Machine Polishing by Dual Action Polisher

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MACHINE POLISHING BY DUAL ACTION POLISHER

DETAILING WORLD GUIDE CREATED BY DAVE KG

One of the best ways to take your car's paintwork to the next level is to use a machine polisher to remove the swirl marks and enhance the gloss by burnishing the finish. Polishing can be done by hand. However introducing a machine polisher to your armoury opens the door to enhancements not readily achievable by hand – both in terms of correction and ultimate finish.

INTRODUCTION

In this guide we will look at the benefits machine polishing can bring to your detailing and outline the generic steps to achieve the best possible finish. There is much more to machine polishing than simply correction of the swirls and other blemishes – done correctly, burnishing the paintwork with a finishing polish can create a deep and crystal sharp finish which will turn heads at a show. Indeed it can be argued that this is ultimately more important than the correction stages as it is the gloss and depth which are the biggest noticeable changes to the paint finish.

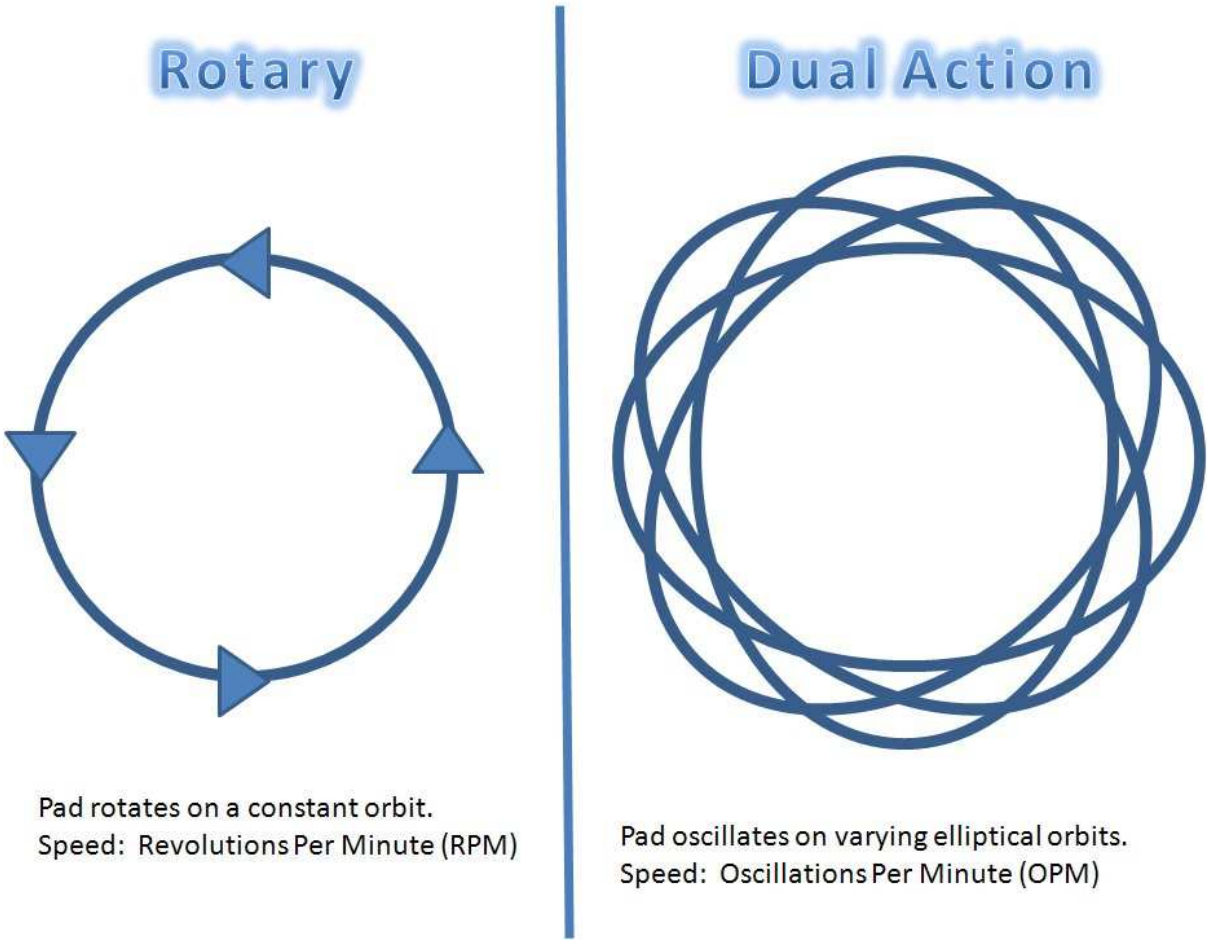
The beauty of a dual action polisher is that it doesn't require years of experience and practice to be able to pick up and use the machine to achieve a good finish. With practice and honing of the technique you can generate a high clarity finish that can turn heads. In this guide we will look at the basic techniques and hints and tips to get you started with a dual action polisher.

An important note: this guide is not polish specific. There are a great number of polishes on the market and each one has a different working technique. This guide intends to cover the basics that will apply to all polishes available. Polish specific guides for the most popular polish ranges will also be available. It is also important to note that every detailer has slightly differing machine polishing techniques – a key to getting the best possible finish is to experiment and see what works best for you. Spend time honing your technique and you will be rewarded for it with the finishes that you can achieve.

WHAT IS A DUAL ACTION POLISHER?

Years ago, the vast majority of paintwork polishing was carried out using rotary polishers with wool or foam "mops". These polishers are still the mainstay of many body shops and professional detailers and when used correctly they can deliver spectacular results. However they have a risks attached to them and require practice to be able to get the best out of them. Owing to their nature, where the pad spins on a constant orbit, a rotary polisher can develop significant heat on the paintwork which can lead to paint burns in the hands of an inexperienced user.

By contrast, a dual action polisher is a much safer tool to simply pick up and use. By dual action, it means that the pad not only spins in a circle, but it also oscillates. This results in a random orbit movement of the pad – sometimes such polishes are referred to as "Random-Orbit" polishers (RO polishers) for this reason. The diagram below highlights the difference between the pad motion of a rotary and a dual action polisher:



The random orbit nature of a dual action polisher means that it generates far less heat than a rotary polisher. It is a more gentle tool so correction work typically takes longer. However it is also safer to use and easier to learn which makes it the ideal beginners' tool.

Some dual action tools such as the Cyclo use two smaller pads which follow the random orbit path above, rather than the single pad of the PC/UDM/G220. These machines are more restricted when it comes to pad size but are still very capable tools when it comes to paintwork correction and finish.

CHOOSING A POLISHER & PRODUCTS

There are a huge array of machines and polishes on the market today, many are readily available through online sellers on the Detailing World forum. This guide is by no means an exhaustive review of all possible products to buy, but rather a generic guide to what is available and some of the manufacturers that would make a good choice.

THE MACHINE

The Meguiars G220 Dual Action Polisher[i]

A quick view of detailing forums reveals three major players in the Dual Action Polisher market: Porter Cable 7424 (PC); Ultimate Detailing Machine (UDM); Meguiars G220 (shown in the picture above). However, there are many other products on the market also from manufacturers such as DeWalt. The first three are the most popular owing to the long throw on the pads which is ideal for the machine polishing application. However this does not prevent the other tools from being a good choice also – there is less of a working base for them in the detailing world, but they are capable tools and should also be considered.

Choosing a machine polisher is very much down to personal preference. A recent addition to the market is the Meguiars G220, which out of the "big three", is the only polisher available in 240V spec that you can simply plug into the wall. It also comes with a full UK warranty. Of course, if you are reading this from outside the UK, this is quite irrelevant and the choice will be purely down to the performance of the various tools.

In terms of the correction that can be achieved, there is very little to choose between the "big three" – any of them would make a good choice. Whichever one you consider, be sure to source out current owners on the forum for first hand experiences of the reliability of each of the tools – a topic that is outside the scope the guide. The UDM and G220 are have slightly faster and slightly more powerful motors than venerable old PC – but the PC is a hugely capable tool and in real terms it is just as capable as the other two.

If you fancy a “double-headed” machine which runs with two smaller pads, then there is the option of the Cyclo. Single speed and more restricted on pad size, but these tools are very well built and very capable.

If you choose the PC or UDM, be aware that these run on 110V and therefore you will also need a transformer to run them. The PC requires at least 750VA transformer, a 1kVA transformer would make an excellent choice for either tool.

PADS & PLATES

Lake Country Polishing Pads and Backing Plates

There are a wide range of foam polishing pads available on today’s market that are suitable for dual action polishing applications, in sizes ranging from 4” – 6”. Different pads use different grades of foam – this effects the coarseness and density of the pad, which gives it varying levels of cut. It is a good idea when buying a machine polisher to include in your order a wide range of pads to give you as wide a possible selection when it comes to tackling the paintwork in hand.

Listed below are some of the most common foam pads made by a selection of manufacturers. The list shows the manufacturers designation for the pad where applicable, the pad colour, its size and its grade (level of cut).

MEGUIARS

- W7006 Burgandy 6” Cutting
- W8006 Yellow 6” Polishing
- W9006 Tan 6” Finishing

SONUS

• SFX-1	Yellow	6” or 4”	Cutting
• SFX-2	White	6” or 4”	Polishing
• SFX-3	Red	6” or 4”	Finshing
• DAS	Orange	6.5”	Light Cutting
• DAS	Green	6.5”	Polishing
• DAS	Blue	6.5”	Finishing

MENZERNA

• Compunding	White	5”	Heavy Cutting
• Polishing	Orange	5”	Heavy Polishing

LAKE COUNTRY (INCLUDING CCS)

• Cutting	Yellow	6” or 4”	Cutting
• Light Cutting	Orange	6” or 4”	Light Cutting
• Heavy Polish	Green	6” or 4”	Heavy Cutting
• Polishing	White	6” or 4”	Polishing
• Finishing	Black	6” or 4”	Finishing
• Finessing	Blue/Red	6” or 4”	Fine Finishing

As with many things detailing, there is a simply mind boggling array of products to choose from! For pads, ensure you have a good range of available grades to use: at least one cutting pad, a couple of polishing pads, and a finishing pad would be good to get your started. The performance of different foams will be covered later in the guide.

You will also notice that the pads come in differing sizes. The biggest advantage of varying sizes is that it allows smaller and larger areas to be tackled with a pad size tailored to the panel. Additionally, the use of smaller pads when compounding with a dual action polisher will deliver a little more cut by focussing the polishing action down more. In order to hold the pad onto the machine, you will need a suitable backing plate – this backing plate must be the correct size for the pads you are using: 6” pads will need a 5-6” backing plate, 5” pads will require a 5” backing plate, 4” pads will require a 3.5-4” backing plate.

POLISH

A key component to machine polishing is the actual polish! You only have to look at a couple of online retailers to know there is a simply overwhelming range of manufacturers all producing a huge number of different polishes. Some of the more popular products from some manufacturers are listed below:

MEGUIARS #80-SERIES

• #85	Diamond Cut Compound	Heavy Cut	10/10
• #84	Compound Power Cleaner	Heavy Cut	9/10
• #83	Dual Action Cleaner Polish	Medium Cut	6/10
• #80	Speed Glaze	Light-Medium Cut	4/10
• #82	Swirl Free Polish	Light Cut	2/10

MENZERNA

• S34A	Power Gloss Compound	Heavy Cut	8/10
• PO85RD3.0x	Intensive Polish	Medium Cut	6/10
• PO91L	Intensive Polish	Medium Cut	5/10
• PO106FA	Final Finish	Light – Medium Cut	4/10
• PO85RD	Final Finish	Light Cut	2/10

SONUS

• SFX-1	Restore	Medium Cut	6/10
• SFX-2	Enhance	Light Cut	3/10
• SFX-3	Final Finish	Light Cut	1/10

POORBOYS

• SSR3	Super Swirl Remover 3	Heavy Cut	8/10
• SSR2.5	Super Swirl Remover 2.5	Medium Cut	6/10
• SSR2	Super Swirl Remover 2	Light – Medium Cut	4/10
• SSR1	Super Swirl Remover 1	Light Cut	2/10

It may be tempting when first starting out with a machine polisher to buy as many polishes and compounds as possible – but in truth, for most general defects on most paintworks, you only really need two products. One medium cutting polish (for example Meguiars #83), and one lighter cutting polish (for example Meguiars #80). On top of this you could add a single compound for more aggressive cutting duties on harder finishes with deeper marring (for example Menzerna Power Gloss Compound). These three products would be plenty to get you started into the world of machine polishing and developing head turning finishes!

GETTING STARTED

You've got all the gear – now let us get down to using it effectively!

PREPARATION & TAPING

Before starting to machine polish your car's paint finish, ensure that it is fully washed and dried. Ideally, the car should also be clayed before machine polishing to remove bonded contaminants from the finish which could otherwise embed in the pad and reduce the quality of the machine finish. Refer to other guides for information on washing and claying the car.

When ready, try to get the vehicle indoors out of direct sunlight and away from the potential of being soaked by the Great British weather! Controlled conditions help when machine polishing to ensure consistency in the polish performance.

It is a good idea to tape up textured plastic trim on the car before polishing – areas such as bumpers, vents, door rubbers that protrude outwards. This can be done using painter's masking tape. You should use a low-tack masking tape which will remain in place even if a machine pad hits it, but yet is easy to remove when you are finished. An example of a suitable tape is 3M 3434 blue tape.

When deciding which areas to tape up: you are looking to protect textured plastics from having polish residue driven into them so these should all be taped; you are looking to prevent the pad coming into contact with regions trapping dirt so the pad doesn't drag the dirt onto the paint so these areas should be taped. When taping, ensure the area you are taping is dry – particularly important around water traps such as underneath wing mirrors. The Mercedes in the picture below shows typical areas for taping up on a car:

Mercedes C36 AMG showing typical "taping up" locations

Protruding edges of the indicator repeater taped up as these could catch the pad causing it to jump and also be harbouring unseen dirt that could embed in the foam and be dragged across the paint. Along the styling line on the doors has been taped up – again we have a protruding edge here but also regions of textured plastic trim which we would want to avoid staining with polish residue. The door handles on this car are black textured plastic so have been taped to avoid staining.

SETTING UP THE MACHINE

This part of the guide is based on the Porter Cable 7424, but the generics of it are relevant to all of the big three polishers on the market, as well as many others too.

First of all, decide which size of pads you want to use. This will determine the backing plate that you will fit to the machine. For general polishing duties on most of the large area panels (bonnet, roof, doors, wings), a 5" or 6" pad would be the choice. For smaller panels (bumpers, bootlids with badges, pillars) or the working of more aggressive compounds, a 4" pad would be the choice.

Using a flat spanner, hold the bolt into which the backing plate fits as shown in the picture below:

Holding the bolt still to securely fit the backing plate

Now screw in the backing plate, taking care not to cross thread it, until you feel resistance and then hand tighten a little using the spanner to hold the bold still as shown in the picture below:

Holding bolt still, tighten backing plate to secure it to the machine

You can attach the backing plate with the pad fitted or not fitted.

