

CHASSIS PREP AND POWDER COATING



The best powder coating jobs take good prep and experienced powder coaters

by Doc Frohmader

There is always a disconnect between the dream you have for your project and reality. No matter how perfect your dream, there will always be limits you encounter that mean you never quite get to actual perfection. Ask anyone who participates in the show car scene or has done high-end restoration. For that matter, there always seems to be limits on skills, time, and money that conspire to keep the dream from becoming reality. Those uber-expensive rods and customs and restos you see don't happen in

small backyard shops for guys with mortgages and families and jobs. On the other hand, a lot of what the big boys do is not exclusive - you can have it for yourself.

In this case we're talking about powder coating your chassis. To many powder coating is still exotic and expensive, but that just may not be the case. In recent times I've been faced with the decision to either paint or powder coat a chassis and powder won. Here's how I worked it out:



After all the rest of the suspension and driveline was completed and everything was assembled to make sure it would all fit (after powder coating is a hell of a time to find out you still need to weld or modify the parts!), I looked the frame over to see how to improve the job. I decided that removing some riveted on parts and powdering them a second color would look good and eliminate some rust areas. I used a sharp, flat air chisel to cut the rivet tops off.

If you work slowly and aim well, you don't gouge the parts up, but just peel the rivet heads off like this. Don't make more work by getting sloppy or rushing.



1. At the point where you have done all the modifications and repairs to your chassis and have pre-assembled EVERYTHING, you have managed to get the functional part done. From that point on, the frame prep for paint or powder is pretty much the same. Both need smoothing, grinding, edge prep, and sandblasting to clean them down to white steel.

2. If you paint the parts you have to buy primers, paints, solvents, reducers, catalysts, and sandpaper. If you powder you send it off to the powder coater and write a check. My experience is that the cost of the materials for paint gets

within spitting distance of what the powder coating will cost. Usually a couple hundred bucks difference.

3. To paint the chassis you will spend significant time priming, sanding and preparing the frame and parts to get where you can paint them. During this time your shop is not really useable for anything else. During this period you cannot be doing anything else so there is a cost in time. Some don't feel their time is worth anything and for those this point is not relevant. My time is precious to me...

Most of the rivets will now pop out using a round punch and hammer. Some will not and so require extra work, so don't just wail on them and damage the frame and part – just get the ones out that come reasonably easy.



I found that if you slip the chisel blade under the part it will pry loose off the rivet shank. Again, this is done with care and you don't want to twist and bend or gouge up parts. I've found that the really tough ones may need the other side of the rivet clipped off to loosen them.

In many cases the rivet shank will still be left like these. Beating on them won't work. Take the chisel and shave the rivets off flush with the rail like this. Often this will loosen them but always it will clip the rivet off so when you use the punch you don't just mushroom the shanks and make the problem worse.





A little smoothing with the grinder cleaned up the rust under the mounts and between the crossmembers and rails. The factory did not coat these areas and there is always rust there. One reason to remove these parts was to eliminate this rust and eliminate areas where new rust could start.

I also smoothed the mounts and other parts up. Off, they are much easier to get at and I smoothed out a lot of flaws to improve appearance. I did this kind of smoothing and repairing on every inch of the frame rails and all the chassis parts.



4. Powder coated frames and parts, when done right and cured properly, will resist rust and road rash far better than paint. You want tough and durable, you choose powder. If you want to be able to simply repair damage, you choose paint.

Now, you may see it differently or may have different circumstances. You may have a body shop and be set up for painting. You may not have local access to a good powder coater. You may have a frame that requires significant amounts of filler – although there are fillers that are made to use under powder. You may simply

want to massage your chassis as part of your own craftsmanship. I'm not telling you what you should do, only that in this case I made what I think was a good decision in terms of expense and time and quality and it may well be that you want to do the same.

Prep for a chassis varies some, but as a rule the farther you strip the frame down and the less complication you retain the better. That means for the suspension parts, steering parts, etc, you want to remove all fittings, bushings, and anything that can be affected by about 400 degrees of heat.

Because I think it is a very bad idea to leave anything that could make trouble or cause surface damage after the coatings are done, I also clamped the parts back on and drilled out the mount holes for the 7/16 bolts that replace the original rivets.



