The Complete Guide to A Show Car Shine

by: Mike Phillips
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Navigation

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- **Section:** Navigation within a specific section, use the sub-index located on the first page of each section.

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Icon definitions

- External web links
- Internal book links
- Sub-section
- Listings or Steps

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I wrote this book to help people better understand how to polish their car’s paint. For me, polishing paint is the fun part. Swapping out engines, replacing brakes, even simple tune-ups and oil changes are the dirty routine things. While important and necessary, these aren’t what most people consider fun and are better described as just plain old knuckle-busting work.

On the other hand, spending a Saturday afternoon washing and waxing your pride and joy is a time to relax and unwind on the weekend, while performing preventative maintenance and having fun. The key to having fun is getting good results. This is where knowledge comes into the equation. You see modern clearcoat paints tend to be hard, thin and delicate in that they are easily dulled and scratched.

For these reasons, it’s important to have a little knowledge about the paint you’re working on, the products you’re using and most importantly, the process. The paint polishing process is where the magic happens, it’s where you take a diamond in the rough and turn it into a glistening gemstone.

Perfecting your technique, with help from the information contained inside this how-to book and reinforced by interaction on the AutogeekOnline.net discussion forum will ensure you get professional results the first time and every time. The members of our discussion forum and I are always available as a resource to see you through to success in your garage. You can even take what you learn from this how-to book and start a detailing business, earning money either part time, or if you wish, full time.

When it comes to washing and waxing your car, there is nothing more disappointing than to wipe off the final application of wax, only to reveal a finish that looks only marginally better than before you started. This how-to book will ensure this never happens to you.

The trend for the last 20+ years has been for everyone from car enthusiasts to professional detailers to switch over to machine polishing instead of trying to do all the polishing steps by hand. An electric polisher is more efficient when working on any type of paint as you always get better results faster. That said, you really need some background information about the different types of popular polisher options available today.

In this updated version of my first how-to book I'll walk you through how paint works and how to work on it through all stages of the detailing process. For example how to wash a car or even wipe a car carefully using a spray detailer and a microfiber towel so you don’t accidently instill swirls and scratches into the paint. These skills are just as important as knowing how to use any electric polisher because after you polish the paint to perfection you’ll still need to know how to expertly wash
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and dry it and then maintain it. (Or you’ll be back to square one).

I will walk you through the different types of electric polishers available and how they work and how to use them to create a show car finish on your own vehicles or for your customers if you detail cars for a hobby or for a part time or full time car detailing business.

Different strokes for different folks

Some of you may look at your car merely as a means of transportation. You are mostly interested in learning how to best protect your investment. Some of you may look at your car as an extension of your personality; you see it as an escape from the daily grind of living in a complicated world. You have a passion for polishing paint and you take it as serious as a heart attack. You want to know everything you can about the products and process you’re using and how to get the best results possible from your time, money and efforts. The term “second best” is not in your vocabulary.

Polishing paint is an art form

To achieve a flawless finish, you need to know a lot more than what the directions on the label of a can or bottle of wax can tell you. Like the saying, “wax-on, wax-off”, from the movie The Karate Kid, there’s more to it than simply wiping wax on and off.

You need to combine knowledge and experience, as well as the right products and tools with the human elements of care and passion. You need to genuinely care about what you’re doing and have a passion for the craft. When all these things come together, polishing paint becomes an art form as you truly create a work of art.

Information is the true secret to a show car finish

I believe you will find the information in this how-to book to be very different from anything else you have ever read in any other book, magazine article or even on any website related to the topic of car detailing.

Over the years, I’ve helped thousands of people with their different paint polishing projects. While demonstrating at car shows or teaching classes, I’d explain how paint works, how polishing products work and the different types of procedures that go with them. Afterwards, I would always be asked the same question that usually goes like this:

Hey Mike, is any of this information written down anywhere?

Until now, the answer was always “no”.

Most of the information shared in this book is from my own experiences, gained from polishing just about every type of surface under the sun, in every imaginable condition.

