

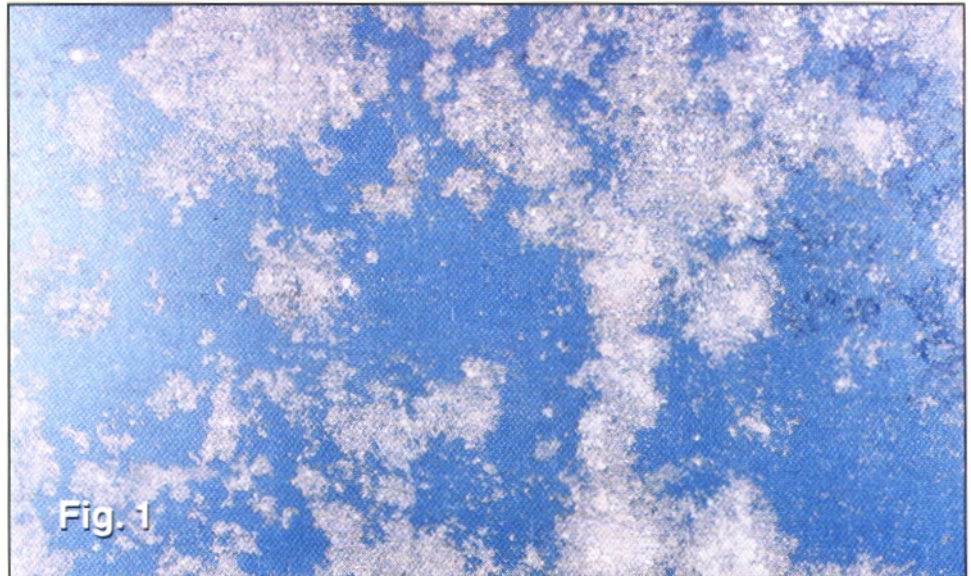
# The *ABCs* of Surface Preparation

By Dr. Lydia Frenzel

This column is for anyone who is making the transition from cleaning to surface preparation. Occasionally I miss the starting point in a presentation. Recently I missed the mark badly when I was lecturing on "Coatings Removal and discovered that the jettors I was addressing; hid only experienced scarifying concrete with blast pots or waterjetting. I "as using terms unfamiliar to my audience.

It is not unusual al for words to have different meanings in different industries. We assume that because a successful contractor has been in business for a good number of years, he has had prior experience in almost everything. We don't often start with the ABCs of surface preparation.

So, you have been using a low-pressure washer below 5000 psi (340 bar), or high-pressure equipment 5,00(1-15,00(1 psi (1020 bar)! You now have a NEW 10,000 psi or 20,000 psi or .10,000 psi (2700 bar) UHP WJ pump. Your company is ready to hit new markets. Your boss has seen this long list of things that can be accomplished with waterjetting. Clean! Clean! Clean! With this new equipment, the company can now clean concrete, take grime off of asphalt, take tile off floors, and remove rust from tube bundles.



Many industrial cleaning companies complete projects all year long that DON'T involve repainting. So, there is no need to know about the Surface requirements for repainting. Wrong. Sooner or later, you will

- remove paint from wood where there will be repainting;
- strip tile, adhesive, mastic, or floor coatings off concrete where it will be recoated; or
- take paint and rust off steel where it will be repainted.

### **Waterjetting Applications**

Removal of coatings is considered to be the largest, single potential application of waterjetting. It involves a whole set of concerns which are driven by the paint industry, not the pressure washer or waterjetting industries. In abstract terms, this process is called surface preparation, or "creating the situation so the new coating can perform as expected." Surface preparation covers a lot of territory (no pun intended). Good

surface preparation is the key to the longevity and performance of the coating. At least 70% of premature coatings failures are traced back to "surface preparation" whether referring to wood, concrete, or metal. In a commercial recoating project, the costs (and profit) associated with surface preparation are about 70% of the job. How extensive the surface preparation is will depend on the performance expectation of the owner. If this is an old barge that is to be sold immediately, the rust may simply need to be knocked off, or "light cleaning" (may need to be performed. If this is a cargo vessel expected to last 10-15 years, you will clean to "bare metal" or "white metal."

