Technical Information Bulletin (TIB):

Over-Coating Existing Coatings

GENERAL OVERVIEW

Over-coating a well-worn, but bonded coating can be a great, less expensive option for like-new look and performance. But improperly over-coating an existing coating, whether the coating is freshly applied or aged many years, can be a very costly mistake. While no reputable manufacturer will warrant bonding to another product without extensive testing, over-coating is very commonly done; with great success. So it is important for all parties involved to understand the risks and rewards of chosing to over-coat an existing coating.

In many ways, the applicator is on their own when over-coating an existing coating. The stakes are high. In extreme cases, complete removal of an improperly over-coated coating system down to the substrate may be necessary; wasting not only the freshly applied material, but also an existing coating that was otherwise usable. Costs of wasted material, lost production, and removal expense can easily exceed the original estimate for the entire coating project. So proper over-coating is critical to increase the likelihood of success.

This guide is intended to communicate basic techniques for over-coating existing materials. It contains valuable information and concepts that will be helpful in most situations. It should not be viewed as the last word in over-coating philosophy. Use these concepts, your experience, common sense, and caution when over-coating existing coatings to maximize the chances of a successful installation.

ADDITIONAL RESOURCES

Wolverine Coatings Corporation (WCC) has developed this bulletin along with other technical information to help all interested parties, from specifiers to applicators to owners, have a better understanding of the considerations, materials, and techniques required for proper installation. Consult all relevant information before using WCC materials.

WCC Technical Information Bulletins
TIB: Minimizing, Identifying, and Remediating Amine Blush

WCC Technical Detail Drawings
TDD: N/A

WCC Technical Data Sheets
TDS: All

WCC Safety Data Sheets
SDS: All

SAFETY

Prior to commencing work, carefully read and follow all SDS (formerly MSDS), Technical Data Sheets, and any Instruction Manuals for products and equipment used during installation. Following the safety regulations of jobsite, local, state, and federal authorities is the responsibility of the installation company, general contractor, and/or facility owner.

DISCLAIMER

This Document does not purport to address all applicability and safety concerns, if any, associated with its use. It is the responsibility of the user to determine applicability of the information and to establish appropriate safety practices.

BASIC GUIDELINES FOR PREPARATION OF EXISTING COATINGS TO BE OVER-COATED

Knowing the 'why' of inter-coat adhesion failure (delamination or peeling between coats) will easily lead to a discussion of 'how to prevent', or at least significantly reduce the likelihood of bonding problems between coats. After this 'Basic Guidelines…' section, there is an extensive discussion of considerations to take into account when faced with over-coating an existing coating. It is well worth the time to read and understand the concepts presented. Again, failure is a very costly, likely avoidable mistake due to lack of proper knowledge.

There are many reasons failure may occur, but apart from incompatibility (which should be addressed long before attempting over-coating), they can be summed up as follows:

- contamination interfering with the bond
- inadequate mechanical bonding when chemical bonding is not sufficient

From these broad failure causes, it is fairly apparent that a clean, abraded surface will most likely result in maximum inter-coat adhesion strength. So if there is a doubt about contamination, 'Recoat Window', blushing, etc., it is best to treat any existing coating as an 'old' coating and follow these guidelines for preparation.

1. Clean the existing coating's surface with a degreaser or other cleaner. If soluble salt contamination is suspected, clean the coating with a cleaner such as Chlor*Rid in addition to normal cleaning. Rinse thoroughly.
2. Remove damaged and/or questionable portions of the existing coating from its substrate. Properly prepare substrate as required. Properly prime the substrate if necessary.
3. Sand, grind, or abrasive blast the existing coating to clean and texture the surface to give it mechanical 'tooth' for better bonding. In many cases, a 60 or 80 grit sanding screen on a rotary floor machine or sanding pad is adequate. Not only is sanding and/or grinding good for enhancing bond strength, it can also smooth out imperfections (texture/aesthetics) in the existing coating.
4. Thoroughly sweep and/ or vacuum the entire area.

BASIC GUIDELINES FOR PREPARATION OF EXISTING COATINGS TO BE OVER-COATED (CONTINUED)

5. Wipe the area with good quality, white towels or rags saturated with denatured alcohol or with a specific cleaner as specified in the product's TDS. If cleaning a large area, a clean push broom wrapped with saturated towels can be used. Change towels often. Continue until towels wiped over the area are clean.
6. Protect the area against contamination until coating is applied.

GENERAL CONSIDERATIONS

There are three main concerns when faced with over-coating an existing coating.

1. Soundness of the Existing Coating
2. Aesthetics, i.e. color hiding, texture, etc.
3. Bonding (inter-coat adhesion).

1. Soundness of the Existing Coating

Just as a firm foundation is critical for a building's structural integrity, a sound existing coating is critical for a successful over-coating project. The existing coating must be properly bonded to its substrate, else if the existing coating peels, the over-coating will come with it.

