

## REPAIRING FIBREGLASS BODIES (Extract taken from Practical Classics & Car Restorer)

In this, the first of four articles about GRP, we shall be looking at the basic equipment, materials, and the safety aspects. The following articles will cover causes of gel cracking and accident damage, repairs and, finally, stripping and preparing GRP bodies for painting.

So, having acquired your GRP-bodied dream car all smothered in cracks and accident damage, you have to understand what glassfibre is all about and how to go about repairing it. The most important thing to realise is that it takes an awful lot of time and you can't skimp on anything, otherwise the final repairs will look like the surface of the moon. All repair techniques are the same whether you're working on a Reliant Robin or a GT40, and why some professionals charge an arm and a leg for repairing a high-class GRP car is beyond me because it takes the same amount of time to repair a crack on a Reliant Robin as it does on a 308 GTB Ferrari.

### Materials

Starting right at the beginning for this series of articles I shall list only what you really need.

**MAT** — this is strands of silicon (glass) chopped and laid down in varying densities and chemically dressed for ease of handling. Unless you are using it for large sheet areas use only 300gm/in (the old 1oz/yd) as it bends around corners easily.

**TISSUE** — a very fine mat looking like a Kleenex tissue to cover gel cracks etc. It gives a very fine finished surface. There are only two mats used, although there are glassfibre tapes and heavy mats known as woven rovings where hanks of glassfibre are woven together to give a heavy drape.

**RESIN** — this is the other half of the GRP (glass reinforced plastic) and is clear polyester resin. In fact resin is solid, but it is dissolved in a solvent called styrene which gives it its characteristic smell.

**GEL COAT RESIN**— used in moulds, it is a thixotropic polyester resin, much thicker than the ordinary lay-up resin above and will not run on vertical surfaces.

**HARDENER** — when you buy your resin you will automatically be given hardener either in paste or liquid form. It is actually methy ethyl ketone peroxide (MEK or MEKP for short).

**ACETONE** — is the brush or roller cleaner and this is the only solvent. You cannot use detergent and hot water. If the brushes go solid then you throw them away. With brushes always buy the correct resin type as they are cheap and contain fewer bristles than ordinary paint brushes; this allows the acetone to get in between the bristles and clean them thoroughly. Normal paint brushes will end up stiff in some places and become effectively useless.

Two other products which are essential are the chopped strand glass paste (Davids P40) which is as it says, a paste which when mixed with hardener will form a very strong bond and filler found on just about every car known to man, be it metal or GRP. Filler is chalk dust in resin and, when mixed with hardener, forms a spreadable paste which can cover a multitude of sins but, in our case of course, produces the perfect repair. Fillers come in all shapes and sizes but we used Davids P38 or Upol C. With all purchases buy the largest quantity you want, ie. do not buy silly tubes of Plastic Padding to do a whole car as it is a gross waste of money. With fillers buy from a motor factor in 4kg tins or so. That way you get trade, the 500gm tin in the local accessory shop costing just about the same as the 4kg tin from a factor!

**Resins** — again buy in 5 litre (10kg) tins along with your brushes, acetone and mat (sold by the

metre). Strand Glassfibre Ltd, Brentway Trading Estate, Brentford,

P38/Upol C filler and the chopped strand mat P40. The Upol C is 7kg size but either 2.5 or 4kg will be ideal for normal purposes.

Middx. TW8 8ER (telephone: 01 568 7191), are the only retail outlet in the UK and are helpful; if you have access to a trade outlet (where I buy my stuff) it will be even less again. Failing that, yacht chandlers will provide resins etc., although buying this way is unbelievably expensive. So, to recap so far, the materials needed are mat, tissue, resin, brushes (and rollers) and acetone.

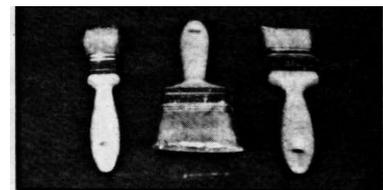
## Tools



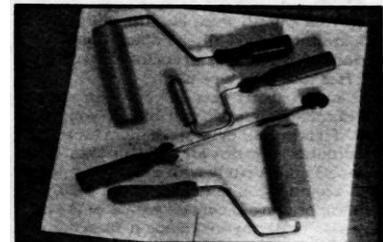
Now the basic tools with which to attack the damage. A hacksaw, chisels, Stanley knife, plenty of tins and sticks to mix up the resin (NEVER use a glass container as the heat of reaction between resin and hardener when it goes off will shatter the glass), a jig saw and a Grinderette — either Wolf or Bosch. They really are essential for preparing gel cracks etc. They are expensive to buy outright but, if tackling a whole car, then it is worth it; failing that, hire one. If desperate, you can use an electric drill with either a cintride disc on it or an adhesive disc on a backing

pad.