Paint manufacturers, owners, inspectors, and specification writers are very sensitive to the details of surface preparation. Even if you don't apply the paint, you will be expected to produce a surface in accordance with what the paint

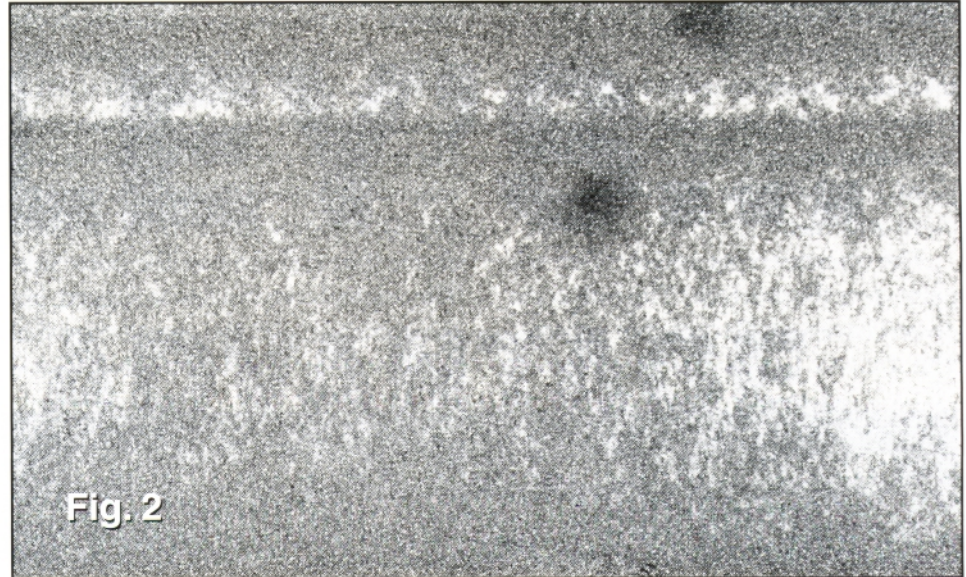
contractor expects. As the paint contractor has probably lost his share of the profit for surface preparation to you, you should not expect him to be your friend. More likely, he will be looking over your shoulder. Your best defensive position is to "know the language."

#### Components of Surface Preparation

Even though the details differ for wood, concrete, or metal, there are three parallel components:

- **Visible-how** much old paint, tape, rust, or glue remains on the surface?
- **Invisible contaminants-is** the oil, grease, chemical, salt, or wood resin off the surface?
- **Profile or anchor pattern-are** wood fibers sticking up or do they need to be sanded? Have we established a measurement from top of the peak to the bottom of the valley in steel surfaces or provided a "clean" mortar-pebble surface in concrete? The paint "needs" a pattern to adhere to. Is the pattern free from dust, loose particles, crushed mortar, or loosely bound abrasive blasting media? Are the smaller crevices filled with crushed material or are they cleaned out?

In any project, all three of these components are addressed whether you are using low pressure water cleaning (LP WC) or ultra-high



pressure waterjetting (UHP WJ) or wet abrasive blasting (WAB). If the paint is flaking and barely hanging on, a LP WC process might take it off; if the paint is tightly adherent and in good condition, UHP WJ might be needed.

Trade organizations and associations have developed extensive standards for metal and concrete surface preparation that focus on the visible appearance. The steel maintenance industry remains influenced by standards written originally for sand blasting. Since 1994, new standards for cleaning by waterjetting have been published. Many engineers and inspectors are not familiar

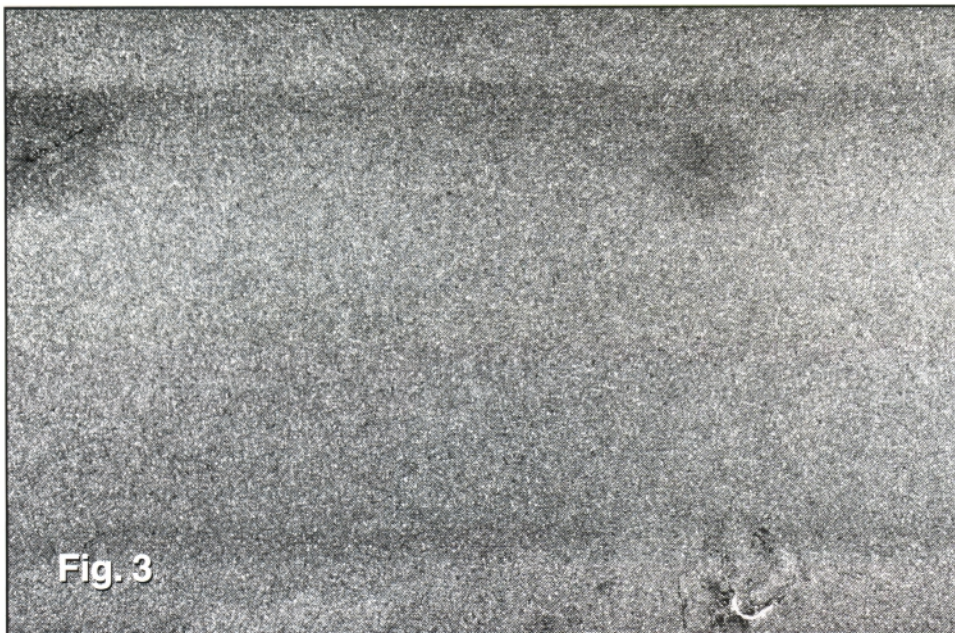
with the newer standards. As a "jetter," you will need to know these standards because you are the first line of contact for your company.