For machines operating at 110V in the UK (PC7424, UDM), you will now need to connect to a suitable transformer to use with the UK mains supply (750VA or more):

240 -> 110V Transformer (750VA) for use with Porter Cable 7424

A 110V machine should never be directly connected to the UK mains supply as this will cause irreparable damage to the tool.

Your DA polisher is now set up and ready to use!

ASSESSING THE PAINTWORK

With the machine ready to use, it is now time to assess the paintwork that you will be working on. This will allow you to begin to choose which polishes and pads you will be using to achieve the desired results on the paintwork.

PAINT CONDITION

A full description of the different paint defects that you may face is given in a separate guide. The aim of machine polishing is to correct paint defects such as swirl marks, etching, random deep scratches (rds), oxidisation, hologramming:

Swirl Marks

Random Deep Scratches (RDS)

Oxidisation (Fading)

Holograms (from previous poorly finished machine polishing)

It is impossible to judge the severity of the paint defects by the eye to an extent where you can work out exactly what combination of pad and polish that you require. However, you can start to get an idea which will begin to help you narrow down the ideal combo for the car.

LIGHT IT UP!

Defects such as swirl marks also show themselves in direct sunlight. Or underneath the halogen lights in a petrol station. It is not always possible to rely on sunny weather to assess paint condition though, especially in

the UK! It is also very bad for you eyes to stare at sunlight reflecting directly off of a paint finish! Please be careful!

A very useful tool to have in your detailing armoury is a suitable light source that you can use to highlight the swirls on the paintwork. An example of such a tool is the Brinkman Twin Xenon torch illustrated in the picture below:

Brinkmann Dual Xenon Torch

This hand held torch gives a light which is bright enough to highlight swirl marks and holograms on the paint finish. In order to use the torch to its maximum effect, hold it far away from the paintwork rather than close up as this will highlight more of the swirls that are present. Additionally, tilt the to a slight angle which can help pick up lighter marring than may be missed from the direct beam. Very light machine holograms can be found by sweeping the torch from side to side and looking for a "wave" effect across the paintwork which is indicative of a light hologram.

Not all paintwork marring is best seen using bright light however. Random deep scratches like the ones shown in the picture above are best viewed under a general garage strip light – the lower contrast of the dimmer light highlighting the softer and deeper scratches more clearly. A bright light would highlight all the swirls, masking the more spread out deeper marks.

HOW MUCH PAINT?

Most machine polishes use mechanical abrasives to remove the paint defects. This means that as you are polishing, you are eroding away a certain amount of paint, the exact amount depending on how harsh an abrasive you are using.

If possible, before starting to use the machine polisher, it is a good idea to check the thickness of the paintwork on the car. This can be done by using a Paint Thickness Gauge (PTG):

CM-8828 Paint Thickness Gauge[ii]

Most PTGs will measure to total thickness of paint on a panel. Paint generally consists of either two or three distinct layers: Base Coat; Colour Coat; Clear Coat (on most cars). It is the thickness of the top layer of paint which is of interest – going through this layer (strike through) will result in a respray being needed! So it is necessary to interpret the readings you see on the gauge and a certain amount of guess work will be required. Very generally speaking:

200 MICRONS +

This level of thickness can be expected on older cars that have been hand painted – the Ferrari F355 for example. It is also indicative of the possibility of the car having been painted at some point in its life. This is something important to note as non-OEM paint can respond very differently to factory paint in terms of hardness and polish behaviour – so if any regions appear quite thick, make a mental note of this for when you come to machine polishing them.

An example of just how thick paint can be is seen in the picture below where a reading of over 1000um was taken – that is paint that is 1mm thick!

Example of a region of a car that has clearly been resprayed at some point[iii]

BETWEEN 100 AND 200 MICRONS

This is normal paint thickness. Reading in this range point to standard paint (generally speaking) and shows a healthy thickness that should present no problems when it comes to machine polishing.

BETWEEN 80 AND 100 MICRONS

For most cars with clear coats, readings in this range point to quite thin paint. Many newer cars give thinner paint readings, but reading in this region should raise caution. Think twice about using more aggressive polishes on thinner paints as significant amounts can be removed, resulting in strike through and the need for a respray. Paint of this level can still be machine polished – but greater care should be exercised in polish and pad choice.

LESS THAN 80 MICRONS

Now we are in the realm of very thin paint, especially if a clear coat is present. Care should be taken when choosing a polish for these thinner paints. A big consideration should be a filler heavy polish which can achieve correction by filling the marring rather than removing any further paint. Thin paint can be a result of aggressive machine polishing in the car's past life.

LAYER THICKNESSES?

As said at the start of this section, it is the thickness of the top layer of paint which is of most interest for assessing the suitability of using machine polishes. But with a reading of only the total thickness, how can you know the thickness of this top layer? The answer is that, unless you buy a PTG that can measure the individual layers (expensive!), you cannot know to high accuracy – but you can give an educated guess.

- 50-25-25: Very generally speaking, on most cars the clear coat makes up 50% of the total thickness. This is a general approximation, and only a first very rough estimate.
- Inside of door: Measure in here. This will give you the thickness with much less clear coat sprayed and you can assume this to be the thickness with no clear coat to a pretty good approximation. The difference between readings inside the door and on the exterior paintwork gives the thickness of the clearcoat.

CHOOSING A PAD & POLISH COMBINATION

Having assessed the paintwork condition and, if possible, found the thickness of the paintwork that you have to "play with", it is now time to choose an appropriate polish and pad combination to achieve the desired correction and finish.

There is much written about the relative hardness and softness of paints on various cars. Mention BMW and you may well think rock solid paint that will need an aggressive polish. Think Honda and you may well think butter soft paint that will be a cinch to remove marks from. Alas there are a lot more factors to consider and at the end of the day, every car is different, even if it is from the same manufacturer or even the same model! It is also not possible to tell how deep general swirls are just by looking at them with the naked eye – they may be deeper or less severe than they appear.

For this reason, it is always good practice when machine polishing to choose a test section on the car and trial various combinations until you find the one that gives you the desired correction and finish. What we are aiming for is to get the desired correction by removing the least amount of paint possible (without using fillers, unless the paint is already very thin). In order to achieve this, always start by testing the least abrasive combination of pad and polish you have and work up until you get the desired correction – this ensures you don't use an aggressive combo unnecessarily, which would remove more paint than is required.

For example, say you have all of the Menzerna polishes mentioned above, and the three Meguiars polishing pad mentioned above. The assessment of which combo to use could be done as follows:

1. Start with PO85RD Final Finish on a W9006 Finishing Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 2...
2. Now try PO85RD Final Finish on a W8006 Polishing Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 3…
3. Now try PO106FA Final Finish on a W9006 Finishing Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 4…
4. Now try PO106FA Final Finish on a W8006 Polishig Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 5…
5. Now try PO85RD3.02 Intensive Polish on a W8006 Polishing Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 6…
6. Now try PO85RD3.02 Intensive Polish on a W7006 Cutting Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required, proceed to step 7…
7. Now try S34A Power Gloss on a W7006 Cutting Pad. Assess the results. If correction is of the desired level, continue with this combo. If more correction is required – see the "Serious Correction" guide!

You can see that certain combinations above were missed out – Intensive Polish was not trialled on a finishing pad, and Power Gloss was only trialled on a cutting pad. This is simply down to the styles of the polishes better suiting the more aggressive pads. For the same reason, neither of the Final Finishes would be trialled on a cutting pad.

Depending on the paint you are polishing, the use of a more aggressive polish may leave marring of its own. Softer paints are more prone to this problem. In this case, you will need to follow your aggressive correction combo with a finishing combo to remove light machine marring and refine the finish to a deep gloss and high clarity. For example, if you found it necessary to go up to steps 6 or 7 above, it would likely be necessary to follow with something like PO85RD on a W9006 Finishing Pad to refine the finish. Always experiment with a finishing combo to see if you can enhance the overall result.

In the pads section above, we could see that there were three main sizes of pads for use on a Dual Action polisher. If you have a twin head polisher such as the Cyclo, you are restricted to using only 3-4" pads (this is not a bad thing). If you have a single head polisher such as a G220, you have a greater choice of pad size.

5 and 6" pads are ideal for large panels where access is easy and there are no objects that leave small complicated regions of paint. Shown in the picture below is a 6" pad being used on a wide open rear ¾ panel:

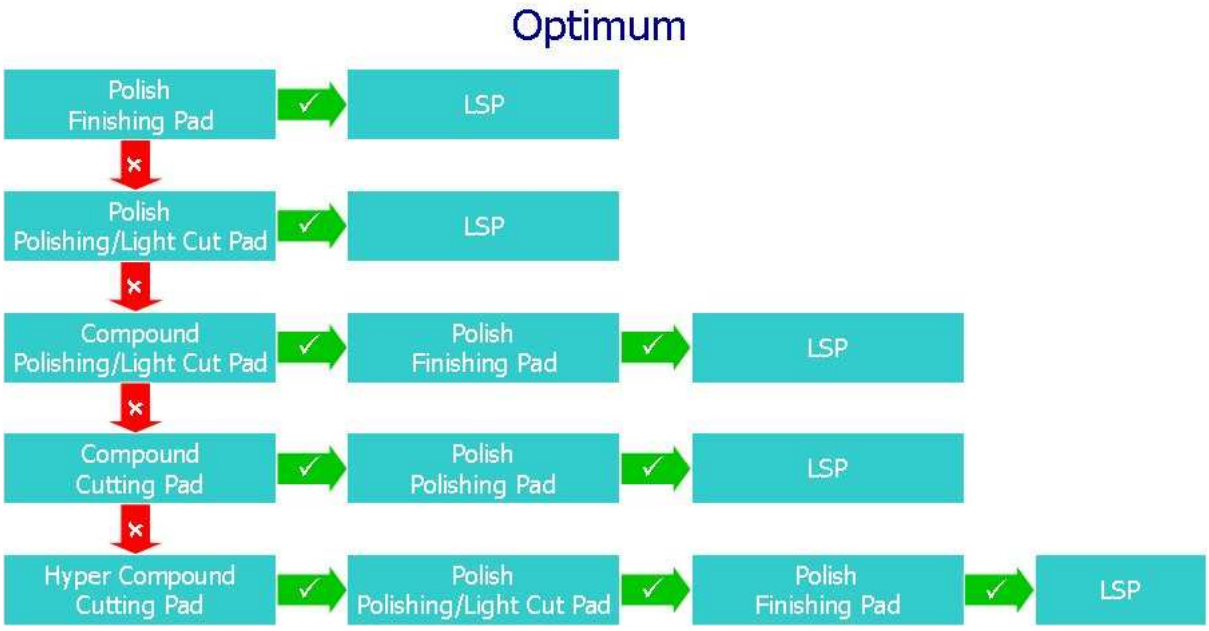
PC with 6" Pad (Meguiars W8006)

Tighter to reach areas of paintwork, such as complex bumpers, or around lights, are better suited to the use of smaller 4" pads as shown in the picture below. The smaller pads allow better access to such regions ensuring you maintain the quality of correction and finish evenly over all parts of the car.

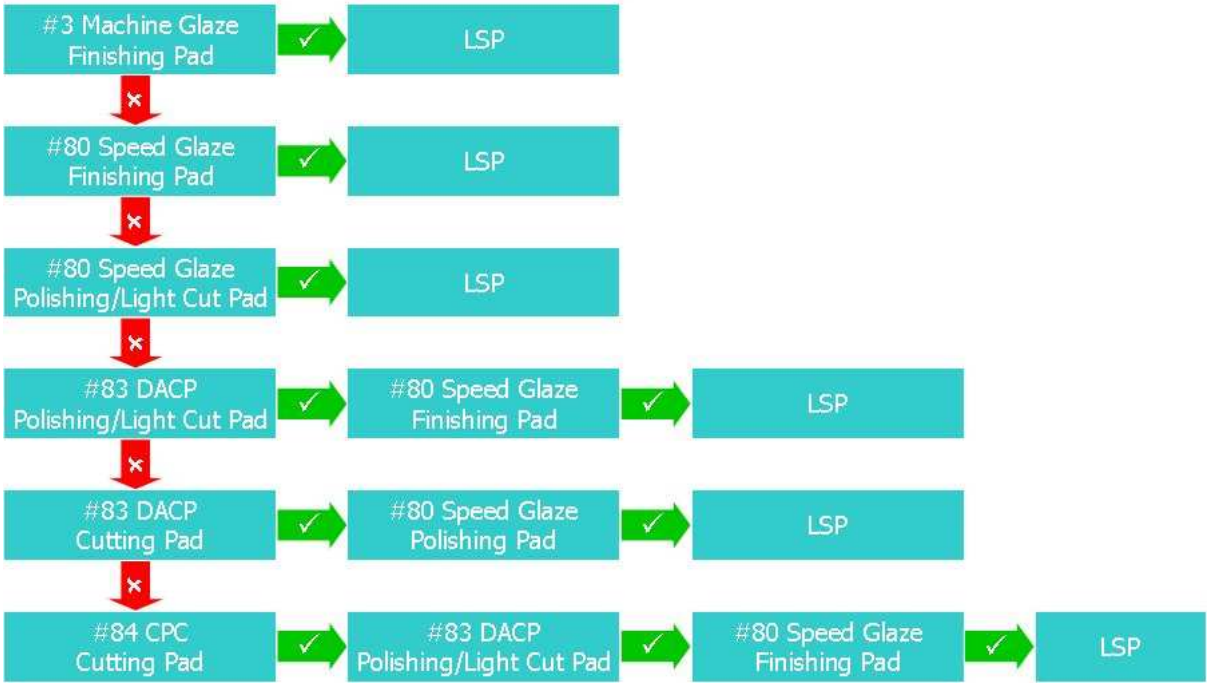
PC with 4" Pad (LakeCountry)[iv]

An additional use of a 4" pad on a dual action polisher is where a little more cut is desired. The smaller pads on a DA machine focus the work effort down a little more and help break down more aggressive compounds such as Power Gloss more effectively. Thus allowing slightly better cut to be achieved.

