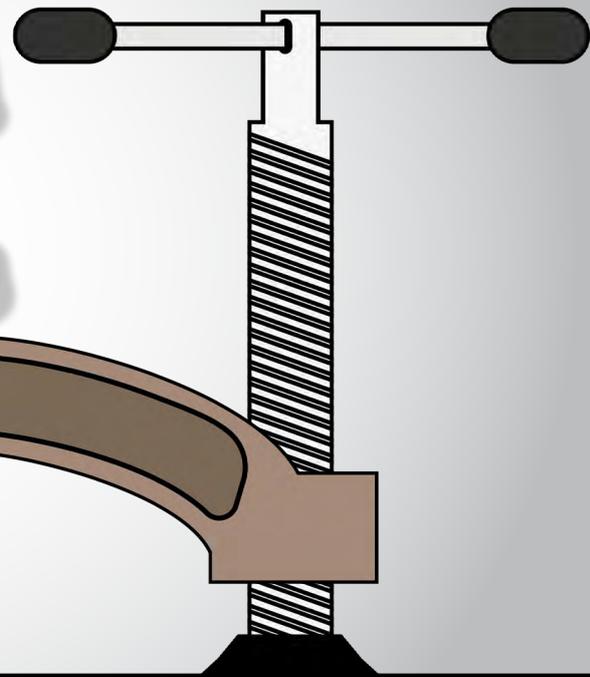


Battles[📶] with bits of RUBBER

THE PODCAST ABOUT
MAKING PROSTHETICS



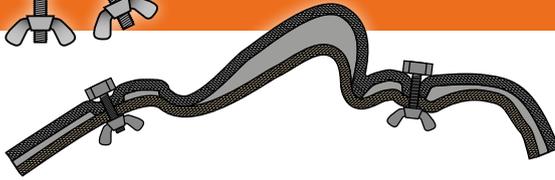
MOULD CLOSURE

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Closing moulds correctly is vital to get good casts out of them. There seems little point in making a good mould and then getting bad casts out of it.

There are a number of things to consider when looking at 'mould closure'. Essentially, a mould other than a flat or open mould will usually need to be attached or fitted to another component to produce a cast.

This could be another part of the mould if a 'multi-piece' mould is made and/or a core which will be placed into the mould to create the interior.

These pieces need to remain securely in position, and may be required to exert a lot of force if the cast piece needs to have thin seams which are more easily repaired.

That has cost implications - think about having to repair bad seams of fifty casts out of a mould which wasn't closed correctly!

Small block moulds are often clamped together for speed and convenience, but what happens if the mould is huge, such as a full body or a dinosaur?

The size of the piece and the material to be cast out from it will usually dictate what materials the mould will be made from, and there are always demands made on the mould regardless of material used.

With foam latex, the mould will be baked for example, so will need to withstand heat, and may warp and distort in the oven or as it cools.

This may mean a single clamp or strap isn't practical, and a series of fixings around the edge such as bolts or smaller clamps may be necessary if using a thinner material such as fibreglass.

Larger moulds are often made from the same material, and may need many bolts at regular intervals around the outside to ensure it remains correctly closed.

If injecting into a closed mould then the pressure those closing devices supply is in place before you introduce the casting material. If a mould is being filled whilst open, and then a core inserted afterwards, then it may be that you have to work quicker.

Imagine you have several moulds to fill with the same batch of foam latex or silicone - doing up 25 bolts on each mould may take too long, and you could find the material has set halfway through bolting up mould number 3 on a warm summer day. In this case maybe clamping with 'quick-clamps' would be faster and more practical.

If the mould is a rounded, bowl-like shape then it is easier to close up with a mould strap or ratchet strap.

There are a number of options, and these notes to accompany podcast #62 will hopefully shed some light and explore options, and why they may be appropriate.

-Stuart & Todd





MOULD CLOSING TOOLS - CLAMPS

Clamps are great for small block moulds and for thicker mould walls on chunky moulds such as plaster. Some can be very strong, so care must be taken to not over tighten.

The 'Turbo Clamp' style is able to be used one handed, which is useful if you need to hold the mould while clamping.

They tend to be much cheaper, owing to their simpler construction of pressed steel rather than the stronger, threaded forged style 'G-Clamp' (UK) or 'C-Clamp' (US).

These need two hands to use properly, and can exert enough force to damage some moulds.

