

Jesmonite Workshop – ‘How To’ Summary

Preparing your mixture: First off, no matter which system you are using, it's incredibly important that your ratios of your mixture are as accurate as possible. This ratio is dependent on which system you are using, and which layer of Jesmonite you are mixing up (the first layer being called the Gel Coat). The ratio you use can affect the viscosity of the mixture, and can also affect the setting times. A higher ratio of powders to resin will set more quickly. On a hotter day you may find that the mixture will set more quickly, so once confident with the system you can start to make small adjustments to the ratios to extend or reduce the working time of your mixture. To extend the working time of your mixture (also known as the pot life) you can also introduce retarders. *Top Tip: If you need to extend the pot life of your mix, but can't use retarder, try putting the sealed tub of liquids in an ice bath before weighing out, and work in a cooler room. This will drop the temperature of the mixture and will give you a longer working time.*

The most important thing to remember is that all the ratios laid out by Jesmonite are done by weight rather than Volume. This is a much more accurate method of measuring, and it's worth getting a decent set of scales straightaway – if you skimp at this stage, what you'd save on tools you'd quickly lose in wasted material. It's also worth investing in one of the Jesmonite High Shear Mixing Blades. These handy gadgets work with any power drill, and create a vortex that will ensure a uniform distribution of the materials in the mixture – much better than the average paint mixing blade.

Jesmonite recommend working out how much material you need to prepare, then work out how much of that would need to be a liquid. If you then weigh out the liquid first, you can measure into the same container the powder to top it up to the total required amount. The liquids for the AC100 & AC300 systems are thicker than the liquids for the AC730 / Flex metal systems, as they contain higher levels of polymer. This is because the powders in the AC730 / Flex metal systems are more similar to concrete than plaster and so they already have binding agents in the base.

Any liquids being added (like retarder or pigments) should have their weight calculated in proportion to the total weight of the mix (base and resin together).

For example.

I need to make up 500g of mixture total.

I'm using the AC100 system, and for my gel coat I've been recommended to use a ratio of 2.5 : 1, base powder : resin. I've also decided I would like to add some green pigment. I want a pale colour, so for the pigment I'm going to use a ratio of 6g per kg, which means I'll be adding 3 g to the total weight of the mixture, taking me up to 503 g.

To work out how much liquid I need I divide 500 by 3.5 (2.5+1); $500g/3.5 = 143 g$ (weighing to the closest gram is sufficiently accurate) - I'll weigh this into my mixing bucket. I'll then add my 3g of pigment using a pipette so as to be as accurate as possible, which will take the weight in my bucket up to 146g.

I can then happily add my base to bring the total weight in the bucket up to 503 g. I can then mix it up, happy in the knowledge that the subsequent mixture will be perfectly in proportion.

Preparing the Mould: Jesmonite recommend using a silicone mould over a rigid mould, as even when using a release agent like APW Wax, the silicone has a naturally occurring oil in it which will allow more flexibility and result in a much lower likelihood of cracking the piece on de-moulding. *Top Tip: If making a mould from scratch, try to colour it so it contrasts the piece you are creating- this will help later with applying the Gel Coat (First Layer).* It's important that before you start you ensure that the mould is completely clean of any dust particles or debris, and that it is level. This will help ensure that you get a level backing to your piece on completion.

Applying the First Layer: The first layer applied is generally referred to as the "Gel Coat". This layer should typically be mixed a bit thicker than subsequent layers (a higher ratio of powders to resin), and you want to make enough up so as to form a layer that's about 3 mm thick across the whole of your mould. The Jesmonite is self-levelling, but you do need to ensure that you get out as many air bubble that can become trapped in the mixture, this can be helped by brushing in the mixture rather than just pouring, and sometimes stippling the brush into the points of finer detail- especially around the edges of the mould. This will also help ensure that you are able to pick up as much detail as possible. Even when casting, Jesmonite encourage users of their systems to brush on the first layer. It's important to build up a layer on the edges of your mould, so you end up with a clean edge to your finished piece. *Top Tip: It's really important that your brush is CLEAN and DRY, any water left in your brush could affect the mixture you're working with – and not in a good way!*

Having spread around the mixture well, you now want to make sure you've eliminated all the air bubbles in the mixture. To do this, you will need to "vibrate" the mould. This doesn't need to be a huge movement, but if you can pick up the mould and "wobble" it around you will begin to help the gel coat to level out. It will start to go glossy and clear. At this point, if you're working with a different coloured mould to your mixture, you will easily be able to see the points of detail that haven't been filled, so more mixture can be added and worked in.

Once you're happy that the entire mould is covered in a layer of mixture about 3 mm thick (including the edges), you can put it to one side. Before you continue with subsequent layers you should wait for this first layer to have part set- it's important that it hasn't dried out completely, but you also want to ensure that it's set enough that as you add the next layer of mixture you won't disturb the surface already formed. The mixture should feel moist, or even tacky to the touch, but no material should come away on your finger. Wash out your brush and mixing bucket IMMEDIATELY after you've finished coating the layer- if rinsing into a sink, ensure you flush with a large quantity of water.