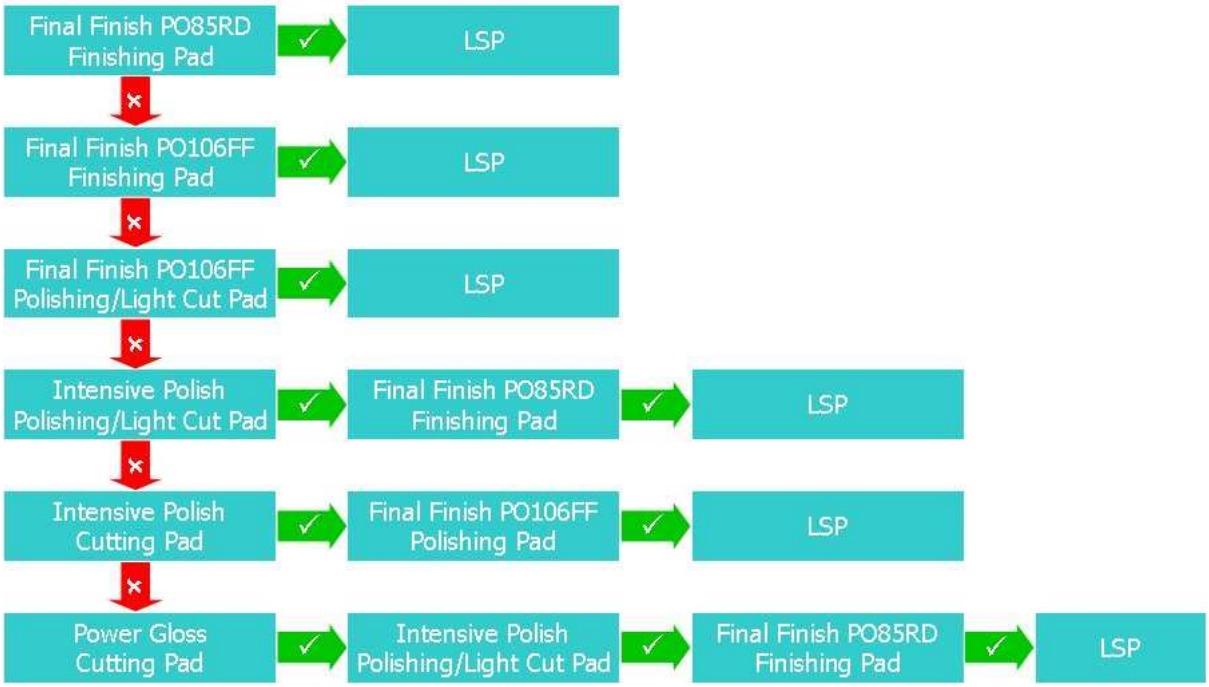
Shown on the charts below are typical "routes" you could take when assessing which combo is right for the paintwork you are dealingwith. This is by no means an exhaustive guide, but rather a generic guide to show you possible conbinations to try and in what order in increasing levels of aggression. Start at the top left, and follow the arrows: if the combo is successful follow the green arrow; if the combo is not successful follow the red arrow.



Meguiars

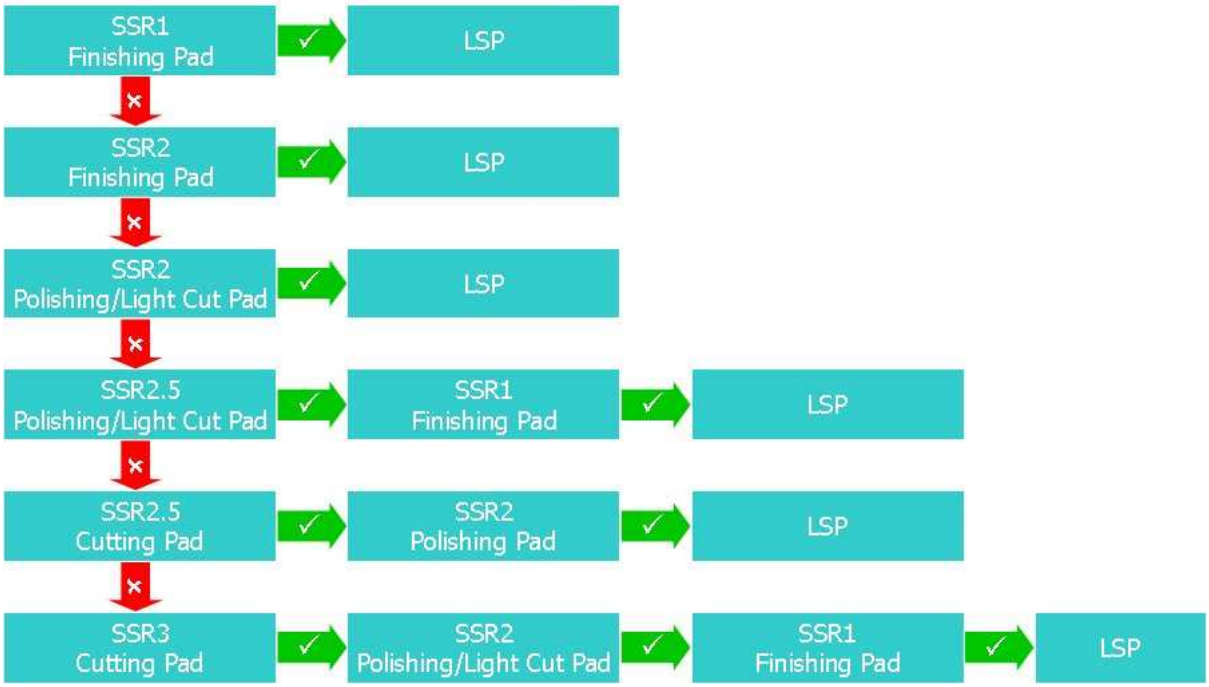


Menzerna



Chemical Guys Diamond Cut

Poorboys



DUAL ACTION POLISHING IN THEORY & IN PRACTICE

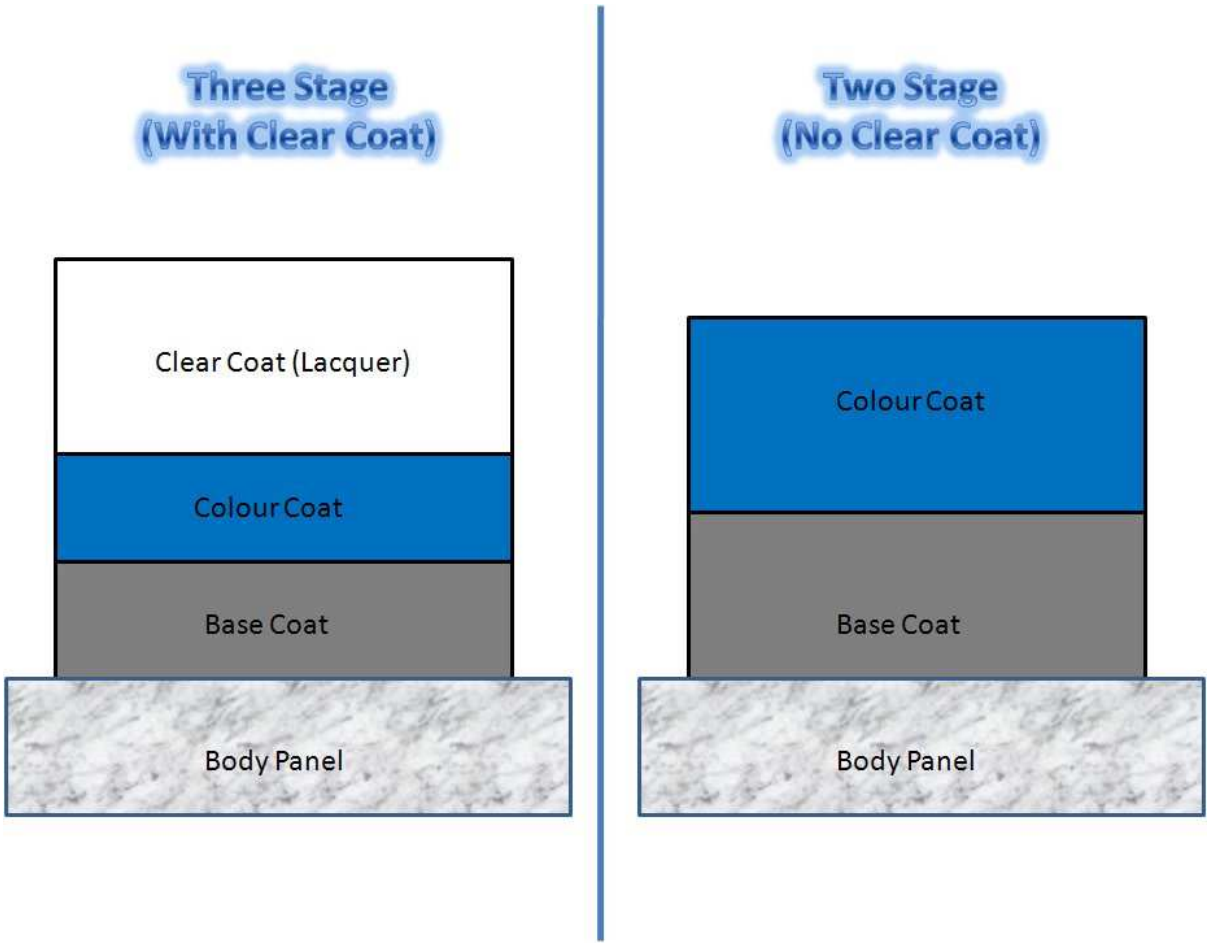
Now we look at the theory and practice of the machine polishing process, focussing on generic techniques to allow you to get the best from your machine and products with explanations of the theory behind the process.

IN THEORY

Here we look at the theory behind machine polishing – what exactly is going on – to see how we can best hone practical technique to get the best out of your machine investment. The descriptions here apply to generic polishes that you will find on the market, though all do differ slightly in their characteristics.

PAINT SYSTEMS

Shown in the picture below are the two typical paint systems you are likely to encounter when detailing: “single-stage” and “clear-coated”.



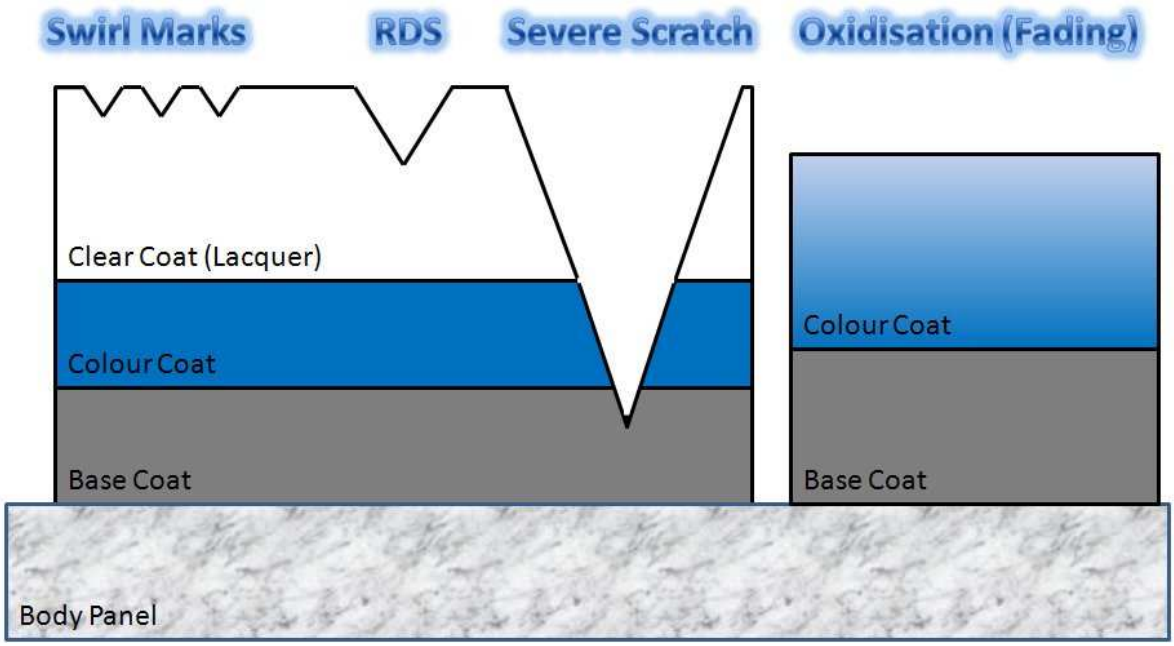
In all cases when machine polishing a car, you are working on the top layer of paint. You cannot remove more than this layer – indeed, you should always leave a healthy thickness of the top most layer. This puts a restriction on the defects which can be removed – any deep marks which go through the top layer of paint cannot be removed.

PAINT DEFECTS

The paint defects that you may encounter are shown in pictures earlier on. We look at these in a little more detail here – for full descriptions please see separate guide.

- Swirl Marks are light and shallow scratches covering large areas of the paintwork, typically inflicted by poor wash technique.
- Random Deep Scratches (RDS) are deeper scratches into the paintwork, typically inflicted by grit being dragged along the paint, or minor key scratches.
- Severe Scratches are marks which go through one or more of the paint layers, sometimes down to the bare metal – these cannot be sorted by machine polishing and require painting (minor filling or section respray) to fix.
- Oxidisation happen generally to cars with no clear coat and causes the paint to fade and look dry.

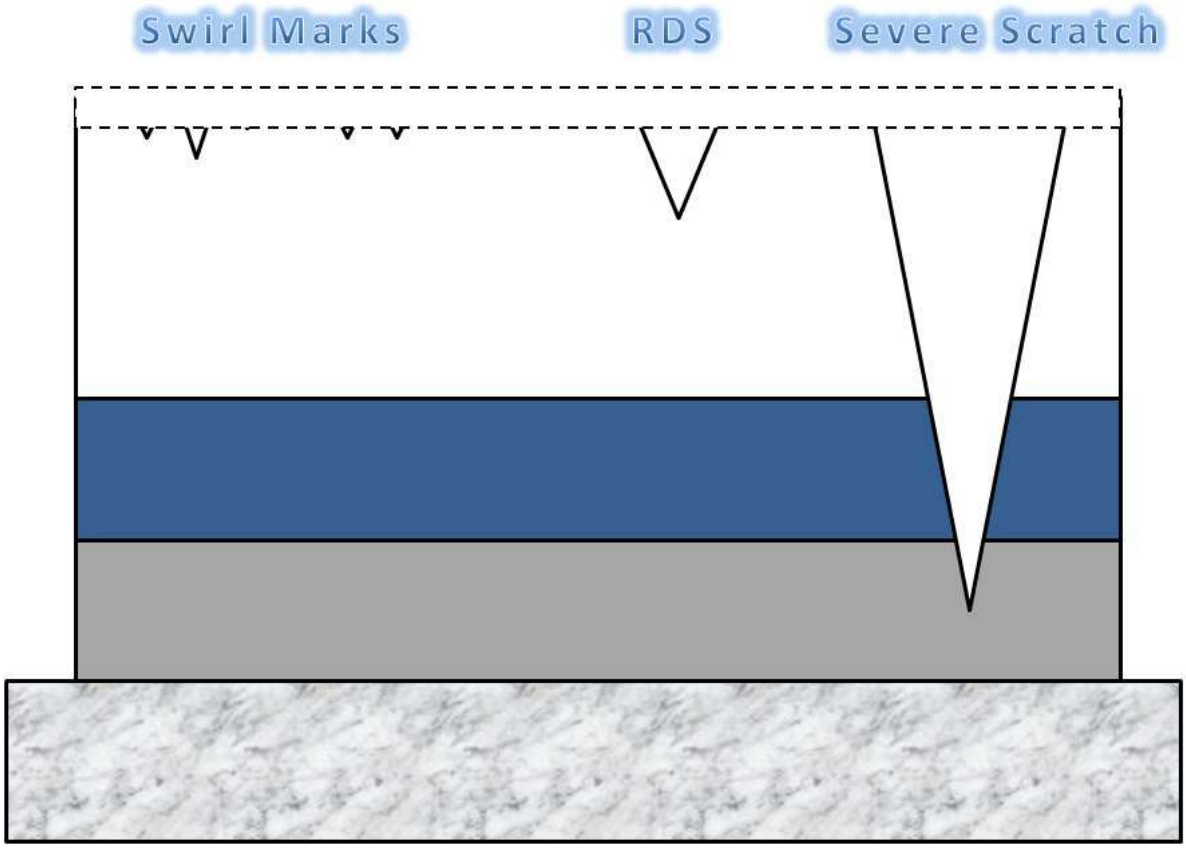
Shown in the picture below is a schematic of the typical paint defects.