Variations include the 'F-Clamp' which has a

longer bar as a frame, and therefore can take bigger moulds usually.

The throat of a clamp is the distance between jaw and the frame, and dictates how far into the mould it can go. For larger moulds, it may be necessary to use a clamp with a deeper throat.



'G-Clamp' or 'C-Clamp'.



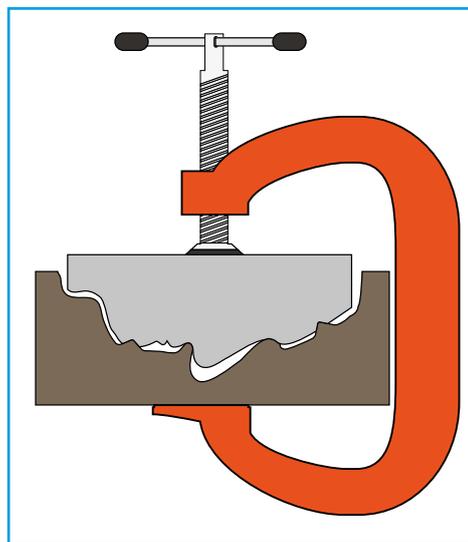
'F-Clamp' sometimes known as a 'Quick Clamp'.



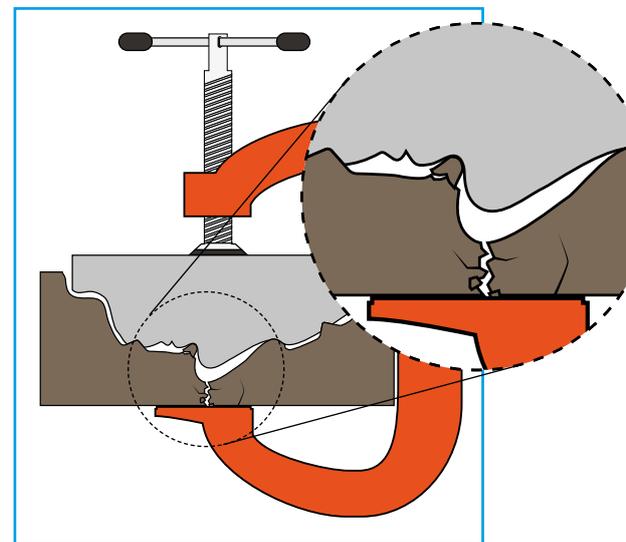
'Deep-Throat' Clamp



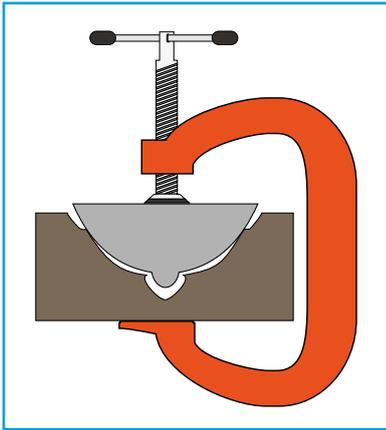
'Turbo Clamp'



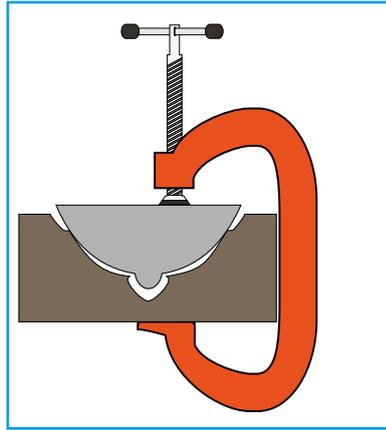
A clamp can close a mould well, and keeping the clamp in the centre should provide even pressure.



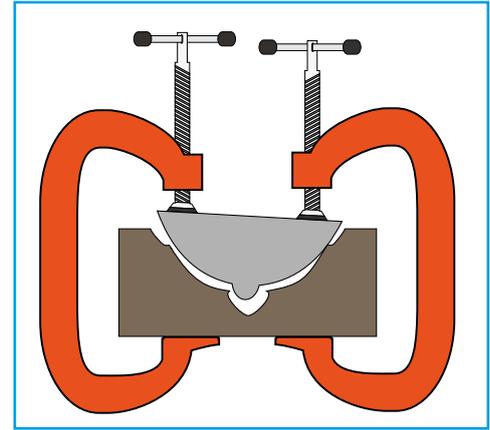
Take care not too over tighten a clamp as it is possible to literally break a mould.



