

Aluminum Hygiene:

A Sensible Approach to Managing Aluminum Complications

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Aluminum repairs in general are currently a hot topic and the subject of cross contamination between steel and aluminum is one of the first issues raised, and for good reason. The approach to controlling cross contamination is multi-faceted and requires a systemic plan.

First and foremost, it will be essential to separate the aluminum operations from the steel operations as much as possible. I say as much as possible because no matter how much effort you put into substrate separation, you will never be able to completely segregate these two processes. Many vehicles that have aluminum components also have steel components and vice versa, so complete separation is often impossible.

Keep in mind that while aluminum repairs are relatively new to most shops in our industry, the truck repair industry has been repairing steel and aluminum vehicles side by side for decades. These shops realized early on that while paying attention to segregating different substrates is important, there are also limits to what can be accomplished in a production shop environment.

Therefore, the second and most important component in controlling cross contamination is vehicle hygiene. In other words, it's critical to ensure that in the almost certain event that steel fallout ends up on aluminum parts, that those parts are thoroughly cleaned before coatings are applied.

Shop cleanliness is another aspect of cross contamination control that requires attention. If shops allow the accumulation of either aluminum or steel dust to get out of control, it will be extremely difficult to manage what is transferred to the vehicles. Your hygiene plan should include:

- A separate work area for aluminum repairs along with a regular schedule to keep that area clean. Sustaining the cleanliness will be the biggest challenge so a *posted* SOP and cleaning schedule will be important to prevent neglect over time.
- Keeping tools, welding drapes, abrasives, gloves and fasteners separate.
- A vacuum system and a policy to eliminate blowing cars off in the shop.
- Regularly cleaning tools and equipment that are used for both substrates, such as air tools and rivet guns etc.
- Having a regular clean-up day, and/or an end-of-the-day time to sweep up and de-clutter the shop. If you are making the investment to take on aluminum repairs, a strongly enforced policy to keep the shop clean will be worthwhile and necessary. Aluminum repairs are a great "excuse" to implement a no clutter policy in your shop.
- Using disposable dust/dirt trapping material on floors and work areas where dust and shavings will directly fall, keeping them from being tracked around the shop.

- Thoroughly cleaning the vehicle before coatings are applied. This includes any priming performed in a prep station. Prep stations aren't traditionally known to be sterile environments but they will need to be kept as clean as possible.

Aluminum Oxidation

Another characteristic of aluminum that is sure to influence shop procedures is aluminum oxidation. It is important to know that aluminum surfaces react with oxygen in the air to form an extremely thin layer of oxide. Though it is only hundredths of a millimeter thick, this oxide layer is dense and provides natural corrosion protection to the aluminum surface. The layer is self-healing if damaged, meaning: it begins to re-form immediately on the surface if it is abraded or removed.

However, this oxide layer is detrimental to the adhesion of any products applied to it. To achieve maximum adhesion, seam sealers, coatings, adhesives and fillers, must only be applied to surfaces where this oxide layer has been removed by abrading with a recommended abrasive and cleaned with a recommended VOC compliant surface cleaner. After the oxide layer has been removed, it is critical to apply these products within a one hour window (OEMs and product makers may recommend a slightly different time window) before the oxide layer re-forms.

If during the repair process the one hour window expires, the substrate must be re-abraded and re-cleaned before applying any of the aforementioned products. The best practice would be to apply any of these types of products immediately after the abrading and cleaning process. This also holds true for primer cut-through areas. If during the primer sanding steps the technician cuts through the primer and exposes bare aluminum, the one hour rule still applies and this exposed area must be coated. Once the exposed aluminum is primed there is no longer a time concern. Always err on the side of caution and re-clean if there is any doubt as to whether the surface is free of oxidation.

How does this affect the processes in the shop?

If a repaired panel with an exposed area of bare aluminum is sent to the paint shop, the repair should be:

- Primed immediately
- Or if it isn't coated within the oxidation window, it must be re-abraded and cleaned before priming

This may appear to be an extra step, but in reality, the repair would need to be abraded with a finer grade abrasive before priming either way. If that repair went untouched until the next day, it would also need to be re-abraded. But once again, refining the exposed area with a finer grade abrasive would have to be done in either case, so in this scenario there isn't much deviation from what has always been done.

However, the body technicians, preppers and painters all need to communicate to confirm that someone has completed the oxidation removal steps before coatings are applied. Timing between these technicians will also be important because within an hour of the panel being abraded and

cleaned for the final time, top coats or adhesives must be applied or it's back to step one. An assistant may be required during adhesive bonding operations on large panels in order to get the flanges prepared and adhesive applied over the bare aluminum within the oxidation window.

There are many other considerations when working with aluminum that shops will need to adjust to, but the cross contamination and oxidation issues may have the largest impact on day to day operations. These adjustments will have a ripple effect on the entire shop atmosphere as well as the floor layout and flow.

Aluminum dust is lighter and finer than steel dust and tends to cling to everything including technicians clothing and bare skin, so where they move through the shop should also be considered. Shops will have to continually maintain clean shop practices and pay close attention to dissimilar substrate transfer. Before solidifying the shop layout and flow it would be a good idea to step back and examine the floorplan and ensure that items like tool and material storage, vacuum access, curtain wall placement, task locations and foot traffic lanes make sense to optimize the ability to control where steel and aluminum dust fallout ends up.

The key fact to remember is that no matter what measures you take to control cross contamination, it will be impossible to completely eliminate it in the shop. If you can't completely eliminate it from the shop you need to eliminate it from the vehicle itself. The ultimate solution to ensure that there are no galvanic corrosion problems on the customer's vehicles that leave your shop, is the final cleaning before the refinish operations. None of the items discussed here will be effective if the vehicle isn't meticulously cleaned before entering the paint booth and again, right before the trigger is pulled for that first coat.

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