You'll also need plenty of sandpapers in varying grades and a selection of cork, rubber blocks and the specialist files (as in the photograph) made by 3M available from motor factors — their sanding files are invaluable. Recapping again; for cutting the mat — Stanley knife and scissors. For preparing the body — Grinderette, hacksaw (padsaw), jig saw for cutting and trimming, sandpapers. For finishing — files, rasp files, blocks and sandpapers; both production paper, ie. carborundum chips glued on a backing paper used dry, going from P40 coarse to P800 fine, and wet and dry silica chips glued on a waterproof backing paper used either wet or dry going from 40 to 1500 which is just like newspaper. A usual selection is P40 and P80 for rubbing down filler and 360,600 wet and dry for final finishing prior to painting.



*A selection of 1in, 1 1/2in, and 2in resin brushes.*



*A selection of rollers for use on very large flat areas where it is quicker to use rollers than brushes.*



*A Wolf Grinderette with a cutting disc on it and, separately, the sanding disc — this is 80 grade.*



*The specialist 3M Stickit file with its adhesive sandpaper strips. Cork and rubber blocks are also essential.*

All your equipment will last indefinitely, the only exceptions being the resin and fillers which have a shelf life of around nine months. In other words, they may 'go off' after this time. In reality, however, resins will last at least two years and so will fillers if the lids are tightly on them and they are left away from sunlight in a cool place. When a crust starts to form then it's time to throw them away. Acetone lasts indefinitely. All this will be useless if, of course, you are allergic to resins or mat, and I suppose I should have started this article with some notes about health and safety.

## Health precautions

You are likely to get a localised rash up your arms and hands if

you handle the mat with no precautions. If you are allergic, do not continue. Get someone else to do the job as the allergy can cause severe swelling, rashes and can be extremely painful. Cover up your arms when cutting or handling mat and use washing-up gloves of necessary. If, like me, you cannot stand gloves then always use a barrier cream which is available from Boots, most chemists, resin shops, etc. Resins normally give people no problems, apart from the smell which may upset you. Always give yourself good ventilation when doing a job since the heavy vapour given off (styrene) can cause headaches and even unconsciousness if you are exposed to it for too long. If you ever feel drowsiness coming on get out immediately into the fresh air.



The warning signs for resins are an itchy nose and running eyes. When you reach this stage stop and recover. When grinding, cutting or sawing a laminate you must always wear a mask and goggles and always grind outside, never in a garage etc., as very fine pure glass particles are thrown everywhere and once they are inhaled the body doesn't get rid of them. Silicosis can result (and this is similar to asbestosis). For the one-off job a simple face mask is enough provided you keep your mouth shut, because your nose is an extremely good filter. When doing long periods of grinding in an enclosed area then a full face mask must be used.

If any hardener gets on your skin wash it off immediately as it will bleach your skin and, if it is in your eyes, wash them for at least 10 minutes. If resins are on your skin, wipe them off immediately with a cloth dampened with acetone (you're not supposed to do this because prolonged contact with acetone may give rise to dermatitis, since it bleaches out the natural skin oils), then wash in warm soapy water and finally rub a skin cream over the affected part (Nivea is very good). If any is swallowed, drink quantities of water and induce vomiting — seek medical aid immediately.

If any hardener spills on the ground or clothing, wash it away with plenty of water. With resins cover with earth or sand and, when soaked in, dispose of safely; wipe the residue off the ground with acetone.

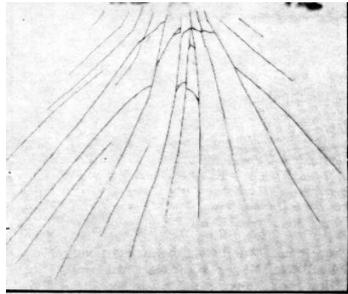
### **Safety during work**

Fire is a major hazard. All resins, hardeners, and acetone are extremely inflammable. All have low flash points, ie. temperatures at which they may ignite; resin is 25-30 deg. C. So do not use naked lights and do not smoke while doing a job or even when you've finished because the styrene vapour given off during curing is highly volatile. Once cured, though, it takes a lot of heat to make GRP burn.

Fire can also be started by throwing away your unused liquid resin in the dustbin because the heat of reaction when it is setting is enough to set alight any paper. Always place the tin in a safe place and wait until it has 'gone off and is stone cold before you dispose of it. If a fire starts, a CO<sub>2</sub> or dry powder extinguisher will cover all possibilities. Always keep an extinguisher handy. Water will not work on resins. All resins that you buy are known as pre-accelerated resins and all you do is add hardener. However, without trying to confuse the issue, unaccelerated resins are available for operatives to add their own accelerator (cobalt naphthalate) to give predetermined set times. If anyone offers you unaccelerated resin do not use it. Buy the correct accelerated type. Accelerator is always added first to the resin, then the hardener. Never mix accelerator and hardener together because they form an explosive mixture.

