

*Joe's Place, by  
Joe Richardson*

## An Introduction to Paint, Painting and Equipment - Part I

What is the first thing you notice when you see an old car or truck for the first time? If you are like most folks, the answer would likely be the paint. Not just the color but the overall condition of the paint finish. Does it have a beautiful, high-gloss shine or a pleasing, soft 'patina' that only the hands of time and exposure to sun and weather can produce? Of course, it is all subjective as we would fully expect a recently completed high-standards restoration to have a flawless, mirror-like appearance. Conversely, a car or truck that is 40, 50, 60 years or even older and is still wearing its factory applied finish is greatly admired and highly prized for its beauty. It may be worn through to the primer from many years of being lovingly polished or even still displaying some runs or imperfections in the finish that it acquired at the hands of that production line painter so many years before. In fact, at many show events, an unrestored car or truck wearing its original paint will often command much more attention from admirers than a perfectly restored

example. What is all the more remarkable when we admire these old, preserved finishes is the fact that those paints weren't really all that great compared with what is available today. This is not to say that those paints were of inferior quality at the time. The manufacturers generally used the best materials that were available, but the technology of paint was not up to the levels that we see today. It is also important to consider that, as the decades progressed into the 1950s & 1960s, the time required to apply paint increasingly became a more critical factor in the assembly of a car, and with the exception of some of the more expensive luxury cars, a few flaws such as runs, curtains, texture and overspray were considered to be normal and acceptable.

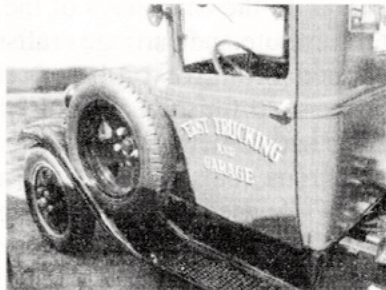
In the early days of the automobile, master furniture and carriage craftsmen painstakingly applied primitive oil-based enamel or varnish primer and finish coatings by brush! These finishes had somewhat poor opacity which required numerous coats for coverage and took weeks to dry. They used mainly ink pigments which tended to be darker colors. These coatings did not withstand weather and sunlight very well and tended to become dry and brittle before long. Since those paint jobs didn't last all that long, it was common for an owner to get some paint at a



hardware store, auto parts store like Western Auto Supply, or mail order catalogs like Montgomery Ward. A good horse hair or hog bristle brush and the car would get an at-home re-paint. With the idea of preserving the car, some folks even did it every year or so. I can clearly recall my grandfather re-painting his 1957 International A-100 pickup with a gallon of bright red enamel and a brush a time or two in the early 1960s, and telling me about painting his Model T a maroon color sometime in the 1930s...by brush, of course.

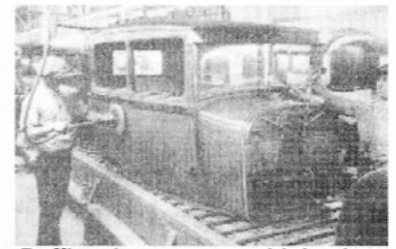


A number of manufacturers including Ford with some of the Model Ts, used a combination of brushing, dipping and even pouring to fully cover and protect the various parts of a car or truck. The 1920s saw the beginning of the introduction of spray equipment and nitrocellulose lacquers and primers which were developed together to speed application and dry time to a week or less, and which cut down dramatically the time required to paint a car. The cars still required labor intensive and time consuming hand rubbing to achieve a shine. This was not especially true in the production of early trucks. Most 1920s to 1960s trucks were considered to be no-frills pieces of working equipment built to be used and abused, not to be fussed over and pampered. A great example of this is a 1931 Model AA Ford dump truck owned and meticulously restored by Keith Ernst of Pennsylvania with great authenticity down to its satin, non-shiny, sprayed appearance which replicates the factory non-rubbed red lacquer fin-



*Although restored, the paint selected was a low-gloss finish which replicates non-buffed lacquer.*