Care must be taken to ensure the existing coating's physical integrity has not been compromised by exposure to chemicals, age and/or abuse. The service life of a coating is very dependant on its environment. As an example, a coating with an expected service life of 15 years may have its longevity cut by 10 years if exposed to high temperature, chemicals, and/or abuse. Since failure of the existing coating will necessarily cause failure of the over-coating, properly assessing the existing coating's integrity will greatly affect the decision whether to re-coat or not.

Cracks, holes, and pits in the existing coating must be carefully inspected and a plan formulated to properly prepare and repair the substrate to receive subsequent coatings. Depending on the substrate and coating condition, a primer and/or repair materials may be required.

Although it will be discussed later in the 'Bonding' section, it is important to mention the issue of compatibility of materials. Assessing the soundness of an existing coating must include some investigation into the existing material itself and its ability to bond with subsequent coatings. If the existing coating has bond inhibiting additives or incompatible chemistry, getting adequate bond strength will be difficult, if not impossible. Extensive testing with multiple coatings and preparation methods may be required to ensure acceptable bond strength. Install a test area at minimum.

2. Aesthetics

Before over-coating an existing coating, a proper assessment of desired color and texture requirements, existing coating condition, and the properties of the coating to be applied must be made in order to assure desired results. As an example of why aesthetics is critical, applying a thin coating over a rough, coated surface is a waste when a smooth surface is required. To achieve desired results in this case, appropriate preparation technique as well as proper coating selection may provide desired results.

A proper consideration of aesthetics will include the following:

- Desired Color – Color is an obvious decision when choosing a pigmented coating. But color hiding is equally important, especially when the existing coating's color is vastly different from the proposed coating's color. Color hiding is affected by:
    - coating thickness (increasing thickness normally increases hiding)
    - coating type (some coatings hide better than others)
    - coating solids (the solids of the coating will affect the hiding)
    - color choice (some colors hide better than others, even if the coating is the same)
    - substrate texture (rough texture will reduce shine and possibly color coverage)

  Experimentation with the proposed coating may be necessary to confirm color hiding. When in doubt, install a test area.
- Desired Texture – Surface texture can vary wildly: from glass-smooth to extreme roughness. Careful consideration must be given in order to transform the existing substrate into the desired surface. While experimentation is always wise, experience can also be a good predictor of desired outcome. Proper assessment of the texture of an existing substrate, required surface preparation techniques, and coating choice are all interconnected in producing the desired outcome. For example, a smooth surface is normally quite easy to coat smoothly, while a rough surface may require extensive grinding to yield a smooth texture.

- Desired Texture (continued)– Additionally, a thicker coating may yield a smoother surface than a thinner one. Moreover, some coatings are designed to be glass-smooth, while others have a more textured appearance. When in doubt, install a test area.
- Existing Coating Condition – As discussed above, color and texture of the existing coating are critical considerations when over-coating. Proper assessment is very important for desired aesthetics.
- Properties of the Proposed Coating – As discussed above, coating thickness, hiding ability, and design characteristics of the proposed coating are very important properties for desired aesthetics. For example, coating thickness affects aesthetics greatly. Thicker coatings normally hide color more evenly and can smooth out rough surfaces. Also, some coatings are designed to be applied thinly or in a very narrow thickness range. While others may be applied in a wide range of thickness. Moreover, some coatings are designed to be glass-smooth, while others are textured. In some cases, this texture property can be varied with installation technique or application thickness, but that is beyond the scope of this TIB. Thorough knowledge and experience with a particular coating is critical for desired results. When in doubt, install a test area.

3. Bonding (Inter-Coat Adhesion)

One of the worst nightmares of an installer is inter-coat adhesion failure. As discussed earlier, inter-coat adhesion failure often requires a very costly repair at best, or a business changing disaster at worst. Discussion of this weighty issue is probably best done by discussing why inter-coat adhesion failure occurs. There are numerous reasons or contributing factors for 'why' inter-coat adhesion failures occur. The following are some of the more significant:

a. Recoating outside the existing coating's recoat window without further preparation
b. Amine blush of existing coatings
c. Inadequate preparation of the existing coating
d. Contamination of the existing coating
e. Incompatibility of existing coating and the new coating
f. Solvent entrapment
g. Disbonding of the existing coating from its substrate

a. Recoating outside the existing coating's recoat window without further preparation – After installation, most coatings have a window of opportunity in which subsequent coats bond well. During this time, its surface is more able to chemically bond to subsequent coats. Holding other environmental factors constant, this ability to chemically bond decreases with age because open bonding sites on the coating's surface are physically abraded off or react with other chemicals like water and carbon dioxide, rendering them unavailable for bonding. A prospective material's Technical Data Sheet (TDS) will indicate 'Recoat Window', the theoretical window of opportunity the coating may be over-coated without further preparation. It is extremely important to understand that environmental factors such as temperature, air flow, humidity, sunlight, etc. will affect a coating's Recoat Window. For example, the 'Recoat Window' property listed on a Technical Data Sheet is necessarily based upon certain environmental conditions. If the field conditions are different, 'Recoat Window' will be affected; dramatically in some cases. If the coating is outside of its 'Recoat Window', or is suspected of being outside, further preparation will be required to maximize bond strength.