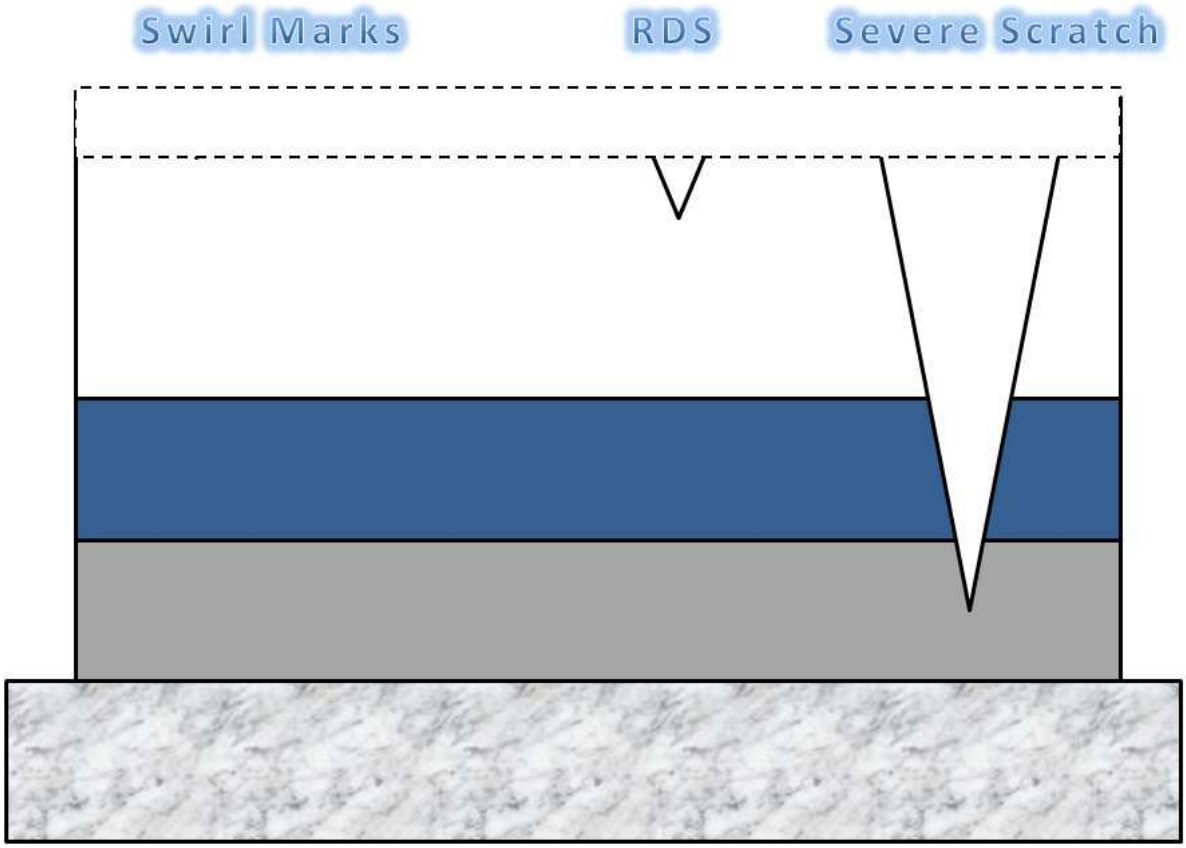
REMOVING DEFECTS USING ABRASIVE POLISHES/COMPOUNDS

The most popular way of removing paint defects by machine is to use an abrasive polish. When worked into the paint, the abrasives cut away a layer of the paint where the defects are. One the amount of paint removed is deeper than the defect, the defect will have been removed. It is like “re-flattening” the paint to a level where no defects exist.

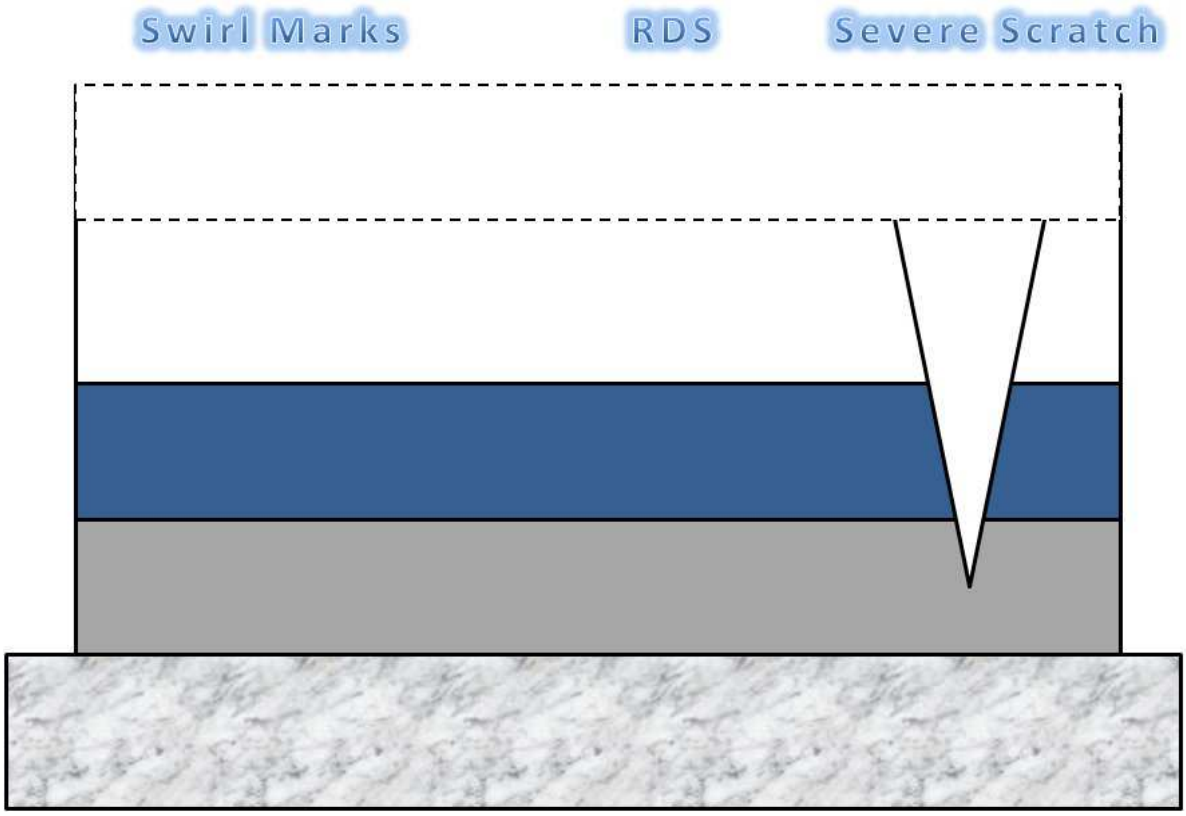
As mentioned above, when first approaching a car, always start with one of the lightest polish and pad combination that you have. This will remove only a small amount of paint, but may be enough if you have soft paint or only light swirls. Shown in the picture below are the above defects after being tackled with a typical light polish and pad combination (for example Menzerna PO85RD Final Finish on a Meguiars W8006 Polishing pad).



A thin layer of paint has been removed with the light cutting polish and soft foam pad. The combination has removed a lot of the lighter swirl marks, but has left the deeper swirl marks and the RDS and severe scratch. It is clear that there is still a healthy thickness left (can be checked with a paint thickness gauge in practice). So we would progress up the ladder to a more moderate cutting combination now to see if we can get better correction. For example, we may step up to Menzerna PO85RD3.02 Intensive Polish on a Meguiars W8006 Polishing pad to get the results shown in the picture below.



A thicker layer of paint has been removed and we have no fully corrected the swirl marks, both light and deep. The RDS remain however as it is much deeper into the clear coat. If the paint thickness permits we may wish to tackle the RDS with a heavier cutting combination to remove yet more paint. An example of this may be Menzerna POS34A Power Gloss on a Meguiars W7006 Cutting pad, to get the results shown in the picture below.



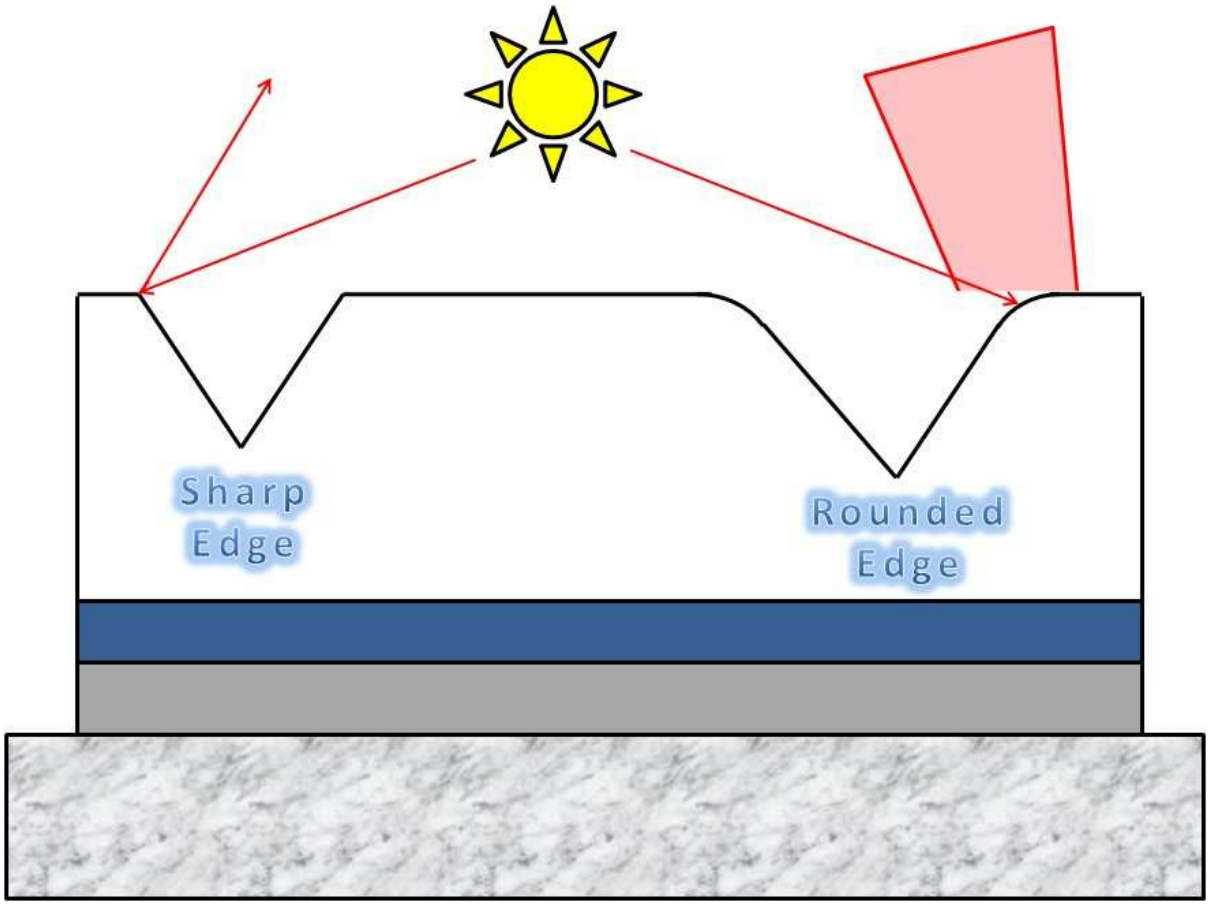
We can see that yet more paint has been removed by this process, however the RDS has been successfully removed. Great care must be taken when using compounds and removing large amounts of paint as leaving the clear coat too thin can cause it to flake off. Clearly the severe scratch cannot be removed as it goes through both the clear coat and colour coat layers.

When working up through the abrasive scale to find the best possible combination for the paint it is worthwile bearing in mind that some of the marks that may be in the paint are too severe to remove safely. Always aim to leave as much clear coat (or colour coat on a two stage paint job) as possible. There are many reasons for this, just a couple are: if the uppermost layer is too thin, it can flake off and the only repair is a respray; if only a thin layer of clear coat is left then it will not be possible to machine polish the finish again with abrasives top remove any marks that may be inflicted at a later date.

Perfection is a wonderful goal to aim for – but always bear in mind the safety of the combinations you are using for the finish you are using them on. This also applies if the paintwork seems soft – use of a compound on soft paintwork can remove large amounts of paint very quickly. So if you choose to use a compound on a car with soft paintwork, be sure to monitor the paint thickness regularly during the machine polishing process – after every few passes.

REMOVING DEFECTS BY ROUNDING EDGES

This method is one which can be used with a moderate degree of success in situations where full removal of deeper marks is not possible for whatever reason (for example, paintwork is too thin). The machine polishing process can naturally round off the edge of marks on the paintwork as shown in the picture below.