Applying Subsequent Layers: Once the gel coat has turned from glossy to matt, but is still slightly tacky to the touch you are ready to add your next layer of material. At this point, Jesmonite recommend making enough mixture to complete 3 layers, each 2-3mm thick. The mixture prepared for this stage will not need to be as thick as the mixture used for the Gel coat, and as the process can take a bit longer than applying the gel coat, it can be helpful to add small quantities of retarder to ensure you have enough pot life to get you through the process. *Top tip: Make sure you're brush is completely clean and dry before you begin, sometimes we recommend using cheaper brushes like our budget ones, as you can effectively use them as though they are disposable and have a fresh one at each stage.*

When applying the first of these “backing” layers, you must be careful to not disturb the layer underneath through overly forceful brushing. If you do get a bit carried away, this can cause a series of fine lines and cracks in the gel coat which won’t become obvious until after de-moulding and the piece has finished drying out. It is also important that you do ensure completely coverage – again right into the corners and up the edges, as this is where the piece will be most vulnerable after de-moulding. Some gentle stippling and easy brushing can help here. You want to achieve a layer about 2-3mm in depth.

Having brushed out a fresh layer of the Jesmonite mixture, you then want to lay a piece of Quad-axial Fabric over the top. You should very gently push this down into the wet layer, starting in the middle and working your way out. It’s important to get the fabric pushed right into the edges and corners of the piece – don’t worry if the overhang, they can always be trimmed off after the piece has been demoulded and dried out using a Stanley knife, or even an angle grinder. *Top tip: Before you get started with even the Gel Coat, cut and measure all your bits of Quad-axial fabric ready to be used in this stage!*

You can then continue to add subsequent layers of the mixture and the fabric, finishing with a wet layer to seal the fabric. Some people prefer to use chopped strand rather than the quad-axial fabric – which is fine – but Jesmonite would recommend a sandwiching of 3 layers of Quad-axial Fabric for the backing as it gives a much more consistent strength to weight ratio. Some people have been known to put one layer of the fabric, then a layer of the mixture combined with chopped glass fibre strands before covering with another layer of the quad-axial fabric, thus sandwiching the strands. This is totally fine, but actually much more complicated!

Between each layer of Quad-axial fabric you want to be putting in 2-3 mm of the Jesmonite material. You need to work fairly quickly, or by the time you get to the last layer the mixture will be too thick and set. The pot life can of course be extended by working in cooler temperatures, or adding some retarder when mixing initially as per the advice laid out above.

De-moulding: Having finished all the layers of Jesmonite, you then need to let it set. For the AC100 / AC300 systems this can take as little as 30 minutes, but for the AC730 / Flex metal gel coats, this can take over 4 hours.

The exposed surface (back) of your piece should feel dry and cool to the touch. Any heat felt would be indicative of the exothermic reaction that occurs on mixing the liquids and the powders. It would be advisable to wait until the back feel cool and completely dry before de-moulding.

The mixture can expand by up to 1 mm / linear metre. This wouldn’t be very noticeable on a large scale, but when using small mould, it can result in the piece being quite a tight fit when you try to de-mould. This is when a Silicone mould is preferable to a rigid mould, and it also allows you to be able to peel back a corner of the mould to check that the gelcoat is not sticking to the mould – though if it were sticking it would be too late and the face of the piece would be ruined.

Although the piece would be part set on de-moulding, it would require a complete 24 hours exposed to the air before it would be fully cured.

Table of Ratios & Drying times for various Systems:

System	Use for Gel Coat	Gel Coat Ratio Base: Resin	Gel Coat Approximate drying time pre lamination	What to use for laminating	Laminating Ratio Base: Resin	Approximate Drying time before de-moulding.
Plain AC100	AC100	2.5 : 1	5 – 10 minutes	AC100	2.5 : 1	30 - 40 minutes
Plain AC300	AC300	3.2: 1	5 – 10 minutes	AC300	2.5 : 1	30 – 40 minutes
Stone Finish	AC730	5.25 : 1	15-20 minutes	AC730	5 : 1	3-4 hours
Flex Metal Gel Coat (Bronze)	Bronze Flex Metal Base / AC730 Liquids	5.5 : 1	15-20 minutes	AC730	5 : 1	3-4 hours
Flex Metal Gel Coat (Brass)	Brass Flex Metal Base / AC730 Liquids	5.5 : 1	15-20 minutes	AC730	5 : 1	3-4 hours
Flex Metal Gel Coat (Copper)	Copper Flex Metal Base / AC730 Liquids	7 : 1	15-20 minutes	AC730	5 : 1	3-4 hours
Flex Metal Gel Coat (Silver Bronze)	Silver Bronze Flex Metal Base / AC730 Liquids	6 : 1	15-20 minutes	AC730	5 : 1	3-4 hours

Depending on the thickness of the piece created, drying times can vary. The Jesmonite systems are water-based, and as such they require the complete evaporation of any excess water to achieve full strength. Care should be taken at the point of de-mould, as the material can break easily if put under too much strain. Soft, flexible rubber moulding materials must be used for delicate objects with thin sections, and are advised on most projects where possible. Once de-moulded place the objects in a warm, dry environment. Dependant on thickness, full strength will be achieved in 24 – 48 hours. Ensure that objects are placed in a suitable rack, or on a shelf where air can circulate. Staining can occur if objects are placed against plastic before all excess water has evaporated.