Unaccelerated resins are usually not available over the counter and, unless specifically asked for, all resins sold are already pre-accelerated so don't worry. Working with GRP is common sense.

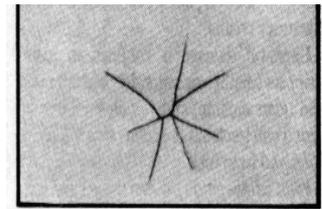
Treat all chemicals with the respect they deserve and, if you're allergic, STOP.



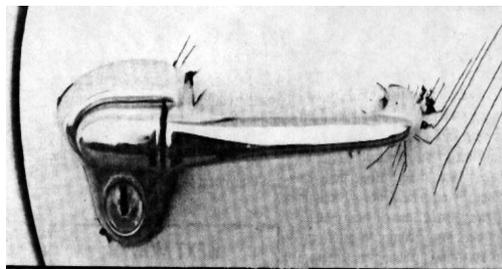
*Extent of gel crazing as a result of movement from a window frame.*

Every GRP car on the road today has a gel crack on it or at least a blemish in the GRP paintwork. Even the best prepared car at a concours event, or a brand new car even, will have a mark somewhere if you look close enough! Gel cracks are really GRP's answer to metal rust and, like rust, most of them should never appear. So, apart from the obvious accident damage (about which more later) how do gel cracks appear, and why, and what can be done to prevent them from happening in the first place?

Starting at the beginning, causes are from the mould itself. If the mould has been constructed from GRP (be it epoxy or polyester resin) and has an in-built crack in it or any other blemishes, then the pattern of the crack will be transferred to the moulding and will show as 'crack indentation'. This is fairly common on, dare I say it, low budget kit cars and on cheap replacement wings, bonnets etc. for Morris Minors and the like. At least with the replacement parts the offending mark can be flatted off with wet and dry paper and then the whole panel primed and painted but, with self-coloured panels (where the colour is in the gel coat layer), then the blemish is there for all to see and if it is on, say, a flat bonnet area it will stick out like a sore thumb, much to the detriment of your pristine car - The only recourse is to paint out the fault and get the manufacturer to rectify the mould and make another one. (The classic example, as reported to me when I admonished one poor kit car manufacturer about the shocking state of a door panel was 'Oh, they're all like that'!).



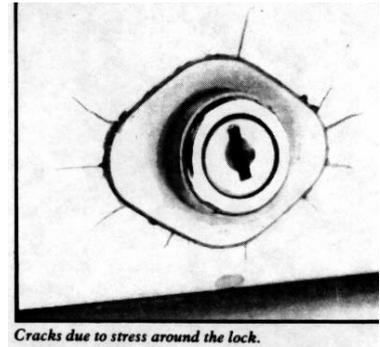
*Gel crack from a stone chip from the underside of a wheel arch which has "penetrated" the panel. This should be dealt with without delay while the damaged area is comparatively small.*



*Cracking around a door handle due to excessive stress.*

From the mould itself we move on to the next stage where the moulding is released from the mould. If, for any reason, the moulding has not fully cured (ie. it is still green), or has stuck fast because the release agent failed to release and too much force is applied, stress lines and cracks will appear and will show up as white lines. Then, if left unchecked, they immediately show through the paint that is applied subsequently. The remedy here is to make sure all the release agent is evenly applied — especially into any awkward corners — and that the moulding has fully cured before attempting to release it. It may also be that the mould design itself has been constructed in the wrong way to allow an easy release from the moulding ie. too sharp a radius on corners, overhanging angles, double curvatures, etc. If necessary a re-design must be done to prevent inherent cracks in the moulding.

With a crack-free moulding released, in-built stresses may eventually appear as a crack, especially on hard butt edges where not enough thickness has been applied. Unless bonded to GRP correctly different materials, such as plywood or steel bulkheads, can move, causing stresses on the GRP. A thick laminate joining a thin flexible panel or a door panel beefed up around a hinge point will cause a gel crack to appear in time where the thin panel flexes and the stiffer hinge panel doesn't. The remedy on any panel is to grade the weight of mat accordingly, rising evenly to a maximum around the stress point. Sadly, too many new GRP car manufacturers don't even bother and the factory laminators just slop it on any old way. If the cars were built correctly then they would be virtually bomb-proof and, having repaired just about every type of GRP car, I feel that so much could be done to prevent totally unnecessary damage.



