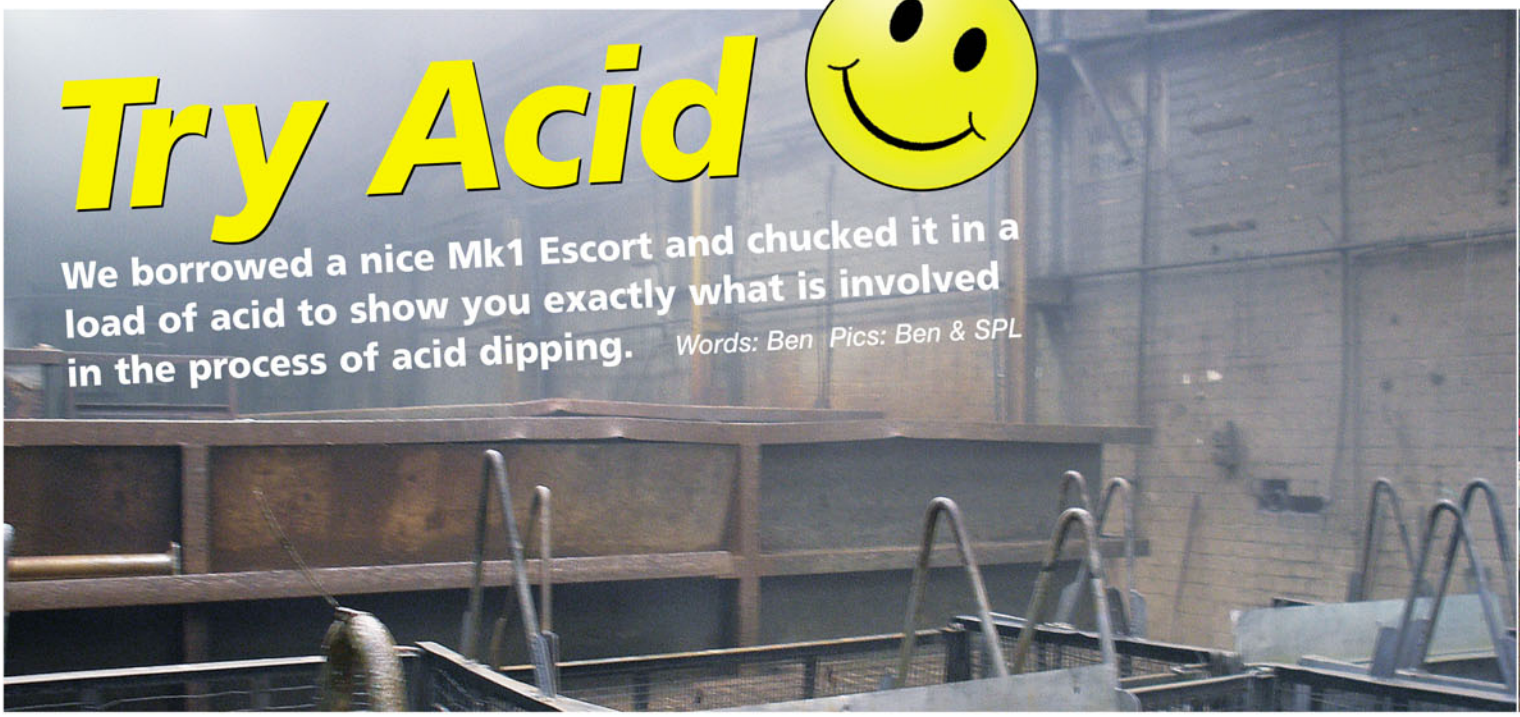
Try Acid

We borrowed a nice Mk1 Escort and chucked it in a load of acid to show you exactly what is involved in the process of acid dipping. *Words: Ben Pics: Ben & SPL*



I'm sure that many of you can relate to that sinking feeling you get when late into the night you are laying underneath a car with a wallpaper scraper and a blowtorch trying to get all that damned underseal off. It's a smelly, laborious, tedious job which seems to take forever. Sadly if you are going to build/restore a car properly, all those years of underseal, paint, filler and sealer have got to come off. The only way to restore a car and have it last is to find the rot, chop it out and weld in fresh metal, there is no two ways about it.

