



## Carbon Fibre Skinning Starter Kit

This Carbon Mods Carbon Fibre Skinning Starter Kit contains everything you need to take an original part (made from plastic, metal or any other material), cover it with genuine 2/2 twill carbon fibre and finish it to a high gloss.

Skinning a part with carbon fibre will enhance its appearance and greatly increase its strength and is a viable alternative to the more complicated approach of making an all-carbon fibre replacement part where volumes are small (such as one-offs) and cosmetic appearance, rather than weight saving, is the primary objective.

### Kit Contents

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- 0.3sqm 2/2 twill 3k dry carbon fibre fabric
- 166g laminating epoxy resin base coat
- 166g epoxy resin top coat
- 166g epoxy hardener
- 35ml polishing compound
- 2 pairs latex gloves, 2 mixing pots, 2 mixing sticks
- 2 x 1" laminating brush
- 120, 240, 400, 800 & 1200 grit full sheets of wet and dry sand paper
- This beginners' guide

### Uses for This Kit

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Use this kit to cover a wide range of parts in and around your vehicle, or just about any other item that would look stunning with a genuine carbon fibre finish.

#### Use this kit to:

- Cover plastic interior mouldings and trim such as centre consoles and door handle mouldings
- Cover plastic exterior mouldings such as wing mirrors, rub strips and bumper inserts
- Cover metal parts such as slam panels

### What Results Can I Expect?

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All the materials, supplies and techniques supplied as part of the skinning kit are completely capable of producing professional quality, saleable parts. However, like any practical task (such as repairing a scratch or dent on your car or fitting a stereo) perseverance will be required to produce parts of the highest quality. As you gain skill and experience the quality of the parts

will increase and the time taken to make them will decrease.

## The Basics of Carbon Fibre Skinning

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When we 'skin' a part with carbon fibre what we are doing is coating an original part with carbon fibre and epoxy resin. Unlike when we make a carbon fibre part using a mould with skinning no mould is required but for every skinned part to be made, an original part will be required. This is because the carbon fibre 'skin' will be stuck permanently to the original part.

Making part without a mould makes it much easier to make one-off parts since the complicated process of making a mould is not required. However, without the smooth inside surface of a mould to work with, getting the skinned part to a smooth, glossy finish needs to be done by hand on every part produced.

Parts are skinned by cleaning and scuffing them, then coating them in a thin layer of special black resin (so that the colour of the original part cannot be seen through the carbon fibre weaves). Genuine 2/2 twill carbon fibre fabric is stuck to the black resin whilst still slightly tacky and then layers of clear resin are built up over the carbon. Once cured, the part is rubbed flat and smooth using a selection of wet-and-dry abrasive papers and then lacquered using a spray can (rattle can) before a final rub back and polish.

## Step By Step Practical Guide

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*Before starting to make your first part we suggest you:*

1. Watch the Carbon Fibre Skinning Starter Kit video guide on [www.carbonmods.co.uk](http://www.carbonmods.co.uk) (in the Guides section)
2. Ensure you have enough space to work, that the work area is free from dust and protected with newspaper or similar if necessary
3. Have to hand:
  - a. A set of scales
  - b. A set of sharp scissors
  - c. A hair dryer
  - d. A washing up bowl or similar container
4. Optionally you may want a can of spray lacquer (clear coat)
5. Have some suitable parts ready to skin

### Stage 1 – Clean the Original Part

The first and very important step when skinning a part with carbon fibre is to make sure that the part itself is clean and free of any dust, grease or other contaminants. To do this, wash the part thoroughly in clean, soapy water and scrub the part all over. If your part has any hard to reach corners, use an old toothbrush to ensure that the corners are fully cleaned.

Rinse the part off with clean water and allow it to drain.

### Stage 2 – Key-Up the Original Part

**EXPLANATION:** In this next step we will be roughening up the surface of the part (called keying-up) so that the resin can get a good mechanical grip on the surface of the part. We do this because whilst most materials bond extremely well to resin, others would benefit from the mechanical grip offered by a rough surface. Because this skinning kit can be used with original parts made from just about any material, it's best to scuff-up the surface anyway and guarantee a good bond.

Using a small amount of the 120 grit wet-and-dry paper, scuff the surface of the part all over. Make sure that you get into all the awkward corners and rub thoroughly all over flat surfaces. When you're done, the original part will have a dull, scratched surface.

Blow the part to remove any loose dust or bits of wet-and-dry paper.

