

Electronic Paint-Thickness Gauges

What They Are, and Why You Need Them

By Kevin Farrell

Paint thickness gauges have come a long way in the past few years. Gone are the pen-like devices that a user would lay against the paint surface to get a reading. While helpful, these gauges involved a bit of guesswork. Today's paint gauges are small, electronic, and extremely accurate. Some can measure in a couple of different ways on different substrates.

WHAT DO THE NUMBERS MEAN?

Before we talk about any individual paint gauge, we must understand what the numbers

mean and what the device is actually measuring. Without understanding the numbers, the gauge itself — no matter how fancy or expensive — will not really help.

The paint gauge will measure the *total* film thickness on the surface. That means it's measuring the E-coat, primer surfacer, base coat, and the clear coat combined. As detailers, we only buff the clear coat, and are only interested in the clear-coat thickness. Unfortunately, the paint-thickness gauge will not read the clear coat only. In order to arrive at the clear-coat thickness, we must know a couple of

things first. We must know what the average film thickness of the entire paint surface is on most vehicles and the average clear-coat thickness.

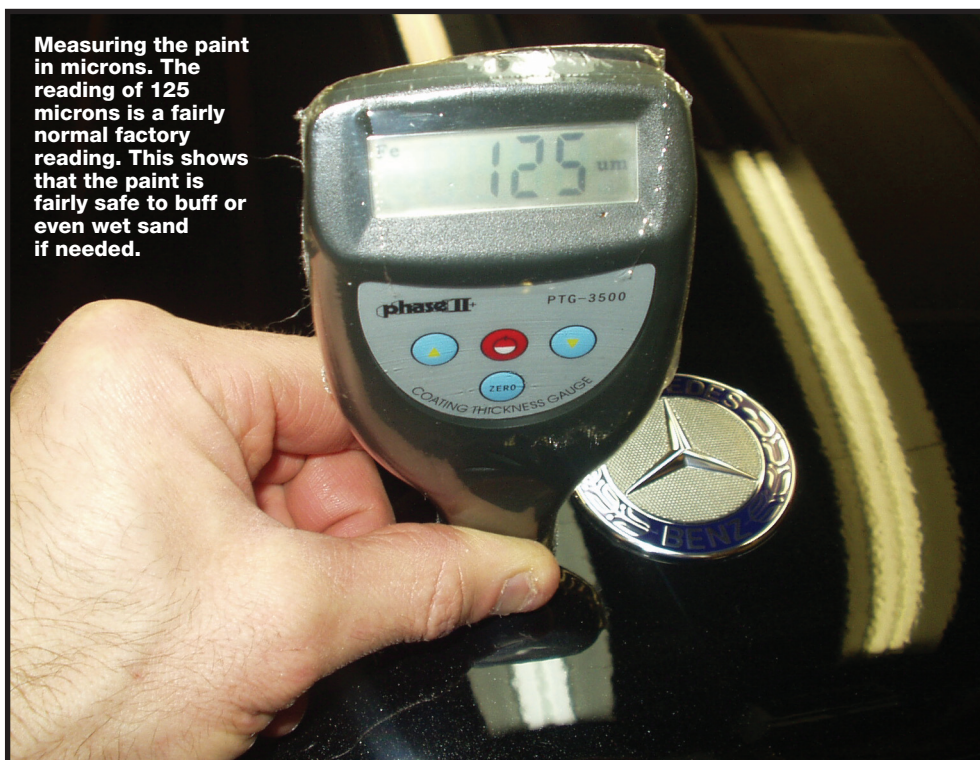
Film thickness can be measured in two ways. The first and more common and standard measurement is called a mil. A mil equals 1/1000 of an inch. A typical factory paint job will measure between 4.0 mils and 6.0 mils. The clear coat will generally measure between 1.5 and 2.2 mils thick.

The alternative measurement is called a micron. A micron is a metric unit that equals one millionth of a meter, or 1/1000 of a millimeter. A micron is much smaller than a mil. There are 25.4 millimeters in an inch and a micron is 1/1000 of a millimeter.

