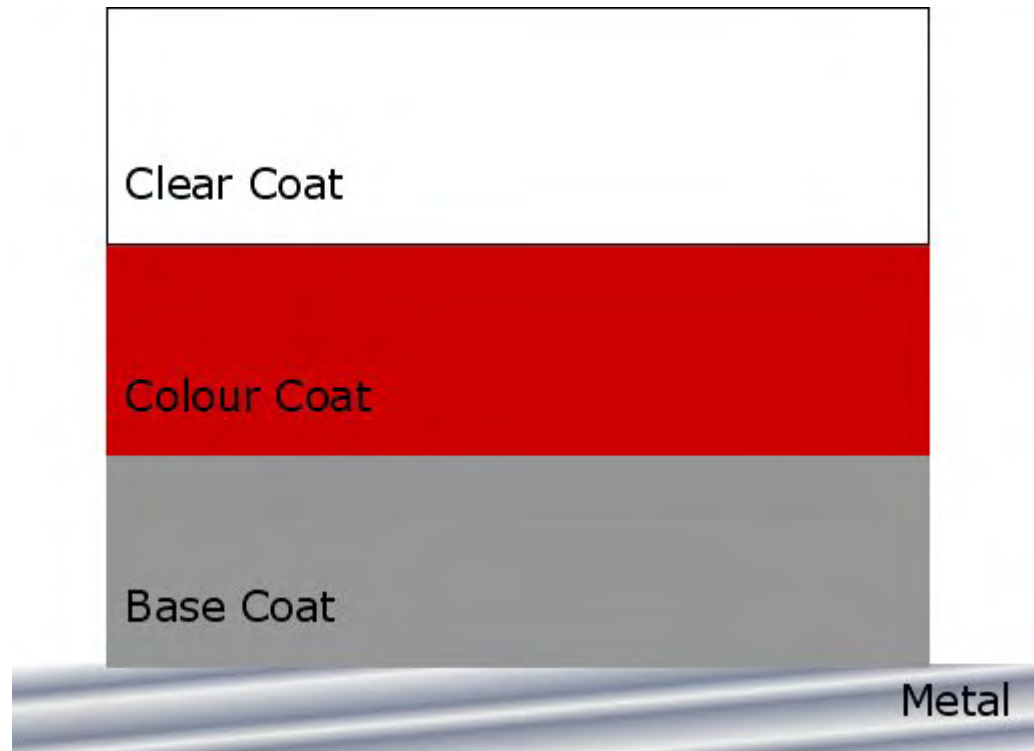


In this thread I hope to give a quick guide to the basics of removing or masking the dreaded swirl marks in paint - both by hand or machine, this guide covers both. 😊

Clear Coat Paint

I will focus on modern clearcoat paint, as the majority of cars are now coming supplied with this type of paint, though what is here is applicable to single stage finishes too.