### Stage 3 – Mix Epoxy Resin Base Coat

**EXPLANATION:** Before we put any carbon fabric down on the part, we coat it with a special layer of black epoxy 'base coat'. This serves two purposes: firstly, the black base coat means that the colour and finish of the original part will not be visible through any gaps in the carbon fabric weave and secondly, it provides a tacky surface onto which the carbon fabric can be stuck.

The special Epoxy Resin Base Coat is clearly identifiable as the container of black resin and is mixed at a ratio of 2/1 with the Epoxy Hardener.

Wearing the gloves and using your scales, pour two parts of Epoxy Resin Base Coat to one part of Epoxy Hardener into a mixing pot, sufficient to cover your part in a smooth, thin layer. For example, for a small piece of internal trim you might mix 40g of Base Coat with 20g of Hardener.

Using one of the mixing sticks stir the resin and hardener together thoroughly. In the video this process has been shortened but in reality you should spend a good few minutes mixing the two parts, particularly as at colder room temperatures they may be very thick. Ensure you mix all the resin and hardener from the edges of the pot as unmixed parts will not cure and will ruin your finished part.

### Stage 4 – Evenly Apply Base Coat to Part

**IMPORTANT:** At every stage when you are applying resin to your part your primary concern is to apply the resin in as smooth and consistent a manner as possible. Ripples, drips or pools of resin on your part will mean much more work later when you come to 'flat' the part out.

Still wearing the Latex gloves and using the 1" laminating brush, apply a thin and even coat of the mixed resin to the surface of the mould. Ensure that you get the resin into any awkward corners of the mould but be careful that you don't end up with thick pools of resin in these areas otherwise you will start to lose the detail of the original part.

### Stage 5 – Leave to Cure to a Tacky Hardness

Once you have applied this coat, set the mould on one side and leave for between 1 ½ and 4 hours depending on the temperature of the room you're working in. The resin will cure quicker in a warmer room and slower in a colder room. Keep checking until the resin on the part is firm and tacky. If your glove sticks slightly to the resin without any of it coming off on the glove

then the level of tack is about right. It is often a good idea to put a small amount of resin elsewhere on your work surface so you can check the cure without touching the part.

**TIP:** In a composites workshop, resin is cleaned from brushes and other laminating equipment before it cures using acetone. As a hobby laminator, your best access to something similar would be a large container of nail polish remover which is essentially the same thing. We would include it in the kit but its volatility makes it dangerous to ship. Use liberal quantities of the nail polish remover in a pot to rinse the brush and any other equipment clean so it can be used again. Alternatively, wrap your brush in some plastic film and keep it in the freezer. The low temperature will prevent the resin from curing so that you can simply defrost it and use it next time you're laminating!

## Stage 6 – Cut the Carbon Fabric

We are now ready to start working with the carbon fabric itself. If you haven't already done so, carefully remove it from the tube and lay it out on a clean flat work surface. Never lay fabric onto a work surface with any dust, uneven or rough surface or contaminants on as this is the easiest way to ruin a product. Dust or dirt will cling to the fabric and be visible on the surface of your part and a rough surface (such as one with resin spatter or splinters on) can snag the fabric and distort it.

Work out how much fabric you will need to cover the surface of the part. You can do this beforehand using a paper template for complicated shapes or for simpler shapes (such as the one shown in the video) we can make a guess.

You want the carbon to be oversize around all edges of the part so that we can trim it back once cured to create neat edges to the part.

**TIP:** The trick shown in the video for marking out the fabric prior to cutting with scissors is carefully isolate a single 'tow' of carbon fibres and pull them gently out of the weave. This creates a line parallel to the rest of weave that you can cut down, helping to prevent fraying and ensuring your cut-line stays neat. If you try this technique yourself, use your other hand to gently hold the fabric flat at the other end of the piece to prevent it from being wrinkled as you remove the strand.

## Stage 7 – Apply Carbon Fabric to Part

It's now time for the all-important laying of the carbon fabric into the part.

Drape the fabric very loosely over the tacky mould surface, allowing it to contact as little as possible. Once in position start to apply a very light pressure to the fabric in the centre of your part and then work your way out ensuring that there is enough fabric available as you do so as to avoid 'bridging' any contours in the surface of the part. This is one of the important techniques to master and when you first make parts this is likely to be where your imperfections will occur. Once the fabric has been pressed to the tacky epoxy resin on the surface of the part any subsequent attempt to move it will disturb and start to fray the fibres and detract from the cosmetic finish of the part.

Keep working your way out gently until the fabric has been laid flat down onto the whole surface of the part.