Some of the information shared in this book comes from people I have met over the years including painters, detailers, do-it-yourselfers and the hundreds of thousands of friends I’ve made on detailing discussion forums and who have attended my detailing classes.

I’m confident that after reading this book, you will be ready to tackle any detailing project that comes your way.

Let the polishing begin!

Mike Phillips
Early Painting Technology

Paint History

Karl Benz, of Mercedes-Benz, was awarded the first patent for what we call the automobile in 1885. However it wasn’t until Henry Ford introduced the Model T in 1908 that the general public began the transition from riding a horse to driving a car.

It was a decade later before enough people had purchased a car for it become established as the new mode of transportation. If we use the general year of 1910, only two years after the Model T was introduced, and fast forward to today, (as I write this, it’s the year 2013), in general terms, we’ve only been driving cars for approximately 100 years out the entire known history of human existence. In context, we’ve only been driving cars for a very short time.

For the largest portion of this 100 year history of the car, most of our cars had single stage paints. It’s only been since the 1980s that car manufacturers starting switching over to modern basecoat/clearcoat paints.

When cars were first introduced in the late 1800s and early 1900s it was a new industry and as such, there were no specific manufacturers of car paints (because cars didn’t exist).

Car manufacturers borrowed coatings from the furniture industry. This would include shellac, varnish and lacquer paints. Early cars used a lot of wood, so these coatings prevented the wood from rotting and the steel from rusting. As the car manufacturing industry grew, paint companies introduced paints specifically for the needs of auto manufacturing assembly lines (high production output) and for the specific

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needs of vehicles themselves. This included characteristics to both protect the surface from deterioration and provide a beautiful finish.

- **Basecoat/Clearcoat Paint Technology**

Most cars manufactured from the 1990s though today have what’s called a basecoat/clearcoat paint system. The top coat is a clear layer of paint which provides gloss and durability to the basecoat layer, which is the pigmented (colored) layer of paint.

- **Not A Miracle Coating**

Some people think the clear layer is some kind of miracle coating that doesn't need to be routinely polished or waxed. That’s simply not true. The top clear layer of paint is just that: it’s paint with no pigment, but it’s still paint.

- **Not An Invisible Force Field**

The clear layer of paint is not an invisible force field that repels anything that comes near it. Clearcoat paint still needs to be maintained just like old fashioned single stage paint; it must be washed, clayed, polished and protected on a regular schedule to maintain a showroom-new appearance.

- **Paint Is Thin**

The factory paint on new cars, trucks and SUVs is thin. How thin? Generally speaking, the top coat layer, the layer you can polish and wax, averages around 2 mils thick. If you like to measure using microns, this would be 50.8 microns. Let me help you to understand just how thin this is by using a simple Post-it Note.

In the picture above, I'm measuring a test shim that comes with the Defelsko PosiTest DFT Coating Thickness Gauge to ensure accuracy. The tool is ready to use out of the box and does not need to be calibrated. If you want to calibrate it just to make sure, it's very simple: simultaneously click the two side buttons three times and it will automatically zero out.

After you do this recalibration, you'll want to test the measuring accuracy. You do this using an object with a known measurement, like the included test shims.

There are a lot of paint thickness gauges on the market and they range greatly in price. But like any quality tool, you get what you pay for. The Defelsko PosiTest is called a 3% gauge, which means it’s very accurate. Most gauges are 5% gauges and while the difference between 3% and 5% may seem minimal, when you're working on a coating that's already thin to start with, accuracy is of the utmost importance.

What you see, (pictured right) is a reading of 0.0 mils after I recalibrated the gauge. After recalibrating it, I measured a test shim that measures 2.01 mils from the factory. The 1 in the 2.01 stands for one ten thousandth of a millimeter. This test gauge, like most test gauges, doesn’t read to the hundredth thousandth of a millimeter measurement. When measuring the thickness of paint, accuracy to the one ten thousandth of a millimeter is not as important.

Here I’m measuring a standard Post-it Note. The reason I’m measuring a Post-it Note is because most of you reading this will have access to one. I took 5-6 measurements and the average was 3.0 mils.