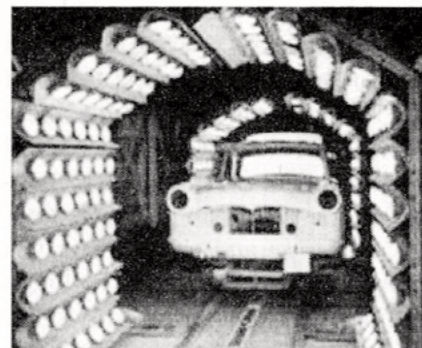
ish. Rubbing-out was an extra-cost Ford AA truck option that, according to a Ford service letter of June 1931, cost \$15 extra for the cab, cowl and hood while a pickup bed cost an extra \$7. In addition to reduced



*Buffing lacquer to a high gloss cost extra because of the hand-labor involved.*

dry times, nitrocellulose lacquers were more durable and allowed the use of brighter colored, although more expensive, pigments. Interestingly, although with constant improvements, the organic-based nitrocellulose lacquer was used by some manufacturers well into the later 1950s when it was replaced with the much more durable acrylic lacquers and primers which were synthetics.

Appearing shortly after nitrocellulose, lacquers were enamels or more specifically alkyd enamels and primers. These were generally a thicker material that required fewer coats than lacquers and usually were baked onto a partially assembled vehicle body by passing it through a large oven. This baking hardened the enamel and



‘flowed’ it out for a great shine and greater durability. Many more brilliant colors were available with the enamels

which became possible due to the use of organic pigments which were widely popular with some of the more flamboyant and attractive two and tri-toned 1950s’ combinations. Eventually, the alkyd enamels, too, were replaced in the early 1960s by the new and superior acrylic enamels and primers favored by several manufacturers.

Of course, as we all know, any paint finish has a limited lifespan, and with the harsh conditions it is exposed to from the sun, air-borne acid, pollution, dust, etc., it is remarkable that it can last



as long as it does. Of course taking adequate care will extend and preserve the paint's life and finish. With time and exposure, even the best lacquers will lose their luster, shrink and crack while enamels will fade out and become dull and chalky. These shortcomings, and a move toward greater environmental friendliness led to the eventual changeover by most car and truck manufacturers to new base-clear, water-borne systems in the late 1970s to early 1990s. However this period was not without serious issues as many of us will recall the peeling clear coats on many vehicles from that era, resulting in scores of cars and trucks being repainted through factory warranty claims. Fortunately, the major paint manufacturers quickly resolved those problems, and the newer finishes are the most durable in history and require virtually no special care to survive.

What does all this mean to the owner of a vintage car or truck today who is planning a paint job in the near future? To begin with, lacquer, while still available, is very difficult to buy today and is actually illegal for sale in certain areas of



the country, especially in California. This is because of state and federally mandated VOC laws. VOCs are Volatile Organic Compounds which are chemicals found in paints and solvents that are considered harmful to the environment and to living creatures. In addition, with the limited life of a lacquer or enamel

paint job and the superiority of some of the higher quality modern paints, unless you are striving for 100% authenticity on your restoration, it would probably be to your advantage to choose one of the modern alternatives to lacquer or enamel. With today's modern paints, there are two major choices suitable for use on a vintage vehicle; Single Stage Urethanes, also known as Single Stage Urethane Enamels, and Two-Stage Urethanes. These urethanes are extremely durable, chip and chemical resistant and they retain their gloss without dulling or fading. The single stage products are only similar to the old air dry lacquers and enamels in that they are one coating with the color, gloss and UV protection

all in one material, and do not require a clear top-coat. That is, the color is all the way through the paint. They are all 2K formulations which means that an activator must be added per the manufacturer's instructions that will chemically cure and harden the paint. They can be color sanded and rubbed out to provide that hard to describe yet pleasing, softer 'polished bowling ball' look of a genuine lacquer paint job that looks so right on the rounded contours of a restored older car or truck. The two-stage products also known as



'base-clear' are also 2K formulations requiring an activator but consist of a thin, no gloss color-film 'base' which is sprayed on and then topcoated with multiple coats of urethane clear. The clear is then responsible for all the UV resistance, gloss and protection of the paint coating. While the two stage base clears do provide an attractive, deep, high gloss finish on more modern vehicles, and the clear can also be color sanded and buffed to a glass-like surface, they often can be too glossy and may look out of place on an older car.