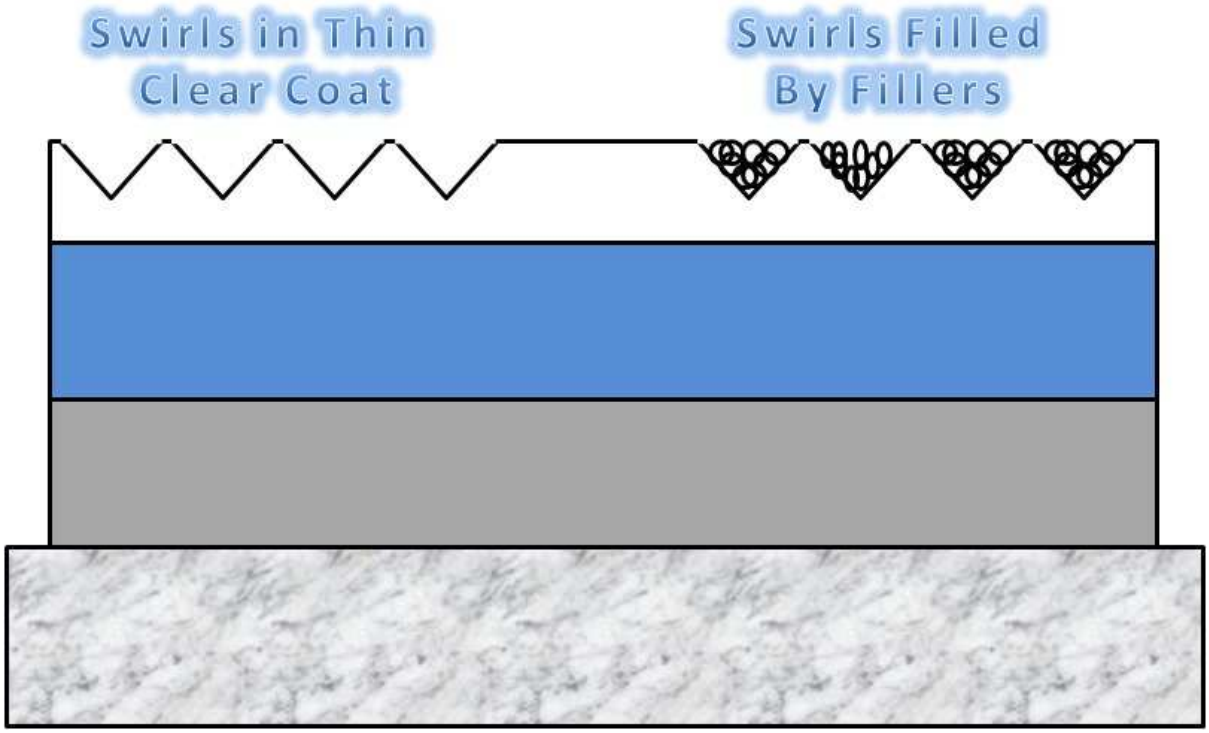


The sharp edges of the deep mark catch the light and it is reflected back in an intense ray allowing you to clearly see the scratch in the finish. When the edge has been rounded off, there is no intense reflection of the light. It is instead spread over a wider area and it doesn't appear as easily to the eye that there is a deep scratch there.

This process is not fully removing the marks in the paintwork. Instead it is making them harder to see by essentially softening the edges, which acts to scatter the light rather than reflect it. This in turn makes it harder for the eye to see the marks. They are not fully hidden, but they appear a lot less severe.

REMOVING DEFECTS BY FILLING

In some cases it is simply not possible to remove the swirls with an abrasive polish, for example if the upper most paint layer is too thin. Using a product with fillers gives another option in these situations – the defects are not removed, but instead they are masked by using fillers as shown in the picture below.



We can see that the original swirls above are quite deep compared to the thickness of the clear coat. Fully removing them by removing the paint would leave only a very thin layer of clear coat and this is something we would want to avoid doing. The alternative shown above is using fillers to mask the swirls. Not all swirls will be filled in perfectly, so complete correction using fillers will likely not be possible. However a significant improvement can be made without risking the paint.

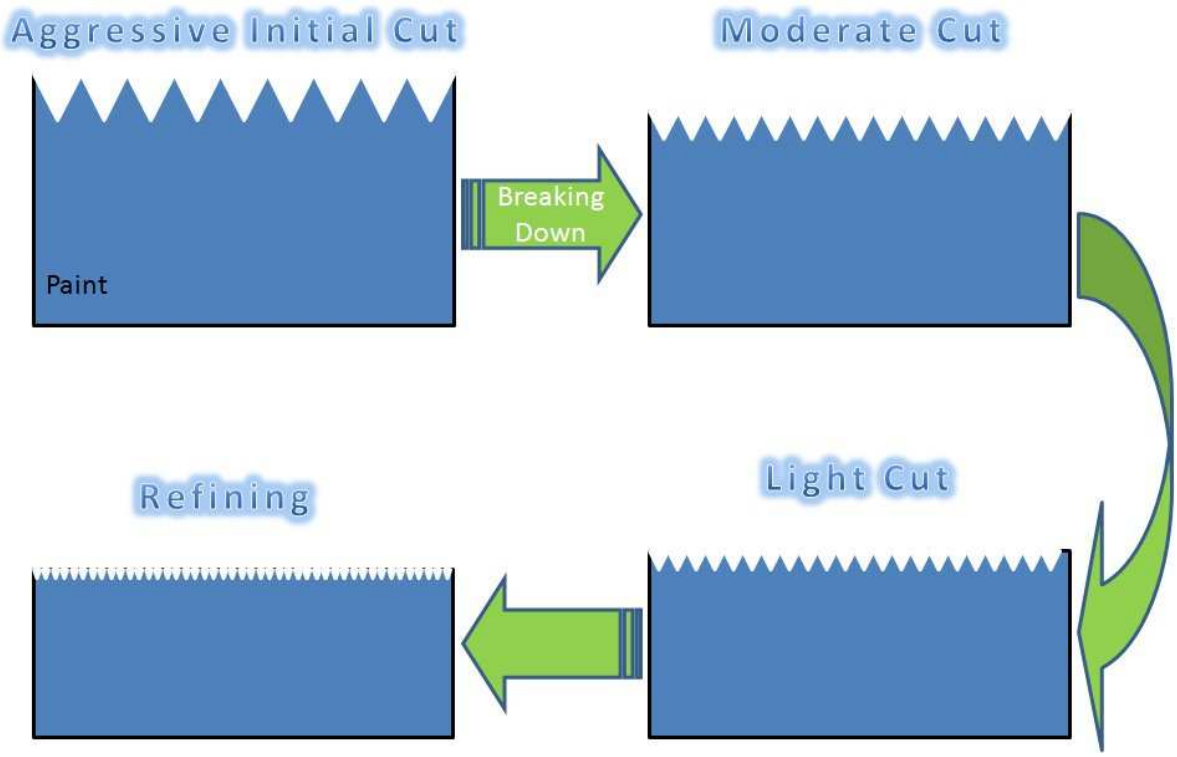
An issue with filling swirls is the solution is not permanent. Over time the fillers will be removed by washing and general wear and this will result in the swirls returning.

THE POLISHING PROCESS

Here we look at how the polishes work the remove the paint defects as discussed above, with a description of the best generic techniques to work machines and polishes.

Polishes which use a mechanical abrasive to remove the paint (most on the market including Meguiars, 3M, Menzerna, Poorboys, Optimum, Chemical Guys…) typically use a “powdered” abrasive carried in a solution with lubricant. The polish contains little abrasive particles which act under the action of the pad which moves them across the paint to slice off a little amount of the paint. It is quite similar to exfoliating the skin on your face with a facial scrub.

In many polishes which are widely available, the abrasives break down under the action of cutting to become finer and finer. This means that as you polish, the amount of paint removed gets less and less. Shown in the picture below is a schematic of how this works in practice.



With the first passes of the machine across the paint, the abrasives are cutting a large amount of the paint away. As the polish is worked, the abrasives break down and the amount of paint removed gets smaller and the finish finer. Towards the later stages of the polishing set the abrasives have broken down to a point where they are removing only a very small amount of paint with each pass. The finish is now also much finer than at the beginning. The abrasives have diminished from heavy cutting through to fine finishing.

It depends on the polish being used how aggressive the initial cut is and how fine the final refining is. Typically, a finishing polish (such as Meguiars #80, Poorboys SSR1) will have very light initial cut but a very fine finishing cut to deliver a sharp finish. An aggressive compound (such as Menzerna Power Gloss, 3M Fast Cut) will have strong initial cut but will not break down to a very fine finishing, thus resulting in a less sharp finish.

Not all polishes break down in such a fashion however. Some polishes remain aggressively cutting throughout the set and for this reason they will require to be followed with a fine cutting finishing polish. Other polishes rely more on the cut of the pad to determine the level of cut and quality of finish, an example of which is MarkV Mystique. These latter polishes can be used on wool pads on rotary polishers to deliver significant correction. By dual action polisher they can deliver high levels of correction on a cutting foam pad, and lower levels of correction but fine finishing on a polishing foam pad.

The use of different grades of foam pad will also affect the cut ad final finish delivered by a polish, the amount of which depends very much on the polish. For many light to medium polishes, the use of a polishing pad is generally sufficient and a more aggressive pad will not deliver that much extra. However for more moderate cutting polishes, the use of cutting foams can give a better cut and allow the abrasives to cut better. The flip side is that the more aggressive cutting foams can also leave marring of their own on a paint finish necessitating a follow up with a finishing polish to refine the paintwork.

The levels to which pads and polishes cut and finish also depends greatly on the paintwork being tackled. Only by experimenting on a test section can you fully ascertain what each combo will do. For example, on some

harder paints the use of a finishing polish on a finishing foam delivers very little if any discernable difference in quality of finish over the use of a medium cutting polish on a polishing foam pad. However on a softer paint which is more sensitive to the abrasives, it may be a completely different story, with big gains to be had by using a fine finishing combo to follow a more aggressive pair of products.

IN PRACTICE

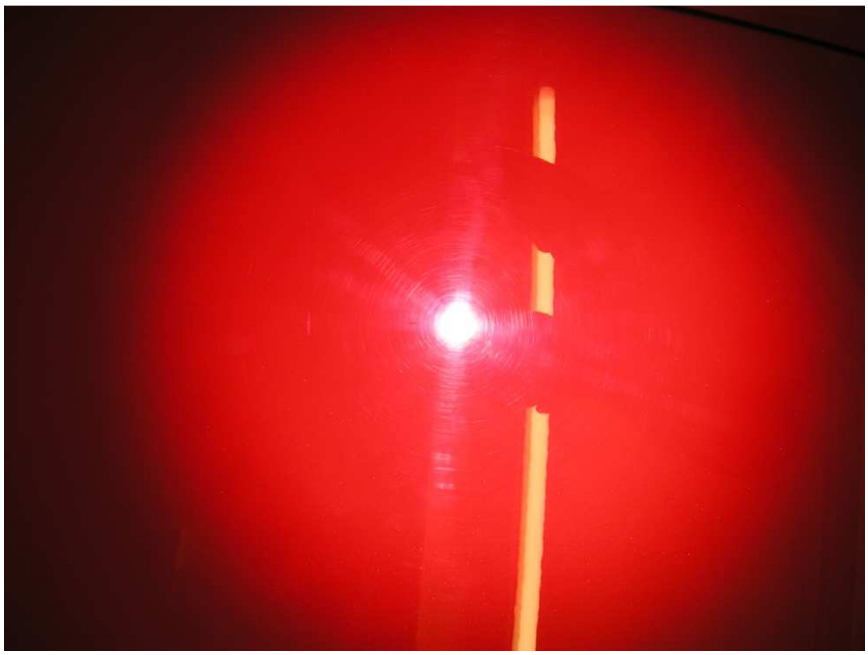
Having looked at what is going on with machine polishing in theory above, here we now look at how this works in practice.

REMOVING DEFECTS BY ABRASIVE POLISHES

As discussed above, the use of abrasive polishes eliminates defects by removing a layer of paint. The more aggressive a polish and pad combination used, the more paint that is removed. Thus more severe defects can be removed by using more aggressive combinations. However with all paints, regardless of any reputation about hardness of finish, always start with a light cutting combination and work up through the abrasive scale until you get the correction required.

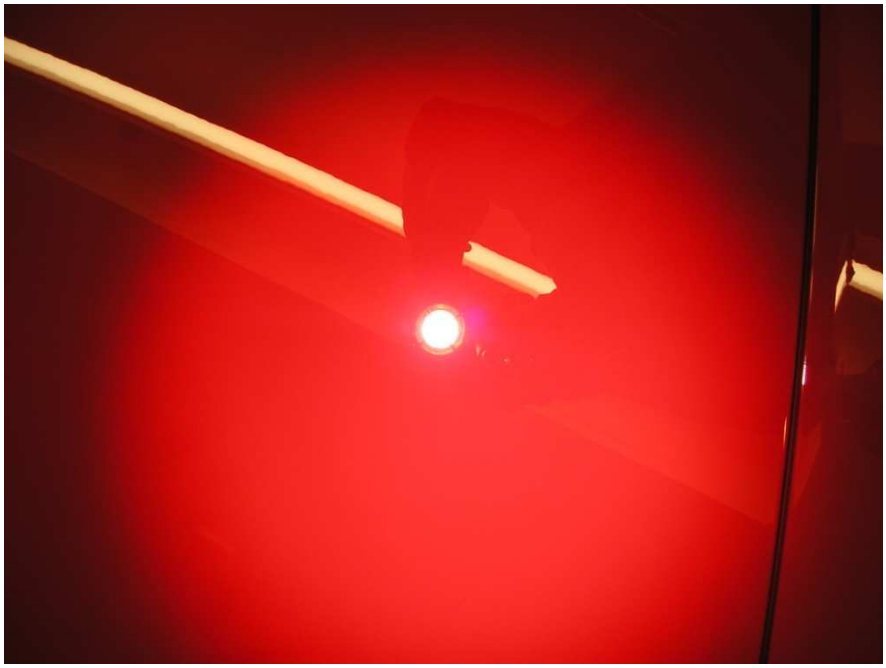
EXAMPLE: HONDA S2000

Shown in the picture below are light swirls evident in a Honda S2000's paint finish. The finish does not contain RDS or severe scratches.



Light to medium swirls in Honda S2000 red paint

To remove the defects, a light polish and pad combination is tried first – for example Meguiars #80 Speed Glaze on a Sonus SFX-2 Polishing pad. This will remove only a small amount of paint. However as the picture below shows, this is adequate to remove the light swirls.



Swirls removed from finish

Having found that this light polishing combination has delivered the required correction, the rest of the car can now be corrected in the same way. Regions of more severe marring, if they exist, can be tackled either by repeating an application of the light combination or stepping up to a more aggressive combination on the local area.

EXAMPLE: BMW E39 5-SERIES

Now let us look at something a little more severe. Shown in the picture below are moderate swirls and RDS in a BMW E39 5-series finish.

Moderate to severe swirls and RDS in BMW E39 paint

Now BMW paint has the reputation for being hard. However, a light polishing combination would be trialled first just in case this was all that was needed – for example Menzerna PO106FF Final Finish on a Meguiars W8006 Polishing pad. The results of using this polish combination are shown in the picture below.

Swirls still clearly evident after light combo

Clearly in this case the light polish and pad combination has not had the desired effect. The swirls are still evident, as are the deeper marks. Only an improvement to the gloss is really evident and this is only slight. So, presented with this, we can see it is necessary to step up to using a more aggressive pad and polishing combo. Before doing this however it is prudent to check the thicknes of the paint to ensure that significant amounts have not been removed for little return – if this is the case, then chances are that to remove the marks will require too much paint removal and an alternative method would need to be looked into.

In this case we now move to trying out a more aggressive polish on the same pad: Menzerna PO85RD3.02 Intensive Polish on a Meguiars W8006 polshing pad. The results of this are shown in the picture below.