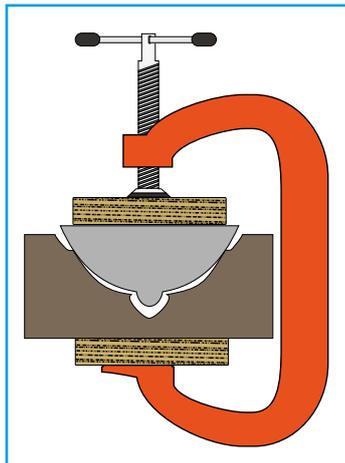
A correctly sized clamp positioned in the centre.



A clamp placed nearer the edge will apply too much pressure on one side, which may damage the mould and give inconsistent results.



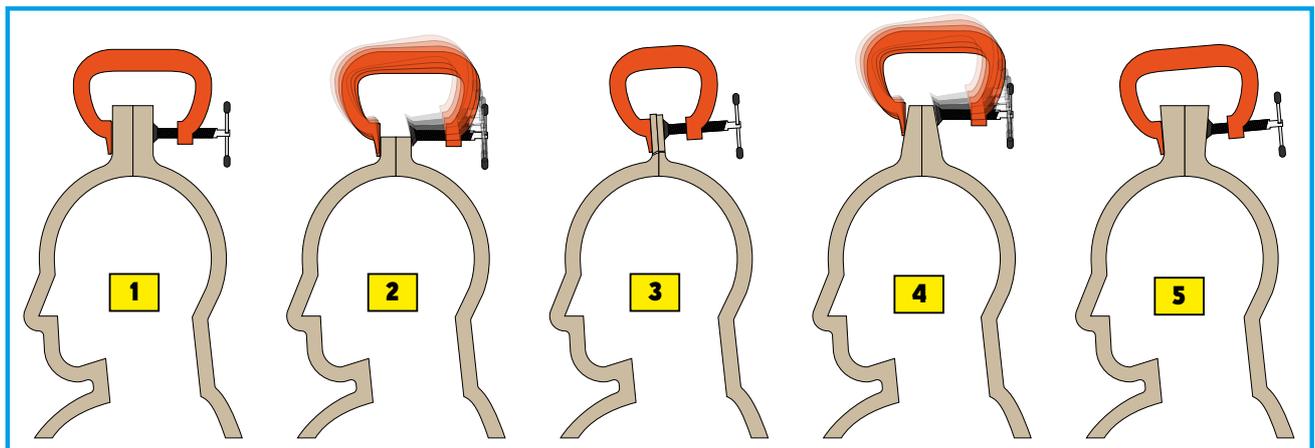
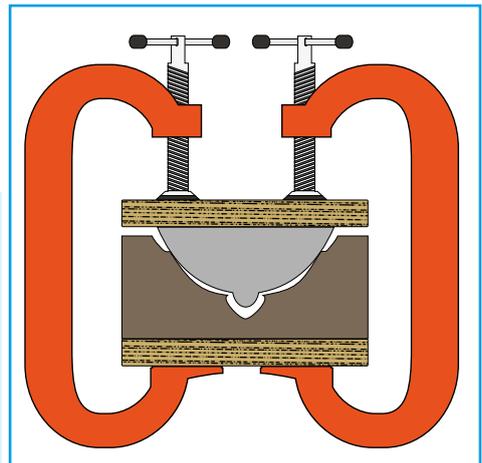
Multiple clamps could be used to spread the pressure, but ensure the clamps are evenly tightened to avoid the core shifting with uneven pressure.



A piece of wood placed between the jaws and the mould will help reduce the likelihood of the mould cracking or breaking, as well as distributing the pressure more evenly.

Wooden blocks or boards cut to the correct size would also help when using multiple clamps on a single mould.

Better to apply a little pressure on each clamp in turn, gradually arriving at the maximum amount rather than fully tightening one and then moving onto the next.



1. Moulds to be clamped like this need strong walls or 'flanges' large enough to accommodate the clamp jaws - ideally flat and parallel flat surfaces.

2. If the wall is not high enough the jaws cannot get a purchase, and slide off. In this instance, maybe a smaller clamp can be used or long bolts drilled through instead.

3. Here the mould wall was not made strong enough, so it can easily crack or break. Even a mould wall which doesn't break straight away may weaken with each use.