I have a bag of 7/16 bolts and nuts that I use to completely assemble these kinds of frame parts. I use a bolt in every hole so later I won't have to start drilling over fresh powder.

I look for rough edges, sharp edges, weld spatter, or anything else that could make the finish look poor later on. It may be a pain in the butt and take a lot of time, but I assure you the result is more than worth this. In the case of this C-notch unit, I also welded it and cleaned up the welds prior to blasting or powder.





There were places where I found dents or rust and there I replaced or repaired the metal. This had a large dent about 1/2 inch deep and as big as your fist. I hammered it flat and ground it smooth and this was the result. About 2 hours work.

Another great trick is to chamfer or ease every sharp edge, including all the edges on the rails. It is definitely tedious and it takes a stable but light touch with the grinder, but sharp edges are the first place that chips occur and are often fragile.



I spent a day doing nothing but removing these kinds of things and getting the parts stripped. For the frame, I removed anything that could be removed. The front crossmember bolted in and so it came out. All but one of the other crossmembers could also be removed by unbolting them and so they were pulled. In the end, there were just two crossmembers out of six that came out, leaving just enough to hold the frame together and no more.

Also for the frame, I looked into body mounts. As part of other work, two of the mounts had already been removed and replaced.

Originally they were riveted on but they were replaced using bolts. As I did this I discovered that like many such added on parts there was rust under them. The factory parts were never painted until assembled and so rust builds under these mounts and creates scale. By removing them you can clean this rust and scale away, repair any damage, and put them right back in place. In addition, you can do what I opted for and make them a different color if you like that look.

As I worked, I discovered some areas where rust or dents needed attention. In some cases you may have to cut out and replace material to fix this stuff. For that, you just make accurate and precise patches, weld them in and grind them smooth. In most cases you can just hammer the dings out and grind them smooth. Unless rust pitting is deep, you can usually run a grinder over it and smooth it out.

There are also a couple of different fillers used under powder. The problem is that you can't do this very well in your own shop. They need to be heat cured in an oven and that means you will pay more to the coaters to get your parts run through. Still, if you need filler and can't make repairs in steel...

Another way to deal with smaller imperfections is powder coating primer. To use it, you take the prepped parts and have them coated just as you would the finish coat, but the powder primer is only partially cured. This allows you to sand the surface, coat with your finish material, and then completely cure both at the same time. It also allows you to get the proper bonding. Unfortunately, if you fully cure powder – color or primer – you will have to fully and completely sand the entire surface to get the top coat material to grip.



After the frame and all the parts were prepped, I sent them off to get them blasted to bare, clean metal. Even then, Todd goes over each piece to look for any sign of missed paint or rust or dirt and scuffs it off with Scotch-Brite or sandpaper. We even found a couple small areas that required a quick shot with a grinder. Prep is everything!



The parts are hung so he can get to them for coating and they head into a wash unit. This degreases and cleans the parts so there is no contamination to affect the powder.



Before they come out of the cleaning equipment they are sprayed with a phosphate liquid that creates a rust-preventative coating on all the parts. Even wet you will not see any sign of rust starting. This goes a long way to enhancing the durability of these parts.

Each part is carefully blown completely dry. If any sign of water is left on the parts it could result in a damaged finish as steam blows the powder off the parts in the furnace.



You gotta look everywhere and know where the potential problems hide. Todd knew from experience that this hollow crossmember would have water inside.

To complete the drying process, the parts go through this high volume blower. The heat and air flow make sure all signs of moisture are gone and all specs of dirt or lint are off. Anything left on the parts will show in the powder later.



On this chassis, I did all the repairs in steel. It took a while, but I found that I could hammer out the dings and defects and smooth them out so as to be invisible with a large flat grinder. On the other hand, there was still some pitting that would have required more metal removed than I wanted to completely eliminate. So after the frame was blasted, it got the primer step. I have to say that the primer really made a difference in the ultimate finish and would recommend it if you have access and can afford it.

Another trick we tried that really hit one out of the park was to use a textured finish on the frame rails and major crossmember. These parts are very large stamped units, meaning that they are never going to have a really perfect surface unless you spend many many hours and many many dollars to work them out. By using a hammer-tone finish the smaller imperfections from the stamping process and even small pits and the like, just disappeared. It left a uniform texture that does not look like a patch but rather gives it an elegant look. I love the stuff.



