooth-On Inc. offers a wide range of synthetic casting resin. It is not easy for a beginner to get to know them all here. Therefore, I will only present those which I have personally worked with and can recommend for various kinds of projects.

SMOOTH-CAST® 325–327

This resin is ideal for all kinds of uses. The higher the resin number (325, 326, 327), the longer it takes to cure. *Smooth-Cast® 327* hardens, for instance, in approximately 4 hours. All resins are mixed in a ratio of 1:1 according to volume and the effective Shore D hardness is 72.

What makes this series special is the coloring and filling abilities of the material. The transparent resin can be easily mixed with "SO-Strong" colors or other filling materials, giving you a lot of room to tweak your designs. I personally often work with *Smooth-Cast® 326* because the curing time is convenient.

SMOOTH-CAST® ONYX® FAST

This is an opaque black synthetic resin that has a Shore D hardness of about 80. It is very stable and the casts do not collapse even after long storage periods. Besides, it has a high heat resistance. The mixing ratio for *ONYX®* is 1A:1B by volume.

What makes *ONYX® FAST* special is the quick curing time of approximately 15 minutes. It is crucial to mix and fill quickly, otherwise the resin might harden in your mixing cup! So, quick work is strongly recommended. Another positive feature is that *ONYX®* can be sanded and easily polished. It'll be easy for you to sand away the seams of the casts and get a smooth surface. Another use for *ONYX®* could be to use rotation casting for making hollow casts. The casting resin is poured into the silicon mold and the mold is then turned by hand or machine until the resin has hardened. The part will then be very stable and break-resistant. Often the hollow casts are also filled with urethane foam to get light-weight parts. But more on that in chapter on rotation casting (from Page 92). Although *ONYX®* is not intended for rotation casts, I have carried out a couple of projects using this technique and had good results.

SMOOTH-CAST® ONYX® SLOW

Most of the feature of *ONYX® FAST* have been included, but *ONYX® SLOW* – as the name suggests – is slow to cure. It

hardens completely in 90 minutes and can be removed from the silicone mold and worked further.
But a disadvantage with *ONYX® SLOW* is that there are small bubbles while curing. This is why I would recommend a vacuum chamber in order to ventilate the resin in advance. If you don't want to purchase a vacuum chamber, use *ONYX® FAST*.

RESIN HAS A SHELF LIFE!

For resin and silicone, always check the expiration date while the packaging is still intact. As soon as you have opened the pack, you must use it as quickly as possible, otherwise the quality will decrease tremendously. One batch of resin I hadn't used for months just didn't mix right when I used it later. In another case, the resin foamed and made the cast useless. So, I'd urge you to make a couple of more casts even if you don't really need them, This way, you won't have any bad resin or silicone lying around.

EPOXACAST® 690

It is a clear UV-resistant synthetic resin ideal, for instance, for making transparent pearls for neckpieces or other projects that require a stable, clear finish. *EpoxAcast*® can be colored with *SO-Strong*® pigments or mixed with acrylic powder for special effects. The resin hardens completely in 24 hours and has a Shore D hardness of 80. I have often used it for casting blades (see the image on Pages 38/39), since the template required that.

EPOXACOAT®®RED OR GREY

This is a resin that can be brushed on and has a good vertical adherence without running down. It comes in a red or grey color and is measured by weight or volume. The Shore hardness of *EpoxAcoat*® is D85, it's abrasion-proof and can be worked with tools such as a drill or sandpaper. Due to this, it's used as a laminate for different surfaces. *EpoxAcoat*® can be applied in several thin layers and is therefore an ideal synthetic resin for complicated silicone molds in which it's not easy to pour casting resin. You can add on another layer after 60 minutes and the entire laminate cures after 16 hours.

A good example where I have used *EpoxAcoat*® is the silicone mold for a battle axe (see the image above). The silicone mold's angle makes it difficult to pour the resin without having everything run out. That is why I made several layers in the mold until I was satisfied with the thickness.

PLASTI-PASTE® II

To avoid your brush-on silicon mold warping during the casting process with resin, a jacket needs to be created and embedded there.

Plasti-Paste® II is a fibre reinforced polyurethane resin made of two components. It is mixed with a ratio of 100A : 62B by weight with a spatula. It adheres to vertical spots. Depending on the silicone mold, a jacket can be made of either one part or even from many parts in more complex molds. The jacket should be removable without problem when a silicone mold contains a cast inside. That is why thorough planning is essential for a multi-part jacket.

Plasti-Paste® II hardens completely after 90 minutes and is ready for further work. It can be colored with pigments such as *SO-Strong®*.

SMOOTH-CAST® 65D

This medium-hard synthetic resin is used hollow casts. Hollow casts are made by pouring resin into the silicone molds and turned or rotated in a machine until it has adhered to the silicone mold walls and hardened. It slowly becomes thicker, which ensures that the distribution within the mold is uniform. Like most resins, the 65D can also be colored with color pigments. It's unfortunate then, that the Shore hardness isn't so high. It was painfully

noticeable in a couple of casts in my case, where these parts "weakened" in a few months in the sense they bent under the weight. So, some part may turn out to be bent rather than straight.

FOAM-IT!® AND FLEX FOAM-IT!®

There is *Foam-iT!*® for light-weight casts in which a mixing ratio of 1A : 1B is used. There are all-expanding rigid foams that are either poured or painted, depending on the product version. These combine well with Smooth-Cast D65 where the core is expanded with *Foam-iT!*® in order to get a sturdy but light structure. We use *Foam-iT!*® for flexible casts for example stage fight weapons as in LARP (Live Action Role Play). Even here, depending on the product, there are varying thicknesses of cell structures and expansion strengths. I love using *Flex Foam-iT!*® for products like daggers and swords.

HOW DO I DISPOSE OF UNUSED RESIN?

Resin and silicone are classed as special waste and need to be disposed of properly. In Switzerland, we are able to get empty containers in a drug store or pharmacy free of charge.
Never attempt to flush the material down the toilet or throw in the normal domestic waste bin. That's extremely harmful to the environment! Silicone and especially synthetic resin contain carcinogenic and hazardous substances in a liquid state, so our hobby isn't exactly environmentally friendly. That's why, it is important to take a couple of extra steps and take everything to the drug store or pharmacy. The environment will thank you.

ADDITIVES FOR SYNTHETIC RESIN

There are a number of additives for resin with which you can achieve excellent effects. There is an exhaustive list of additives below to help you get introduced to the vast range available.

LIQUID COLOR PIGMENTS

SO-Strong® color pigments by Smooth-On Inc. provide a number of options to tint resin. Even the smallest drops of this product will color large quantities of casting resin in rich colors. Normally, the pigment is first mixed with Part B (blue container) of the resin and then everything is added together to Part A (yellow container). This way you won't waste any time trying out the color and be free of the fear that it'll harden in the cup, especially when you are using fast curing resins.

CAST MAGIC® POWDER

The *Cast Magic*® powder is available in many variations: Glitter, metallic and other effects additives for casting resin with which you can create cool effects. They are UV and weather-resistant and can be mixed with synthetic resins. It is also possible to mix these with *SO-Strong*® pigments to achieve new color nuances. For my projects I often need them as material to create effects in transparent synthetic resin (see the image above).

METALLIC POWDER

"Cold casting" gives some interesting effects. The metallic powder is powdered on the entire inner wall of the silicone mold and then a part of the resin is mixed with approximately a third of the metallic powder of choice. Then the mix is poured into the silicone mold and is divided uniformly until it's hardened. The surface of the finished cast can then be polished until the model looks like metal. This is the easiest way to simulate metal. Another method is only mixing the metallic powder in the resin. In that case you will need much more powder and a ratio of 1A:1B:1. Not every resin can handle such a high metallic powder content. An example is *ONYX*®. It begins to foam a little and will then spoil the casts. I can, however, recommend Smooth-Cast® 326 here, because it causes hardly any problems. While buying metallic powder, make sure the grains are really fine.

ACRYLIC POWDER

An alternative filling material which I personally love to use is acrylic powder. Normally, you need this for nail art, but since it is so fine, I have used it as a pigment and filler for my synthetic resin. There is a wide range of glitters, neon colors, pearl effects and fluorescent powders. The best is to try the acrylic powder and decide which one you want to stock up for your personal inventory.

IGNITE® AND CRYPTOLYTE®

With *Ignite®* Smooth-on offers a range of palettes in fluorescent colors that light up in black light.

Cryptolyte® for example is colorless in daylight and is visible only in black light.

WOOD, STONE AND PORCELAIN EFFECTS

If you want a natural effect with your synthetic resin project, for instance an impression of wood or marble, you could use *Ure-Fil®* by Smooth-On. *Ure-Fil® 7* is mainly used for creating a marble effect while *Urefil® 5* is used for wood effect. The mixing ratio for the resin is normally given clearly in the datasheet of the product.

If you want a porcelain effect, then *Urefil® 3* is the one for you.

EVERYTHING ELSE

As mentioned earlier, a specialized store will have a large selection of additives. Less conventional fillers like pebbles, shavings (metal, plastic or discs), etc. should first be tested with a small quantity of synthetic resin before using them for larger casts.

As they say, an ounce of practice is worth a pound of theory.


Easton, PA 18042
www.smooth-on.com


Red
agic

IGNITE COLORS USED AS PAINTING COLORS

VACUUM CONTAINER WITH VACUUM PUMP

This chapter is about the vacuum container and corresponding pump. Since these machines are really expensive, you might first want to evaluate whether you really need them.