4. Large enough and strong enough, these walls have a tapered profile which can cause the clamp to slide off as it is tightened.

5. This kind of taper is more favourable, as it will help keep the clamp from slipping. Not essential, as parallel will work fine - just avoid tapering as #4.



MOULD CLOSING TOOLS - STRAPS

There are a few different kinds of straps which are great for closing moulds. The main two are 'Ratchet Tie-Down Straps' and 'Mould Straps' (or 'Mold Straps, depending which side of the pond you are).

Ratchet straps are very effective, and may come as a single part or in two parts. Thread the strap through the mechanism and pull tight, then use the handle as a lever and 'ratchet' the mould as tight as you dare.

There is a danger you could over tighten it and damage the mould - so be careful.

Packing out underneath the ratchet with a block of wood will help push the core into the mould, and supply a support for the underside of the mechanism.

Mould straps look kind of similar but are a different mechanism. Instead of an endless ratchet, they use the power of the lever in a single turn to snap the tension on with

less chance of breaking or stressing the mould.

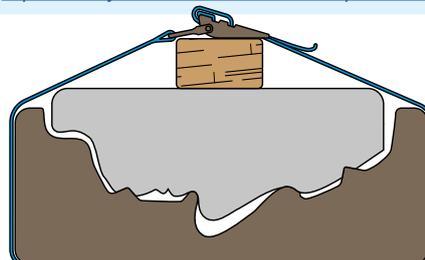
Another strap which can work but with less ease of use is a 'Cambuckle' luggage strap. This uses a sprung cam-shaped buckle with teeth to prevent the strap from slipping back.

Tension is provided by you pulling it tight or packing out beneath it with a couple of wedges, but it's not as elegant a solution as the other straps.

Ratchet straps are very effective. The mechanism may be large compared to the mould, so a block of wood shown below can raise it up which provides space to use the ratchet more easily, as well as ensuring the core is pressed into the mould rather than just squeezing the sides of the mould together.



The 'Mould Strap' or a 'Mould Banding Strap' is the ideal mould closure tool for many moulds. It is perfect for round shapes (as above) where perhaps there isn't a flange/wall available, or larger moulds which can't be clamped. Brick in the Yard made a great video showing you how to use them here: <https://www.youtube.com/watch?v=NziqlcX3DZs>



The Cambuckle strap is OK, not as easy to get tension as the others but they can work. They are relatively easy to obtain, and in a pinch they can work.

The best way is to use them again with a wooden block, and then after pulling tight, packing a wedge or two underneath the wood block to increase the tension.





MOULD CLOSING TOOLS - WEIGHTS & BOLTS

Weights can be used to press a core into a mould, but they will always be heavy so can be cumbersome to have in the way if you don't have a lot of workshop storage space.

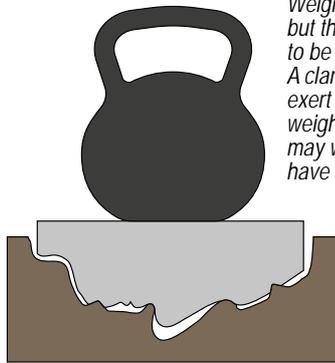
The mould will need to remain level to ensure the weights remain in place, so a flat and wide enough base will be important.

Bolts of different lengths and sizes are useful. Hex head bolts are good and can be more easily tightened and loosened using the appropriate sized socket spinner in a power drill.

Large fibreglass moulds are usually fixed together with bolts - in the UK M6 is popular, as short as

possible for the mould thickness to reduce the amount of time it takes to fasten each one.

Usually best used with wing-nuts, and sometimes washers to spread the load.



Weights work, but they need to be heavy. A clamp can exert a lot more weight than you may want to have to lift!



Nut spinners - hand held and to fit a power drill.

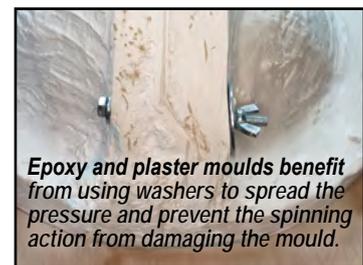
M6 (6mm wide) bolts with hexagonal (hex) heads which fit a 10mm socket. These are most usually used with wing-nuts which are quicker to tighten. It may be prudent to use pliers when fastening them to avoid injury when the threads snag.