Keep in mind that the average clearcoat is approximately 2.0 mils. I’m talking about just the clear layer, not the color coat, or primer or e-coat, etc. The clear layer is the part you can work on and the coating you need to take care of in order to maintain the finish over the service life of the car.

The next time you have a Post-it Note, feel it between your fingers and
Understand that the thickness is thicker than the average clear layer of paint on a modern car, truck or SUV. In other words, paint is thin!

With this in mind, there's not a lot of room to make mistakes. Hopefully, understanding how thin your car's paint is will drive home the importance of obtaining knowledge before attempting to polish or correct the paint. Understanding how thin your car's clearcoat finish is drives home the points made in this article:

- **Use the least aggressive product to get the job done**

**Paint Is Hard**

Compared to paint systems from just a few decades ago, modern basecoat/clearcoat paints tend to be harder than traditional single stage paints. It's this hardness factor that makes paint more difficult to work on.

All my detailing classes start with a PowerPoint presentation in which we go over the principals of machine polishing paint. This way, students get head knowledge before moving onto hands-on training. You would never go to a heart surgeon who has never been to medical school, would you? In the same way, before you go out and start working on your car's hard and precious thin paint, it's a good idea to learn a little bit about the material itself.

**Difficult To Work By Hand**

From the time of the Model T to the cars of the 1970s, it was easy to work by hand and get some pretty good results with no problems because the paint systems were softer and easier to polish.

All you have to do to see why machine polishing is so popular is to go out into your garage with a modern compound or polish and try to remove swirls by hand and leave a better looking finish than when you started. You'll find out really fast that working on paint by hand is more work than most people are prepared for. Besides being a lot of work, it's difficult to get good results by hand as you can't duplicate the power or the action of an electric polisher. It is easy to get show car results by machine with a little bit of head knowledge on what I call the three Ps. That is, you need to know a little bit about paint, (the finish you're working on), products, (these would include paint care products like compounds, polishes, waxes), and process (that's the actual manner or method in which you use your hands or polishers to apply the products to the paint).

Polishing paint by hand is frustrating and you'll quickly discover that as soon as you get started. The next step in the natural progression of car care as a hobby or profession is to correct, polish and wax your vehicle using an electric polisher.

**The Practical Differences Between Single Stage Paints And Clearcoat Paints**

I've worked on thousands of cars with single stage paint and have conducted many extreme makeovers in which the project car had single stage paint. The opportunity to work on cars with single stage paint is becoming rarer as all modern vehicles feature a clearcoat paint system. I'll outline some of the practical differences between singles

Early Mustangs had single stage paint while modern Mustangs have a basecoat/clearcoat paint system.

Clearcoat paints were introduced to production cars in the USA starting in the early 1980s. Since that time, technology has continually improved to create automotive paint systems that will last a long time and provide a beautiful finish with great gloss and clarity.

The oldest factory clearcoat finish I've ever worked on was an all original 1980 Corvette when I was the guest speaker for the 2007 National Corvette Restoration Society at their National Convention in Boston, Massachusetts. I gave a presentation on machine polishing paint at their national convention. Afterwards, the owner of an all original 1980 Corvette (the owner purchased this Corvette new and has never had the car repainted), asked me to show him how to remove swirls. Since the owner had not yet progressed to machine polishing, I first demonstrated how to remove swirls by hand. Afterwards, I demonstrated how to remove swirls using the Porter Cable DA Polisher.
Car Paint Overview

The clearcoat used on this 1980 Corvette was soft and it was easy to remove the swirls and scratches by hand or machine. Anyone with detailing experience that has worked on new Corvettes knows that the current paint technology is very hard. This just demonstrates that since the introduction of modern clearcoat paint systems in the early 1980s, paint technology is continually changing and improving. I’m sad to say it’s not getting thicker however.

The next oldest original factory basecoat/clearcoat finish I’ve buffed out is this 1982 Corvette, which is still in very good condition with no signs of clearcoat failure. Above you can see it in my driveway after I detailed it.

It was owned by April aka “The Vette Lady” and she gave me the Johnny Lightening version of her car.