b. Amine blush of existing epoxy coatings – Amine blush is a common cause of inter-coat adhesion failure. Many times a disastrous one. Consult WCC TIB: Guide for Minimizing, Identifying, and Remediating Amine Blush on Epoxy Coatings for a thorough discussion of blushing. For this discussion, blush is the oily, greasy products of an undesired reaction which typically acts as a bond breaker, causing delamination of subsequent coats. All epoxies have the potential to blush, but some are more susceptible than others. Wolverine Coatings Corporation's products are generally very resistant to blushing. But some of our specialized products are more blush-prone. If one of our products is prone to blushing, we will indicate it in the 'Installation' section the product's Technical Data Sheet. If blush is suspected or encountered, further preparation will be required.

c. Contamination of the existing coating – There are many types of materials that can interfere with the bond between coatings. Blushing from epoxy coatings has been discussed as a bond inhibiting contaminant. Other contaminants, such as dust, grease, and grime, act as barriers which physically prevent coats from bonding to each other. Some invisible contaminants, such as soluble salts, may or may not prevent initial bonding, but may cause bond failure in the future when they attract moisture through the coatings and produce materials that will cause blistering and inter-coat adhesion failure. Other contaminants, such as silicone and surface tension modifiers, can cause disbonding of subsequent coatings, as well as causing surface irregularities such as fish-eyes.

d. Inadequate preparation of the existing coating – As discussed above, if the existing coating is outside its 'Recoat Window', further preparation will be necessary. Further preparation will also be necessary if the surface is contaminated with blush or other materials that can act as bond breakers. Also, bonding to an older coating can be more difficult since the surface is well-cured and hard (glass-like). To overcome these conditions, further preparation methods will be required which enhance the mechanical bonding (since chemical bonding is no longer adequate) of subsequent coatings to existing coatings through some sort of abrading operation. Abrading procedures can also aid in removal of bond inhibiting contaminants.

e. Incompatibility of existing coating and the new coating – Some coatings are not compatible with each other or may have additives that make bonding with future coatings very difficult, if not impossible. In addition, dissimilar chemistries may not be compatible. While there are known compatibility problems between certain materials, it is beyond the scope of this TIB to discuss specifics. Consult Wolverine Coating Corporation for recommendations when attempting to bond dissimilar coating chemistries.

f. Solvent entrapment – If the existing coating is solvent or water based, over-coating too soon can entrap solvent or water in the coating system. In the correct environmental conditions, the solvent will seek to escape and may cause blistering and inter-coat adhesion failure. With the advent of low solvent coatings, this is not as common as it once was. Observe the 'Recoat Window' of the existing coating, since solvent entrapment is only a concern when over-coating new coatings.

g. Disbonding of the existing coating from its substrate – While this is not inter-coat adhesion failure, it should be considered when over-coating an existing coating. It's very obvious that if the existing coating peels from its substrate, your new coating is peeling with it. Therefore it is necessary to assess the bond of the existing coating before attempting an over-coat. Any loose or questionable coating should be removed and the exposed substrate properly prepared and possibly primed to receive the new coating. Special attention should be given to the edges of the remaining existing coating. The edges may need to be feathered down to meet aesthetics requirements. The age and quality of the existing coating should also be considered. An old and/or poor quality coating may easily disbond, or will disbond soon, because it has become very brittle and weak.

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SAFETY

For your safety, all required personal protection equipment should be used when operating machinery or handling chemicals. Concrete dust is a source of silica particles and other hazardous materials that can cause silicosis and other illnesses. Proper safety equipment and methods are the responsibility of the installation company, general contractor, and/or facility owner.

WARRANTY

Wolverine Coatings Corporation warrants its products to be free from defects in material and workmanship. Wolverine Coatings Corporation's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Wolverine Coatings option, to either replacement of products not conforming to this Warranty or credit to the Buyer's account in the invoiced amount of the nonconforming products. Any claim under this warranty must be made by the Buyer to Wolverine Coatings in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the ship date, whichever is earlier. Buyer's failure to notify Wolverine Coatings of such nonconformance as required herein shall bar Buyer from recovery under this warranty.

Wolverine Coatings makes no other warranties about the product. No other warranties, whether expressed, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply.

Any recommendation or suggestion relating to the use of the products made by Wolverine Coatings, whether in its technical literature, or in response to specific inquiry or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for the Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedure of use, or extrapolation of data may cause unsatisfactory results.

LIMITATION OF LIABILITY

Wolverine Coatings Corporation's liability on any claims based upon Wolverine Coatings Corporation's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or parts thereof which give rise to the claim. In no event shall Wolverine Coatings Corporation be liable for consequential or incidental damages.

LITERATURE REVISION

Published literature is subject to change without notice. Wolverine Coatings Corporation is constantly formulating innovative products, new technologies, and practices. Please check www.wolverinecoatings.com for the latest product data sheets.

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