Moving to the vehicle itself, what can be done to prevent cracks? The main problems are due to high stress points ie. door handles, hinges etc. and panel flexing due to a stiff bulkhead flexing the panel around it. This also applies to glass windscreens, be it front or rear, where the glass is heavy and does not give — but the GRP panel will. All fittings on any panel must have the load spread over as large an area as possible, especially around the door and boot handles. If necessary, add one or two extra laminates behind the handle and grade them over an area, then use large 'penny' washers when bolting up. With all fittings DO NOT bolt up like a gorilla. Use common sense otherwise that sickening cracking sound will be heard and, yes, there is a crack on your brand new paint. Make sure with any panel that it fits correctly ie. all doors, bonnets and boot lids fit their shut lines, since tugging away on the handle trying to open the door will only succeed in cracking the panel. A correctly fitting panel will require no force to shut or open it but force, wherever it is applied, will lead to cracks. NEVER slam doors and lids because cracks will appear in time.

With bulkheads and glass windscreens, build up the area around the aperture to prevent flexing if required, but grade it away to the original thickness otherwise it will crack somewhere else.

Fitting trim and badges on a newly painted body is another cause of cracks and heartache. Drill the rivet or screw hole OVERSIZE ie. if using 1/8 rivets use a %4n drill; do NOT force in a rivet or screw because as soon as you tighten up — bang — a star crack will appear through the paint around the fixing. If possible always use a washer behind the rivet or screw to spread the load. With badges use double sided adhesive tape if possible to save using screws or rivets. Remember, any mark will remain for life and may spread. The only way to get rid of it is to do a repair and repaint. Fitting the 'pretty' bits causes more damage to new GRP bodies than any other operation.

Other areas to watch are the fitting of non-standard items like sun roofs, fancy air cleaners etc. and not realising that they are chaffing on the adjacent GRP panels, thus causing damage. With any item do not force a panel over it; always check first that it does not foul before shutting the panel. With any exhaust system, wiring and water pipes make sure there is a large enough hole or air space around the pipes so they don't touch and cause cracks. With any wiring always use a rubber grommet to prevent the raw edge cutting into the wires. Make sure underpanels, such as wheel arches, are well protected by anti-stone chip paint (3M supply a good one) or a good FLEXIBLE underbody seal so stones flung up by the wheel do not star crack the GRP from underneath (Lotus Elans and Europas suffer from this).

Most, if not all, of the foregoing can usually be avoided with simple precautions and attention to detail. The next cause cannot! It is that of accident damage. Proper GRP cars (such as Reliant,

Lotus, TVR and Marcos) are infinitely better in an accident than metal cars because GRP will absorb the impact and shatter, NOT deform, thus minimising panel damage. Metal will deform and go on deforming ie. a front panel through the wing, a post, roof, door etc. and be a total write-off.

Furthermore, pulling out metal bodywork, aligning on jigs and welding on new panels actually puts more stress into the bodyshell, whereas bonding on a new GRP panel should cause NO stress at all. After a major accident the extent of gel crazing may not be evident until some days or even weeks later, when it shows. Driving a car after a minor accident will cause the cracking to spread, making life difficult for any accident estimator to assess the TRUE damage. I always look for the slight deflections of light over the paintwork to tell me where the cracking stops, even though nobody else can even see the cracks under neath the paint. It goes without saying that all the accident damage/crazing must be removed completely to prevent any further stress/gel cracks occurring again on the 'repaired' area. All too often new sections are bonded in and 6in behind the joint all that is under the new paint are the remains of gel crazing from the accident. If new sections are bonded in it is essential that the thickness of the new laminate matches the old and the join itself must be graded over a wide area.

Other causes of GRP damage, apart from fire, are confined to nature. GRP will delaminate if left out for years with no protection; water will enter the mat strands which act like capillaries and, if there is a severe frost, the layers can physically separate. Once water is in GRP then it must be dried out in an oven for about a week at 85-100 deg. F before any attempt at repairs or painting can take place otherwise water will just break through, giving unsightly bubbles and blisters on the paint surface.

Severe heat will distort the panel or body-shell. Above 140 deg. F the resin MAY start to 'flow' and, once set again, the deformed panel will have to be replaced. This is why one NEVER low bakes GRP bodies when painting (however, many people still try with disastrous results).

Chemical damage is confined to paint strippers (methylene chloride), hydroflouric acid (glass etching) and certain fuels over a period will leech out the resin (after all, resin is derived from fuel).

Paint strippers will eat into the gel coat and resin and, if left, will make a hole. The only action is to cut out and repair. Hydroflouric acid not only will eat into the GRP but will eat into you as well! HF is NOT available to the public due to its lethal qualities. Brake fluids and anti-freezes do not attack GRP. Fire is the most feared and any fire damage on GRP MUST be cut away since only the glass mat is left. The mat has no strength at all after the resin has burnt away. Never bond new panels to fire-damaged old ones because, at best, you will make a very weak bond.