Light swirls removed, but more severe marks still remaining

The use of a more moderate pair of products has results in greater correction – the light swirls are now removed and the gloss more noticeably enhanced. But the severe swirls and RDS are still clearly evident suggesting that a more aggressive combo is still required. As before, the paint thickness should ideally be checked before stepping up the aggression scale to something more serious.

In this case, it is clear that the paintwork is quite hard and that the marring is severe which points to a compound being necessary. For example, Menzerna S34A Power Gloss on a Meguiars W7006 Cutting Pad. The use of an aggressive cutting pad and compound combination should be a last resort and the thickness of the paint should be checked before hand to ensure the safety of the method. Additionally the use of an aggressive compound can leave its own marks in the paintwork as discussed above. For this reason it should always be followed with a light polish and pad combination to refine the finish – for example Menzerna PO85RD Final Finish on a Meguiars W9006 finishing pad. Shown in the picture below are the results of using these combos on this paintwork.

Swirls and RDS fully removed and high gloss finish returned

This combined aggressive combination followed by a finishing combination has resulted in all of the swirls and RDS being removed from the finish and a high gloss and clarity being restored.

REMOVING DEFECTS BY ROUNDING EDGES

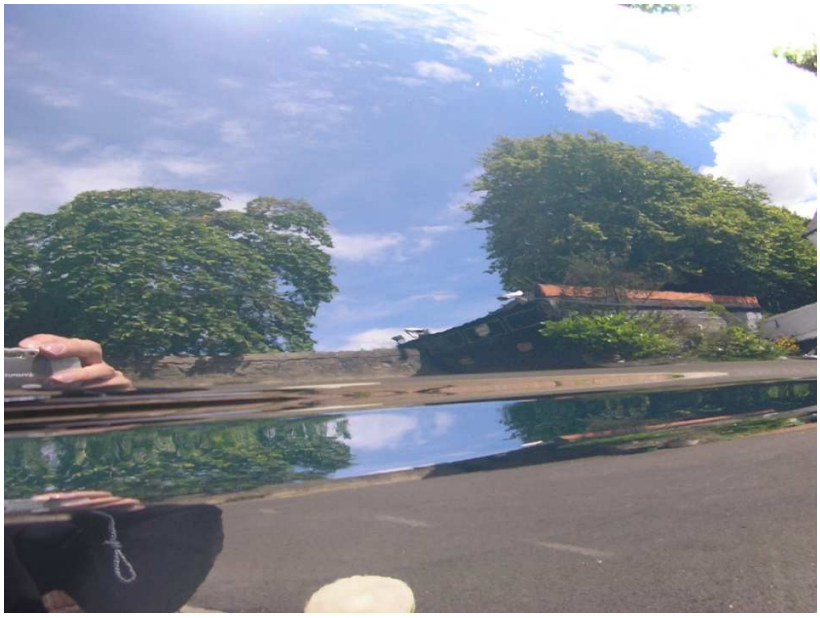
As we have seen above, some marks are too deep to be fully removed. Either the mark is too deep or there is simply not enough paint. All is not lost however! Sharp edges on deeper marks catch the light and reflect it back in a beam which is easy to see with the naked eye. If these edges can be "rounded off" then they will scatter the light rather than directly reflecting it which will result in the mark looking less visible. This method does not remove the scratch, and it doesn't make it invisible, but it does deliver a notable improvement.

EXAMPLE: JAGUAR S-TYPE

Shown in the photograph below is a deep scratch mark in the rear wing of a Jaguar S-Type. The area here has been polishes already with a light abrasive to remove surrounding swirls and restore the gloss but the deeper mark is unaffected.

Deep scratch clearly visible in Jaguar S-Type paintwork

Confronted with this situation, the paint thickness should first be checked to ensure continued polishing is safe. Here, complete removal of the mark would not be possible owing to its depth and the thickness of paint available. So in this case, a medium abrasive polish and pad combination (for example Meguiars #83 Dual Action Cleaner Polish on a Meguiars W8006 Polishing pad). The results of two applications of this process are shown in the picture below.



Deep scratch still visible, but severity significantly reduced

The scratch is still visible, but its severity has been significantly reduced. The removal of sharp light catching edges of the mark have made it less visible.

REMOVING DEFECTS BY FILLING

Removing here should really be in quotation marks… This is quite often viewed as cheating as when using fillers, you are not removing the marks. Rather you are hiding them by filling them in, a bit like filling holes in a wall with plaster.

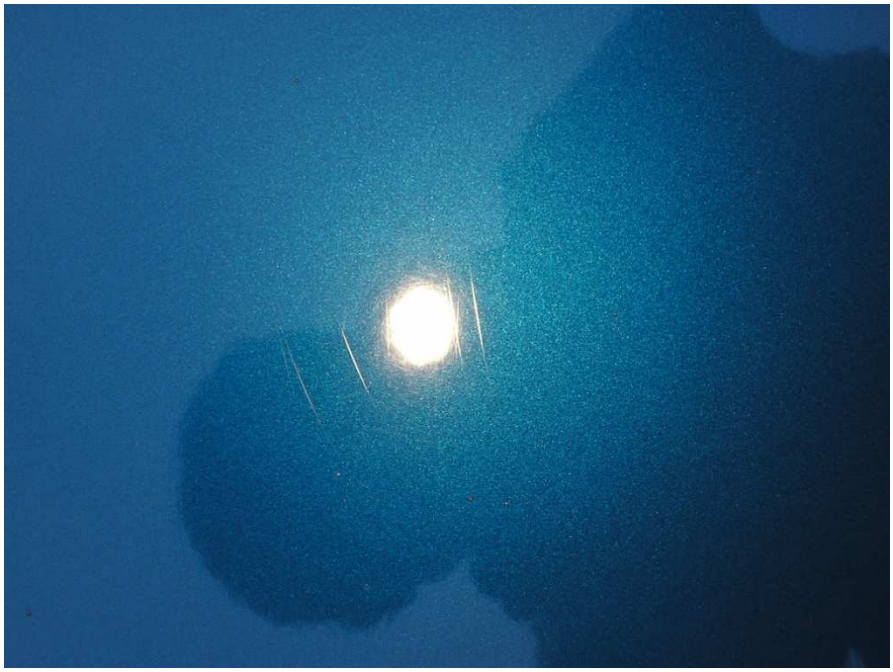
To call it cheating though is a bit unfair! There are many cases when the use of fillers to hide swirls is preferred to removing swirls with mechanical abrasives. For example, on a car where the paintwork is very thin, the removal of defects by removing paint is not possible so as to avoid the risk of striking through the paint. In this case, while not ideal from a purist's perspective, filling the swirls will deliver a notable improvement that would otherwise have not been possible.

EXAMPLE: PEUGEOT 307

Shown in the picture below is the door of a Peugeot 307 with light to moderate swirls.

Peugeot 307 door showing moderate swirls

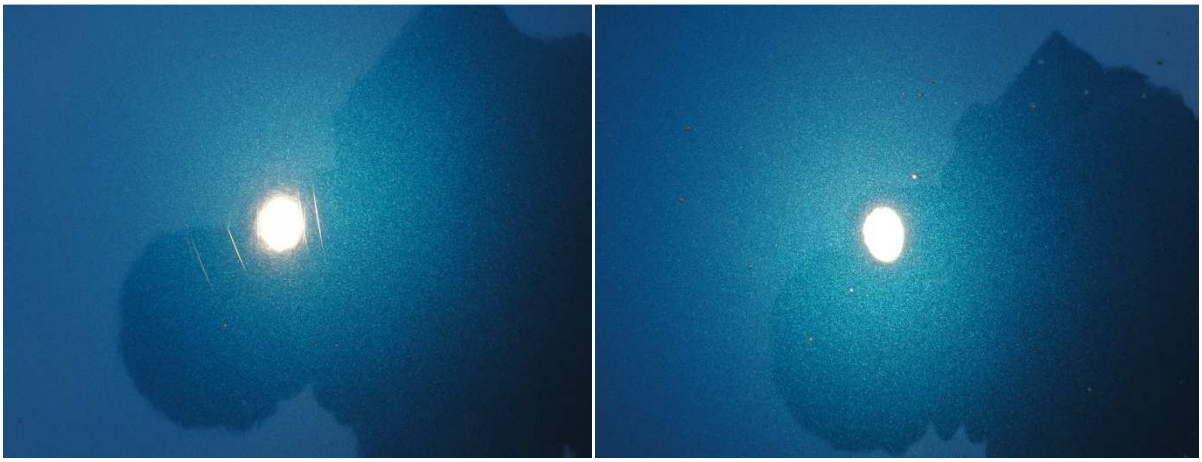
If the paintwork on this door measured to be very thin (for example <80µm) then removal of these swirls with an abrasive polish would not be wise. Instead, a filler heavy glaze (for example Clearkote Red Moose Machine Glaze), applied using either a finishing pad or a polishing pad could be used. The fillers would be worked into the paintwork, to be worked into the swirl marks to help hide them. The results of filling is shown in the picture below.



Peugeot 307 Door – most swirls filled, RDS remain

HOW EFFECTIVE IS FILLING?

Typically, removing swirls by filling is less successful than removing them with a mechanical abrasive. Shown in the picture below is a comparison between the effects of a moderate cutting polish, a finishing polish and a filler heavy glaze on the general swirls on a Peugeot 307 door.



Left: Marks after filling. Right: Marks after mechanical abrasive correction

THE POLISHING PROCESS

Having seen what various types of polishes can achieve in practice, we now look at the best ways to attain these results using a dual-action polisher.

HOLDING THE POLISHER

One of the most important things when machine polishing is to get comfortable! If you are tense or stretching awkwardly, you will find the machine polishing experience an uncomfortable one. Always ensure before you switch the machine on that you can easily reach all areas that you are planning to tackle, and that the pad is of suitable size.

You typically hold a machine polisher with two hands. However some users will prefer to use the tool one handed. Finding the best way to comfortably hold your machine will take time and there is no right or wrong way providing a few basics are observed: you want to be able to comfortably move the machine around the paintwork; ideally you want to be able to control the amount of downwards pressure over the polishing pad. Typically, you would hold the machine at the back with your writing hand and over the head with your other hand as shown in the picture below.

Typical hold for a Porter Cable 7424 Dual Action Polisher

Most dual action polishers come with a handle – either a side handle in the case of the PC7424, or a D-handle in the case of the Meguiars G220. The use of the handle is purely personal preference – try holding the machine with and without the handle to see which you prefer. Shown in the pictures below are examples of the Porter Cable 7424 being held using the handle, and without the handle.


Left: Using a PC7424 with no handle Right: Using a PC7424 with a handle

An important point when holding the machine polisher is to ensure to keep the cable over your shoulder as shown in the pictures above. This prevents the cable trailing along the paintwork inducing marks of its own.

Another important point is to **relax**! Dual action polishers vibrate, if you are holding on to a machine tensely then the vibrations will cause you pain quite quickly. Additionally if your driving arm (arm at the back of the machine) is tense, you will be less able to easily follow the contours of the paintwork. It is necessary when machine polishing to keep the pad flat at all times – this will be much easier if your driving arm is relaxed as you will find yourself better able to follow the contours and shapes of the body panels you are polishing.

DRIVING THE POLISHER

A dual action polisher will require to be driven across the paintwork when switched on – it has little to no inclination to move itself. This makes it an easier machine to control when first starting out in machine polishing. Driving of the polisher is generally down with the back arm (your writing arm), while the arm over the head of the polisher is simply controlling the downwards pressure onto the pad.

It doesn't matter what pattern you move the machine polisher across the paint area in. Side to side, up and down, figures of eight, combination of all of them… So long as you cover the area evenly!

When using abrasive polishes, the machine should be moved at slow speed across the panel – approximately 1" – 2" per second. This allows the abrasives to be worked as discussed above to get the best cut and best finish. When using cleansers and glazes, the machine can be moved faster (using slower speeds) – around 3 – 5" per second.

Different products require a different amount of pressure when being worked. Many abrasive polishes work with between 10 – 15lbs of pressure. To get an idea of how this feels, push down the machine on a pair of scales. As a rough guide, when in use, you will hear the tone of the machine's motor change slightly under this amount of pressure. To vary the amount of pressure, push down over the head of the machine using your arm. It is important to experiment using different pressures with the products you are using to see what delivers the best results on the paintwork that you are working on.

When using the polisher, ensure that the pad is not only vibrating but also turning in circles as well. This is best assessed by drawing a thick black line on your backing plate – you should see this line rotate at about 1 –

2 times per second. If the pad rotates faster than this it is not a problem, especially at high speeds. If the pad is not rotating then this means you are using too much pressure on the pad. Reduce the pressure until the pad begins to spin. Pay particular attention to this when working near edges and contours as these can be pressure points which will cause the pad to stop spinning.

It is very important to start and stop the machine polisher when the pad is in contact with the paintwork. If the machine runs with the pad in mid air there is a large risk of the pad (and any product on the pad) flying off the machine at high speed!

WORKING AN ABRASIVE POLISH (DIMINSHING ABRASIVES)

As discussed above, the abrasives in many machine polishes on the market are diminishing abrasives. This means that they need to be worked through their stages of cutting from high to finishing. Here we look at how this would be done in practice. This is just a generic technique and guide to working such polishes – each polish will have its own characteristics and only through experimenting will you be able to find the best possible working methods that suit your technique.

Key to getting the best out of the abrasives in a polish, both in terms of cut and in terms of finish, is to work on a small area at a time – of around 12" – 18"square. Once the pad is initially primed with polish (a 3 – 4" line is enough for this), only a couple of skittle sized beads of polish are typically required.

With the machine switched off, spread your polish around the area you plan to work. You can either dab the pad on the paint, or drag it across the paint. The switch the machine on a slow speed (PC: 2-3; UDM: 2; G220: 2) and spread the polish with one or two fast passes across the area as shown in the picture below. You can see that the residue of the polish is white and cloudy looking.

Polish spread over small 1' square area on a BMW E46 bonnet

Once the polish is spread, step the machine up to a higher speed (PC: 5; UDM: 4-5; G220: 4-5). Now increase the amount of pressure over the head of the machine as appropriate, ensuring that the pad is still rotating. Move the polisher across the area at a slow speed of about 1" – 2" per second. Make three or four passes at this speed to begin working the polish. With certain polishes, for example Meguiars #83 Dual Action

Cleaner Polish, keep the machine at this speed for the duration of the polishing set until the abrasives have fully broken down. The picture below shows the polish beginning to be worked.

Working a polish using the Porter Cable 7424

For many other polishers, step the machine up to a high speed (PC: 6; UDM: 5.5; G220: 5.5), maintaining the pressure from above. Continue to ensure the pad is rotating. Don't be tempted to speed up the movement of the machine (you'd be surprised how easy this is!) – keep it to 1" – 2" per second. Keep going until the polish residue goes clear as shown in the picture below. The residue will look like thick water has been spread across the paint and the white cloudiness will have vanished.