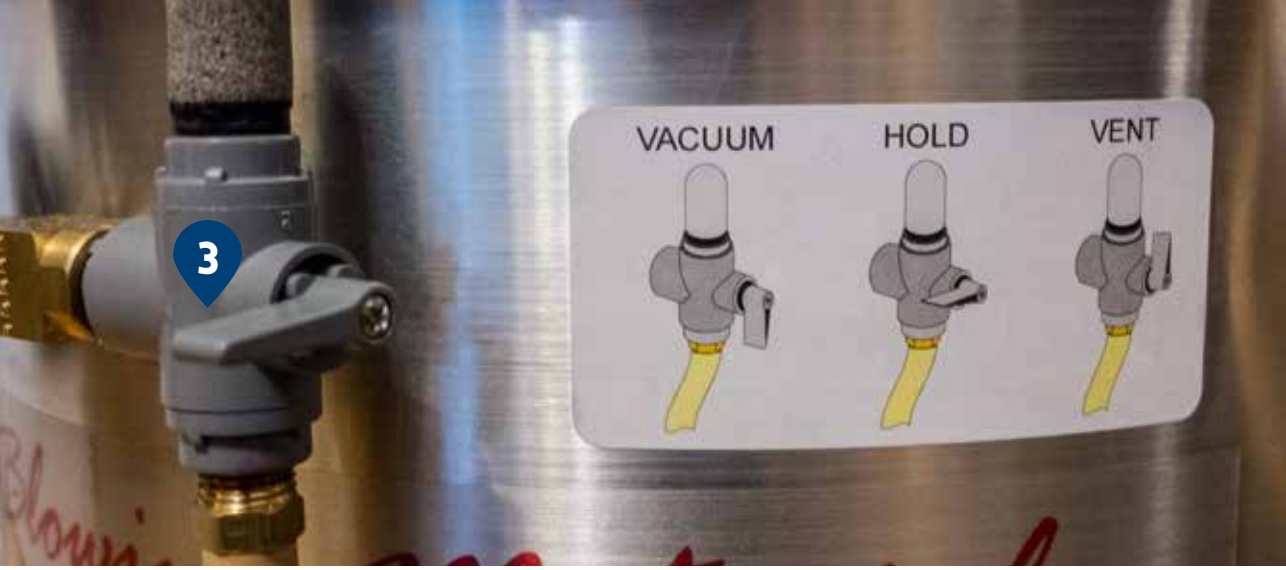
A vacuum container and matching pump are enormously important for professional use. With these machines, you can eliminate air bubbles that have built up while mixing silicone or synthetic resin. The vacuum presses out these bubbles, leaving behind a compact mixture, which is quite visible in transparent synthetic resins. If you, for instance, pour in pretty clear-as-glass projects and ask yourself why the air bubbles don't go away, the vacuum unit will help you out. Though

the costs of the container and pump are easily around €700 to almost €1000, but the purchase is worth it when you want to take this hobby further or even go professional.

FOLLOW THE INSTRUCTIONS

Handling and using the vacuum unit is easy. For my Smooth-On model, I connected everything as instructed in the user manual and filled the required oil in the pump. Note that the black stopper **[1]** on the green oil mist separator should be taken out **before** switching on the machine. When the pump is not required and is switched off, close the oil mist separator with the stopper.

The tube must be connected to the suction supports **[2]**. Then mix the silicone or synthetic resin and place the mixture in the container. Note that the container needs to be large enough since silicone can expand by up to 5-times its original volume under vacuum before collapsing again.


VACUUM
HOLD
VENT
3


ASHCROFT

Open the drain lever **[3]** on the vacuum container to "VACUUM" and switch on the vacuum pump. You'll see how the display changes and slowly rises up to about 29 inHg. Now the silicone or synthetic casting resin should begin to expand and bubble. Turn off the pump at exactly 29 inHg and turn the lever to “HOLD“. The air bubbles burst and when the mixture collapses back, leave it inside the chamber for an additional 90 seconds. Switch off the pump and turn the lever in the vacuum container slowly to "VENT" to release the pressure. Once the display shows zero, you can remove the lid and use the mixture for your project.

Please note that you cannot degas every silicone or resin! With quick-curing materials such as *Smooth-Cast®* *ONYX®*, you don't have enough time left and the mixture will harden in the mixing container itself.

Try to degas such resin before you mix it, it sligthly decreases the formation of bubbles.

ONE-PART SILICONE MOLDS

A one-part silicone mold is made of a block of silicone. This method is good, if you are in a hurry or only need to make a few copies. The advantage is that there is much less work involved than in two-part molds; for instance, you don't need to embed the model in clay and then clean it up.

One-part silicone molds are good for prototypes and simple molds. These molds are used for casts in the décor industry and also for pendants as in our example here.

In a one-part mold, the model is stuck or screwed on to a plate. Then the mold box (see page 16: The mold box) is built. It is important to have about 2–3cm thick silicone wall around the model (master) so that the mold has some stability later while casting.

Make sure you always use a release agent for the inner part of the box before pouring in the silicone. You also have the option of adding color to the silicone at this stage before you begin mixing. While filling the silicone in the mold box, don't cover the model with the fluid right away but rather carefully let it flow into a corner. The best is to aim for the lowest corner in the box. The silicone trickles in to your model slowly from below. Otherwise, you might quickly find that the liquid develops air bubbles. This influences the quality of the silicone mold since the bubbles that get formed during

the mixing adhere to your master and you won't get the right details from the mold.

Allow the silicone to flow down in a thin stream so that you can further prevent bubbles as in this way they burst instead.

VENTILATION

You'd rather use a vacuum container to remove the air bubbles beforehand? But you must remember in such a case that you'll have slightly smaller amount of silicone or casting resin once all the bubbles are removed in the vacuum container (the material will be more compact). This means that it is better to use a slightly larger amount than required so that you don't need to add silicone later, which would of course mean more work!

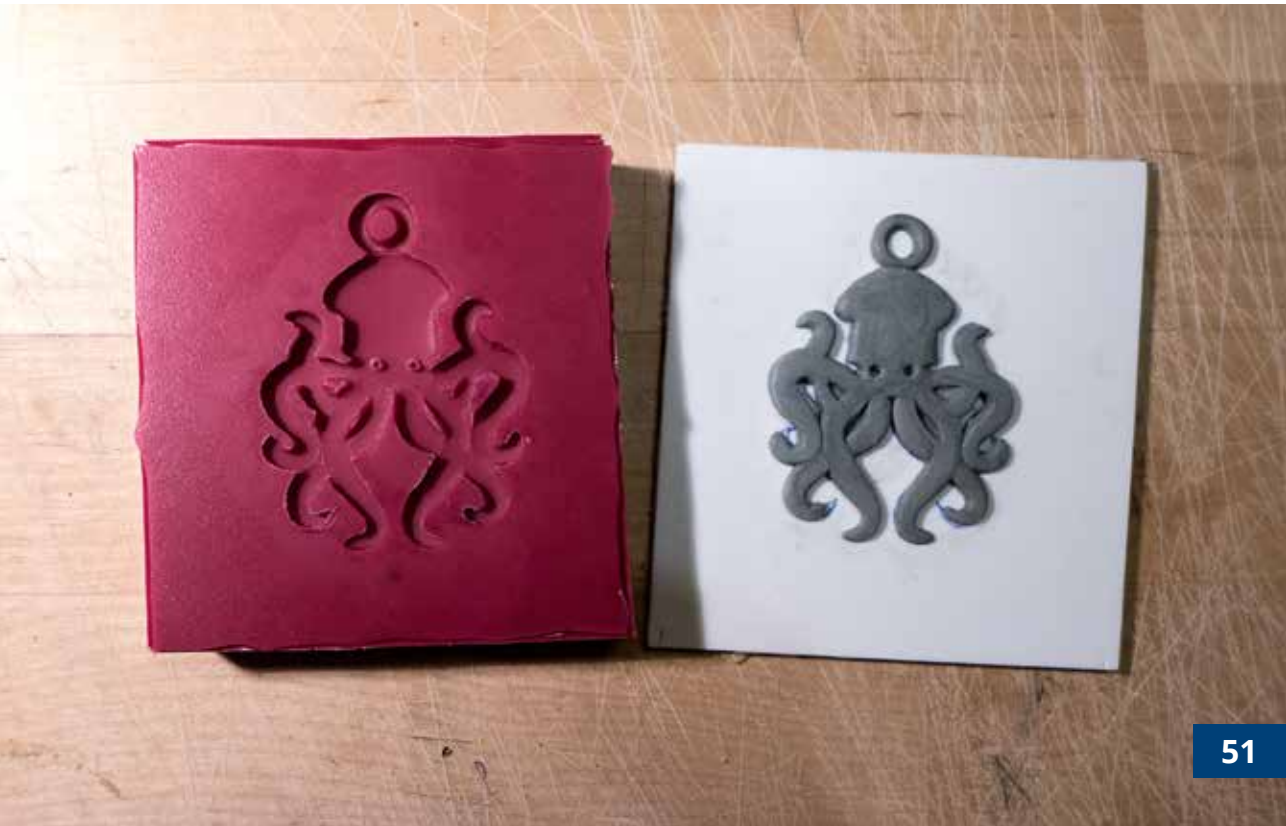
For this experiment here, I haven't ventilated the silicone in advance, as you can see bubbles on the surface. This is why, finer details such as the eyes have not filled up completely. It doesn't matter much in this small model. But if you are making a larger one, you'd have to smooth out the errors for hours after the casting, which is quite annoying.