GRP is pretty indestructible and really will last a lifetime if looked after correctly.

This part is really the nub of the matter — how to repair your crazed dream car. The repairs can be divided into three types. (1) simple gel cracks, (2) compound accident/gel crack damage requiring reinforcement and, (3) major accident damage requiring replacement sections.

### **The simple gel crack**

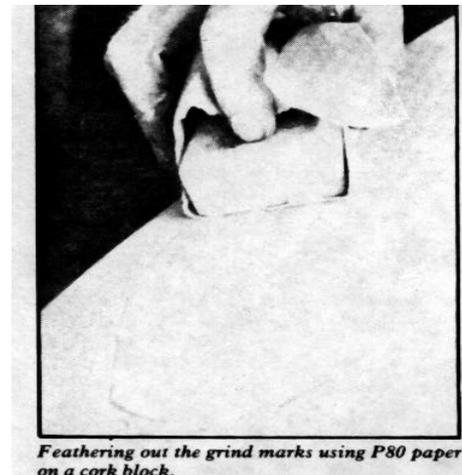
The first thing to realise is that every GRP car will have a gel crack on it somewhere. Even brand new cars will or, after a professional respray, a crack will appear from just knocking it in the garage or by fixing new items of trim, badges, etc., so don't get paranoid about gel cracks. They may look unsightly and annoying but, unlike rust on metal cars, they are not going to affect the structure in any way. I have just supplied a brand new Esprit Turbo hot off the transporter with two gel cracks on it due to over-zealous trim fitting but fortunately they didn't show! The worst thing to do is to eliminate just one crack and make more of a mess doing so; it is far better to save up and do the whole car in one go, culminating in a superb respray. The second thing to understand is that it TAKES TIME, a great deal of time, to carry out repairs correctly and, as described in the opening article of this series, the technique is the same for ANY GRP car. The cost of professionally repairing a Reliant or Ferrari is equal and only the final painting and finish will give the price differential.



*Grinding out the crack. Note the flat angle of attack of the grinderette. 80 grade paper is used.*

With the simple crack then, wash the car first. It is amazing how many people gaily grind away, sweeping all the muck into the freshly ground area and then splodging over the mess with filler. Dry it thoroughly and de-wax the area if required with white spirit or 2-star fuel. Now comes the moment of truth. Get your grinderette and remove the guard so you can obtain the correct FLAT angle of attack and gently grind the crack area, overlapping the end of each crack line by at least an inch. The crack shows up as a dark yellow line so you know when it stops. DO NOT grind away at such an angle that you go straight through the lot but use just a gentle angle ie. 15 degrees to the horizontal. DO NOT (as, incredibly, many manuals tell you)

ROUT OUT each line of the crack and fill it with filler, rather like doing lino-cuts at school (do they still do lino-cuts?) because each 'line' will show as soon as it is painted. Grind enough away to just enter the mat layer, ie. go through the paint and gel coat layer. The mat layer will show up white and 'rough hairy' to the touch. Use an 80 grade paper disc on the grinderette. Next feather the paint/grind edge with 80 production paper at 90 degrees to the grind mark to remove the marks and to give a gentle slope to the repair. Another myth — there is no such thing as re-gelling. You do not put gel coat resin over the area because gel resin is sticky on the top surface and you cannot rub it down but, more to the point, any resin on its own is brittle and the crack will work through again. In the same



*Feathering out the grind marks using P80 paper on a cork block.*

vein, filler alone will have the same effect but 90% of so called repair specialists will just grind away and slop filler over it and in about four to six weeks the marks will show through the paint again. The next stage is the only correct way and that is to paint resin over the ground area and 'lay up' the piece of tissue which has been pre-cut to shape. Just jiggle the resin up to the paint boundary and when it is FULLY set ie. dry to the hand (don't forget there will still be a slight stickiness, but your hand will not stick to it), mix up your filler and spread it evenly over the tissue/resin and over the paint boundary. When it is set use 80/220 paper on a file or block to contour it; a second application of filler may be needed. Finally finish off with 220 grade paper because all spray fillers and hi-build primers are designed to take out the 220 marks.



*Area is now ready for repair and the next stage is to paint resin it prior to . . .*

The main potential faults are firstly, creating 'flats' on curved surfaces such as wings where when using a file it will work at a tangent to the curve instead of following it and, secondly, causing hollows in large flat panels ie. doors, bonnets, boot lids, where the panel will flex every time you rub and, consequently, you rub (dig) harder thus causing a hollow in the middle of the repair. Thirdly, not spending enough time ie. the resin is not fully set before applying the filler and, finally, the filler not mixed thoroughly; some areas gone off; some still soft and leaving grinding or score marks everywhere. All these defects will show up immediately when the repair is

painted.