Fully broken down polish shows a clear, thick water like residue

When the polish is at this stage the abrasives have fully broken down as described above, allowing you to get the best from the available cut and also the best finish the abrasives have to offer. The finish will be free from micromarring as discussed above (unless an aggressive compound has been used on softer paint).

NB: The Cyclo machine polisher is only single speed. In this case, spread the polish around with a single pass moving the machine quickly and then slow the machine movement down to work the polish as described above until the residue goes clear.

WORKING A FILLER HEAVY GLAZE

Unlike polishes which contain abrasives, filler heavy glazes such as Clearkote Red Moose Machine Glaze do not need to be thoroughly worked to "break them down". Instead, they simply need to be worked long enough to work the fillers into the swirls.

As for an abrasive polish, the glaze should be dabbed around the area intending to be worked before the machine is switched on. This area can be a little bigger than for a polish with mechanical abrasives as we do not need to focus the effort down as much as before - 2' square or a little more is acceptable. The glaze should be spread as before at a slow speed (PC: 2-3; UDM: 2; G220: 2).

Then the glaze should be worked into the paint with a few passes at a moderate speed (PC: 4-4.5; UDM: 3.5-4; G220: 3.5-4). Light to medium pressure is typically all that is needed for working a filling glaze. Work the glaze for a few passes (experiment to find out what works best).

PROBLEMS & SOLUTIONS

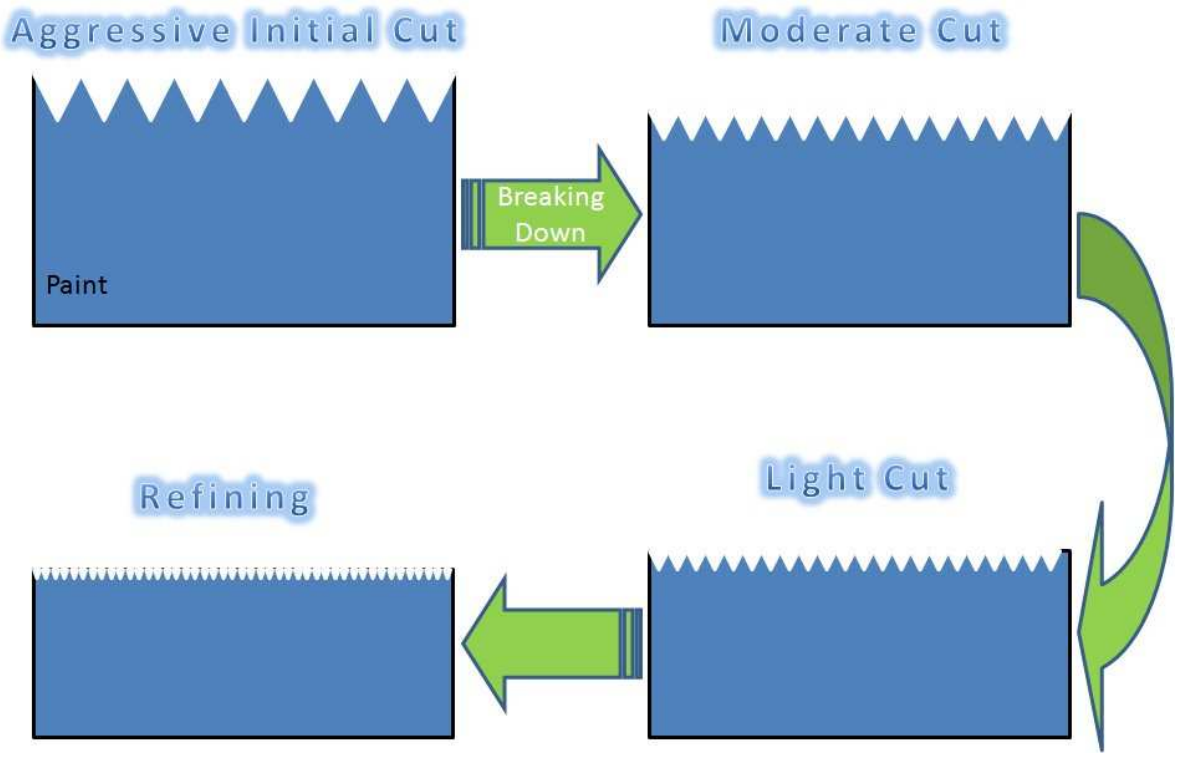
Here we look at some of the most common problems encountered when using a machine polisher and solutions for countering them.

POOR CORRECTION

When starting to machine polish a car, you should always test on a small area a group of combinations starting from the lightest first and work up to the required aggression to get the correction you want. Sometimes however, a polish and pad combination doesn't give the expected results on paintwork. For example, if you have a car with a reputation for soft paint (Honda Civic) and a medium abrasive polish such as Meguiars #83 Dual Action Cleaner polish isn't removing light swirls, you would be quite surprised by this. Also, if you get to the top of the abrasive scale and are not getting the desired correction then this is also a problem.

CAUSES

Poor levels of correction can be caused by a variety of things. One of the most common causes is not fully working the polish that you have (which can also lead to micromarring in the finish – see below). Consider the typical working on a diminishing abrasive polish shown below.



If the polish is not worked for long enough then you stop before the abrasives have fully worked and the level of cut is not as much as is possible for the polish. Polishes with slower working abrasives (for example Meguiars #80-series) take longer to cut, and require more passes to work them – not fully using the abrasives in them will result in a lower cut than expected.

Sometimes, the polish can dry out before the abrasives have been fully worked. The residue will look like it has gone clear at this stage, despite the fact the abrasives have not fully worked. This can be caused by working too large an area at a time, or by working in high temperatures or direct sunlight. Additionally, some polishes are naturally dry – for example Farecla G3.

In cases where the swirls and scratches are very deep, the level of correction may not be of the standard you would expect. As shown above, for deep scratches, a significant amount of paint must be removed in order to correct them with mechanical abrasives. To achieve this, especially on hard paints, requires a lot of time and aggressive abrasives (where safe!).

On rare occasions, you may find that some cars have swirls that are **underneath** the clear coat as shown in the picture below.

In the rare event of below clear coat swirls (generally a result of a poor paint repair), the removal of the top layer of paint by machine polishing will make no difference to the marks. In fact it will be impossible to correct these swirls without resrpay work!

SOLUTIONS

If you are faced with a correction level which is lower than you expect, first of all check that you are working the polish thoroughly to get the best of the abrasives. Ensure you are making enough passes to take the abrasives through from their initial cutting stage to their finishing stage – this typically takes between 10 and 20 passes at the higher speeds depending on the polish. Make sure that the residue goes clear before you stop the machine and assess the correction. Try increasing the number of passes with the polish to see if this improves the correction.

Check the area that you are working – it should be no larger than around 18" square. If you find the polish struggling with this size of area, try reducing to 12" square as this will focus the work down and work break down the abrasives more thoroughly. Too large a work area can also cause the polish to dry out too quickly, reducing the number of passes available to you so reducing this can increase the amount of cut (and improve the finish) from a polish.

If a polish seems to be drying out too fast, first of all ensure you are not working in direct sunlight and if you can avoid working in high temperatures where the body panels are hot. Reducing the work area can often help as if it is too large a polish can dry out as it spends too long untouched by the pad. In the case wher a

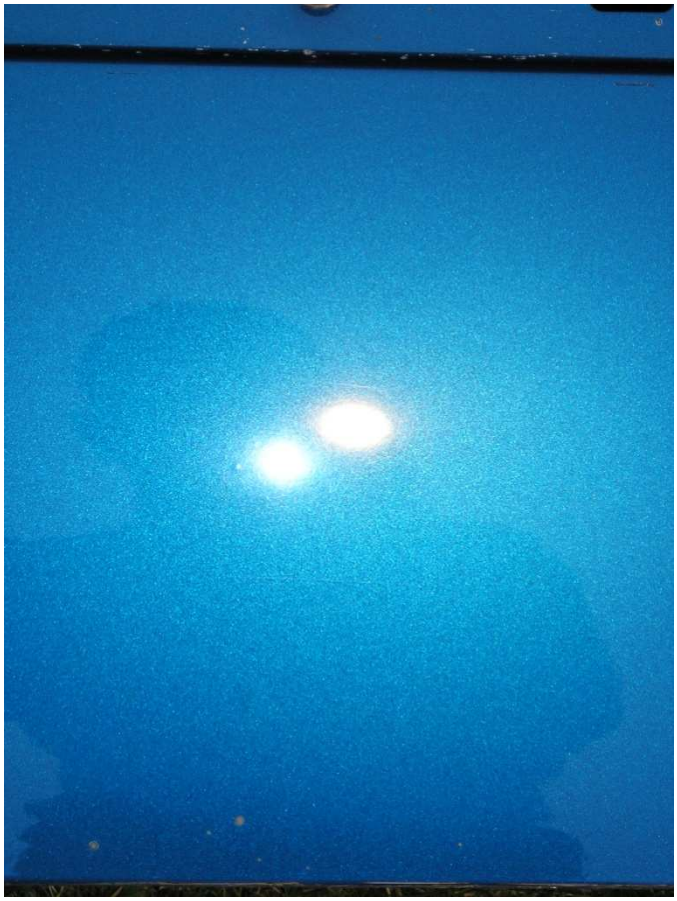
polish is drying out, try spritxing you pad with some water or quick detailer spray and then start to polish again as this will give you a few more passes to continue working the abrasives with most polishes. Some naturally dry polishes such as G3 require regular spritzes with water – when doing this, use light sprays of water often rather than lots of water irregularly. The latter method can lead to splatter and results in a lot of mess.

Deeper marks are very tough to deal with by machine polishing. For very severe marks, it may be necessary to wet sand the paintwork to get the desired correction in good time. However, repeated hits with a compound will deliver the same result in a lot more time – so in some cases it is simply a case of being patient and repeating with multiple hits on a single area. The Slow Cut Method discussed below may come in useful here. However, this comes with a health warning! Remember that every time you polish, you are removing paint. Ensure that you do not remove too much paint in the quest for perfection as once the paint is gone, its gone! Much better to leave the odd deep mark here and there and have plenty of paint left than to risk striking through just for the extra little bit of correction.

In the case of swirls inflicted below the clear coat, the only solution here is to respray the car as to get to them, the top most layer of paint would have to be removed.

MICROMARRING

Micromarring is a generic term used to describe machine induced marring that is left on the paintwork after polishing. Typical micromarring from a PC is shown in the picture below on a Peugeot 307 door.



Micromarring on Peugeot 307 door

The above door was treated to Menzerna S34A Power Gloss on a Menzerna 5" White Compounding pad – one of the most aggressive combinations around for a DA polisher! The induced micromarring can be seen to cause a haze around the light rather than a sharp reflection and closer inspection reveals lots of little circular marks that are causing this.

CAUSES

One of the main causes of micromarring when using a dual action polisher is the use of aggressive compounds and coarse pads. The gentle nature of a dual action machine means that with aggressive compounds, the abrasives are often not fully broken down and this leads to micromarring. Compounds such as Menzerna S34A Power Gloss and Meguiars #85 Diamond Cut Compound can easily leave marks of their own when used in polishing. The softer the paint, the more prone to machine induced marring it is.

Another cause of micromarring is not thoroughly working a polish. As discussed above, most polishes use diminishing abrasives which break down throughout the polishing set. If you stop before fully working the polish then the abrasives don't make it to the finishing stage and the result is marring left by them when they are still in their aggressive cutting stage. The example on a Lotus Excel below shows this.

EXAMPLE: LOTUS ELAN

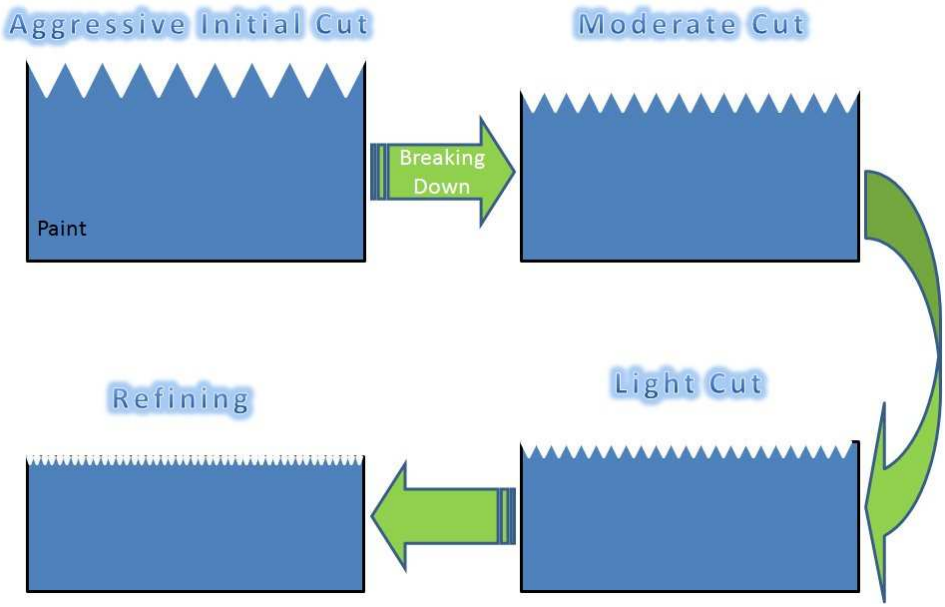
Shown in the picture below are moderate swirls in the bonnet of a white Lotus Excel.

Moderate swirls in a white Lotus Excel

Using a medium abrasive polish and pad combination of Meguiars #83 Dual Action Cleaner polish on a light cutting pad, the picture below shows the results of not fully working the polish.

Micromarring in Lotus Excel finish

All of the swirls have been removed but definite micromarring can be seen (little close together circular marks). The abrasives in the polish are still cutting quite aggressively at this stage, as if the machine was stopped between the moderate and light cutting stages in the diagram below.



Working the polish for more passes delivered the results shown in the picture below.

Swirl and marring free finish on Lotus Excel

We can now see that the swirls have been fully removed and the finish is free from micromarring. Working the polish for longer has allowed the abrasives to fully break down and refine the finish after the cutting stage.

The use of too much polish can also cause micromarring as it means that you struggle to fully break down all the abrasives. In addition to this, ensure the pad does not become clogged with product as this will reduce the effectiveness of the pad and can easily induce marring especially on softer paints.

Marring can also be caused by dirt in the pad scouring the surface.

SOLUTIONS

In cases where an aggressive compound and pad combination is required, some micromarring left in the finish is an inevitable consequence. The best solution is to follow the application of an aggressive combo with a light finishing combo such as Menzerna PO106FF Final Finish on a Meguiars W8006 polishing pad. The lighter abrasives can be easily broken down and will remove the micromarring left by the compound. The two stages allow correction of severe swirls and a high clarity deep gloss finish.