You can weld to the scabby, thin metal that is sort of rotten but good enough to get a pigeon-poo spec weld on, but chances are it will be non-existent again within a year. The reason for that is because the rust is still ingrained in the metal, you've only cleaned the surface of it. To do it properly, everything needs to come off so that all you're left with is bare metal, it's only then that you can see where the rust is and it's only then that you can begin to deal with it.

What options do you have for uncovering that bare metal/rot? Well there is the aforementioned elbow grease method, you could get it shot-blasted or you could get it acid dipped. Acid dipping, I hear you say, that sounds a bit dodgy – won't my car melt? Well we at Retro Towers were also intrigued as to what exactly acid dipping was and whether or not it was any good. So we borrowed a Mk1 Escort shell and took it to SPL in Dudley to find out what goes on.

Who are SPL?

The company came into existence in 1994. Their original aim was to provide the motoring industry with a reliable de-greasing, paint stripping and rust removal service. The company quickly grew to offer a large range of various industries an effective recovery route for products that needed re-working. This basically means that if a product was finished but had some kind of defect which had to be fixed, be it with the finish of the paint, some dodgy welding, contamination of the metal or worse still, corrosion, the whole lot needed to be quickly and easily stripped back to bare metal and if corrosion was the fault, it needed to be removed. The simple solution was acid dipping which was developed to remove paint, rust, grease, sealants and silicone to name but a few, from a variety of different materials.

The motorsport industry cottoned on to this and badgered SPL into developing a way of applying this procedure to complete cars. Rather than using up hundreds of man hours scraping the paint, sealant and underseal from a car, then start trying to remove the corrosion before they could even start work putting it together, a cost effective route was required. Just think, if this could all be done in one hit, it would save a hell of a lot of fannying about.

Yes you can sand-blast a car, but what happens with the chassis rails, sealed areas and exterior panels? The best blasting companies will not shot-blast exterior panels, they will only do the interior, the engine bay, the underside and the boot floor. This is purely because no matter how experienced the operator, it is likely that if blasted, the exterior panels will become distorted. Which is great for the inside and underneath, but then sends you back to the old Nitromors and scraper routine for the rest of the car.

In days gone by, the acid dipping process was a very rudimentary procedure. Sealants wouldn't become broken down, acid would become trapped in chassis rails and leak out over time, causing damage to any newly prepared surfaces. So SPL developed a process that can do the lot safely. Read on to find out exactly what's involved.

The car

Because we are basically cheeky, we "borrowed" a supposedly good Mk1 Escort shell and stripped it out, ready for the process to take place. By stripped out we mean everything. Every last nut, bolt, washer and clip had to come out. The reason this has to happen is so that the treatment can reach all areas and also because this particular treatment is designed to tackle corrosion in mild steel, and will melt any aluminium that is left on. It's also best to take the doors off too, which is a real pain in the arse on Mk1 Escorts, but we did. On some occasions it is necessary for a few 6mm holes to be drilled to help with the draining process when the car comes out of the various stages of immersion. Fortunately the Mk1 Escort drains quite well so there was no drilling for us.

We trailered the car up with the remaining running gear held in with nuts that were done up finger tight, ready for quick release upon arrival. It appears to be a relatively good shell, possibly saved by the inch thick Ziebart treatment on the inside of the rear quarter panels, the boot floor and the entire underside. New wings had been fitted at some point, but on the whole the shell looks to be in good form. Would this be the case after all the paint and sealant was removed though? Would the owner be happy if we returned a

not-so-original-looking shell to him? After all, filler can hide a multitude of sins.

Stage 1

When we arrived at SPL we unloaded the shell, which was then safely lifted off the ground in order for us to remove the 12 nuts and bolts that were holding the front and rear suspension in place. All that was then left was a bare shell, complete with bonnet, boot and a pair of doors. The shell is then securely mounted on a specially made transportation cage and gets taken to the initial stripping process which is a somewhat closely guarded secret. In basic terms, the car is dipped into a solution which has been developed to break down and completely remove what are known as "heavy organic contaminants". These are found on both new and old shells, they are basically things like underseal, body filler, silicone sealants and so forth. This process also starts to break down the paint which coats the car. After being immersed in this solution for a period of time, the car comes out and is then rinsed with water at high pressure to remove all the bits of sealant and filler which have been loosened by the process but not quite removed.