The point is I’ve been teaching machine polishing classes since 1988 and have had the opportunity to work on paint systems from the 1920s all the way to a brand new 2012 Mercedes-Benz CLS63 AMG. I’ve seen the changes in paint technology first-hand as both a detailer and a detailing instructor. One of the primary changes I’ve seen take place is the clearcoat hardness factor.

The hardness factor is both a good thing and a bad thing. These new high-tech paint systems are incredibly durable as far as coatings goes, but they are also incredibly hard to work on by hand.

- **Clearcoat Failure**

Since clearcoat paint systems have become the standard for automotive finishes, we now have entire generations of people that have only owned cars with basecoat/clearcoat paint systems; they have never owned or worked on a car that has a single stage paint system.

Clearcoat paint systems will deteriorate over time when exposed to too much sun without proper care. This occurs throughout the entire matrix, or thickness, of the clear layer of paint, meaning you can’t fix it by abrading the surface. Abrading the surface simply removes damaged paint and uncovers more damaged paint. If you continue abrading the paint you will get down to the basecoat or pigmented layer of paint. The pigmented layer of paint is naturally dull and will not polish to a clear, high gloss. This deterioration of the clear layer is called clearcoat failure and the only solution is to repaint the affected panels or the entire car.

The cool thing about old single stage paint systems is they don’t suffer from clearcoat failure since there is no clear layer of paint. Single stage paint systems oxidize and oxidation is easy enough to fix that anyone can do it.

- **Swirls – The Number One Complaint**

Swirls are among the most common defects present in clearcoat finishes. Besides being ugly and unsightly, these scratches make the surface hazy and this dulls your view of the color coat under the clearcoat.

Swirls can be removed because they
The noticeable problem is the dullness and fading caused by oxidation. True oxidation is easy to remove, making restoring a show car shine easy.

If after reading all of the above you’re wondering,

If single stage paints tend to be more user-friendly to work on for the average person, why do car manufacturers use basecoat/clearcoat paint systems?

Good question!

The primary reason the Original Equipment Manufacturer (OEM) industry switched paint systems was due to new laws and regulations from the Environmental Protection Agency (EPA) and other governmental regulatory agencies.

The new basecoat/clearcoat paint systems emit less VOCs (Volatile Organic Compounds) into the air, making them safer for the environment. Another benefit is that modern finishes will tend to last longer over the service life of a car because clearcoat paint systems offer greater hardness and dramatically improved resin technology.

Paint Hardness Or Softness – Polishable & Polishability

Most people talk about paint being either hard or soft. Better words for describing the hardness of softness of paint are polishable and polishability

- **Polishable** - Capable of being polished
- **Polishability** - To the degree a surface or coating can be polished

Polishable, in the context that I use it, refers to how easy or difficult it is to remove below-surface defects from the paint.

Polishable is a range between:

- **Too Hard** – Extremely difficult to level paint in an effort to remove below-surface defects.
- **Too Soft** – So soft that just the act of wiping the paint with a clean, soft microfiber polishing towel can instill swirls and scratches.

The best paint systems are somewhere between these two extremes. This would be a paint system the average person can work on. By this I mean a paint system soft enough that defects can be removed but hard enough to resist scratching through normal maintenance procedures while still providing long service life.

Hard Paint Or Soft Paint?

When you go to work on your car in your garage, the best thing you can do is what we call a Test Spot. This is where you’ll test the products, pads, and procedures to see if they’ll remove the defects and restore a show car finish. This is called dialing-in your paint polishing process.

Dialing-in a process means starting out with the least aggressive products you have available. If your test spot reveals that your first choice for products are not working effectively enough or fast enough, you can always try again substituting a more aggressive product, pad or both.

Once you determine a combination of products that will remove the defects and restore a show car shine to your expectations, then all you have to do is duplicate this process over the rest of the car. Your test spot will prove your paint polishing process either works or it doesn’t.