Once the silicone has hardened completely, the mold box is removed and model is taken out from the silicone block. Your negative is now ready for making copies. Here as well, you

MY SILICONE IS LEAKING!

The more silicone a mold box can hold, the more pressure is applied on the walls of it. It may be that the silicone runs out through small cracks and your box leaks because you've perhaps overlooked a couple of places while sealing the walls. If so, you can easily stop the leakage by quickly using some modelling clay. You can also seal it with hot glue but for some reason it doesn't stick very well. Hence the modelling clay recommendation. Keep an eye on the mold for more such weak spots.

If the box walls are also bending and you are afraid that they'll break under pressure from a lot of silicone, then secure the walls at the top with a crosspiece as support. Over time you will get to know how to make boxs stable enough not to need regular improvements.



will use a release agent for every casting step with resin so that the silicone mold is saved from damage and weathering. As an exception, I have used synthetic casting resin *Gedeo Pearl Resin* by Pébéo for this small pendant because it already had pretty effects mixed in the resin.

You can, of course, dust the silicone mold with metallic powder and make a cold cast with *Smooth-Cast® ONYX® FAST* and later polish the metallic layer on the surface.

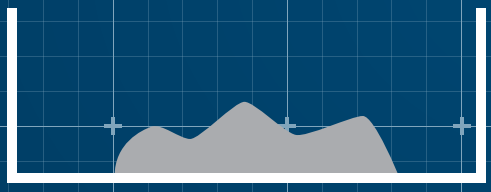
HOW LONG WILL MY SILICONE MOLDS LAST?

Silicone molds can be used as long as the surface is soft and has not become brittle. The molds become slightly harder with time and the surface of the negative becomes glossy and there may also be small pieces that break off when you take out the cast. Depending on your use, it can be several years before they become unusable. Then it is time for a new mold. With the molds you can create several dozens of copies like I did. Store them, if possible, with the corresponding master on the inside on a stable and horizontal base. This way you can avoid warping.

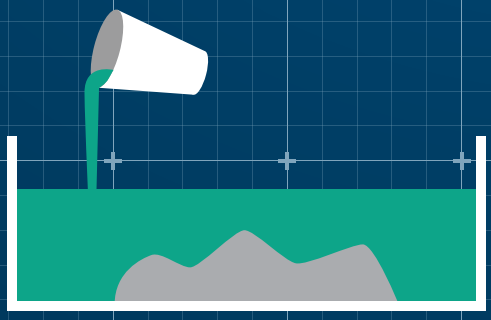
CROSS SECTION OF A ONE-PART SILICONE MOLD

1 This cross section shows a simple illustration of a one-part silicone mold with a mold box. The model here is glued or screwed onto a base.

2 Around the model is a basin of PVC sheets, joined together with hot glue. A release agent has been spread over the inner walls and on the model to allow silicone to come off easily later.



3 Silicone is being poured into the mold and hardened. Keep an at least 2–3 cm thick layer of silicone on the model to get a stable mold.



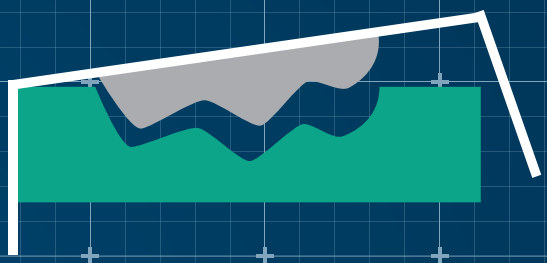
MOLD BOX

SILICONE

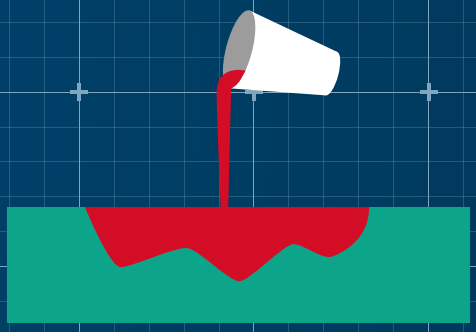
MODEL/MASTER

RESIN

4 After the hardening, the mold box is removed and the model/master is removed from the silicone mold. It's quite clean and quick because of the release agent.



5 Before you pour in the synthetic resin, apply the release agent here as well. Pour in the resin and let it harden. Note the hardening/curing times on the datasheet of your resin.



6 Once the cast has cured, you can remove it from the mold and continue with the next one.

UNDERCUTS IN MODELS

Undercuts can be difficult for a beginner.
Let's take a simplified look at it.

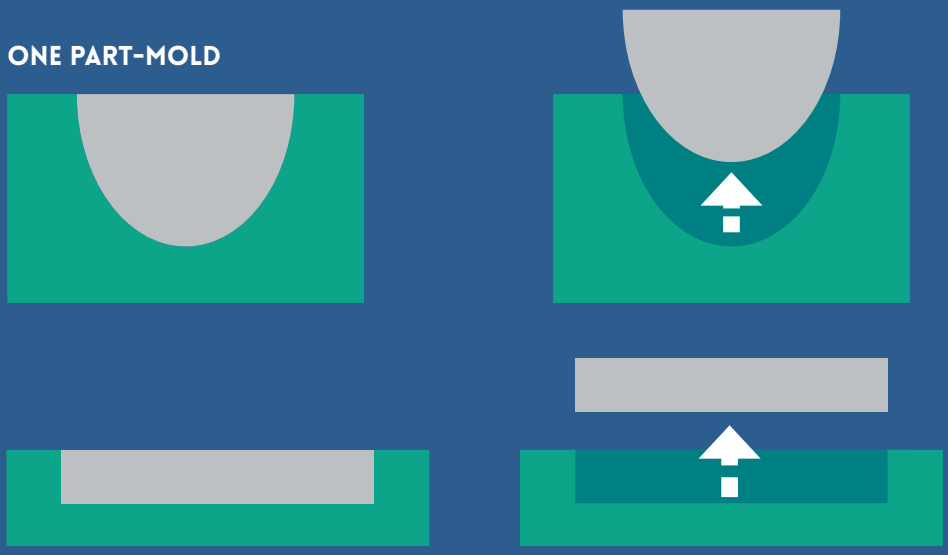
Undercuts are spots in a model that can give problems while molding with silicone. Often, these are projections or complicated parts such as narrower sections, hollow spots or bulges.

If you have such sections, you cannot make a one-part mold. You will need a two-part mold so that the model, the cast and silicone mold do not get damaged.

Models such as the one in the example (Page 48: one-part silicone mold) that can be easily removed from the mold normally don't have any undercuts. In all other models you need to decide in advance the kind of silicone mold is best suited. Look at the example on the right, you see a couple of molds that can be made with one-part silicone molds since they can be removed easily once they harden.

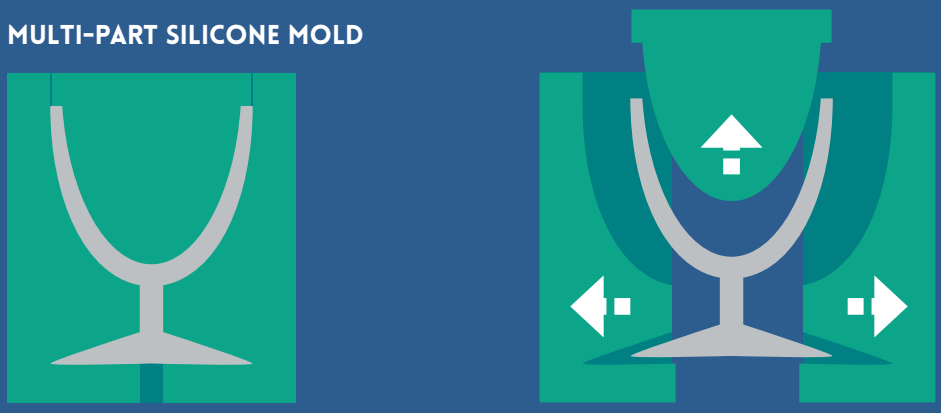
In complicated molds – those with undercuts – you need to quickly decide on two or multi-part mold since otherwise your model will get stuck. That is why it is important to carefully study the model's structure and then decide the number of parts your model can be molded in.