Stage 2

After being fully rinsed off by the high pressure water, the car is then re-immersed into an alkaline hydrocarbon solution which is heated up to around 85 degrees celsius. While it is in the tank, where it stays for several hours, all the remaining contaminants are broken down and fall free of the steel. Any oil, adhesives, wax and paintwork that have been broken down by stage 1 just come away from the shell and float away. This leaves you with a completely bare metal shell, inside the chassis rails, all the closed in areas are all bare metal. It also fully exposes any oxidation or corrosion that may have occurred over the years.

It is at this stage where you will see the many cover sill panels, arch repairs, roof dents etc that have been cleverly hidden by years of filler and paint. The same can be said for any corrosion that has been repaired with a tin of Isopon and a newspaper. The rust will be on show in its purest form. When removed from the solution the shell is once again rinsed with high pressure water to remove any remnants of contaminants. These first stages are vitally important for the process because if these haven't been effectively carried out and all the contaminants removed, it is impossible to effectively deal with the corrosion.

Stage 3

After the rinsing process has been undertaken once again, the shell is immersed in a solution which contains 5% hydrochloric acid. This solution also contains inhibitors. The inhibitors are there to basically control the acid. In doing this, the acid will quite happily munch into any corrosion that it finds and dissolve it. It won't just keep dissolving the metal though, as soon as it reaches uncorroded mild steel it stops in its tracks.

Stage 4

Once again the shell is going to go diving, this time in an advanced neutralisation and pacifying process. The solution this time contains what are known as wetting agents and has been specifically designed to be more searching and penetrative than any of the processes that have previously taken place. The liquid has a pH rating of 12, which is a high alkaline solution, and neutralises all the acidic compounds that remain on the car. The car is totally immersed, including all the chassis rails and hard to reach areas. As well as doing this, it also interacts with the negative ions which remain on the surface of the steel which leaves the shell with a bright finish (see pictures) which is preserved for around a week.

Stage 5

The last stage of the dipping process is the final pressure washing of the shell. This is done manually with a special solution of preservative mixed with water. This is shot out at around 2000psi, with plenty of attention being paid to any folds, seams and recesses to make sure any chemicals that might remain on or in the car are removed completely. What you have now is a shell in a pH neutral condition which if stored away from the elements, will remain bright and stable for a short period of time.

You now have a couple of choices. You could take the car away, dig your mig welder out and set about replacing what was corroded metal, and is now a hole, with fresh metal. Or, if the shell is good enough you can get it baked and etch primed which will keep it protected in the short term. The third option is to get it e-coated. Our man's shell was surprisingly good and has got to be one of the nicest unrestored examples left in the country. So, we asked SPL to go the whole hog and show us what e-coating was and explain why we would need it.

When going to be e-coated the shell is mounted on a cradle, chained down, wired and earthed ready for the 19 stages that are ahead

E-coating

So we now had a completely bare metal Mk1 Escort shell. No paint, no underseal, no Ziebart, no sealer and best of all, no rust. Brilliant. But, it won't stay a bare metal shell forever. Moisture in the air will get to it over time, surface rust will begin to creep in and it will be back to square one. As we didn't have any major rot leaving us with big holes, we could look at protecting the shell. If we had uncovered lots of rot, we would have taken the car back to the owner and after we had stopped feeling guilty, we would have got the welder out, repaired the car and returned it to SPL for a repeat of the final few stages of the dipping process to remove any imperfections.

With a paint-ready shell, the cheap option is to spray and bake on etch primer. This would work well as a short term answer, but there are a couple of things to bear in mind. When the car was being treated, the inside of the chassis rails, door pillars, folds, creases and joins were returned to bare metal. There is no form of protection anywhere. It is all but impossible to spray a car and get a coating into all these areas. This means that in time, moisture will get in and the rust monster will start eating your car from the inside out. This is where the e-coating process comes in.

E-coating, or electrophoretic painting as it's also known, is a nineteen stage process. It takes place on a plant-type conveyor, similar to how you would see a brand new car moving around a factory, which has four main stages. There is pre-treatment, electro-coating, post-rinse and curing. It is widely regarded as the best anti-corrosion paint system for mild steel and is used by a lot of manufacturers during the build of new cars, believe it or not, from panels and shells, right down to handbrake levers, pedal boxes and suspension components. When it's completed the shell will be water resistant and could last many months before beginning to deteriorate, something that could not be said of a lot of primers on the market today. Most tend to be hygroscopic which means that if they aren't covered with a top coat within a short space of time, they will absorb water and where water is, rust will follow. The e-coat can be applied to many different surfaces, it is only the preparation process which will differ from metal to metal.

