

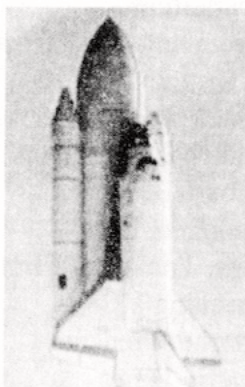


BY LOREN KNUITSEN

Making Paint Stay On

Way back before the first Space Shuttle ever flew, our aerospace electronics was contracted to manufacture some parts for the Space Shuttle. Of course, like many other companies, we had never done work for that particular space project, so we had to master many new tasks to complete the project. Painting was one of those new tasks.

NASA approached us with a request to supply strobe marker lights for the debris that fell back to earth after each launch. That debris included the booster rockets, their nose cones, (that were detached to free up the parachutes used for landing in the ocean), and the cone frustum, the part between the rocket body and the cone itself that housed the parachutes and the recovery equipment. These parts were large and could be a hazard to navigation, so lights had to be on all the parts that came down.



Way back before the first Space Shuttle ever flew. Shown above is the first, STS-1 in 1981.

The lights we designed around NASA's requirements were to be mounted on the outside of the rockets for re-entry, and that required them to be painted. This is where this story begins.

Because of weight requirements, the cases for the lights were to be made of alu-

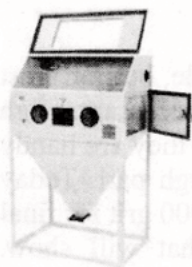
minum, and the light dome itself was a special grade of Plexiglas® brand acrylic plastic. The booster rockets never achieve the escape velocity of about 25,000 MPH, but they do get to near 17,000 MPH, and that is fast enough to remove most paint. NASA specified the manufacturer of the paint and the exact type, which was the same as all the other paint on the shuttle.

As a young man I remembered that it was almost impossible to remove the paint from a jelly jar lid or painted food can. Whenever I tried to make paint stick it just wasn't the same. If I painted something and let it dry, I could almost remove the paint with my fingernails. Something was different, and NASA helped me to find out just what that difference was. In fact, they insisted on it.

We studied pages of instructions on the preparation and application of the paint. Included in those pages were minute details of the how and when to use this paint. Of course no one restoring old cars would go through all the steps that NASA required, but the basics were all there, and the results proved them to be correct. For those of us who do some or all of our own paint work, the essentials described here will yield very satisfactory results.

To begin let me say that the materials to be painted will require some variation in chemistry. To paint aluminum, the pre-treatment of the metal is similar, but somewhat different, than when it is steel that is to be painted. There are products available for each application in most auto supply stores. For steel the treatment is either iron or zinc phosphate. For aluminum it is a chromate conversion. Pot metal is basically a zinc alloy, and that requires an acid treatment. If a zinc prep material is not readily available, a short soak in vinegar will do a fair job. Both the phosphate and chromate systems are water based chemicals that are easily handled with normal caution. For these to work their magic the first step is to thoroughly clean the base metal. Wiping with a thinner soaked rag will never do a good job. One of the best cleaning solvents available is water, and when a bit of a good industrial soap is added it will clean any

metal. This cleaning does not remove rust, so that must be done prior to any thought of paint. Rust can be removed either by chemical cleaning or abrasive blasting. I generally use glass beads for blasting, but for heavy rust there are other mediums available that are faster but leave



a rougher finish.

Extreme care must be used

with blasting as thin metal parts can be warped and wrinkled or even perforated by excessive blasting. Following any kind of abrasive blasting it is necessary to clean the blasted parts. They

may appear to be clean, but a good deal of contamination will be left behind, and this must be removed.

An example of a fairly good cleaner is liquid dish soap. Some cleaners are caustic based, and they are fine for steel, but such an alkaline cleaner will dissolve aluminum which requires an acid based cleaner. Scrubbing with a Scotchbrite pad is helpful also, but be sure to wear rubber gloves when doing this. The gloves are not to protect your hands, but to keep from contaminating the part you will paint. Finger and hand oil is really a no-no where paint is concerned. When the parts are cleaned a hot water rinse followed by a blow-dry is good.

Now that the parts are clean and dry it is time to use a metal prep solution. For steel this will be the iron or zinc phosphate immersion or

Editor's Note: Loren's recommendation that a metal converter be used on the bare metal is a good one. I tried to locate a converter in local auto parts stores but without success. Paint specialty stores would be the best bet. DuPont makes a cleaner for iron, steel, galvanized and pot metal (#5717) and the converter for these metals as well (#5718S). For aluminum, there is a special cleaner (#225) and a converter (#226). The paint specialty store can recommend a metal prep for your particular job.

wipe-on followed by another hot water rinse and blow dry. These treatments do not seem to change anything, but in truth they provide a molecular change to the metal that gives the paint about four times the adhesion that untreated metal would have. Remember that once the metal is cleaned, there is no touching with bare hands permitted. The inexpensive, throw away plastic gloves that food handlers wear will work just fine to keep hand oil away from your parts.