If the result from your test spot works and looks great to your eyes then you can tackle the rest of the car without wasting your time using a product, pad and/or process that isn’t working. I started writing on the Internet about how to do a test spot back in 1994, that’s nineteen years ago. I believe it’s very important to learn how to do a test spot and to practice this the first time you work on any vehicle.

If your first test spot doesn’t work then you continue testing until you dial-in a pad, product and process that works. If you run into trouble, the best thing you can do is to join the AutogeekOnline.net
Car Paint Overview

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Car Paint Overview

Technique isn't exactly right, you won't get the best tools available but if your products and pads you're using. Technique is more important than specifically how to use a DA polisher. Polishing how to detail cars, and more people that are brand new to machine almost two decades of teaching I know the above to be true after and technique, then removing swirls and scratches. You'll know immediately whether your vehicle's paint is hard or soft after performing a test spot. Nothing beats first-hand experience. Your personal skill level will have a huge influence on your success or failure and can actually mislead you regarding polishability of the paint. For example, if you're new to machine polishing and are still honing your skills and technique, then removing swirls and scratches out of soft paint may seem difficult to you. Put someone with a lot of experience in the same garage with the same car and they may find the paint is soft and show you just how fast and easy it is to remove swirls and scratches.

I know the above to be true after almost two decades of teaching people that are brand new to machine polishing how to detail cars, and more specifically how to use a DA polisher. Technique is more important than the products and pads you're using. You can have the best products and the best tools available but if your technique isn't exactly right, you won't get the results that you're after.

In order to really know if the paint on any car is hard or soft, you must have as much experience as possible working on a wide variety of paint systems.

So get experience!
Go out into your garage and do some testing on your car's paint. Dial-in a process that works to your satisfaction and lock into your memory how the paint reacted. That way when you detail your car in the future, you'll know exactly what products and processes gave you great results.

Paint Systems

There are about a dozen major automotive paint manufacturers in the world that supply paint systems to both the OEM and the refinishing industry.

Paint Systems Vary
Different car manufacturers and body shops use different paint systems. These can vary greatly and because technology is always changing, even paint systems from a single paint manufacturer can vary greatly.

Every time you work on a car, you're working on a specific paint system. Because the chemistry between paint systems can be very different, polishing characteristics can vary greatly.

Even identical models from any particular car manufacturer can have paint that is completely different (harder or softer) from year to year. Try to avoid generalization in regards to paint hardness. Instead, test each car you work on and gain experience.

Paint Type Affects Paint Hardness

Clearcoats
The hardness of a clearcoat finish is determined primarily by the type of resin used to make the paint. Other factors include catalysts, hardeners, solvents and other additives as well as the drying or baking process used to cure the paint.

Single Stage
The hardness of single stage paint is determined primarily by the type of resin and other ingredients used to make the paint, as well as the type of pigment used to give the paint color. Different pigments can be soft or hard, altering the overall hardness of the finish.

How To Test For Single Stage OR Basecoat/Clearcoat Paint Systems

Chances are very good that if you're working on a car less than 10 years old, you're working on a basecoat/clearcoat finish. Even though the majority of cars manufactured since the mid-1980s come with a clearcoat finish, I still get asked how to check.

Here's a simple way to test the paint on your car to find out if it's a single stage paint or a basecoat/clearcoat finish.

It's easy to see...
With a true single stage paint system, it's very apparent because you'll easily see the colored paint residue building up on the face of your buffing pads.

To test for a single stage paint system, try to find a white colored polish (if you're working on any kind of pigmented or colored paint), and a light or white colored applicator pad. Pour some polish onto a clean applicator pad.

To test for a single stage paint system, try to find a white colored polish (if you're working on any kind of pigmented or colored paint), and a light or white colored applicator pad. Pour some polish onto a clean applicator pad.
Use an ample amount of polish for plenty of lubrication as you’re going to want to push firmly if no visible oxidation is present (as was the case on this 1956 Pontiac Starchief). Then using firm pressure, apply the polish in an overlapping circular motion to a small section of paint.

**Confirmed Single Stage Paint**

As you can see, red pigment is coming off the car and onto the applicator pad, so we’re working on red single stage paint. If the pad remained yellow with some white polish on it, this would be an indicator of a basecoat/clearcoat paint system.