Stage 1 – Pre-treatment

The shell gets securely mounted into a cage, where a conveyor takes it through this eleven stage process. It gets chained to a special cage, wired with an electric current and earthed through the cage. The pre-treatment process involves an initial de-grease which removes any silicone etc that may have come into contact with the shell since it came out of the final stage of the acid/alkali dipping process, and this is done in two stages. It is then rinsed twice with water, and a third time

Below: It's almost like something out of the *Terminator* movies... The shell is lowered into the e-coat solution and stays there for 5 minutes

The shell gets washed many times in a variety of solutions to prepare it for the electrostatic dipping process. It's never been so clean!

with a special activating solution. Next it is rinsed with a tri-catatonic phosphate solution which consists of zinc, nickel and manganese – all known to dispel the onset of corrosion. It again goes through two water rinsing stages. There is then a chromic rinse and finally a further two de-mineralised water rinses to leave the shell thoroughly clean and ready for the next stage.

Stage 2 – Electro-coating

Once the clean-as-a-whistle shell has left the pre-treatment plant, the conveyor takes it around to an 8-metre long tank which contains 80,000 litres of cathodic electrocoat paint. Here the shell gets completely immersed and manipulated (jiggled about) within the tank coating cycle. It sits in the tank for around five minutes. The electrically charged shell attracts the electrocoat paint which causes it to cling to the shell. The final thickness of the primer coat will range from 17 to 30 microns, which is fairly thin but ultra-effective. Because the car is completely immersed in the tank and the paint is charged, the interiors of chassis rails, creases, panel joins and folds get a complete and equal coating of the paint, leaving them protected from the elements. Something which could not physically happen with primer applied with a spray gun.