It is a good idea to let the parts dry for 24 hours at room temperature before applying any finish. NASA required a three hour drying time in a 300° F drying oven to rid the parts of any water. That is an overkill for car parts, but the 24 hours at room temperature is a good idea.

For cast iron parts it is not necessary to use a primer unless the parts are to be shiny finished, and a primer surfacer will permit sanding to smooth parts for that glossy finish. Most cast iron parts will be a bit rough and look like castings and that's okay, unless you are heading to Pebble Beach with your project.

Aluminum should be primed, and here is a good place to inject my personal opinion based on experience. If you are using a DuPont® paint system, for example, use all DuPont® products. Most paint manufacturers have good products, and they have spent a lot of money developing their own chemistry. No single company has all of the best products, but each manufacturer has designed their product to work as a system. Whatever brand you use, stay with that brand for the entire process. I have seen painters mix one brand of metal prep with another brand of primer and yet another brand of top coat. This is just foolish as the mixing will almost surely degrade the entire job, and the result is never better than if one brand had been used.



Back in the good old days we painted with little or no paint masks or breathing equipment.

A full-face respirator will not only protect your lungs, but also your mouth and eyes.

That is no longer true; paints today have chemicals that can, and will, do serious damage to your brain, lungs, eyes, and other organs. Any two-part paint will have chemicals that you don't want to ingest through breathing or skin exposure. Enough exposure to some of these can be fatal. A nose mask is not enough. Wear a full-face mask/respirator and skin covering.

Another concern is how the paint is dried. It can be every bit as dangerous to breathe the outgassing of these paints as they dry as it is to breathe the vapors during application. Do not paint with these toxic paints and then bring the parts into your shop to dry. Always follow the manufacturer's directions, and don't assume that all paint works the same. Allow ample drying time between paint coats, and again, do not touch the parts with bare hands until all the painting is finished and dried.

Aerosol paint can be good or bad. If the label states that it is just paint beware as some brands are just that. They may be fine for sprucing up the kid's wagon, but don't trust them on your car. Find a brand that specifies if it is lacquer or enamel. Those are about the only aerosol types that are common in most auto parts stores, other than specialty paints for plastic or vinyl. They are a special case beyond the scope of this article. My personal preference is Plasti-Coat®, and they specify the type of paint that is in the spray can, but there may be others just as good. Availability is an important consideration, so spend the time to find a good brand

and stay with it. There are some good urethane clear coats in spray cans, but these are not usually sold for automotive use. Some auto parts stores and specialty paint shops can mix and fill aerosol cans but these have been known to leak. Once that happens, you lose the paint. Check on the experience of your supplier to decide whether you want to have them fill aerosols for you.

There are sealers available, but for most small parts those are not really necessary. High build primers are expensive, but they are handy to smooth out an otherwise rough part. Today we have sandpapers as fine as 2000 grit for final color sanding and for parts that will show. These are very handy.

My best advice for those who are doing larger parts like fenders is this: do the metal work, filling and smoothing and masking. Make an arrangement with a body shop known for good work and have them do the spraying. They have the breathing equipment, the paint booth and all the equipment to do a good job. They can do the priming, and you can do the sanding at your shop. When you are satisfied, have them do the color. If your parts are ready for paint, it should not be too expensive for a shop to do the painting. Remember, the time you spend on the preparation is worth that same time that the shop will charge you if they have to do it all.

S.K.

Editor's Note: Loren suggested that media blasting thin metals may warp or distort the metal. I recently had an antique auto trunk that had been lying around in a garage since 1956. I bought it from the grandson of the original owner, and although in generally good condition, the trunk was rusted.

I took the trunk to three media blasters and asked for their recommendations. The first two blithely told me, "Sure, we can do it", without any reservations or cautions. I went to the third shop because they can use walnut shells, a less aggressive media. The third shop

recommended against blasting it because of the fear of warpage.

A fourth shop told me that they could do the job, and they would use glass bead at low pressure (40-50 psi rather than 90-110 psi). I left the trunk with them, and they did a good job without damaging the metal. Lesson learned: ask questions and give specific instructions.

I was also told that it was imperative that the trunk be prime-painted immediately to prevent flash rusting.

Editor