**Tinted Clears**

Some car manufacturers use a tinted clear for the top coat of paint over the clearcoat finish. The car has a basecoat/clearcoat finish, but the very last layer of clear paint has color added for a special effect. This can be a little misleading and make someone think they’re working on a single stage paint when in fact they’re not. The biggest visual indicator of a tinted clear is when you test as shown above. If you’re machine polishing the paint, you will only see a little color coming off the surface, not a lot.

My friend Rene’s 2001 Camaro is painted Red Jewel Tint and you can see a “little” red coming off on a Cyan Hydro-Tech Pad as we were buffing it out for a how-to video with Matt Steel and me.

**How To Test For Single Stage White Paint**

Testing white paint can be just a little trickier, because so many abrasive polishes are white in color. This makes it hard to see if the test results are white paint coming off, or just the color of the polish.

**Tips for testing white paint**

If you’re testing white paint, try to use a colored polish with a dark colored cloth (so you can confirm that you’re removing white paint and not just seeing the color of the polish or the color of the cloth). Most people have old t-shirts that are blue, red or black that can be cut up for testing purposes.

Pinnacle Advanced Finishing Polish not only works fantastic as a finishing polish, but it’s also gray in color.

Interestingly, it’s possible to find white single stage paints on newer vehicles manufactured in the last twenty years. Due to the ingredients used in white single stage paint, it is very hard and durable and will hold up to exposure to the elements as well as normal wear and tear without a clear layer of paint over it. It normally costs less to spray a car using a single stage paint system rather than a basecoat/clearcoat system in a production environment due to reduced costs in labor, time and materials.

**Mismatched Panels**

I buffed out a 1956 Rolls Royce a few years ago and it had been repainted using a basecoat/clearcoat paint system. I tested on the hood and confirmed it was a basecoat/clearcoat paint system. Like I recommend in this how-to book, I started buffing on the highest point of the car and then moved downward and tackled the hood. Next up was the trunk lid; I discovered by the volume of white paint on the face of my buffing pad that the entire car was clearcoated except the trunk lid, which had single stage paint.

So it’s completely possible to find cars like this that have two types of paint. It may all look the same from a distance but as soon as you polish each panel, you might find that it has two paint systems.

**Lesson learned**

The lesson here is if you’re in doubt, simply perform the aforementioned test and find out for sure.
Step-by-step procedures with hundreds of easy to follow pictures and illustrations.

Written from 36 years of real-world, hands-on experience, Mike covers how to use all the popular tools including DA polishers like the Porter Cable 7424XP, Meguiar’s G110v2 and Griot’s Garage 6” DA Polisher. He also covers the Cyclo Orbital Polisher, Flex 3401 Forced Rotation Dual Action Polisher and rotary buffers like the Flex PE14, DeWALT 849X and the Makita 9227c.

Mike Phillips shares tons of tips and techniques that will help you take a diamond in the rough and turn it into a glistening gemstone. With Mike’s book your next detailing project will be easier and less time consuming plus you’ll get professional results the first time and every time. Knowledge is power and whether you’re a weekend detailer, part or full-time professional detailer or even work in a body shop, this book is jam-packed with information that will take your abilities to an even higher level.

Modern clear coats are thin and easily scratched. It takes the right pads, products, tools and most important, knowledge of how to use these things to correctly and safely work on modern clear coat paints by machine.

Mike’s been detailing cars and teaching others how to detail cars all his life and his passion for the craft shines through on each page through his clear and concise writing style. Plus you can access Mike and ask him any questions you have for your specific detailing projects at the AutogeekOnline.net discussion forum.

In the Complete Guide To A Show Car Shine, Mike Phillips will assist you through every step of the polishing process. Perfecting your technique, with help from the information contained inside this how-to book and reinforced by interaction on the AutogeekOnline.net discussion forum will ensure you achieve professional results the first time and every time. The information in this book caters to everyone from the at-home enthusiast to the full-time pro detailer.