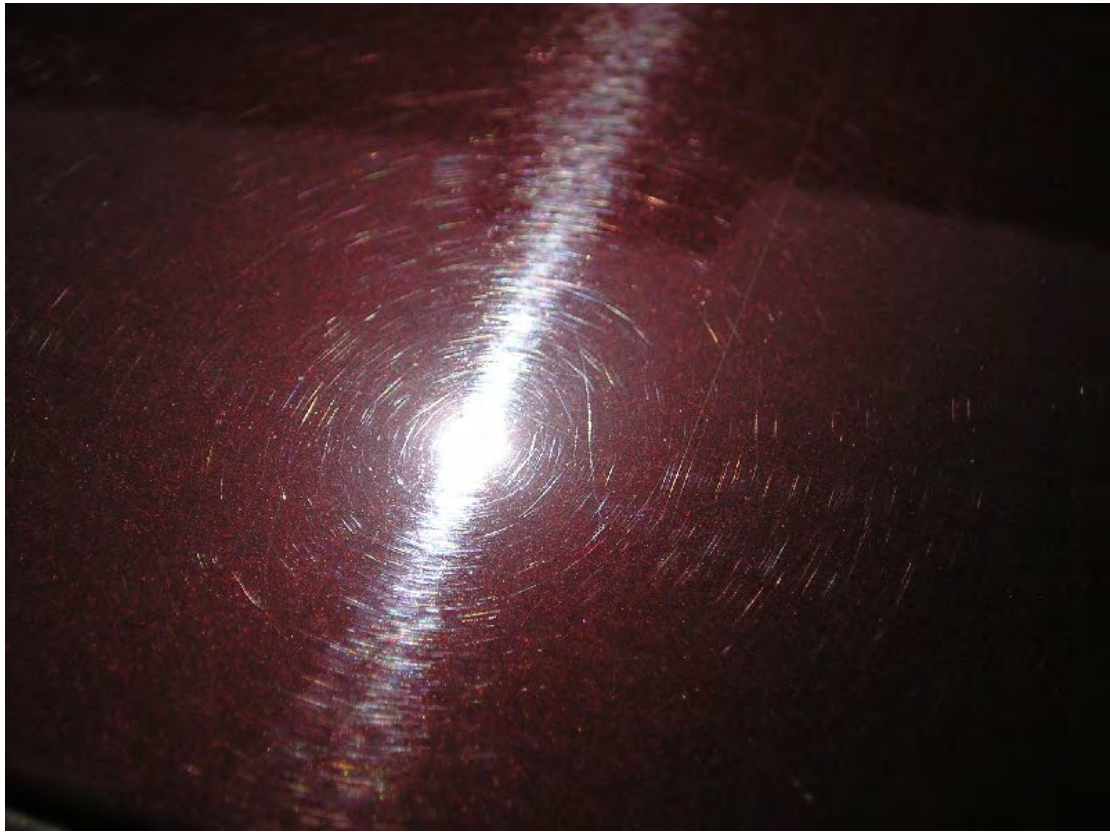
If you look at a cross section of clearcoat paint, you will see three basic layers of paint on the bodywork of the car - the base coat, the colour coat and the clear coat:



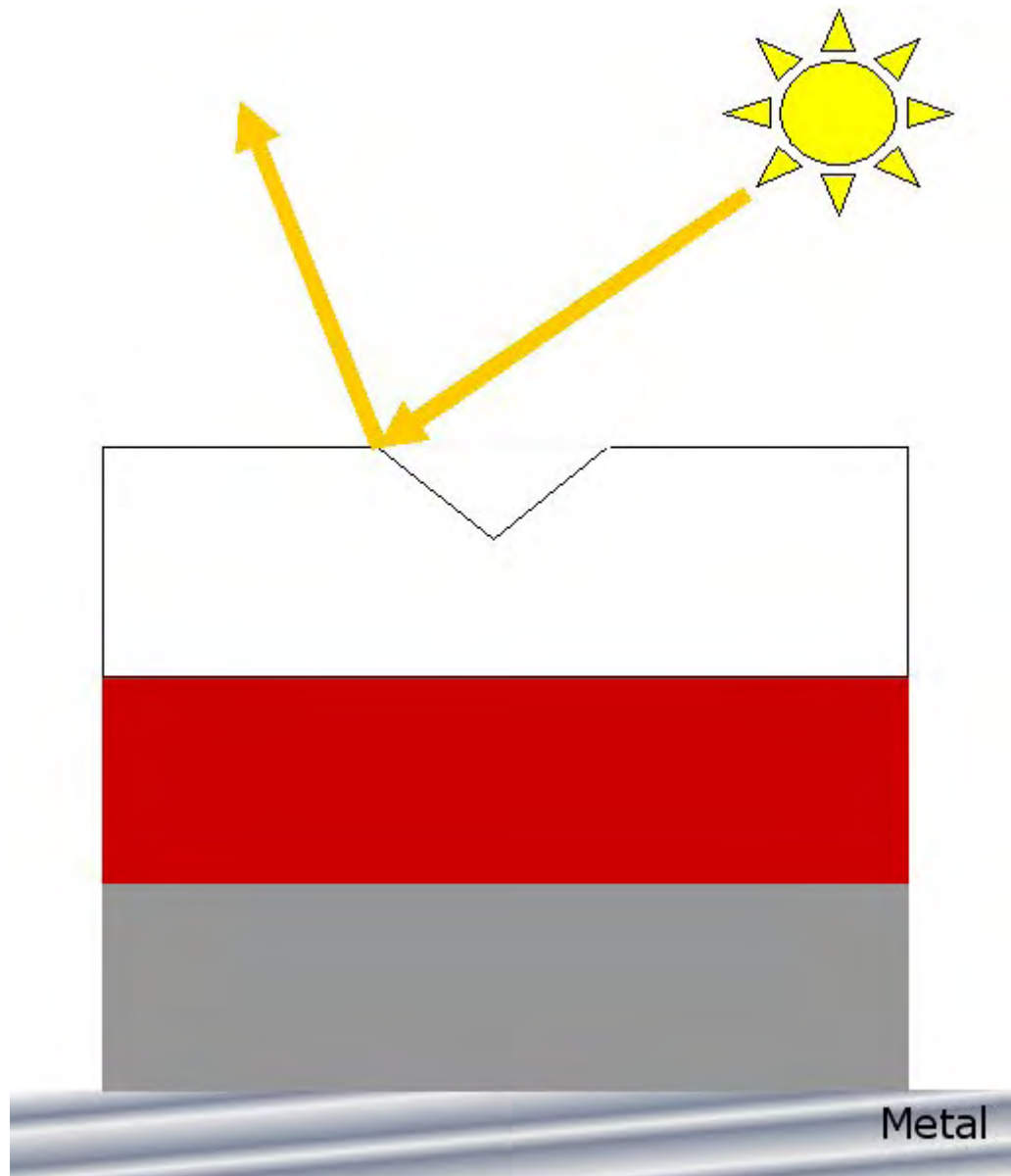
If for example you get a deep scratch in your paint, you may see a different colour of paint revealed - this means you scratched down through the colour coat and into the base coat at which stage machine polishing cannot remove the scratch, you'd need to fill and wet sand and then polish but that's a story for another guide! 😊