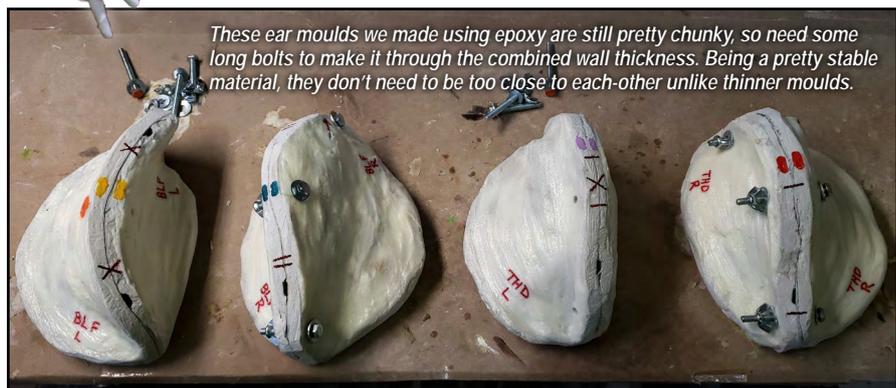
This fibreglass mould was made in many pieces, and will be held together with numerous bolts. With prosthetics particularly, the holes should be as close to the cast as possible to provide maximum pressure.



Thicker walled moulds need longer bolts.



Epoxy and plaster moulds benefit from using washers to spread the pressure and prevent the spinning action from damaging the mould.

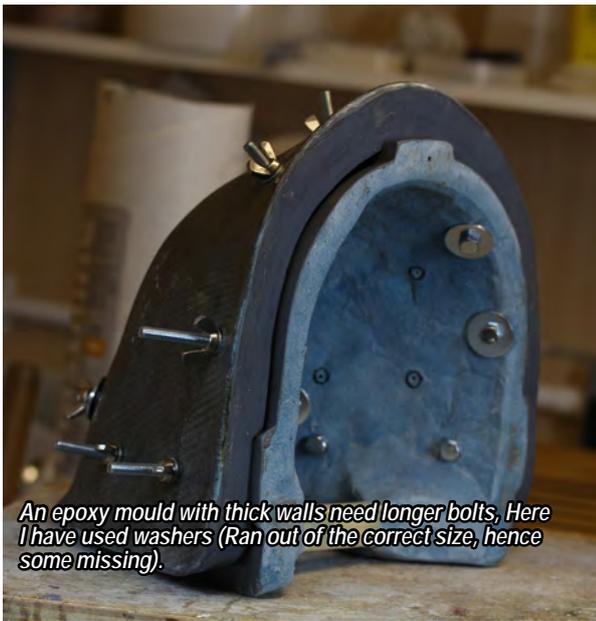
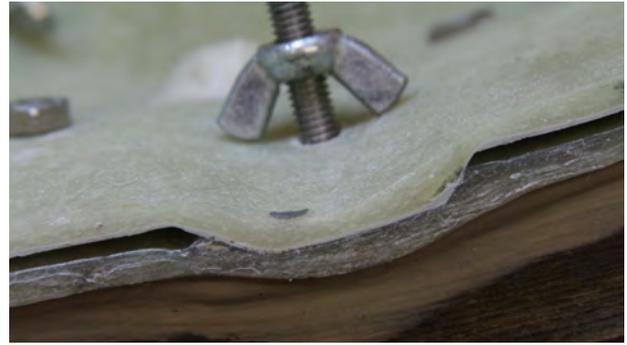


These ear moulds we made using epoxy are still pretty chunky, so need some long bolts to make it through the combined wall thickness. Being a pretty stable material, they don't need to be too close to each other unlike thinner moulds.



The Plastiline flashing and overflow with holes cut at regular intervals to allow touch down areas for bolts to be drilled. This core is thin fibreglass with a grey gelcoat.

Reversing the wing nut, so the wings dig into the mould, can stop them spinning so violently when using a power-drill to tighten. Washers can help reduce damage to the mould.