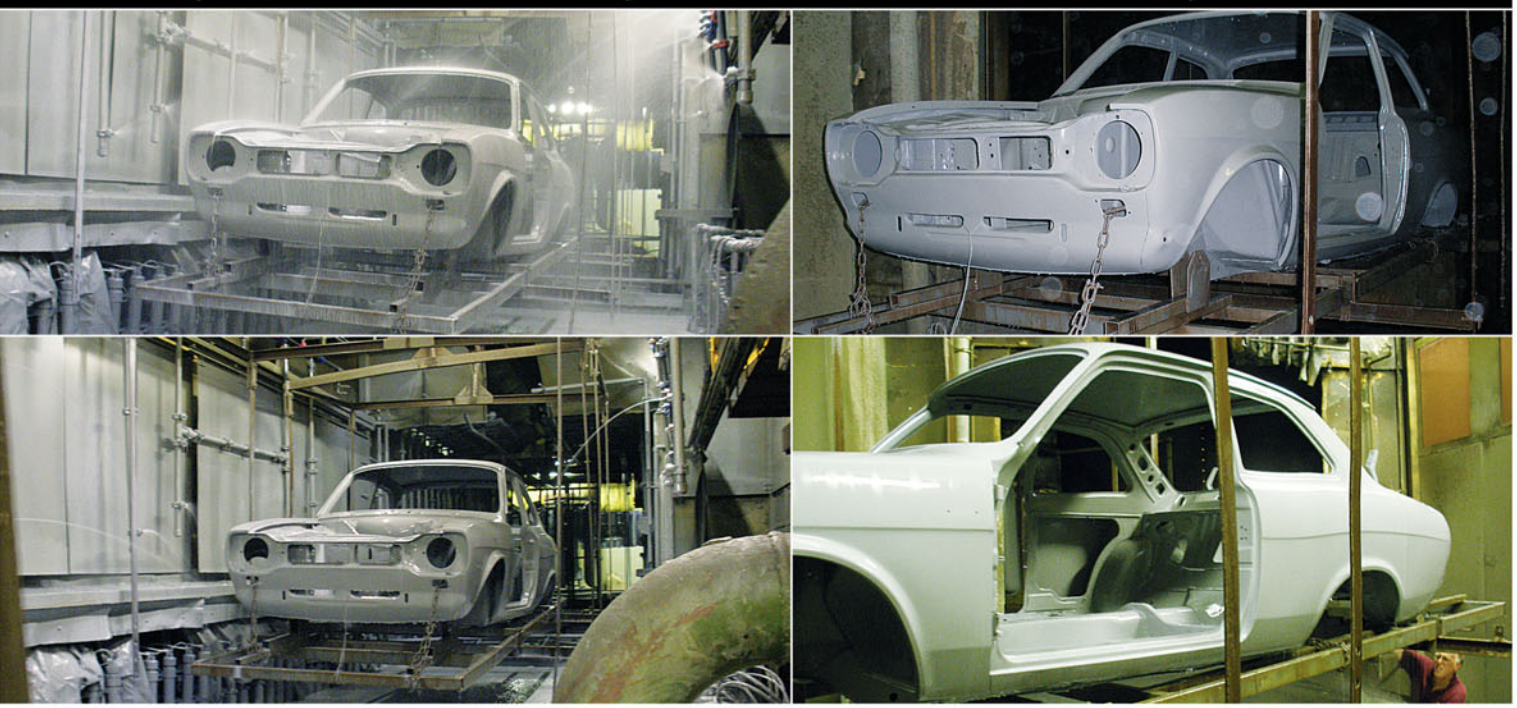
Stage 3 – Post rinse

When the car comes out of the paint tank, the shell gets rinsed again. This process removes any paint that hasn't stuck to the shell or is excess. None of the paint covering on the shell is removed during this process because it is still electrostatically charged. Doing this over the paint tank allows all non-adhered paint to be re-used. Following this, the shell undergoes three ultra-filtrate rinses and a de-mineralised water rinse to remove all unrequired paint.

Stage 4 – Curing

After the car has been thoroughly rinsed, the conveyor belt takes the shell through a huge oven. In this oven the car is cured, or baked, for around forty minutes. The temperature is a constant and somewhat balmy 185°C. This procedure ensures that the paint is fully bonded to the shell and that any moisture remaining in the shell is driven off. If the car has had any lead filler or lead loading work in the past (very common before body filler was introduced), these high temperatures may cause that lead to move. Once baked the coating turns a shade of green not dissimilar to that used by army vehicles, caused by the chemical reaction that takes place during the curing process. This e-coating will not need rubbing down, apply a decent base coat of primer, prep that surface and then paint it. With no attack on the base metal, it's easier to now get an excellent finish with the bonus that it's fully rust proofed.

After coming out of the e-coat the car is then rinsed again several times before it carries on around the conveyor to be cured in an oven



Conclusion

The final result is a shell which, by definition, has no hidden secrets. Any imperfections in the manufacturing process, rust areas and parking dents will be revealed. What is left is a completely blank canvas. There is absolutely no rust left in the shell because the acid has dispensed of it, all we have left is pure, mild steel. Sure there are two very, very minor areas that were once home to rust and are now home to fresh air, but we can rest safe in the knowledge that it has been stopped in its tracks and will not travel any further.

In addition to this, we know that the shell has been protected against the elements in areas that we can see, as well as those we can't. There will be no nasty surprises leaking from the gaps in seams, panel joins or folds, messing up the lovely top coat that will eventually be applied. This 33-year-old Mk1 Escort is as protected from the elements as any brand new production car that may roll out of the factory and has exactly the same amount of rust – none.

To get a fully stripped out shell around the same sort of size as a Mk1 Escort dipped will cost you £695 +VAT, to then get it e-coated it will cost you a further £775 +VAT. If after it has been acid dipped you want to take it away and either repair the holes left by rust or you want to start chopping the shell about for big mods, you can take the car back for e-coating, but it will require another trip through the acid tanks to cure any corrosion or contamination that may have occurred in the meantime. For the amount of work it saves you in the long run and the quality and durability of the end product, it's most definitely worth the money.

Thanks

A huge thanks to Adrian and all the staff at SPL (01384 242010), www.surfaceprocessing.co.uk, Mr X for trusting us with his mint Mk1 shell, Vinny Chisolm for helping with the delivery of the shell, Chris for helping with the collection of the shell and the Guvnor for lending us the Toyota Surf and trailer.

Before and after – what a huge difference

Here we can see the shell before it goes in, after the acid dip and then after it's had the e-coat treatment

Engine bay before, during and after. As you can see it has come up really well. The owner will be well chuffed.

Panels before and after dipping – like new! Bulkhead looked a bit scabby, the acid reveals some minor holes. Ziebart in boot no problem!