What Are Swirl Marks?

If you look at your car under a bright light, for example sunlight, sometimes you may see very fine scratches in the paint. There can be lots of these, like someone's draped multiple spider's web across the paint. Here's a couple of pictures of what quite severe swirl marks look like:



These tiny scratches are catching the light such that it masks the colour underneath and you don't see it. This robs the paintwork of its true deep colour. Shown below is a single swirl/scratch mark in the clearcoat of paint (not to scale):



The sharp edges of the swirl mark are catching the sunlight and directing it up to your eye so you see sunlight along the swirl mark, not the paint colour. This is why these blemishes are particularly prevalent in bright lights - sunlight, halogen lights in petrol stations are kinds of light that really show up the marks!

Where Do Swirls Come From?

Swirl marks can be inflicted to paintwork by a variety of means, and ultimately the bad news is that it's nearly impossible to avoid inflicting swirl marks altogether to paintwork. However, severe swirl marks can be avoided and amongst other things, these are caused by:

Poor Wash Technique - washing using a sponge traps grit between the surface of the sponge and the paint, dragging sharp grit across the paint and scratching it. Automated car washes do this on a grand scale by essentially battering grit into the paintwork and should be avoided at all costs.

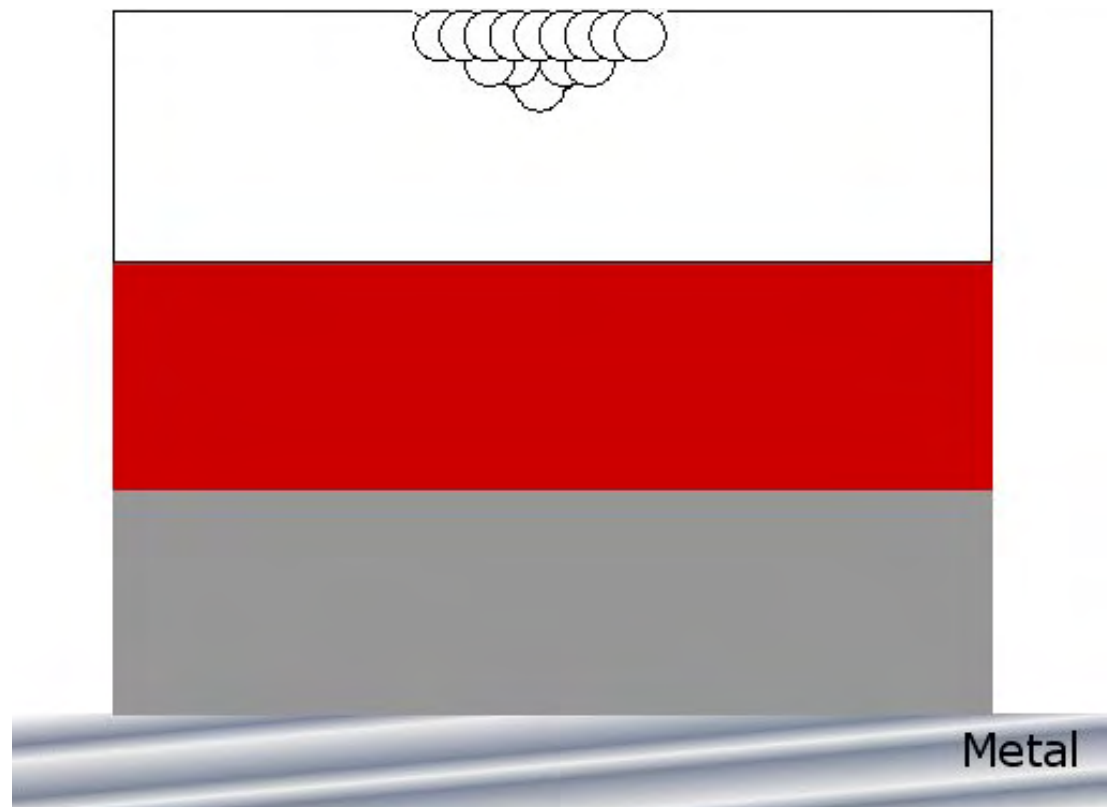
Using the Wrong Buffing Towels - using the cheapest cotton stockinette you can find in Halfords will inflict swirls to the paint as the material is hard and unforgiving, itself inflicting scratches without even the need for grit particles!

However, all is not lost when swirl marks appear, it is possible to either mask them (by hand) or remove them completely by machine polishing...

Filling Swirl Marks - Recommended for working by hand

One method of getting rid of swirl marks is to basically fill up the mark with a filler (a bit like anti-wrinkle cream!!) so that there's no longer a hole and sharp edges to catch the light. This method I prefer for working by hand as it does not require massive effort to break a product down (see machine polishing later), and by hand this method achieves better results.

Below is a diagram showing a swirl mark that has been filled with filler:



This can be achieved by using products such as paint cleansers, some glazes and even some sealants contain fillers. When applying a paintwork cleanser, work the product well into the paint to fill the swirl and be prepared for a repeat application if more filler is required. Some products which contain fillers, there are many others:

Meguiars NXT Tech Wax
Autoglym Super Resin Polish
Clearkote Red Moose Machine Glaze

If masking swirls by hand using this filling technique, a generic recommendation I would go for would be:

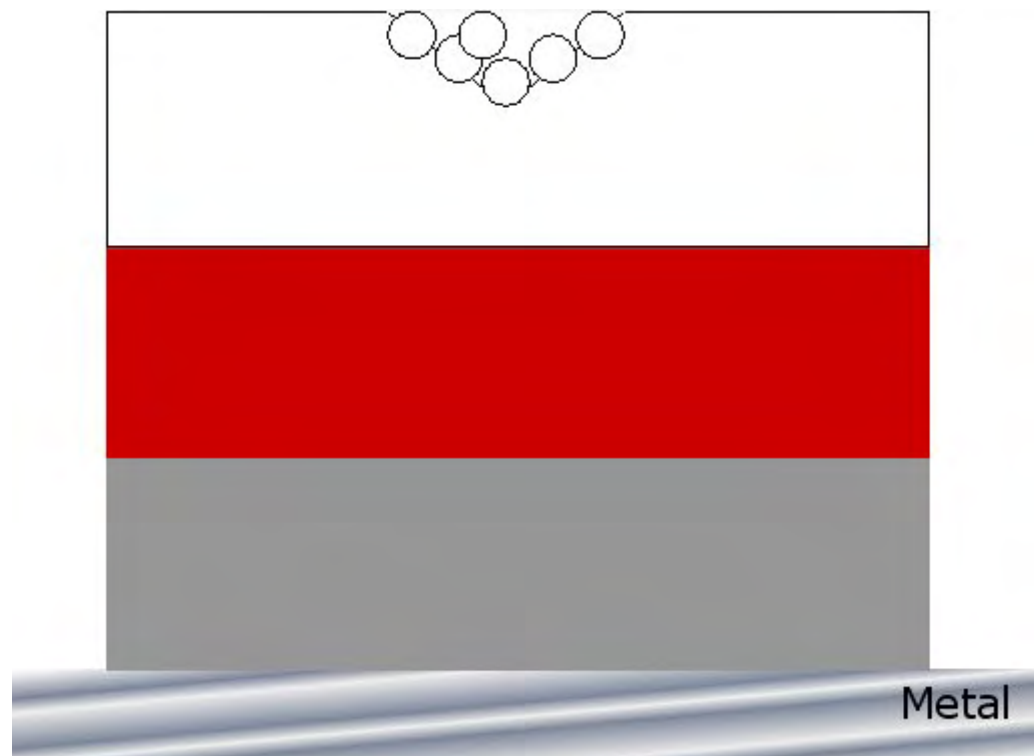
1. Paintwork Chemical Cleanser - work this well into the paint with medium pressure and remove from surface immediately - working on small areas at a time (2' by 2' roughly). Repeat application if necessary. Example products to use here are: Meguiars Deep Crystal Paint Cleaner; P21S Gloss Enhancing Paintwork Cleanser; Pinnacle Paintwork Cleansing Lotion. These cleaners also help remove oxidation from the

paintwork too.

2. Glaze and Seal - can be done in one step or too, glazes will deepen and wetten the shine and most will further fill and hide the swirl marks. Sealents protect the shine and seal in the fillers, as they can be washed away very easily. For light colours I find Clearkote Vanilla Moose Wax Hand Glaze works very well, followed by Poorboys EX-P sealent. Apply the Clearcoat in circular motions first with medium pressure then finish in a fore and aft motion. Work on small areas at a time and remove residue straight away. For the Poorboys EX-P apply to paint and leave for an hour to cure and then remove. For dark colours I prefer the single step of Meguiars NXT Tech Wax which is a glaze/sealent combined - apply to whole car, leave for an hour to cure and then remove. Repeat this step 24hrs later for additional coverage which helps to ensure even coverage.

3. Optionally, top this off with a pure wax to give the icing on the cake, and you choices of wax are endless but a good starting point for light colours would be Poorboys Nattys, and for darks Poorboys Nattys Blue - apply to one panel and remove immediately as if left too long to dry, it can be a bit of a pest to remove.

While filling the swirls works in the short term, there is the disadvantage of what happens when the fillers fade and leave the original swirl marks as shown:



The swirl mark starts to come back which will then require filling again in order to hide it and this process goes on and on. By hand, this is the most effective way to hide swirls, but you can do better by machine....

Removing Swirls - recommended for working by machine

This is a more long term solution for dealing with swirl marks and involves removing a thin layer of the clearcoat where the swirl exists down to a flat layer where there are no swirls. This requires a cutting polish and a lot of heat to be generated to achieve this and is therefore best suited to a machine polisher, although results can be

achieved to a more limited extent by hand with plenty of patience and the strength and stamina of Arnie!! I will concentrate on working by machine however.

In order to abrade the clearcoat away as shown in the diagram:



we require a cutting polish. A cutting polish is a liquid substance which has suspended in it tiny little sharp particles that when worked into the paint, scratch the surface away. The liquid acts as a lubricant to prevent scouring and they polishes are made such that the paint receives an even amount of these little sharp particles, known as *abbrassives*, so that the paint layer remains flay and you don't just inflict many more little swirls. Many modern polishes such as Meguiars, Poorboys and Menzerna, have diminishing abbrassive which means that the sharp particles atart large and get smaller as they are worked so the cut less and less. Thus they start by removing larger quantities of clearcoat aggressively and finish by removing a fine amount to smooth the surface and leave it flat with the swirl removed as shown:



This happens automatically with quality polishes as you work the machine, so you don't need to do anything other than keep working the product until it begins to cure and dry (dusts a little). For deeper swirl marks, highly abrasive polishes (sometimes called *compounds*) are required and sometimes the sharp particles in these leave some light swirls of their own as they abrade the clear coat. Going over the area again with a *Finishing Polish* will use much smaller abrasives to flatten the surface, removing the fine swirls left behind to give the surface a nice flat mirror appearance. For this reason, many detailers will use a high abrasive polish and finish with a finishing polish - *however, read the general rules of thumb for machine polishing for which products to start with!*

Polishes are graded by how aggressive they are, and listed below are some cutting polishes in order of how abrasive they are (generally):

Menzerna Power Gloss Compound

Menzerna Intensive Polish (PO85RD3.0x or PO91L); Poorboys SSR2.5; Meguiars #83

Menzerna Final Finish (PO106FF); Poorboys SSR2; Meguiars #80;

Menzerna Final Finish (PO85RD); Poorboys SSR1;

There are, of course, many other polishes! 😊

These are combined with cutting and light cutting and polishing pads on a machine polisher (for example the Porter Cable 7424). More aggressive polishes work best on cutting pads, the less aggressive ones I would use on light cutting pads and finishing polishes I would use on a polishing pad. (Yellow, Orange and White respectively in colour if using the Lake Country pads). Also, you can get both 6" and 4" pads - the 4" pads can generate more heat when used on a PC7424 and therefore have more cutting power so are good for more severe swirl marks.

To machine polish, the generic method I use is as follows. Spread the polish with the

machine off over a small area of the paint (2' by 2'). Turn on the machine at a low speed (speed 3 on PC) and go for one quick pass to spread the polish even more, then turn machine up in speed (speed 5 on PC) and go for a single slow pass with increased pressure on the PC head, then turn machine up in speed again (speed 6 on PC) and go for multiple slow passes with medium pressure over the head of the PC and keep going until the polish starts to dust. Remove the residue with a microfibre towel.

General Rules of Thumb for Machine Polishing

1. Always work out what the least aggressive pad and polish combination required for the task in hand. To do this, start with a light aggressive polish on a light cutting pad - eg Meguiars #80 on a light cutting pad. Apply this and examine result. If marks not removed, step up to Meguiars #80 on a cutting pad and repeat. Again examine, and if required step up again to #83 on a light cutting pad and so on. Once you've got to the least aggressive combination required, proceed to polish the car and if you've gone for an aggressive combination be sure to follow this up with a finishing polish to restore surface gloss.

2. Spot repairs - on some cars, there are specific areas of severe swirls while the rest of the paintwork has only light swirls. Only use your aggressive combination on the light swirls and use a 4" pad for spot repairs and then do the rest of the vehicle with your less aggressive combination. I find it best to finish by doing the whole car with a finishing polish to ensure an even looking appearance.

3. Always follow up the polishing stage with a glaze to add wettness to the shine by moisturising the paint.

4. Always follow up the polishing and glazing stage with a selant and/or wax to protect the finish.

5. As you can see from the (not to scale) diagrams, you're effectively removing paint using this technique so machine polishing is something that should only be carried out when required - say every six months to a year, otherwise you'll end up with clearcoat failure and require a re-spray if you machine polish every other day for example!

6. Swirls you can remove by machine - run your finger across any scratch, if it catches your nail its too deep to be removed by machine and will require filled and wet sanded then polished, which is a story for another thread.

7. The Porter Cable 7424 is one of the most popular machine polishers for beginners because its dual action nature makes it safe.

8. Striving for perfection - some swirls will be very deep and to fully remove every single one may require the removal of a lot of clearcoat! Its sometimes best to leave behind the odd deep swirl in favour of keeping most of your clearcoat - the paint will still look immesne, and you wont be risking clearcoat failure.

Polishes I find work well are the ones I listed in the list above and you can mix and match brands to you satisfaction (so long as you don't actually mix the products together, chemistry set style!). Combos I use with success are (there are many others!):

Menzerna PO85RD3.01 > Menzerna PO85RD > Swissol Cleaner Fluid > Swissol

Best of Show

Meguiars #83 > Meguiars #80 > Meguiars #7 > Meguiars #26

and many others too, the best thing is to start with a set of products and gain experience, find products that you like and stick with them.

The Menzerna list above sorted the swirls in the photos at the top leaving this finish:





Credits

DaveKG for all the info contained in this document.