ONE PART-MOLD



TWO-PART SILICONE MOLD

MULTI-PART SILICONE MOLD

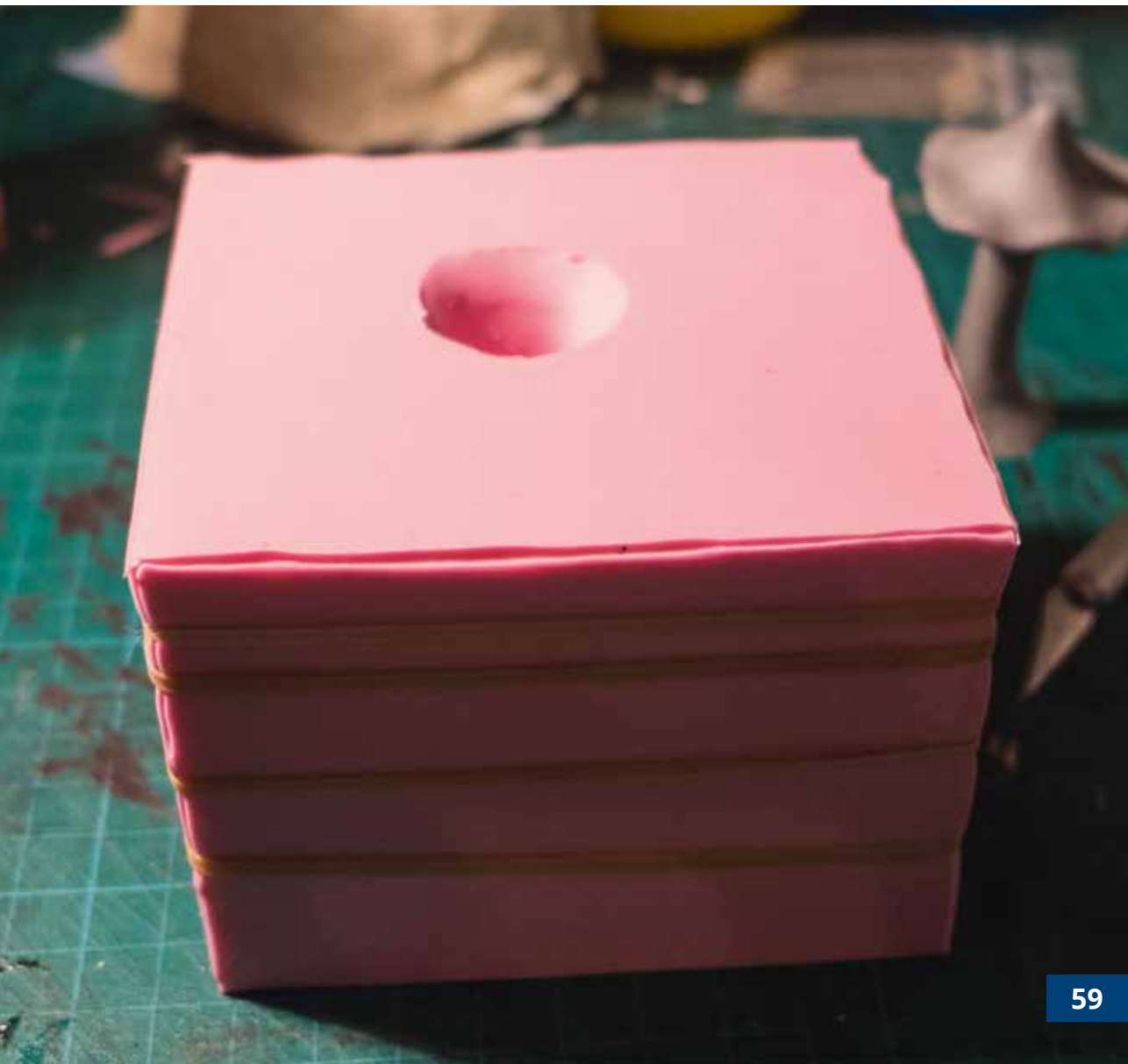


CUT SILICONE MOLDS

Cut silicone molds are an easy method for complicated masters (models) that have been actually created for two-part molds, but due to time restrictions, you use the cut version.
If you are pressed for time, then this version would be something for you.

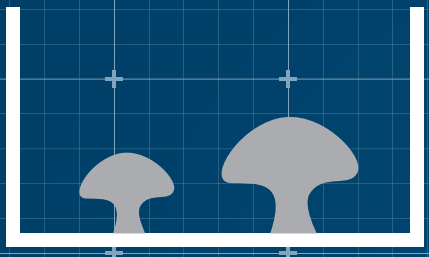
The process is the same as one-part mold up to a point. You pour the silicone in your mold box and let it harden. Normally, you can remove your model from the mold without any problem and use it for casting. But this is where the undercuts or projecting parts will make things difficult for you. In this case, you have the option of cutting the silicone up to the model. You can do that with a sharp scalpel or knife that lets you work with precision. If the silicone mold permits, cut your mold in waves and work carefully inwards up to the model. The wave line should become weaker as you approach the model. In the example on this page, the line gives out short but serves as the registration point when you want to bring the two halves together.

This kind of silicone mold should be used only when you are pressed for time and want to cast only a couple of pieces. But if you've planned for over a dozen copies, then I recommend that you use a clean, two-part silicone mold that will then keep for a long time. If the mold is used often, it is possible that the silicone will wear out and the wave line does not lock in place.

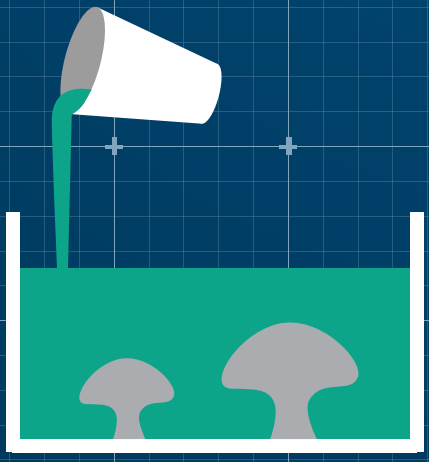


CROSS SECTION OF A CUT SILICONE MOLD

1 This cross section shows a simple illustration of cut silicone mold-making with a mold box. The model is stuck or screwed on to a base and around the model is a basin of PVC sheets, joined together with hot glue. A release agent has been applied over the inner walls and on the model to allow the silicone to come off easily later.



2 The silicone will now be poured into the mold and hardened. There should be enough silicone around the model here as well in order to guarantee good stability later while casting.



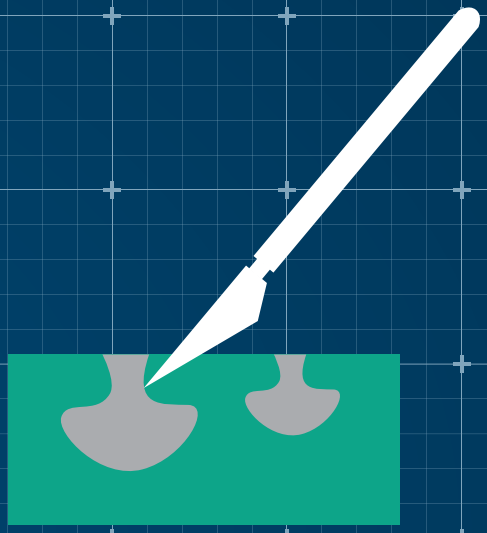
MOLD BOX

SILICONE

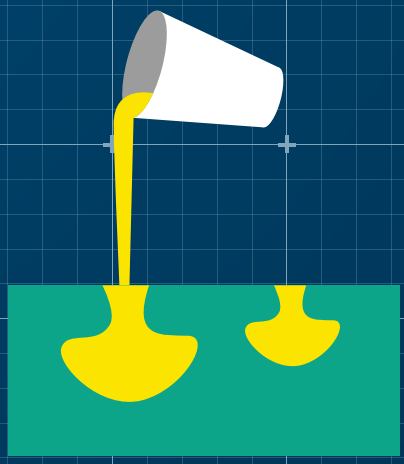
MODEL/MASTER

RESIN

3 After it hardens, make wave-shaped cuts with a sharp scalpel in the silicone until the model inside is released. The wave lines will be flattened closer to the model. The cuts should be placed in such a way that while closing the silicone mold, they behave like registration keys.



5 Now the silicone mold can be closed with rubberbands and the cast can be made.




VARIOUS RESIN DAGGERS


Winterhold
Whiterun
Whiterun Hold
White River

TWO-PART SILICONE MOLDS

Two-part silicone molds are, as the name suggests, made out of two parts. They are solid silicone molds that require an average amount of work.

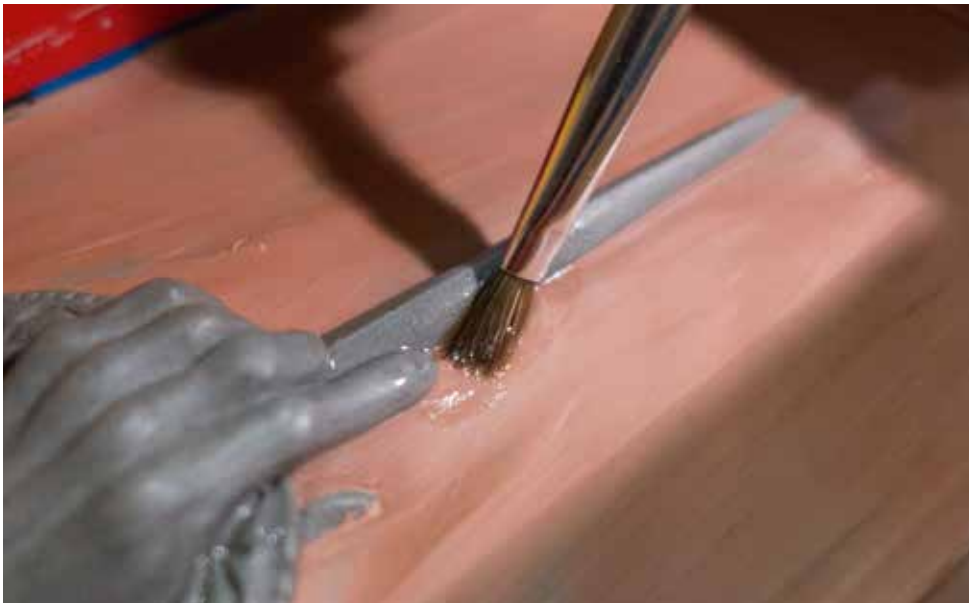
MODELLING CLAY

A mold box is also required for two-part silicone molds. Place the model you want to copy on a base like PVC sheet and embed everything in sulphur-free modelling clay (e.g. like *Chavant NSP Sulfur-Free Plasteline*). If the modelling clay is too hard, you can place it in warm water and let it soften. The model should be covered roughly half-way. The best is in such a way that all its complicated spots like undercuts are well divided into two halves. You can use a water-proof pen to draw a guiding line around the model to indicate the point where you need to put the modelling clay. Make sure you don't stick the clay on important elements of the model, because they'll show later.

