Primeaux Associates LLC

Polyurea Technology & Application Consulting

Technical Note

A Sticky Situation

Polyurea Adhesion Characteristics

Written by:

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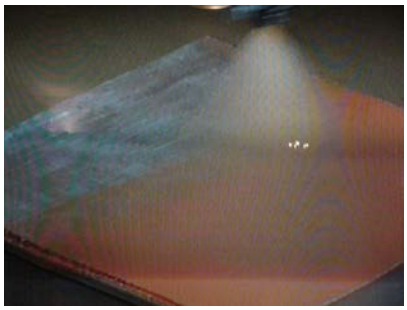
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Technical Note: A Sticky Situation – Polyurea Adhesion

During the January – February 2011 SSPC Conference in Las Vegas, Nevada, ***polyurea*** technology was a main item of discussion. In addition to the dedicated session, "A Sure Bet with Polyurea Technology," there were also several Committee meetings with documents and standards in the works. But one thing was really bothering me and that was several comments related to poor adhesion issues that had been experienced by several facility owners when the technology had been used in their locations. Well I really thought that we had gotten past all that, but still continue to hear today……

I will admit that when the technology was first introduced back in the late 1980's, one of the big challenges was adhesion of the applied polyurea coating / lining to items we wanted it to stick to, as opposed to things we did not want it to stick to. Some of the first commercial applications were of the adhesion challenged standpoint and unfortunately many failures did in fact occur. Now while this may have been primarily due to incomplete or even non-existent surface preparation, much was formulation related.

You see because the polyurea technology sets / gels so quickly, it is difficult to properly "wet" the surface. Now couple that with poor surface preparation, or even spraying over water or ice, you have a recipe for disaster! Ah you all remember the original Texaco Chemical Company video on The Polyurea Technology from 1990? Yes there it was for all to see, spraying over water and ice! But what many don't remember is the voice-over explaining the reason for this to show water and ice (cold) does not interfere with the reaction, as compared to polyurethane technology. When many companies copied this video for their company use / promotion, this voice over (explanation) was left off, so many thought it was OK to do this. I can't tell you how many *failed* projects I have been on where applicators have applied the polyurea over water because they saw in a video and training that this was OK to do.





So that is why much research and development was done over subsequent years to make the polyurea a coating & lining technology, rather than an interesting or Entrepreneur's Dream Material. This work has relied on conventional additives that are commonly used in other coating system technologies, as well as special primer developments to enhance adhesion. But the best solution is common sense, ***"you are only as good as what you are sticking too!"***

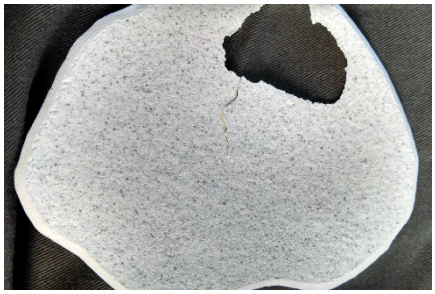
OK, so back to the point of this story, adhesion. Surface preparation of the substrate is imperative and must be accomplished. For this, we look to industry standards and follow what is taught to us by SSPC / NACE / ISO (see Technical Note on Surface Preparation Standards). Why re-invent the wheel? These are out there and shall be followed. In addition to cleaning, you shall also create a profile so as to achieve mechanical adhesion,

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or locking to the substrate if you will. The required profile should be specified. Also, your polyurea system supplier will communicate with you on the best procedure to utilize for their material, but you shall follow and do it.

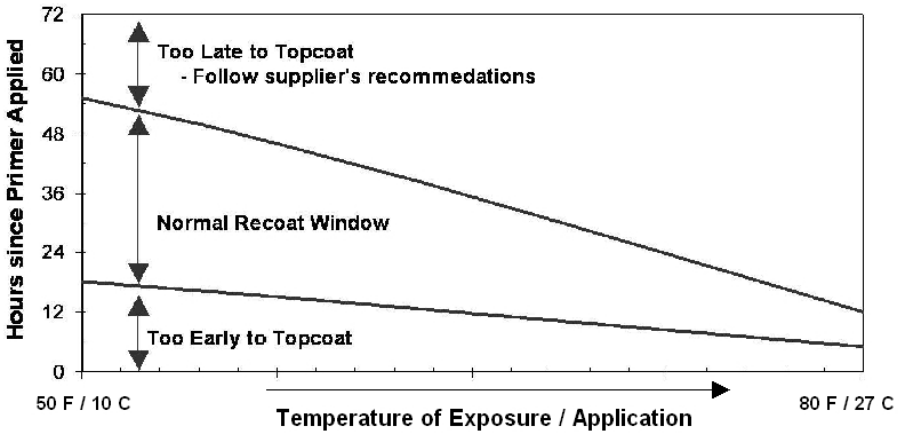
And an important note here, make sure that after any surface preparation method used, the substrate is cleaned of any dust or debris….. Otherwise….