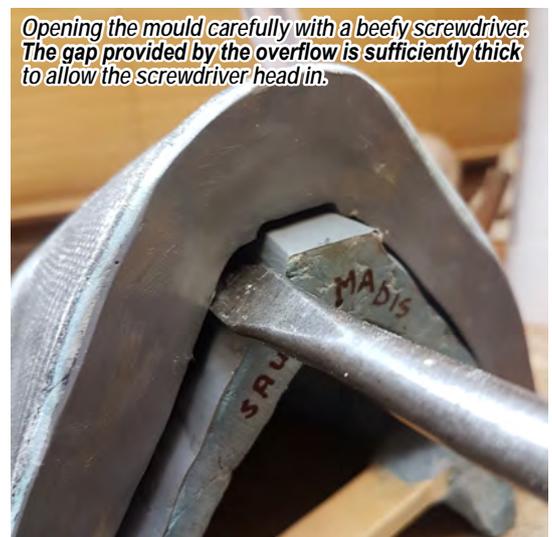
An epoxy mould with thick walls need longer bolts, Here I have used washers (Ran out of the correct size, hence some missing).



The front of the same mould as left. Carbon fibre layer a bit showy, but does look nice as a finish.



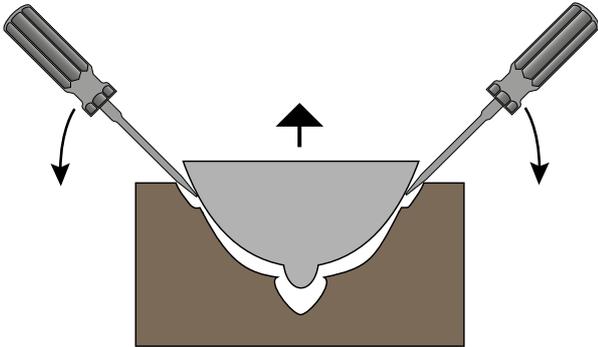
Another block mould here closed firmly with an F Clamp.



Opening the mould carefully with a beefy screwdriver. The gap provided by the overflow is sufficiently thick to allow the screwdriver head in.



OPENING MOULDS



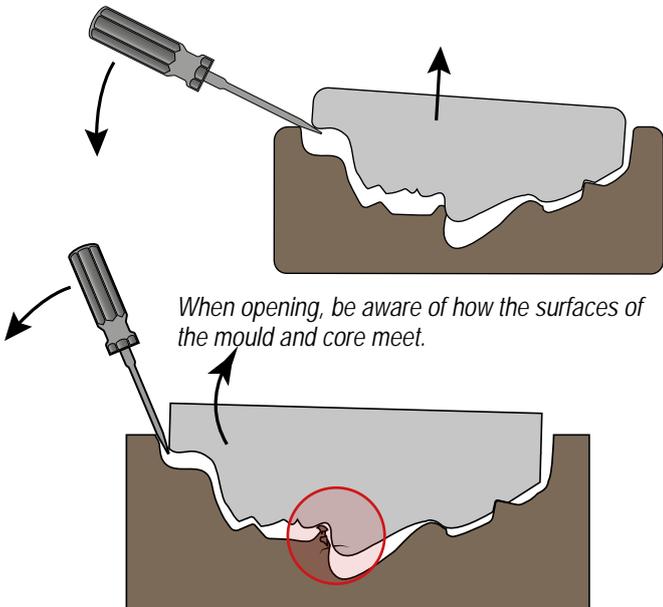
A pair of screwdrivers can work well, supplying leverage from opposite sides simultaneously.

As we have looked at keeping moulds closed, it seems only fitting to briefly look at opening them too.

Moulds need to be made strong enough to withstand the pressure of closure and the forces employed to open them afterwards. Using screwdrivers or a pry bar will exert a lot of pressure on a small area, and it is easy to cause damage doing this if you are careless.

Ensuring there is sufficient clearance for the tool to get between the core and the mould is important, and is something that should be taken into account when making the mould.

Below: The technique we have attributed to Rob Freitas using a clamp to pull a core from a mould. A handle fitted into the rear of the core can be pulled upwards with blocks of wood braced on the outer edge of the mould. This is only possible if these considerations are taken into account when planning and making the mould. Design the mould with as much care as the sculpture inside it.



When opening, be aware of how the surfaces of the mould and core meet.

Practicing opening and closing the empty mould will alert you to any issues that may occur. If the nostrils of the sculpt were deep, for example, then they could be long 'prongs' in the mould which could catch when opening. Changing the place where the core is levered from can solve the problem.

Beware making moulds too weak to withstand the pressures involved with opening! It may save some money to make moulds with less material, but making a mould which then breaks more easily as a result is a false economy.