Remember, just one simple gel crack on, say, a bonnet will take from start to finish 45 minutes to one hour. Now, how many gel cracks have you found?

### **Compound damage**

This type of damage, which requires laminating from behind, is fairly straightforward in that the top surface is always treated as a large gel crack. If there is a simple split, say, on a wheel arch, thoroughly clean the underside of all debris and underbody sealant and use the grinderette with an 80 disc and abrade the surface to form a key, then go 3-4in either side of the split, and lay up these to form layers of 300 gr/m (old 1 oz/yd) mat, wait until it is fully set and attack the top surface as in part one. If the split has 'ridden up', one of two things can be done. Run a hacksaw blade or jig saw blade up the crack; this will remove the jagged edges and you can press the edges flush again. If the crack is severe then, after laminating underneath, grind into the new laminate on the top surface and use one layer of mat plus the tissue for the 'gel crack' repair.

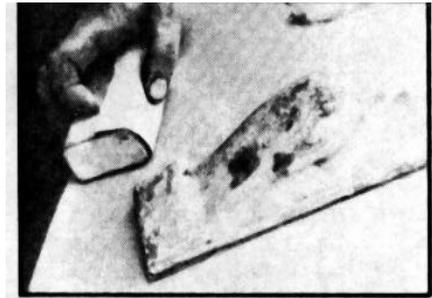


*When all is thoroughly set, mix up the filler and make sure it is thoroughly mixed. Spread the filler over the repair evenly. Don't leave large tramlines all over it.*

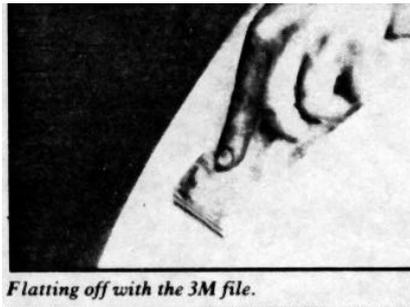
For major compound fractures that don't require sections the area may have to be pieced together like a jig-saw using clamp plates to hold it fast. Always clamp from the top (painted surface) and laminate using four layers. When it is set, remove the plates and denib the screw surrounds with the grinderette. The structure is now sound again but the top is still a mess so grind the whole area and, if extensive, either drape one layer of matt plus tissue or two layers over this. When it is set fill as in the first part and get the contour right. Remember, the filler acts only as a veneer so it MUST NOT go on three inches deep because it will only crack away again. We have all seen superbly resprayed GRP cars which, given a slight 'ding' on a wheel arch, have shed two tons of filler from the entire wing due to a previous repair! All the strength of the repair is derived from laminating and filler is to give the cosmetic shape ONLY.

MAJOR DAMAGE.

Major accident damage which requires replacement sections can get complicated but buy only the repair section you actually need; don't buy half the front when you only require a quarter front, panic sets in at the thought of cutting off half the car to bond on a new section but just remember to strip out everything around the bonding line and MEASURE it all correctly first BEFORE you cut it away. Use reference points ie. chassis fixings, bonnet, door openings, windscreen points, then cut off the damage and offer up the new piece. Local jiggling and cutting will result in the final fitting and, when you are satisfied, clamp (or rest) the new section in place temporarily and check the FIT of the door, bonnet etc.; do it BEFORE everything is stuck solid and you cannot shut the door. Prepare the old and new surface thoroughly, go back at least 12in beyond the join and then re-align and clamp on. Spread the load away from the join with at least four to five layers of laminate and, when it is set, remove the clamps, grind into the new laminate and then join and feather out to at least 8in-9in either side. Do it as described in part one but place two layers into the join and grade out, finally using tissue and filler. The join is inherently strong because you have made a whole new join with fresh laminate. NEVER just butt-joint two sections as eventually a whole line will appear at the 'butt'. I've actually had an Elan rear section fall off where the owner had just butt-joined them up with one layer only underneath and filler on top. No one will ever know that a correctly fitted section has been put on. Approximate times for this type of repair (depending on the car) vary between 10-50 hours.



*Contour the filler by using a "half file" by 3M or a cork block, both with P80 paper.*



*Flattening off with the 3M file.*

A final piece about 'bolt on' GRP panels, either to GRP cars or metal. With like-with-like bolt through panels on GRP cars use a silicone sealant between them first and use the largest washers available to spread the load. Do the same with metal or even sit the panel on a thin piece of isolating rubber strip; glazing rubber is ideal. If any panel has to be bonded on it is essential first to key the area well and use three to four layers graded out. On metal all rust must be removed and use a coarse disc 40 or 80 grade to provide the key; the bonding must be

perfect with no air bubbles if possible, cross-bolt as well because metal always will expand and contract at different rates from GRP. Remember, **NO STRUCTURAL METAL MUST EVER BE REPLACED BY GRP PANELS.** Apart from the fact it is illegal, it is also highly dangerous.