Another two-stage, base clear system is the 'water-based' coatings that are rapidly growing in popularity especially in today's VOC sensitive world. It should be noted however that it is only the color base coat that is water based. At this time, there are no known successful water-based clear coats. They are still solvent based formulations, although the paint manufacturers are working hard to introduce a successful, water based clear product.

To clarify some of the terminology used in describing the many types of automobile and truck paints, the following is a glossary of terms that apply:

**Primer:** Primer is the necessary base for any paint job. It binds the paint to the metal, wood, fiberglass or previously painted substrate and provides a smooth and even base for the final finish. There are many different primers each with a different specific purpose depending on



the type of finish being used over it and the substrate it is covering. It must be carefully chosen depending on the application. Always used regardless of finish.

**Nitrocellulose Lacquer:** Nitrocellulose lacquer is based on wood or cotton fiber dissolved by acids to create a resin combined with color pigment and solvents. When applied in multiple coats and sanded out between them, after a lot of hard work, it is well known for its deep and beautiful finish. Very rarely used today except on 100% authentic restorations.

**Acrylic Lacquer:** Acrylic lacquer is made of synthetic resins, pigment and solvents. Like Nitrocellulose Lacquer, it also requires a lot of hard work but when done properly, is beautiful. Very rarely used today except on 100% authentic restorations.

**Enamel:** Enamels or 'oil-based enamels' are based in linseed or other drying oils along with pigments and mineral spirits or turpentine as a solvent. They tend to be thicker and harder than lacquer especially when baked but do not respond well to final sanding and rubbing out. Rarely used today.

**Alkyd Enamel:** Alkyd enamels use a synthetic resin base, pigment and mineral spirit solvents. Like oil enamels, they tougher than lacquer but are generally not sanded and rubbed out. Rarely used today.

**Acrylic Enamels:** Acrylic enamels are made with acrylic resin and have alcohol solvents. They are often used with an activator for dramatically increased durability. Still used today. Very dangerous without proper breathing apparatus.

**Single Stage Urethanes:** Also sometimes referred to as 'urethane enamels', urethanes are modern two-component or '2K' formulations requiring an activator. The activator is usually mixed in just before use in a 4:1 or 3:1 ratio of paint to activator and has a window of 1 to several hours before hardening completely. They do not air dry but chemically harden with the activa-

tor. They provide a full gloss, do not require a clear coat, can be sanded and rubbed out like lacquer and are extremely durable, chip and UV resistant. Used in many re-paints today as well as fleet truck and aircraft use. Very dangerous without proper breathing apparatus.

**Two Stage Urethanes:** Also two-component or '2K' formulations like the Single Stage coatings, they also require mixing with an activator. The base coat or 1st stage is strictly the color coat and has no gloss or protective properties and must be topcoated with the Urethane Clear Coat or 2nd stage which provides a high gloss, can be sanded and rubbed out like lacquer and is extremely durable, chip and UV resistant. Used in some factory paint finishes and most repaints today. Very dangerous without proper breathing apparatus.

**Water-Based/Waterborne:** These are also 2-stage systems but have water-based, base color coats that have a very low toxicity level or 'Low VOC's. The base color coats have no gloss and no protective qualities. They must be topcoated with a Urethane Clear Coat or 2nd stage which provides a high gloss. They can be sanded and rubbed out like lacquer and are extremely durable, chip and UV resistant. Used in most factory finishes and many repaints today, this appears to be the direction of future automotive painting. These systems require a drastically different application technique.

**VOCs:** This is a popular acronym for Volatile Organic Compounds which are the powerful solvents derived from petroleum sources. Found in most solvent based finishes, they are considered to be hazardous to health and to the environment.

This month, I have provided only a brief introduction to the subject of today's paint systems. There is a great deal of additional information to be presented on modern paint formulations, primer and sealer systems, painting supplies, spray guns, equipment and paint application techniques, so stay tuned for additional continuing articles on this subject in the next several issues of SK.

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