If you have wet modelling clay, let it dry out completely. Clean your master with acetone or Isopropyl to remove any remaining modelling clay. When it is clean enough, you can add registration keys in the material (see how to correctly handle on Page 74: Registration keys).

RELEASE AGENTS

When everything is ready, spray the entire inner part of the mold box and model with a release agent like *Mann Ease Release® 200*. This prevents the




SALTER


239
SALTER

silicone from sticking to the box, modelling clay, and your model. Though there are certain types of silicone that are non-adhesive and can be used without release agents, but out of experience, I wouldn't want to rely on that. It's better to have a layer of release agent in the box rather than having to start from the beginning and maybe even damage the model because the silicone won't come off.

MATH IS COOL

Now measure the silicone according to the instructions on the datasheet. Let's take for example *Mold Max® 30*, where you weigh 239 gm of Part A as shown. The datasheet asks to mix 100A:10B by weight.

In order to get the amount for Part B, divide 239:100 and multiply the result with 15 to know how much of Part B you need.

Make sure the container for Part A is large enough to allow mixing Part B in without anything spilling over. Even when you are working with a vacuum container, you need to ensure that the cup is large enough (see Page 44: Vacuum containers with vacuum pumps). See for comparison: I have not placed half of the silicone (image on Page 67) in advance in the vacuum container. If you want to color the silicone, you can do so before mixing it. Make sure that the mixture gets a uniform color. If there is still white silicone on the walls and base of the cup, scrape the bits out and mix everything well. You have enough time to mix everything really well with *Mold Max®* 30.

WORK CLEAN

As in casting, pour in the silicone really slowly like before and let it flow in a thin line into the lowest point of your mold box (if you have not ventilated the silicone).

Once the first half of the silicone is cast and cured, you can dismantle the mold box (if you have used PVC sheets for the box) and remove the modelling clay. Clean all spots on silicone imprint that show traces of the clay so that you get a clean counterpiece of the second silicone half later. Let your model, if possible, inside the mold and do not bend the mold too much. When you remove your model from the silicone mold, it is possible that when you replace it, all the key points of the model are not in the same place. Silicone can then flow under your model when you pour your second half with silicone.

If everything is cleaned up, secure the mold with a new mold box if your original box was made of PVC sheets. It's a time consuming process and needs some preparation. Some steps always need to be done twice to make two-part silicone molds.

ADVANTAGE OF PLASTIC BLOCKS

With boxes made of plastic blocks, it is quite easy to make room for the second layer of silicone if you turn it over, remove the modelling clay and after cleaning the second side, build a couple of layers of blocks to accommodate another round of work (see Page 69).

To begin with, generously spray the surface with release agent otherwise the silicone halves will join together and your entire effort will go waste. Once the second silicone half has hardened, remove the blocks and clean them so that you can use them again. The silicone mold will now be ready to begin the first test casting. As already mentioned, (see Page 22: Silicone and casting resin 101), you can, depending on the size of your silicone mold, easily measure the amount of casting resin you need with tap water.

STABILISING THE SILICONE MOLD

When everything is ready, spray the entire inner portion of the silicone mold with the release agent, close it and secure the mold with rubber bands. Depending on how big your mold is, you might need additional wood supports and tension belts to stabilise it otherwise you might have a warped cast.

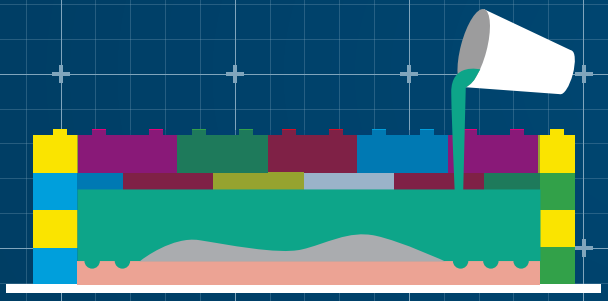
You can now either ventilate the casting resin with vacuum before filling

the mold or mix it without this step and pour the mixture into the silicone mold. Keep the potlife (mixing time) in mind, because this varies from resin to resin. Once the resin has hardened, you can remove the finished model from the silicone mold and prepare it for further working.

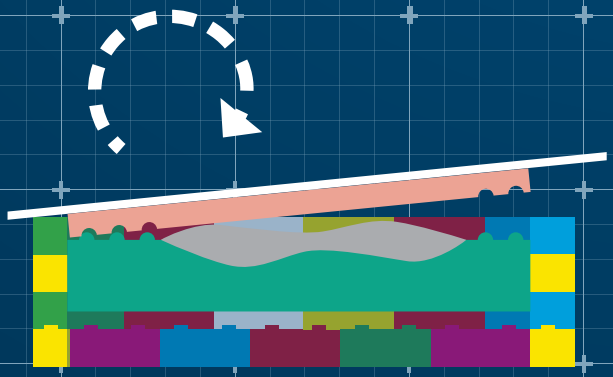
CROSS SECTION OF A TWO-PART SILICONE MOLD

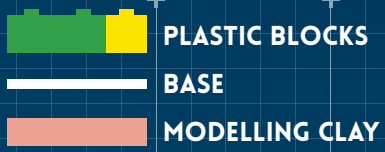
1 These cross sections schematically show the process of casting a two-part silicone mold in a mold box. The model is then embedded in a layer of clay and build a box of plastic blocks around it.

2 Silicone is being poured into the mold and hardened. Do not pour in the silicone right on the top of the model. Keep the silicone layer at least 2 cm thick around the model to ensure the mold is stable enough when making your casts.

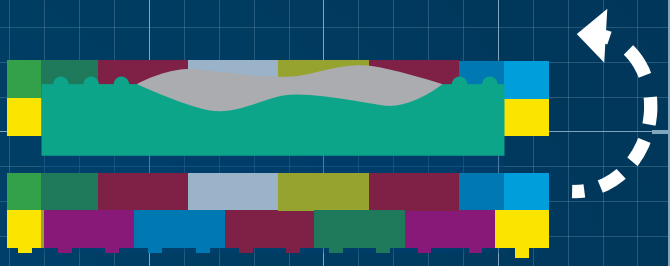


3 Once the silicone has hardened, turn the mold box over, remove the base and clean out the clay from the silicone section. You can easily remove the modelling clay from the mold with Isopropyl and paper tissues.

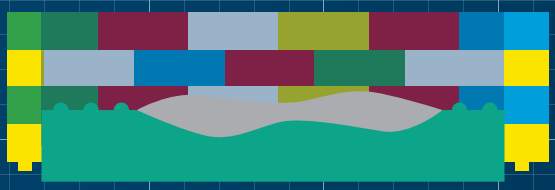




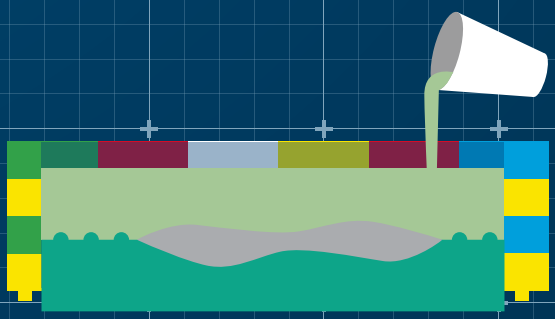
4 With a mold box made with plastic blocks you have the advantage of not having to make another box to cast the other silicone half. You can comfortably stack the walls from one side to the other. Once done, you have enough space for the second silicone half.



5 Even if a small part of the silicone mold now sticks out at the bottom, it will not effect the quality of the silicone half. The silicone seeps in through the gaps between the plastic blocks, thus preventing it from running out.



6 Now pour in the second silicone half. Remove the silicone from the blocks when it has hardened and store the blocks away for your next project. Clean dirty plastics blocks with Isopropyl so you can use them another time.



REGISTRATION KEYS

The so-called registration keys or keys come in various shapes. Mostly they are lines or round indentations and they are normally used for multi-part silicone molds.

We need registration keys to put multi-part silicone molds back together in their original position. These are pressed into the finished modelling clay.

You can best make them with the round end of a pen or brush or you can also make them with a modelling tool. Knobs **[1]** and lines **[2]** are common keys because they can be made easily and quickly and still fulfilll their job. Make sure that the knobs and lines are not too thin, too deep, too flat or too small, otherwise, they might break off to one side or not lock in place when you place the two molds together. It is also important to not keep the points too close to each other or to the master. Keep at least a 1 cm gap between them. You can also keep the examples below as reminders and then you'll never go wrong.


1
2

CASTING VENTS

This is a small introduction of the casting and ventilation channels. They are an important part of the two-part silicone mold process, perhaps requiring some practice to allow you to use them with confidence.

When you pour resin into a mold, the excess air will need to be let out somewhere. Since this air often cannot expand to where you are filling your casting resin, you need to make some ventilation channels that are independent of the casting channel.

When the resin flows into the silicone mold, it's pressed towards the ventilation channel at the highest point in the mold.

When the resin slowly oozes out of the ventilation channel, you'll know there is no space left for more resin within the mold. When everything is hardened, you can simply cut off the extra piece of the ventilation and casting channel along the cast and get a clean surface.

The correct placement of such ventilation channels cannot be generalised here since each model needs to be assessed differently. What is important is to make sure these ventilation channels have the outlet on top of the silicone mold at the highest point. They can also link from several points from the model into a collective channel (e.g. 3 channels meet to make one), or link one part of the model with another part **[1]**.