All the foregoing has been condensed from my book 'How to restore Glassfibre Bodywork' published by Osprey and available at £7.50 from: Fibreglass Services, Charlton Saw Mills, Charlton, Chichester, West Sussex.

Painting GRP is not the same as painting metal and the quicker everybody realises this the better. The preparation required takes far longer as does the painting time so different painting techniques have to be applied. There are literally only a handful of professional GRP sprayers in the UK who achieve a finish that will last for at least 10 years or so.

Why does GRP painting differ so greatly from metal painting? The main reason is sinkage. GRP is a 'soft' material compared with metal and any repair NOT done properly will show due to the thinners in the painting process sinking into the GRP and then evaporating out, bringing the repair with it. Any excess of paint layers, ie. after about three resprays, will always show as a boundary around the repairs for this reason. The thinners will soften the receding layers of paint and lift the repair.

There are several matters arising from this. First, when doing a full repaint, if there is any

shadow of doubt as to the soundness of the ORIGINAL factory paint, ie. microblistering or flaking off, or the car has had more than one or two resprays, it ALL HAS TORE STRIPPED OFF. This cannot be stressed enough. Adopt any other approach to the problem and the end result will look terrible. You cannot paint over blisters, flaking paint etc. Secondly, all repairs must be done absolutely perfectly otherwise you're wasting your time and, thirdly, choose the paint scheme correctly, ie. stick with one system all the way through and use the same manufacturer, be it cellulose or the isocyanate 2K system (known as two-pack acrylics). Spraying cellulose systems requires a different technique from that used when spraying on metal; keep the thinner content to a minimum and build up the layers of paint almost dry. High thinner content will just flood the GRP surface to cause problems later on. If the original finish was cellulose use it again — nothing is worse than seeing an orange peel, lurid acrylic coloured Elan when it should be a flat-finished cellulose original factory colour.

### **The paint systems**

It is worth mentioning the advantages and disadvantages of various paint schemes.

1. Cellulose — These have improved considerably over the past 15 years or so. Don't be bamboozled by the fast-talking sales rep about synthetic whizzos etc. They do NOT always understand about GRP but only about high volume spray shops dealing with Minis, Escorts etc. where turnround is all important. Cellulose was used (and still is of course) on all GRP cars up to the early '70s (Lotus changed to a polyurethane paint in '71 on their Elans etc.). So, first for originality on your classic, use it. Secondly it is easier to apply and can be blown-in locally if a mistake is made. Thirdly, a superb flat mirror finish can be achieved by hand-flattening and polishing. If looked after, cellulose will last for ten years plus. Metallics are also done in cellulose or by using the system known as base coat and clear. Here a base coat colour is sprayed on, followed by the clear lacquer which is then flatted and polished. This system is awful to match on part repairs since the final colour is not known until the lacquer has been painted on.

2. Two-pack acrylic-isocyanates. Quite simply do NOT spray these yourself as external breathing apparatus is required. The fumes given off are lethal. Either use new isocyanate-free paint (only available in a few colours as yet) or get a professional firm to spray it for you. The advantages of this system are that it minimises sinkage (no thinner content) and it is more durable in service. Its disadvantages include the fact that it cannot be part blown in on a repair so the whole panel has to be done. It is very difficult to lose an edge and, unless flatted and polished within 24 hours, an orange peel finish will remain.

3. Synthetics. Nobody in their right mind uses these air- or chemical-drying plastic paints on a classic car. They provide a very cheap way of obtaining a shine and may be ideal for kit cars etc. but are virtually impossible to repair over and, as with acrylics, the edge cannot be lost. The whole panel has to be painted.

Do not bake

It is time that everyone, professionals included, realised that YOU CANNOT LOW BAKE ANY GRP CAR. Numerous bodies have been lost in this way and people still do it. A true low bake is 130C. At that temperature, even for half an hour, the body will flow and become useless. The maximum temperature for any scheme is a FORCE DRY 85- 110F which is 30-40C. I have had to arbitrate on several occasions on behalf of owners whose cars have suffered GRP flow after being painted by professionals.

What it costs

I repeat, GRP painting is very different from painting metal and it costs two or three times as much. There is no such thing as a 'cheap £400 blowover'. The true cost among my professional 'friends', including ourselves, starts around £1500 to £2500 for a strip and repaint on, say, a Europa. Realistically the finished cost is over £3000 which includes new rubbers, re-hanging doors etc. **IT IS NOT CHEAP TO DO IT PROPERLY** and to do it properly is the only way.