The 2/2 twill fabric included in the skinning kit is especially good at draping round contours and can be manipulated to follow simple shapes without the requirement for cut lines. If you can't

get the fabric round without cutting and jointing it then it is fine to do this. A steady hand and some well placed cuts and folds will certainly be necessary for more complex shapes.

Once the carbon is down all over your part you can proceed straight to the next step.

### **Stage 8 – Mix Epoxy Resin Top Coat**

Mix the Epoxy Resin Top Coat in the same way as you did the base coat, two parts of resin to one part of hardener (Both the Base Coat and the Top Coat use the same hardener). Make sure you mix the two parts together thoroughly.

Mix about the same amount of Top Coat as you needed for the original Base Coat as you will be applying only one layer of resin at this stage.

### **Stage 9 – Apply Epoxy Resin Top Coat**

Again, wearing your gloves but using the second 1" laminating brush (to ensure it is not contaminated with the black Base Coat) apply a thin layer of clear resin all over the surface of your part.

Make sure you don't apply the resin too thickly otherwise you will see resin running off the part or 'pooling' in corners or edges. Try to leave the surface as smooth as possible.

### **Stage 10 – Leave to Cure to a Tacky Hardness**

Before we can build-up another layer of resin, we first need to allow the first layer to cure at least to a tacky hardness. This will typically mean setting the part on one side for 2-3 hrs.

### **Stage 11 – Repeat Top Coat Application**

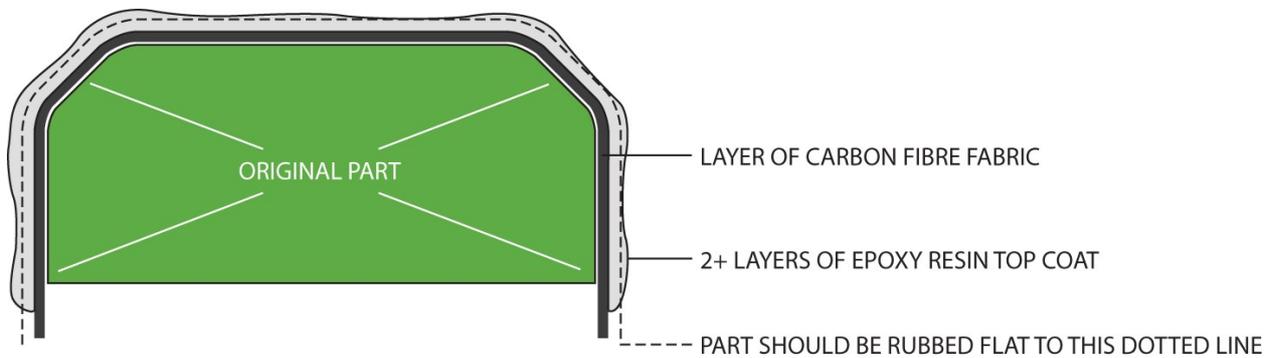
In order to ensure that we have enough thickness of resin above the carbon fabric to rub down into we need to add at least one more layer of Epoxy Resin Top Coat. To do this, follow exactly the instructions for Stage 8 and Stage 9.

### **Stage 12 – Leave to Fully Cure**

You now need to leave your part to fully cure before beginning the process of flattening it back and polishing it. Set the part on one side for around 8hrs (depending on ambient temperature) or until fully cured. Under no circumstances attempt to continue on to the next step until the part is completely cured to a hard finish.

### **Stage 13 – Flat the Part**

**EXPLANATION:** At this point, whilst your part might have a reasonably glossy finish and the look of carbon fibre fabric underneath the gloss it will have an uneven surface that looks messy and hand-made. The purpose of this next stage is to rub down through the layer of resin coating the part until this uneven surface has been 'flattened'. This means using the various wet-and-dry abrasive papers to sand away the high spots until the resin is only as thick as the lowest spots.



Start by wrapping some of the 240 grit wet-and-dry abrasive paper around a suitable block and begin to gently sand away and the part trying to smooth out its surface to remove any high spots and take make the thickness of the clear epoxy an even as possible across the whole surface of the part. In the diagram above you can see an exaggerated version of this where the epoxy top coat is an uneven thickness over the shape of the original part. The aim is to rub back all the high spots until you are at the thickness of the lowest point (shown by the dotted line).

Have a tub of water handy to wash the part and the abrasive paper in as you go. This will unclog the paper and clean the part, making it easier to check your progress.

Be careful not to break all the way through the resin and the fibres beneath. If the dust has gone black, you are down to the carbon and should stop.