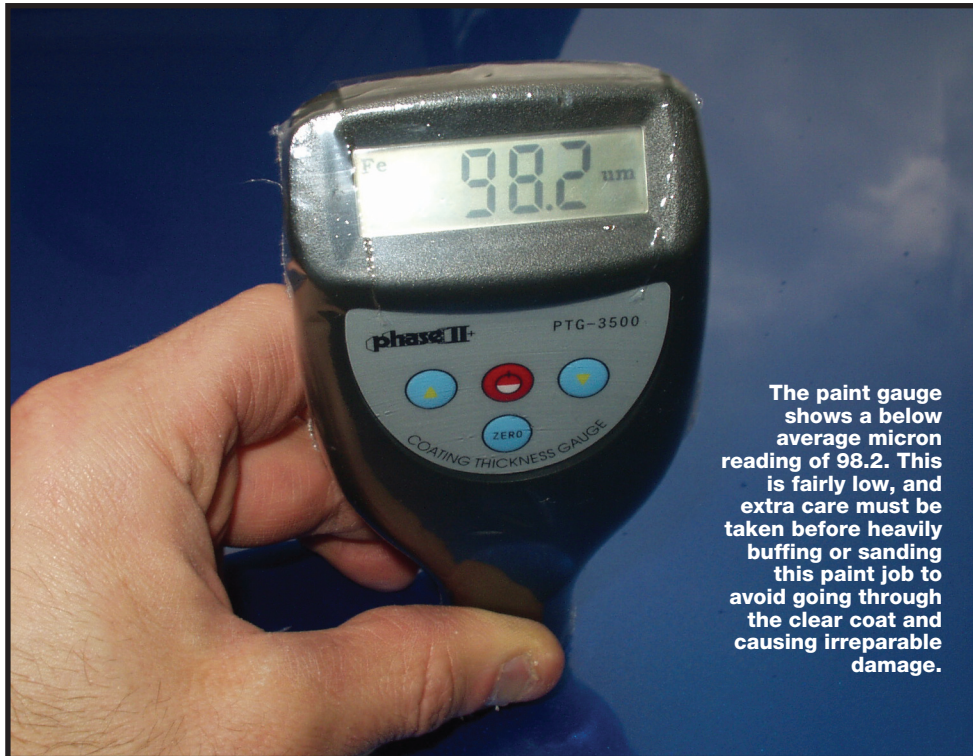
I use the micron measurement because it's so much smaller. I always want to know where I am at all times in terms of paint removal. If I need to be aggressive on a paint surface — such as during wet sanding — micron readings will constantly change as I sand, keeping me constantly informed of my progress. A mil reading will not change that rapidly during the process.

IN REAL TERMS

To illustrate how thick (or actually thin) a paint surface is, consider a cigarette wrapper — the cellophane wrapper that



Measuring the paint in microns. The reading of 125 microns is a fairly normal factory reading. This shows that the paint is fairly safe to buff or even wet sand if needed.



The paint gauge shows a below average micron reading of 98.2. This is fairly low, and extra care must be taken before heavily buffing or sanding this paint job to avoid going through the clear coat and causing irreparable damage.

HOW FAR CAN WE GO?

As you will see with the cigarette wrapper, you can't take all of it away (even though it would seem rather easy to do). But how much is acceptable? Can we take 50 percent off, 60 percent, 70 percent? You need to know how much removal is safe long before you get involved with an aggressive procedure such as wet sanding. The percentages just mentioned are way too high, so let's see what can be done.

Most car manufacturers will only allow roughly 25 percent of the total clear-coat thickness removed without long-term durability problems becoming an issue. That means that if you started off with 50 microns of clear coat, you would only be able to remove 25 percent or 12.5 microns without voiding the paint warranty and possibly having problems in that repaired area down the road. Again, in a buffing situation you will probably never even come close. However, in a wet sanding situation, you can remove 12.5 microns very quickly.