Todd had one more trick up his sleeves and this one surprised me. There were a couple areas where two layers of metal were sandwiched together on the frame. Even after blowing, there was still water between. When Todd took the propane torch to these areas, he boiled the water out. He just gets the metal hot enough to boil the water and waits until the sizzling stops.



Finally time for powder. This is a high production setup and the spray booth is open. The filters catch the loose powder and the high air flow leaves nothing in the air. The trick is to know how to coat evenly and completely and Todd knows his stuff.

I worked with a company called Manufacturing Systems Incorporated that does a lot of powder coating to support their manufacturing side, but also does custom powder coating for us car guys. Probably because Doug and Todd Bidwell are both serious car guys and understand what we are all about. I either did the prep or (in the case of the sandblasting) had the work done in advance of delivering the parts to MSI. Mind you, as time permits the boys will do this kind of prep, but they don't work for free and you can save a lot of money by doing it yourself. When the parts got to MSI, they took over and left nothing for me to do but watch, learn and be impressed.

In the background for this effort was a company called Tiger Coatings. They are one of the major suppliers of powder coating materials and equipment and their man Brian Caudill helped considerably to advise me on the prep work, the kind of materials to use, the techniques involved, and even the colors and textures available. That last id something else. You can get just about any color you can imagine and there are tons of special finishes that range from various stages of gloss, metallics, two-stage candies, clears, wrinkles, and various textures and effects like the hammer-tone we chose. I found the company not only offers some great materials but the people were very helpful in getting us lined out.

The open booth was the perfect deal for the frame which was done in sections. It was quite a trick to make sure all surfaces were fully coated and evenly coated with the primer.



The first run through the oven gets the primered parts hot enough to flow the material but not hot enough or long enough to cure it completely. Cured powder will not allow a second coat to adhere properly.



On both the primer and the top coat the true temperature of the metal and powder are checked with an infra red thermometer. It is absolutely critical to get the temperatures to the right level for long enough to allow proper curing.

The primered parts come out of the oven glossy, showing that the powder melted. However, none of the curing has been completed. Both primer and top coat are cured at the same time.





The Tiger Drylac powder comes in various sized containers and each has information as to how long and at what temperature the material must be heated so complete curing takes place. Powder d has not only to melt, but time and heat cause the molecules to cross-link and become very much stronger and durable.

After any imperfections are corrected in the primered parts, they go back around to have the top coat sprayed on. The powder is electrically charged and the parts are oppositely charged so the powder is drawn to and sticks to the parts with little waste and no liquid carriers.



The one drawback with using primer is that it insulates and the top coat is harder to get coverage on. Altering the charge, the powder flow and air pressure take experience and generally work, but in extreme cases the parts are heated so the powder hits and melts on contact to achieve full coverage.

The finished satin black parts come out of the furnace after 20 minutes at 380 degrees. Melting happened at about 5 minutes into the process, the rest was curing. They travel down the track and cool slowly before being removed.



The frame was a bit tricky in that it took a lot longer to fully heat it to temperature and allow complete curing. Careful monitoring with the infra red thermometer kept Todd on top of the process and it came out perfect.

The whole coating process took a LONG day to do. Partly this was because of the extra step of using the primer coat, baking, then backing the whole thing up to do the finish coating. Part of it was that I chose to go with two colors. Part was due to the fact that this particular hammer-tone finish was new to Todd and Doug and they were very careful to make sure they knew just how it was going to work before they would use it on the finished parts. In fact the first experiment that came out didn't look too good, and they conferred with Tiger rep Brian

(at night, at home!) and made adjustments that gave the excellent results you'll see here. They figure that it's better to go slower and do a little experimentation on anything new rather than give a customer a bad job. Gotta like that!



A closer look at the hammer-tone grey/black finish so you know what I'm talking about. I was amazed at not only how even and consistent the finish was, but that it holds a nice sheen and hides the small imperfections that can make any frame look shabby. I would definitely use this hammer-tone material again.

Sources:

Tiger Drylac
3855 Swenson Avenue
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Manufacturing Systems, Inc.
300 Industrial Street
Belle Fourche, SD 57717
605-892-2717