In our finished silicone molds here in the example, you can see where the casting channel **[2]** and the ventilation channel **[3]** are located. You can either press in the casting and ventilation channel in the base of the modelling clay or even cut the silicone later **[4]**.

The images on the right show you a small selection of silicone molds and how such channels run through them.


3
2


3
2
1


4

COLD CAST RESIN SWORD

BRUSH-ON SILICONE

As the name suggests, brush-on silicone is painted directly on the master with a brush. This is a completely different procedure from what we have talked about so far.

Brush-on silicones such as *Mold Max® Stroke,* save material since they are applied in a controlled way with a brush and don't need to be poured in a mold box.

They do require a longer preparation time than the other silicone molds. In this procedure, our master is embedded in the clay as we already know from the two-part silicone mold. However, we don't need to build a mold box (you can add walls as support), but instead fasten the model on a base. Registration keys are made on the modelling clay.

For the first layer of *Mold Max® Stroke*, apply a thin layer of the silicone on the master's surface. While doing so, make sure that everything is covered and there are no bubbles. Every nook and cranny needs to be covered because you won't be able to correct the mistake later. You might notice that the silicone does not adhere completely to the master and flows down slowly. This is because the silicone in this consistency can be easily applied to the indentations.

SILICONE THICKENER

In the next steps a thickener (*Thi-Vex®*) will be used to apply thicker layers of silicone. You will be able to make all followign layers quicker with this consistency. I like to work with differently colored layers here because it's easy to differentiate between the layers. This way, you can be sure you apply a complete coat in each layer.


SHAKE WELL BEFORE USING
STROKE
SILICONE RUBBER
Mold Max
ON-ZERO-OFF
UNIT
SALTER


Thi-Vex
Silicone Thixotropic

You can also add a few registration keys to your silicone layers made of small silicone strips like you see on page 83.

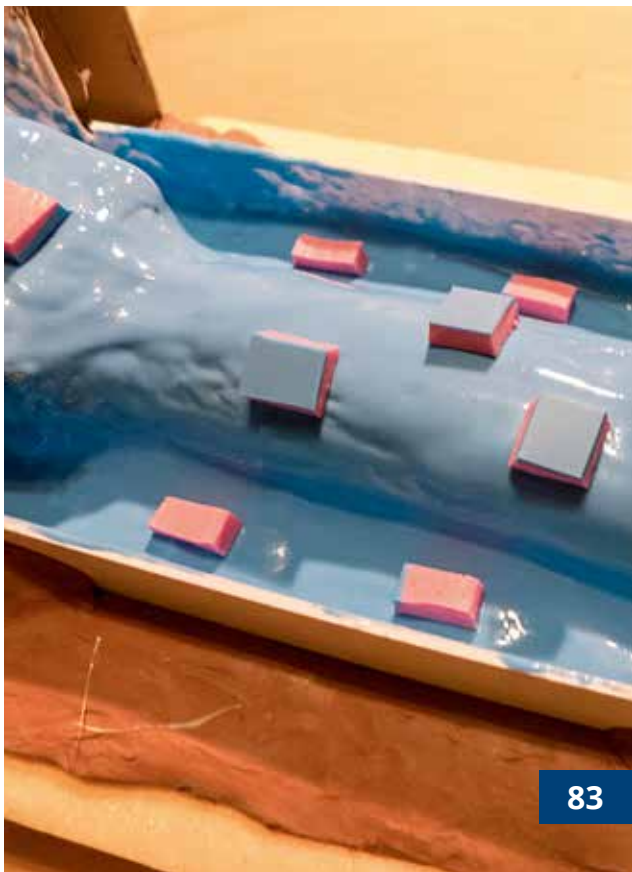
After several such layers and an approximate thickness of 1 cm, the first part of the silicone mold is complete. Now after the mold has hardened completely, you will make the jacket.

A jacket is a hard and stable support for brush-on silicone molds, which helps supporting the soft molds while casting with resin and it prevents them from warping.

You can make these jackets with *Plasti-Paste® II*, in which the components are measured either by weight or volume. I like to make it by weight because it is simpler and more exact!

The *Plasti-Paste® II* is applied on the silicone mold until a sturdy layer is formed. With *Plasti-Paste® II* you can add additional material at any time (even after it has hardened), because *Plasti-Paste® II* adheres to most surfaces and attaches without any problem.

Attention, *Plasti-Paste® II* becomes really hot during the curing process.



Do not touch those parts! The jacket should ideally be 1–1.5cm thick and should not have any too thin points because otherwise it can break. You can always add more layers for stabilization, even on cured ones.
Once the jacket has hardened, you can remove the clay and clean your master.

NEVER WITHOUT THE RELEASE AGENT

Please don't remove the master from the silicone mold and don't remove the jacket after everything is cured. Remove the clay and clean all areas.
Now the second part of the silicone mold is next, but before you carry on, I'd recommend covering the jacket's edge with aluminum foil. When you later place the second part of the jacket without any foil, it may happen that *Plasti-Paste® II* sticks despite the release agent. The aluminum foil is here to separate the two halves without much effort later. Now spray everything generously with a release agent and coat the other half of the silicone mold in the same way as the first half. Simply cut off the excess silicone from the edges. You coat the jacket with *Plasti-Paste® II* here as well

after your silicone layers are all cured. After hardening, the points where the foil served as a separator can be opened. If it does not happen immediately, you can carefully prod along the seams with a screwdriver and slowly release the two parts. Do it from all sides until it is clear that the jacket will come off easier. Please do not apply force with the screwdriver otherwise you may damage the mold and possibly the master as well. Once you have separated all the parts from each other, you have your finished silicone mold with its jacket. You can secure the jacket for casting with rubber bands or tension belts. If your mold is really big, you can also hold it together with screws and nuts for casting.

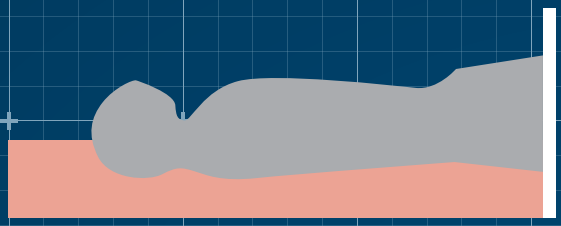
When not in use, always store the silicone molds with a jacket with the master inside so that they retain their shape.

WARNING, RISK OF INJURY!

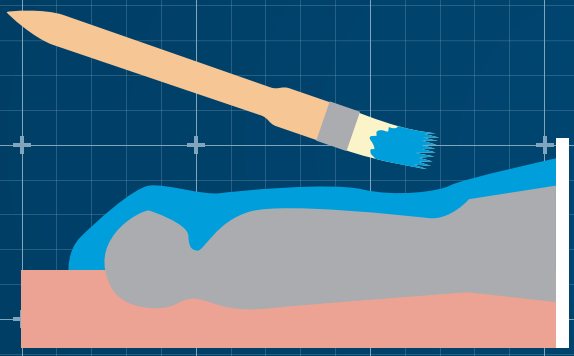
Edges and corners may form after applying *Plasti-Paste® II* that remain after the curing in such a way that you may injure yourself while handling. Therefore, it is recommended that you smoothen out the surface and press back the pieces that stick out either with some Isopropyl and brush. Or during the curing process, use your hands to press them in. You must, of course, wear gloves while doing this.
You will be pressing in these sharp points back onto the jacket. I've found this to be easiest way to remove the cumbersome lumps and bumps because I hurt myself a couple of times in the beginning.

CROSS SECTION OF A BRUSH-ON SILICONE

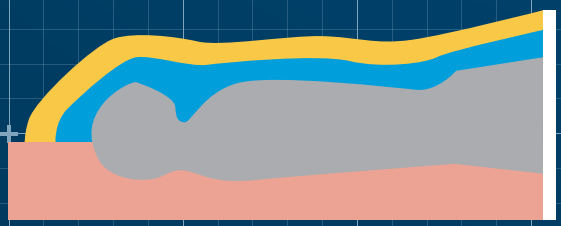
1 This cross section shows a simplified illustration of a brush-on silicone mold as described in the last few pages. The master is embedded in modelling clay and coated with a layer of releasing agent.



2 The silicone is now brushed on one layer at a time until the walls are stable. The first silicone layer is brushed without an additive and all subsequent ones are thickened with *Thi-Vex®*.



3 After the layers harden, a releasing agent is applied on the silicone later and the jacket is built here with *Plasti-Paste® II*.



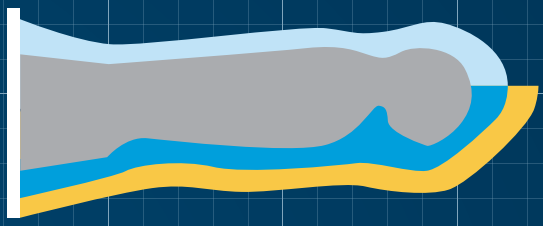
JACKET

MODELLING CLAY

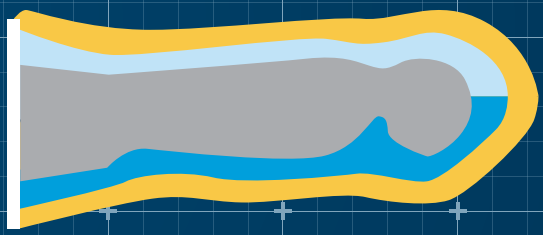
SILICONE

MODEL/MASTER

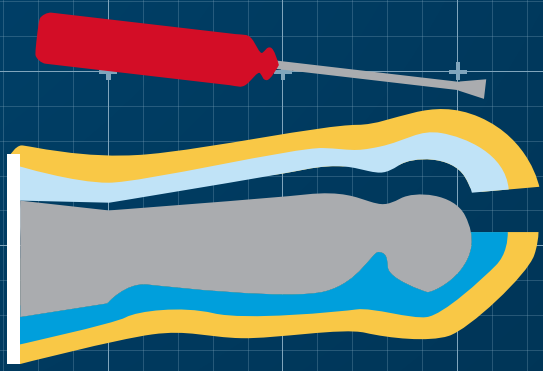
4 Now the modelling clay is removed and the entire piece is turned around so that you can work on the other side. After using the releasing agent again, the other silicone half will now be brushed on the master using the same procedure as before.