SANDING PAINT PROBLEMS

If the paint surface needs wet sanding to correct a problem, it probably has a nasty issue like a deep scratch, or etching, or some kind of blemish "below" and "into" the clear coat. You know normal buffing and even compounding will not come close to getting it out or improving the problem, so wet sanding needs to be employed.

Without a paint gauge informing you of how much clear coat you are removing, you are walking a tightrope. Removing too much clear coat and possibly sanding through into the base coat or primer can happen extremely

encloses the entire package.

We have all seen them and some people will have a pack of cigarettes with them, so it's easy to demonstrate. In my classes, I explain all these numbers, but it never hits home until I show and measure the cellophane wrapper. One layer of the wrapper will generally measure about 24 to 27 microns. Two layers combined will generally measure about 50 microns. This is the *entire* thickness of the clear coat on most of today's vehicles. That's it! We obviously can't remove all of the clear coat in a paint-correction procedure or we would be into the base coat or worse. At that point the entire panel would need total refinishing.

DON'T BE SCARED ... YET

Fortunately, most of the "normal" buffing and polishing that we do is not that aggressive. A simple polish or wax job will not really remove any film thickness. You are simply bur-nishing and polishing the clear

coat to bring out its beauty. Even in light correction or compounding situations, you are only removing maybe 1 or 2 microns. In heavy compound procedures, maybe 3 microns of film will be removed. Since a car's finish is probably not going to be corrected like that every time, the chances of buffing all the paint off the car (unless mistakes are made) are relatively slim.

So, why all the talk about paint-thickness gauges? Do detailers need these tools? Why spend the money?

Let's look at safety first — the safety of the clear coat! Of course incorrect buffing techniques and over-aggressive products and pads will take clear coat off rather quickly. That is not really why we need a tool like this. We need a paint-thickness gauge for wet sanding. If you are going to get into heavy correction such as wet sanding, you will be *quickly* removing clear coat, and will need to keep track of how much is being removed, and will need to be accurate.

quickly. You need to know where you are at all times. Two variables need to be established before you start out: first, how much clear coat is on the vehicle and second, how much clear coat can be removed.

However, without the paint gauge, these numbers mean nothing. This is why many mistakes are made during

wet sanding and also why detailers are deathly afraid to wet sand because of what can happen.

TYPICAL REPAIR PROCEDURE

Deep scratches that give a car a poor look are the problems you will most often encounter. Customers will

request these scratches be taken care of. A deep scratch is unsightly and could be costly to the customer. He knows that if he goes to the body shop, they will be repainting at least the problem panel. The correct way for a body shop to repair and refinish a clear-coated paint surface is to sand out the problem area, mist in the base coat for a color match, and re-clear the entire panel. If the scratch is near an adjacent panel, then the adjacent panel may need to be refinished for color matching as well. Repairs like this can run hundreds of dollars in a body shop.

So wet sanding the scratch is a win-win situation for both parties. The detailer can make a good amount of money in a short amount of time, and the customer can get a scratch repaired well, save money, and keep the car out of the body shop.

But how do we use the paint gauge? You need the paint gauge to get baseline readings. If you sand without the gauge, you could be in big trouble very quickly. However, the gauge readings will always be alerting you how far you can go and when you need to stop sanding. I generally take a few readings across the scratch before I start to sand it.

REAL LIFE SCRATCH REPAIRS

I mentioned that most car manufacturers want no more than 25 percent of the clear coat removed. This equates to about 10 to 13 microns. While this is considerably more than you would ever remove in buffing, it's really not all that much in trying to repair a deep scratch by wet sanding. Deep scratches need to be "shaved" down, almost like what a Zamboni machine does to an ice surface. This is the only way to repair clear coat. With a harsh scratch, the penetration may be very deep. Remember the cigarette wrapper and how easy it would be to slice it or cut it? This is the same way the paint is generally scratched. The penetration is often deeper than 25 percent into the clear coat. I sometimes have to sand deeper than what a car manufacturer would recommend to repair a scratch

to a customer's satisfaction. This means I usually have to take off more than the 10 to 13 microns of clear coat. I will sometimes go as deep as 20 to 23 microns.