If a lighter abrasive polish is inducing micromarring, ensure you are fully working the polish as illustrated above. This makes sure you are getting the polish to the finishing stages and refining the finish with very light cutting abrasives. You can gauge the working of a polis by the residue – it should go clear as discussed above.

If the residue goers clear but the polish is still leaving micromarring, check to make sure the polish isn't drying out too fast. If this seems to be a problem, consider using a spritz of water to lengthen the work time or reduce the area you are polishing to help prevent the product from drying out. If you are convinced the polish is being fully broken down, yet it is still leaving micromarring then step down to a much lighter cutting finishing combo to refine the finish – this may be necessary on softer paints.

Keep the pad surface clean and free from residues. Regular spur the pad with a brush (a toothbrush will work well) to remove dried polish residue which can cause marring. Also ensure at this stage that the pad is free from any dirt and grit that can scour the finish. Remove any dirt immediately or switch to a clean pad. You can reduce the risk of picking up dirt by taping regions which can trap it, for example plastic and rubber trim.

DUST

Large amounts of dust can be a problem when machine polishing, finding its way into every nook and cranny and leaving you with a large task to fully clean the car up!

CAUSES

Some products, especially heavier cutting compounds such as Menzerna Power Gloss and Farecla G3, are naturally quite dusty by nature. The polishes are quite dry and as a result they can generate a lot of dust when polishing, especially in hot and dry conditions. Some polishes will create dust in certain working conditions.

Large amounts of dust can also be caused by the use of too much polish. This can become clotted in the pad, dry up and product dust. Hot and dry conditions can magnify the effects of this.

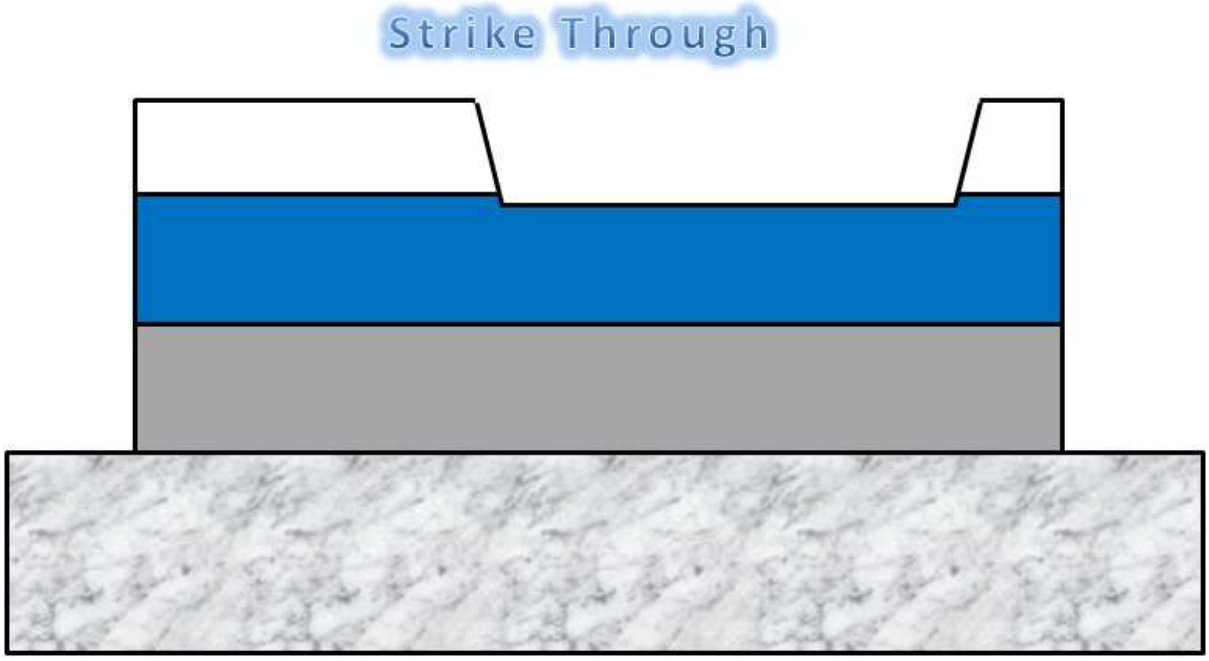
SOLUTIONS

To help keep dust at bay with a dry polish, regularly spritz the pad with a little water or quick detailer. This keeps the polish wetter and for many will reduce the amount of dust produced. Be careful not to use too much water however as this can adversely affect the working of the polish and can also lead to splatter which is just as messy but harder to clean up!

Also ensure that you are not using too much polish on the pad. A couple of skittle sized beads of polish is typically enough for an 18" square area after the pad is initially primed. Keep the pad surface clean and free from dried residue which can cause dust in later polishing sets. If a pad becomes badly clogged during a detail, switch to a clean pad.

STRIKE THROUGH

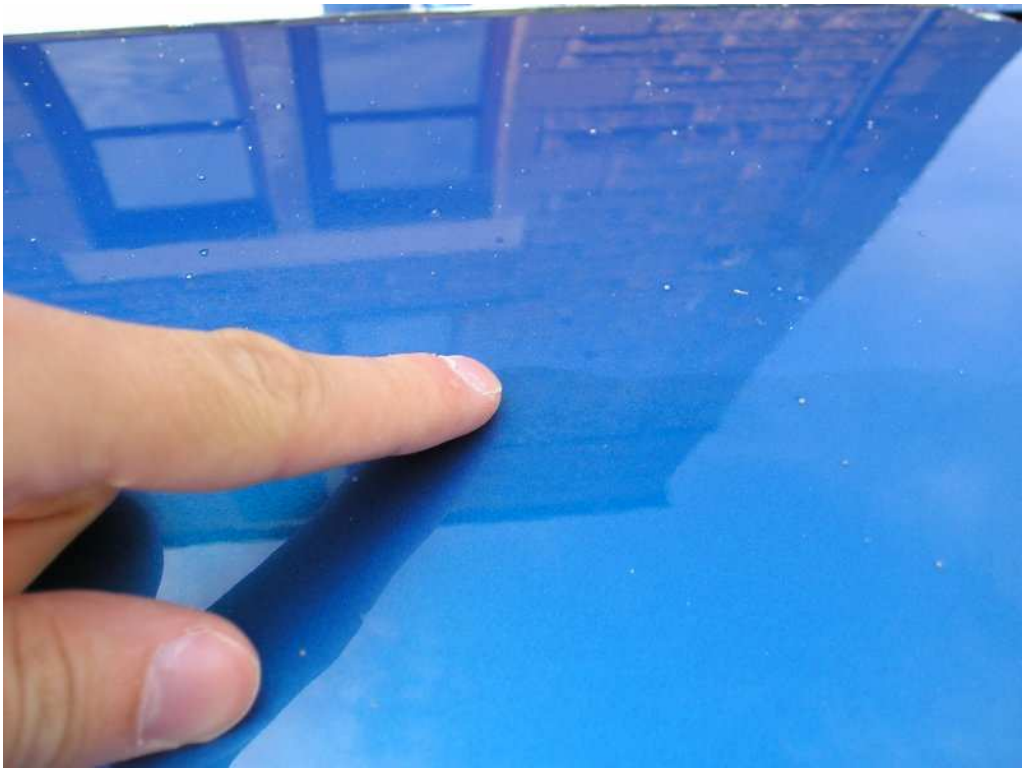
So far, all of the problems discussed can be easily and inexpensively solved. Strike through is a different kettle of fish! Strike through is the term used to describe polishing through the top most layer to the underlying layer as shown in the picture below.



In this example, the clear coat has been fully removed in this area and the colour coat revealed. This is repairable only by respraying the paintwork!

EXAMPLE: PEUGEOT 307

Shown in the picture below is strike through of the clear coat on a blue Peugeot 307 door.



Clear coat strike through on Peugeot 307 door

In daylight, this damage is quite hard to see – the strike through area is slightly lighter than the surrounding paintwork (just above the finger) and lacks the gloss. The effects can be more clearly seen under a bright light as shown in the pictures below.

Left: Normal region of paintwork Right: Region of paintwork with clear coat strike through

This is clear damage which requires an expensive repair. The first warning of strike through comes from visually checking the paintwork as you work – any evidence of a strange change in colour should raise the alarm bells! Also, the pad will turn the colour of the paintwork as shown in the picture below.

Pad stained by colour coat after clear coat strike through

This pigmentation of the pad is normal for two-pack paintwork where there is no clear coat but is indicative of damage on a finish where the is a lacquer layer! Strike through can also occur on two-pack finishes where you would go through to the underlying base coat.

Checking the paint thickness on the struck through area we can see a reading of between 70 and 80um… While this thickness would still be okay for some cars, clearly for this Peugeot 307, this was too thin! Numbers in this region should also bring about caution when machine polishing!

Paint thickness reading on struck through area of Peugeot 307 door

CAUSES

Strike through is caused by using too aggressive a polish and pad combination on paint which is too soft. This results in the removal of too much clear coat. Do not panic however! Providing you exercise caution when machine polishing, strike through is a rare occurrence.

SOLUTIONS

Prevention is better than cure! If possible always check the paint thickness on any vehicle you are planning on polishing. Be sure to take many paint readings, as a car can have local thin spots which are quite small in area and easily missed. In regions where the paint is thin, exercise a lot of caution and don't use aggressive cutting combos. Always monitor the thickness of paint being removed during the initial testing to see who hard or soft the paint is which will give you an idea of which combos are safe on which thicknesses.

If you don't have access to a paint thickness gauge, then take comfort in the fact that strike through is a rare occurrence. Exercise caution, and don't use aggressive combos unless absolutely necessary. If the paintwork seems soft, the use of aggressive cutting compounds is not recommended. Obviously there will be a small risk as any local thin spots will go unnoticed with no thickness gauge, but they are rare and you should not encounter any problems.

In the event of strike through, there is only one solution – a respray!

SPECIAL TECHNIQUES

The above guide covers the generics of machine polishing. Here we look at some of the special techniques you can try to get a little extra out of your dual action polisher.

THE SLOW CUT METHOD

This technique was developed to get increased cut from a dry style compound such as Menzerna Power Gloss by making better use of the abrasives. The regular spritzes of QD here allow the polish to be worked for longer delivering more cut which is particularly useful on harder paints.

THE TECHNIQUE

1. Apply a spray of water to the pad to wet it, and then apply some polish or compound to the pad.
2. Work on a very small area at a time - roughly 1' square, nothing more. Dab the machine around this area to apply the polish.
3. Turn the machine on at speed 3. Support the weight of the machine, one hand underneth the back to hold it up and the other on the handle/head to guide direction without applying weight to the

machine. Any hold is good though, so long as there is no weight over the head of the PC. Move the polisher slowly across the area in overlapping strokes, at a speed of around 1/2" per second - very slowly. You should get around ten passes before the polish starts to go clear and look like its drying and ready to buff off.

4. Rather than buff off the residue, spray the pad with some more water and repeat the above step. Speed 3, no weight, very slow passes. The polish hazes up again and you have more work time. Make more slow passes until the polish begins to go clear again.
5. After two hits at speed 3, spray the pad with water and move onto speed 5, again no weight and no pressure and make slow passes by moving the PC at about 1/2" per second.
6. Finally, spray the pad with water again, and move to speed 6 and this time apply pressure to the PC for a final single pass over the area at about 1" per second. The polish will likely be pretty clear after this stage, so buff off the residue. If you examine the pad, I found that it actually looked quite clean after this, very little white polish left there.
7. If you've used an aggressive compound, you will induce micromarring with this method, but this can be easily removed using a finishing polish.

CLEAR PLASTICS & GLASS

As well as paintwork, the dual action polisher can also be used to polish and/or cleanse clear plastics and glass, for example lights and windscreens. For clear plastics, techniques discussed above for paints apply. Glass on the other hand is very hard and defect correction would be very difficult. However a dual action polisher can be used to enhance the amount of cleaning power available from a glass polish such as 1Z Glas Polish.

ROUNDING UP

We have seen that machine polishing can deliver significant improvements to a car's paint finish – from removing swirls and scratches, to restoring the colour and giving the best possible depth and clarity from the paintwork.

In this guide, the basics of machine polishing by dual-action polishing were covered along with generic techniques to get the best from the tool. Nothing can beat practice however, and as you learn machine polishing you will develop your own techniques that will get the best results for you. The methods discussed here are meant purely as a guide to get you started.

The biggest gains in quality of finish on a car's paintwork can be made by machine polishing – this removes or reduces swirl marks, scratches, etching, oxidisation and staining. In addition to this, the abrasives refine the finish which allows for a deep gloss and high clarity to the paintwork that will turn heads at any car show. If you are keen to take your car's finish to the next level, there is no doubt that machine polishing will deliver you impressive results.

The market is filled with loads of possible combinations of pad and product. As is quite often the case in marketed products, each one claims to be better than the next – this can lead to a lot of confusion! At the end of the day however, all of the polishes on the market are just as capable as the rest: what differs on the whole

are the working characteristics. The differing characteristics of each polish result in personal preferences in brands – but this is more down to different people have different techniques than one product being significantly better than the other.

When starting out with machine polishing, you want to ensure that you have a suitable range of polish and pad combinations to achieve good results on the majority of finishes. Buying every polish and pad under the sun will allow just about every job to be tackled within reason. However you can also set yourself up for the majority of tasks with just a couple of polishes and a few pads!

To start out, a finishing polish and a medium cutting polish would be a good starting point, with finishing and polishing foam pads to go along with these in both 4" and 6" sizes. An example of possible good starting polishes would be Meguiars #80 Speed Glaze and Meguiars #83 Dual Action Cleaner polish (or equivalents from other manufacturers). The light cutting polish will serve as a polish for light swirls on all paints, and more moderate marring on softer paints. It will also serve as a finishing polish to follow the use of more aggressive polishes. The medium cutting polish will serve to remove more moderate marring from most paint types and on the harder ones it will also finish down ready for a wax. Combined, polishes of this type will give you a great base for tackling the majority of cars and you can then build from this as you experience the need for differing correction.

It is important to learn a polish. Best results will come with practice and learning the characteristics of how a polish breaks down and how many passes and at what pressure and speed are required. Experiment, and enjoy getting pursuing the best results you can achieve from a specific product rather than changing products in the quest for the holy grail of a perfect finish.

Machine polishing is a time consuming process. The polishes must be properly broken down in order to get the best from them and this takes time – typically a good five minutes per 12 – 18" square section. Don't be tempted to rush your car when machine polishing. Take the time required and you will be rewarded with the finish you achieve.

The most important thing with machine polishing is to relax and enjoy making your car's paintwork look as best as it can. Using a dual action polisher can become a chore if you are tense and worried about the finish you are achieving – and it is at this stage that mistakes and poor finishes are more likely to occur. If you relax you will find the task more enjoyable and your results will also likely be better.

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[i] Photograph courtesy of Epoch
[ii] Photograph courtesy of Mark J
[iii] Photograph courtesy of Snowwolf
[iv] Photograph courtesy of Epoch