### Preparing/removing the old paint

Now for the awful bit! Having decided the course of action for the repaint you have a choice of methods of preparation depending on circumstances:

1. The lazy one first — on self-coloured gel coat cars, namely kit cars or bolt-on GRP wings/panels etc., if any repairs have to be done, do as outlined last month. Then flat off the whole car/panel with 360 wet and dry (wet with a little washing up liquid in it) to provide the key. Dry thoroughly and then it is ready for the painting process.
2. If the original paint is sound or you elect not to strip it all off, repair the cracks/damage/marks etc. first, then **REMOVE EVERYTHING** from the car that can be removed ie. door frames, glass, lights, the lot, and flat off the entire car with 360, paying particular attention to the repair/paint boundaries. These areas must be absolutely perfect. Use lots of water and change the paper regularly. If the carpets/seats are still left in, cover them up well because wet coloured stains are quite difficult to remove when the crud has dried! Finally, when all has been flatted, wash with clean warm water and dry thoroughly.
3. Stripping a whole car will take a very, very long time whichever method you choose. People just do not realise the hundreds of hours it takes. Unlike metal where you can apply paint stripper everywhere and high pressure hose it off, paint stripper attacks GRP so extra care has to be taken. If using the paint stripper method buy the water soluble stripper only. Do **NOT** buy the special GRP ones that are intended for marine purposes only. They do not remove cellulose/acrylics. If you are stripping an original finish take it off **BY HAND**. **DO NOT** use paint stripper because, if you do, one pass of the scraper and you'll be through. Start with 80 grade wet and dry finishing with 220 and 360.

Before starting with paint stripper first de-wax the car with petrol or solvent but be sure to eliminate all risk of fire. Wipe clean and then key the surface with 80 grade paper to provide a grip for the stripper otherwise the first applications will remove only the remaining wax polish! Work on a small area at a time and scrape the paint down to the original primer coat only. Always leave doors, boot lid etc. attached to the car because it is easier to work on these when they are anchored in position.

When you have finished with the stripper, take off the door handles, frames, glass, lights etc. and finish around these points by hand with wet and dry paper. Taking everything off first may seem logical but you do not want stripper all inside the car eating into vinyl seats etc. and the build-up of unremoved stripper in and around door handle holes etc. will give horrible paint problems later on. After each patch has been done thoroughly, wash off with water to neutralise 'the stripper. Go over the whole car, leaving any old repairs — do not paint strip them out. When the car is, hopefully, in its original primer, flat off by hand with wet 220 wet and dry. Next wash the entire car and then **TACKLE THE REPAIRS** both old and new (gel cracks show up as dark yellow lines). Finally flat off again totally with wet 360 grade wet and dry and the car should be ready for painting.

Chipping off the paint using chisels is an alternative to paint stripper. This can sometimes prove to be quicker provided that the paint comes off easily. You will find this method is best when the

car has many layers of paint. Use a un wide chisel (maximum) or smaller sizes for the fiddly bits. Do not gouge into the GRP. If you do scrape too far and remove the gel coat treat the area as a gel crack for repair. This applies also to gouges made when using paint stripper.

Another method of stripping is by hand-sanding. This will really take forever, especially if you have to take off six repaints; to use an electric orbital sander or equivalent is a waste of time. NEVER be tempted to use a grinderette or a cintride disc as these will tear through the paint and straight into the GRP. By far the quickest method is to use a compressed air orbital sander with 40 grade paper and working down to 220 grade, the flexible backing pad will allow awkward corners and curves to be reached. . Be careful when nearing the initial primer coat. Stop and take this off by hand otherwise, after painting, you'll wonder why the beautiful gloss finish has a myriad of squiggles all over it.

For the bare body use ICI (or Glasurit) spray filler. This is designed to take out 80 grade marks and is self-etching. I never use Lessanol as I believe that it can cause problems later on. DO NOT use spray fillers over painted surfaces but only over the repairs. After the spray filler use high build primers

then your colour. Or, if the body is perfect, use a two-pack primer (which should prevent sinkage) and bthen your colour whether cellulose or two-pack scheme.

On a final note, it usually takes about 250 hours to strip and paintspray a Lotus Elan +2. If you have done it yourself you have probably found that it has taken hours more. Painting and polishing alone in a cellulose scheme will account for around 70-80 hours of that time.

#### Further Reading

"How to Restore Fibreglass Bodywork" and "How to Restore Paintwork", both by Miles Wilkins and published in the Osprey Restoration Guide series. Both of these books can be obtained direct from Miles at £7.95 each including postage and packing and his address is Fibreglass Services, Charlton Saw Mills, Charlton, Singleton, near Chichester, West Sussex.

*Please note mentioned prices are a guide only and date to the time this article was first published.*