Without a paint-thickness gauge, and without being able to be so precise, I would not have the confidence to do this. I also would not be able to sufficiently repair the scratch. I track the clear coat removal from the beginning by keeping track of the paint readings. It is important to measure the paint thickness before I begin.

For example, before I begin I may get a reading of 125 microns of total film thickness. This obviously is the total measurement of all the layers of the paint. However, we know that the maximum amount of clear coat will be no more than 50 microns. So, in a real life repair situation, I determine that I will remove no more than 20 to 23 microns or about 40 percent of the clear coat. You need the customer to be satisfied with the repair, so keep in mind that in certain circumstances 10 to 13 microns or 25 percent removed is sometimes wishful thinking

The original measurement is 125 microns, and I am willing to remove no more than 23 microns of clear coat, leaving me with a "final" reading of no less than 102 microns. This is how we can use the gauge effectively and keep track of the progress throughout the entire repair.

The numbers will tell you when to move on. If you start with an aggressive grade of paper like 1000 or 1200 grit, you will not be able to remove the entire 20 microns with that piece of paper. You will need to back down to 2000 paper to finish it off. At some point the numbers, *not* the repair itself will tell you that you need to stop sanding. Sanding through the clear coat can happen very quickly, so knowing where you stand at all times is extremely important.

TYPES OF GAUGES

Again, if you are only buffing vehicles, having a paint thickness gauge is not critical. However, in wet sanding, it really is mandatory. One catastrophic

mistake made in sanding without a gauge, and the resulting paint repair cost, would have paid for the gauge. So, don't think it's too expensive, or that you do not need one and will just go by "feel." You can't "feel" when you are about to sand through the clear coat.

There are many types of gauges out

there. I have one of the original electronic gauges that were introduced about 10 years ago. It's a little bigger than the newer ones, has a wire and a probe on the end, and was very expensive. Ten years ago it cost over \$1,000. But, as with any piece of electronic equipment, the gauges are getting smaller,

DETAILING

better, and less expensive — and there are a few choices.

Most gauges will fit in the palm of your hand and in your pocket, but they are not all created equal. The less expensive ones will only measure in mils. This is okay if you choose to measure that way, but some are only accurate to one half of

one mil, which is not good enough for a detailer. These are fine for car auction guys looking for very large paint readings, which would signify body and paint work had been done and where extreme accuracy is not all that important. If you purchase a mil-only gauge, it needs to be accurate to one tenth of one mil for

use in wet sanding. For me, this is still not a small enough unit of measure. I need the gauge to constantly change readings as I sand. Sometimes, when measuring in mils, you can pass over the repair area numerous times without seeing a reading change. This is no good; I chose not to use a paint gauge that will only measure in mils. The mils-only gauges will be cheaper and better than nothing, but there are better options out there.

I use a paint gauge that measures in both mils and microns. As I said, a micron is a much smaller unit of measure and I need to know where I am in material removal at all times, so this is the tool for me. However, a tool that will measure in both microns and mils is a bit more expensive. The better gauges will also measure over both steel and aluminum. The cheaper gauges will only measure over steel. There are still other gauges that will measure over rubber and composite materials, but I generally find these are still a bit cost prohibitive.

MONEY MAKER

The bottom line is that a paint-thickness gauge will help you in wet sanding and make you more money. It also shows a customer that you are a true professional. You will be able to determine if paint work has been done on a vehicle by seeing the varying readings from one panel to the next. Customers will sometimes be amazed that you were able to discover this. If you want to do more wet sanding, an electronic paint-thickness gauge is a tool that you must consider investing in. It will pay for itself and make you money in no time. 📧

Kevin Farrell owns and operates Kleen Car (www.kleencarauto.com), a full-service auto-detailing business located in New Milford, NJ. Kevin is also an instructor for a detailing program he developed for, and in conjunction with, BMW of North America. His background includes auto dealership experience and training through DuPont, General Motors, and I-Car.