Below are examples of polyurea systems that had blistered from the properly prepared and profiled steel substrate. However, the surface was not cleaned of residual blast media, etc, and that can be seen imbedded in the backside of the removed polyurea coating.





But you know we sometime forget that the "substrate" can also be applied primer, or a base coat of the polyurea system. Surface preparation and care here is also very important. And in the case of primers and applied polyurea, there is a very important item called **re-coat window**. This is the time in which a polyurea can be applied to the primer or first coat of polyurea and still expect adhesion and subsequent performance. For a primer, if you coat over too soon, the primer may not be cured properly and blisters will result. If you apply a second coat after this re-coat window, then poor adhesion may result.



Also, re-coat window is affected by ambient temperature. For example, a given primer system may have a re-coat window of 24 hours, at 75°F (25°C). But the same primer, if used at an ambient temperature of say 100°F (38°C), the re-coat window may only be 4

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hours. That means you shall coat over within the 4 hours after application or chances are the applied polyurea will peal from the primer. Seek advice from your supplier as to real re-coat window times for both primer and polyurea system being used. Don't guess around with this. All polyurea systems are different from this aspect.



Peeling of a secondary coat of aliphatic polyurea applied over a base-coat of aromatic polyurea. The re-coat window had been exceeded, surface preparation was not performed, and the topcoat later failed after being put back into service.

So what do you do if the re-coat window has been exceeded? Well you need to abrade the surface to cut the hard glossy appearance, wipe or scrub with a good solvent (or activator material), possible use of a primer and then apply the polyurea to the ***confines*** of the prepared area only. Now be careful here, **wipe** and **flood** are not the same! I can tell you a horror story about a project where the contractor was going to be smart and flooded (dumped a 5-gallon pail) the floor area of the applied layer of polyurea with a strong solvent and used a mop to work in. Not a good idea (and safety issue here), but at least that complete applied layer was then easy to remove and start over. Wonder what that cost was????

Now I have commonly heard that before a second coat of polyurea is applied, wipe the surface with denatured alcohol. Well, if you look at most suppliers Product Data Sheets, a common aromatic polyurea system will hold up to alcohol in a splash / spill application. So the alcohol does nothing to activate the surface, well maybe remove any oils or contaminants that may be present. Use of denatured alcohol is not a good practice. One must use a stronger solvent to activate the surface. Seek direction from your supplier!

And while there are some polyurea systems based on phenoxy resins that have been touted as "The Duct Tape Molecule," these are excellent systems, they still have a specific recoat window, and do require proper surface preparation and cleaning of existing substrates in order to achieve adhesion. Use of these is not an excuse not to properly clean and prepare the substrate prior to application.



So yes, an applied polyurea system will bond to various substrates. But the systems SHALL be properly formulated, with no extra "ad-on" for this, and proper & complete surface preparation is required! Attend a training school, this is all covered in detail and will insure successful application work.

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Additional Reading / References:

SSPC-Paint 36, “Two-Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based,” SSPC: The Society for Protective Coatings, Pittsburgh, PA.

SSPC-Paint 39, “Two-Component Aliphatic Polyurea Topcoat, Fast or Moderate Drying, Performance-Based,” SSPC: The Society for Protective Coatings, Pittsburgh, PA.

SSPC-Paint 43, “Direct-To-Metal Aliphatic Polyurea Coating, Performance-Based,” SSPC: The Society for Protective Coatings, Pittsburgh, PA.

SSPC-Paint 45, “Two-Component, Thick-Film Polyurea and Polyurea/Polyurethane Hybrid Coatings, Performance-Based,” SSPC: The Society for Protective Coatings, Pittsburgh, PA.

Coating System SSPC-PS 28.01, “Two-Coat Zinc-Rich Polyurethane Primer / Aliphatic Polyurea Topcoat System, Performance-Based,” SSPC: The Society for Protective Coatings, Pittsburgh, PA.

Note: The original version of this updated article, written by the same author, appeared on the Polyurea.com website, March 2011.

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