5 Once the piece is cured, extra silicone can be cut off so that there is nothing unwanted on the jacket. Now wrap one half of the jacket in aluminum foil so that it does not get stuck while adding layers of Plasti-Paste® II.



6 The jacket can be carefully opened with a screwdriver by pushing it gently and slowly into the seam and pry it loose.



A MACE MADE WITH RESIN

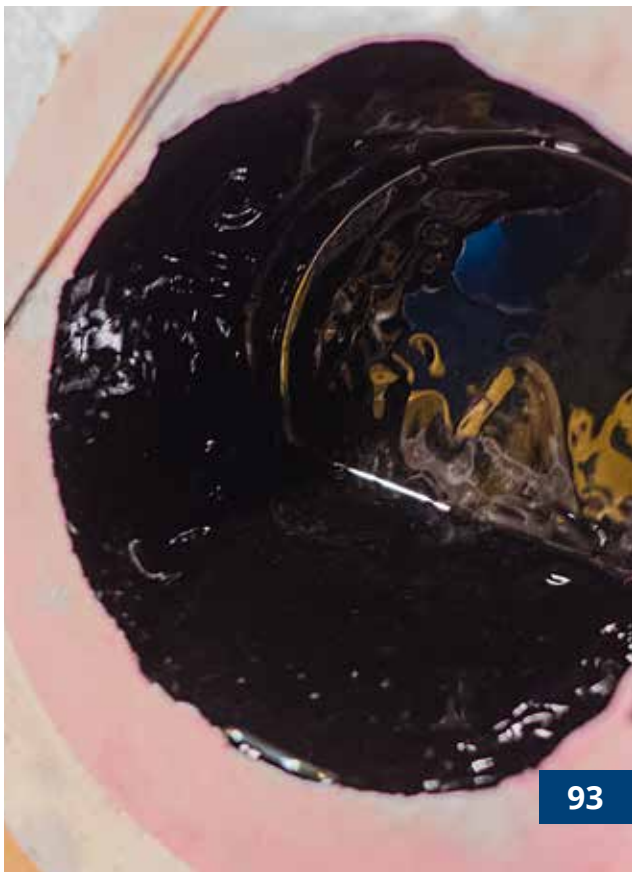
ROTATION CASTING

Also called roto-casting, it's used for light-weight casts.

In this method, only the inner walls of the silicone mold are covered with resin. The aim is to make a light-weight cast and improve the wearing comfort of props or a part of a costume. No one wants to wear large weapons or horns on their head or objects like these made of solid synthetic resin. You can use *Smooth-Cast® ONYX® FAST/ SLOW* or *Smooth-Cast® D65* for rotation casting. Both synthetic resins become thicker with each step until they harden. The resin is poured into the silicone mold, which is then rotated by hand or machine. Rotation by a machine will naturally be more uniform than by hand, but you don't need a machine for the projects in this book. I also make my rotation casts by hand.

You can choose either *ONYX®* or *D65*. Both can be used for rotation, but do keep the Shore hardness in mind. Once you have selected your resin, you can begin the rotation. Work over a cover or plastic sheet spread out on the ground, while rotating, because the resin can splash around. While doing the manual rotation, always wear gloves, correct clothing and safety glasses.

If you notice that the entire inner portion has not been covered with resin enough, you can also make a second cast later (try to avoid doing that, though). *ONYX®*, for instance, does not adhere to the subsequent resin layers, which will mess with the stability of your cast.



GRAVITY WINS

Once your roto-casting process is done, place the mold with the cast for the final curing on a secure base. Since rotation casts still contain soft resin, they may warp, depending on how they are kept. So make sure that you store the silicone mold in such a way that it does not warp during the curing process. Look at the graphic with the examples on the next double page.

HOLLOW OR FOAMED

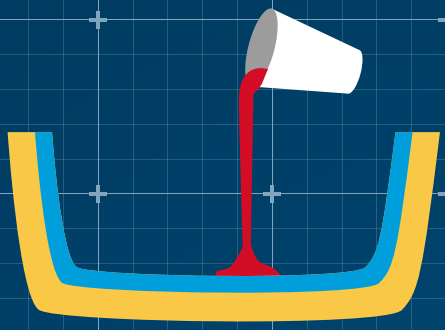
Have you thought about whether your light-weight cast is going to be hollow inside or will have some filling? There is now an option of filling the cast with polyurethane foam as example. It provides the cast a specific structure from inside, almost eliminating any chances of breakage. Thin-walled casts that will perhaps not have uniform thickness are quite vulnerable to breakage. Thankfully, you can fill up the hollow sections with rigid foam.

Foam-IT® is just right for this work. It is mixed in a ratio of 1A:1B by volume and needs to be poured immediately into the prepared mold. Expanded rigid foam has a very short life and can even harden inside the mixing cup. That is why it is essential to keep everything handy and to pour the mix in as soon as possible. The foam expands much more than the original volume and has a sturdy cell structure. *Foam-IT*® is also available in different options such as slow expanding or spreadable foam. Rigid foam such as *Foam-IT*® can also be used directly and poured into the silicone mold unless a layer of synthetic resin is required. It is often used for theatre and film props for light-weight objects.


ON-ZERO-OFF
51
Max 5000g x 1g
Max 11lb x 0.1oz
UNIT
SALTER

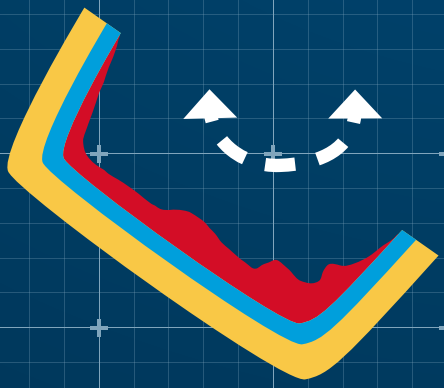
ROTATION CASTING AND STORAGE

1 Rotation casting makes hollow, light-weight casts. In this process, synthetic casting resin is poured into the silicone mold and turned around until the resin hardens. Before casting, the mold must be covered witha release agent.



2 The silicone mold is rotated uniformly by hand so that the resin does not collect at one place. Depending on the synthetic resin, it can take a couple of minutes until nothing flows any more.
You can also close the opeing with a piece of pastic to control the flow of the resin a bit better.

3 Even when the resin does not flow any more, it should be allowed to completely cure before removing it from the silicone mold (see product description of your resin).

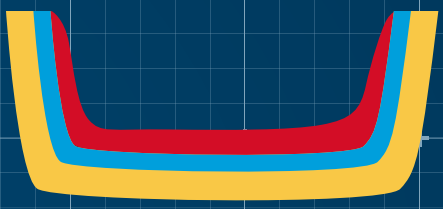


JACKET

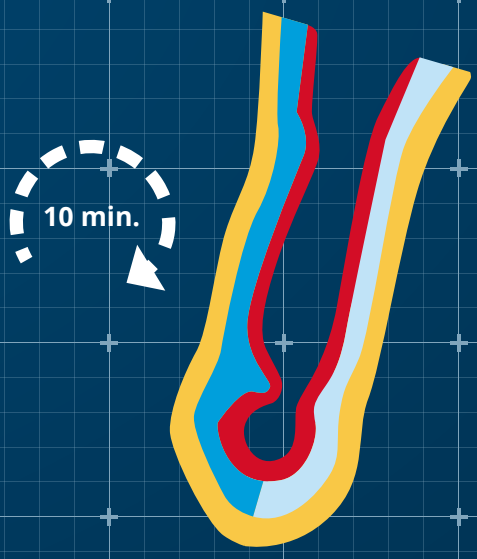
SILICONE

CAST

To ensure that, the product's storage until then is crucial. The mold shown can be kept only in this way because this way the resin can only move to the side towards the walls.
Since machines are usually used for professional rotation and they keep moving until the resin cures completely, you will have to think of practical methods when you are rotating the mold by hand (see below).



4 For complicated casts with distinctive parts there is a risk that the resin will take a different shape while hardening. I recommend that you turn the mold every 10 minutes so that there is no chance of the resin running thin at any spot.



MORE TIPS AND TRICKS

This topic is so complex that it's nearly impossible to process all the key informations at once. However, I have listed a few things below that you might encounter while working with these materials.

CASTS ARE OILY

Especially in winter. You might notice that though the resin has hardened, there are still some spots that are oily and have not hardened. This happens when you work immediately after the resin is delivered to you. Instead, leave the resin for a couple of hours (if required, up to a day) before it reaches room temperature. It is best to work with synthetic resin at about 23° C, and you won't experience any problems.

WHICH SILICONE MOLD SHOULD I MAKE FOR MY PROJECT?