#### **Stage 14 – Smooth the Part Using the Remaining Abrasive Papers**

Once you are happy that the part has been properly flatted you can start progressing up through the different grades of abrasive paper to smooth the finish of the surface. You do not need to use a block inside the paper for these subsequent grits unless it seems appropriate on large flat areas since the surface of the part should already be flat.

Never progress to another paper if scratches can be seen in the surface of the part that are anything more than those created by that grit of paper otherwise you will end up with a shiny but scratched surface.

**IMPORTANT:** It is extremely advisable to completely change the water and discard any loose grit in the tub each time you change grits. This avoids the risk of putting scratches back in by picking up contaminants from the previous grit.

Use each grade of abrasive paper. They have been included in the kit for a reason and any temptation to skip a grade will result in a scratched surface on your part.

Once you have worked your way all the way up to the 1200 grit wet-and-dry paper rinse your part off in clean water and leave it to dry (you can speed this up with a hair dryer if you like).

#### **Stage 14 – Lacquer (optional)**

At this stage you may be perfectly happy with the finish of your part (bearing in mind it has not yet been polished) or you may want to supplement the resin top coat with a coat of clear lacquer (clear coat) using a spray can (rattle can) of lacquer. Spray lacquer is available from any good auto store and can add even more shine to your part or seal it if there are any areas where the resin has been rubbed through all the way to the carbon fibre.

If you choose to spray lacquer your part follow the instructions on the can (including the safety advice) and give your part a number of coats, making each one as light as you can.

## Stage 15 – Final Flat and Polish

If you lacquered the part in the previous stage then you should give it a gentle rub over with some more 1200 grit abrasive paper to smooth the surface of the lacquer before proceeding.

Next, using a clean cloth and the polishing compound included in the kit polish the part to a high gloss. Use a clean area of the cloth to remove compound as you go until you are left with a clean glossy part.

## Repair and Care

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Fine cutting pastes and rubbing compounds can be used to polish the finished part in the future and light scratches can be removed by following some of the sanding and polishing steps you should now be familiar with.

Automotive car polishes and waxes are all perfectly safe to use on your part for the ultimate shine.

## Troubleshooting Hints & Tips

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**PROBLEM:** I get a milky surface finish to my parts, or I can see tiny air bubbles in the surface.

**SOLUTION:** This problem is caused by TINY air bubbles in the resin. This bubbles can be caused either when the resin is mixed (giving it a whipping effect like whipped cream) or simply from the air trapped in the carbon fabric not being able to get out through the resin, when it's very thick (either a thick coat or thick as in a high viscosity).

Here's some ways to get rid of it completely, try some or all of the following:

For ALL top coats, place the epoxy resin and the hardener (still in their containers) in a bowl of hot water. Let them both warm up for a few minutes. This will reduce their viscosity (thickness), making mixing easier and less likely to aerate the resin.

Apply the FIRST topcoat as thinly as possible. Build up thickness on later layers, use the very first coat simply to wet out the fabric and seal it. By being a thinner layer, any air in the carbon fabric doesn't have as far to travel to escape.

After applying any top coat layer, use a hair dryer (one that gets pretty hot) or a heat gun and spend plenty of time aiming it at the surface of the part, this will keep the resin warm, reducing its viscosity and also causing the air bubbles to expand and rise/pop on the surface. If you look closely during this process you can actually see the bubbles rise and disappear.

The problem mainly occurs when you're working in a fairly low ambient temperature. The above steps do a very good job over overcoming these problems and should produce a glass-clear surface finish.

**PROBLEM:** I get a patch in the surface of the part that doesn't ever cure properly. When I sand it, it peels away and ruins the surface of the part.

**SOLUTION:** This is caused by uncured resin being used on the surface of the parts and can be very bad news indeed. To prevent this from happening, after THOROUGHLY mixing the resin and hardener together pour the

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mixed resin into a separate container and use that to apply from. This will avoid the risk of any unmixed resin, clinging to the sides of the mixing pot, from being used.

If this problem has already occurred, all you can do is try to scrape out the uncured resin from the surface of the part using whatever means necessary and then clean out the 'pit' using a clean, lint free cloth soaked in acetone (or nail polish remover without any additives). Once you've done this, mix some new resin and apply it into the pit. Once it's cured you should be able to flat it smooth again and hopefully the repair will not be visible.

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## **About Carbon Mods**

Carbon Mods is a small specialist carbon fibre products company operating from premises in Staffordshire, England. All our products are designed, tooled and manufactured on site using high quality carbon, resins and other materials.

We design and manufacture niche performance products for motor sports, aerospace and marine applications as well as a range of best-selling kits to introduce people to the world of carbon fibre.