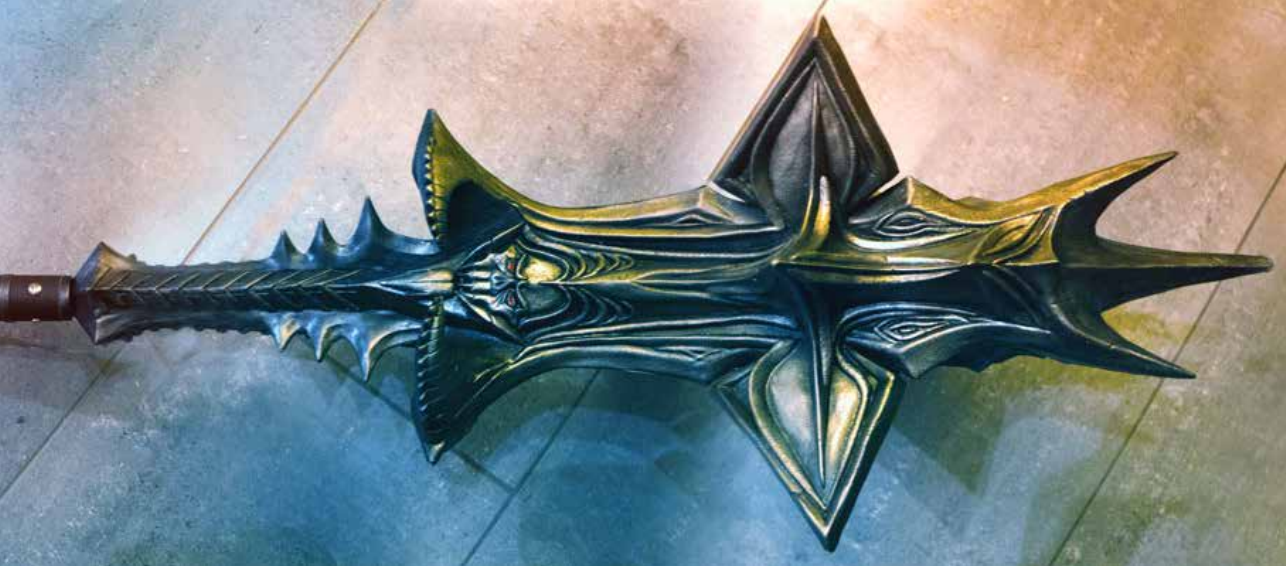
If you're still unsure, you can get a rough idea from the following guidelines:
If your master is flat, two-dimensional and has very undefined shapes, you can make a one-part silicone mold.

If your master is three-dimensional and has undercuts, then use a cut or two-part silicone mold or a brush-on silicone mold.

As explained in detail in previous chapters, the advantages of one-part and cut silicone molds are less work and also that they can be made in a day and be ready for use.

Two-part silicone molds are necessary when a cut mold is not sufficient and registration keys are also required. The amount of material used for all these molds is much greater than in the brush-on.

The brush-on silicone mold is used for models that cannot be simply placed in mold boxes because they would require a lot of material or have complicated shapes. An example would be horns, swords or magic



wands that require long and complicated silicone molds. Brush-on silicone with a jacket would be perfect here. This type of silicone mold requires correct planning, preparation and time, since layer after layer will be applied here and waiting periods are essential between the layers.

SHELF LIFE

Manufacturers give a usability guarantee of 6 months from delivery for an unopened pack. After opening, the polyurethane resins have the shortest life, since the Part A contains isocyanate, which is very sensitive to humidity. Epoxide resins and silicones can be kept for longer. However, all materials need to be stored at around 23° C so that there is no loss of quality.

WHERE SHOULD I SHOP?

A quick stop at the Smooth-On website tells you where you can find all the distributors. It's the easiest way for you to check where you can buy your goods:

www.smooth-on.com/distributors

GLOSSARY

BRUSH-ON SILICONE

A silicone that is brushed on the model and usually doesn't require a mold box.

CAST

The cast copy of a model/master.

COLD CAST

In this type of mold, a metallic powder is coated on the silicone mold whereas a part of the powder is also mixed with the resin and poured into the silicone mold. Once everything has cooled down, the topmost metallic layer is polished, creating an interesting metallic look.

COSPLAY

A performance art where players wear costumes of their favourite character from a video game, animation, or film.

JACKET

A supporting piece for a silicone mold that was made with brush-on silicone molds. Also called a support shell.
I've called it a jacket here in this book.

MODEL/MASTER

The sculpture or object that you have modelled or created and are using as a template for molding.

MOLD BOX

A box that contains the model and is filled with silicone later to get a silicone mold.

POTLIFE

Is the time for which you can prepare the silicone or resin before it begins to harden in the cup (pot).

PROPMAKER

Property maker, responsible for making props for a film set or in theatre.

RESIN

Liquid plastic that is poured into silicone molds. It is available in different levels of hardness.

SHORE HARDNESS

A unit with which the hardness quality of the silicone or synthetic resin is specified. Described in the book as Shore A and D.

SULPHUR-FREE MODELLING CLAY

Used for embedding the master. When sulphur is a part of the contents, it can reduce the curing time of the silicone or completely prevent it. That is why you should always buy sulphur-free modelling clay.

SILICONE

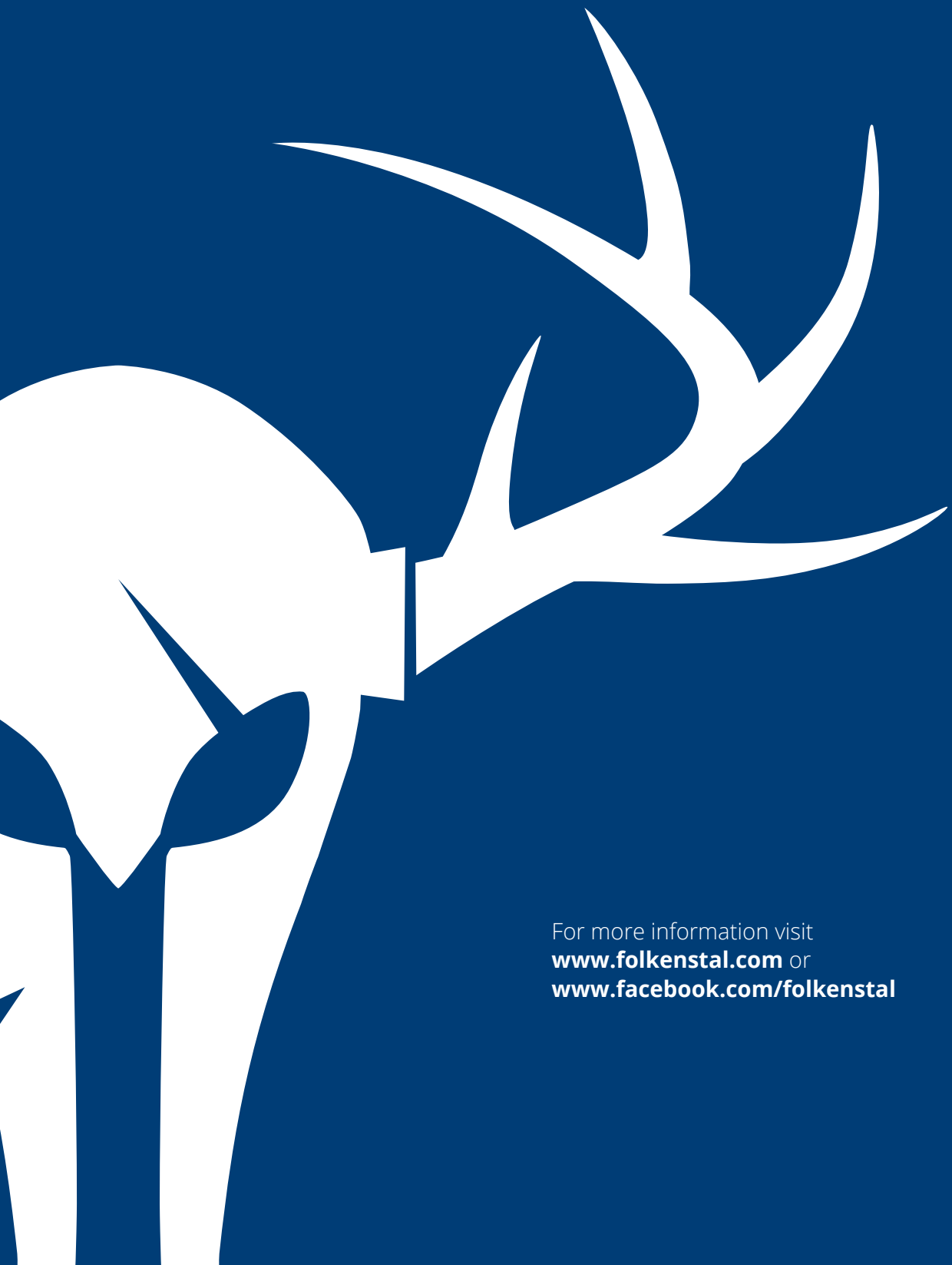
Rubber-like substance used for molding. It is available in different levels of hardness.

SMOOTH-ON, INC.

A manufacturer in the United States of materials such as silicone, casting resin and other things in the field of film, props and theatre. This book describes Smooth-on products mostly.

“THOSE WHO DON’T WANT TO IMITATE ANYTHING, PRODUCE NOTHING.”

– Salvador Dali



For more information visit
www.folkenstal.com or
www.facebook.com/folkenstal