Some words sound the same but the actual physical appearance is very different. Abrasive blasting leads to a uniform appearance but waterjetting reveals every defect from heat spots to corrosion under the coating spots. (See Figure 2 and 3 white paint removal revealing heat spots under the coating.)

#### Bid Specifications

Now, let's return to the presentation where I missed the mark. We spent a lot of time looking at photos. Then we cleaned the paint and rust off a deteriorated trash dumpster. The dumpster steel substrate looked like **Figure 1-removal** of rust from condition B steel. All of the published photographs for waterjetting are of metal surfaces that have been abrasive blasted or heavily rusted. The profiles reflect the blasting or rust pattern. As the paint and rust were removed, it was obvious that the original hot-roll mill scale was present. The dumpster's appearance was like none of the "standard" photos.

Cleaning with water or water-abrasive systems, in my opinion, produces a surface superior to dry physical methods alone. The UHP WJ effectively removed all the soluble, continued on page 44



## ABC's of Surface Prep...

*Continued from Page 43*

invisible contaminants (old food, salts, chemicals, and any wet trash) from the rusted areas. It removed all of the paint. It revealed the profile under the paint and rust.

The question was asked, "Can we paint over that surface? The mill scale doesn't have a profile or anchor pattern." The answer is that has to be determined

in the bid specification documents. Read the bid specification carefully. The bid specification SHOULD address each of the three components, but many do not. The dumpster was originally painted without a surface profile. Dumpsters get a lot of physical abuse that will remove the paint fast. The original construction is rugged, but inexpensive, with the expectation that the dumpster may be painted several

times during its lifetime. The most likely answer is the dumpster will be painted again over the mill scale.

In fact, on many older steel structures, the paint was applied over mill scale without blasting. The refurbishing specification MAY call for leaving on the intact paint or intact mill scale and only critically cleaning the rusted areas where various salts and chemicals, road dirt, and grime could contact the metal. The idea is that the mill scale has been on for 80 years, so why touch this area. Let the mill scale continue to protect the metal. The bid specification MAY also be written to "establish a profile of 1-2 mil where mill scale is encountered." The coatings manufacturer plays an important role in determining whether or not the mill scale can remain in addition to the dollar amount of the contract.

The bid specification should be read carefully. It can be an economic disaster on a coatings removal project for a contractor to get on the job and then discover that the owner-engineering firm-specifier expected existing mill scale to be removed. Your estimator should ask the question in the pre-bid process and *get an answer in writing.*

### Closing Thoughts

Removal of coatings is considered to be the largest single potential application of water jetting. Surface preparation, or "creating the situation so the coatings can perform as expected," is driven by the economics and expectations of the owner and the coatings manufacturer. Know your "A, B, C's of surface preparation" visible contaminants, invisible contaminants, and profile." When you try something new, you want to be sure that you understand how to go about it because understanding the process will enhance your bottom line.

*Lydia M. Frenzel, Ph.D., is executive director of the Advisory Council. She is an industry resource and works as a proactive advocate for emerging technology. She shares her knowledge and experience through custom courses, educational modules and presentations.*

## Photos and Standards for Surface Preparation

by Dr. Lydia Frenzel

Magazines: *CleanerTimes*, February 2001, p. 52.

- General information books available through SSPC:

- *Good Painting Practice*, a two volume set covering abrasive with a small section on waterjetting.

- *Surface Preparation and Coating Handbook*, NSRP 0412, June 1994, (has no copyright).

Concrete Surfaces:

- NACE No. 6/SSPC-SP12 "Surface Preparation of Concrete."

Written Standards for Waterjetting:

- NACE No. 5-SSPC, SP-12, WJ-1 "Clean to bare Substrate."

- WJ-2 "Very Thorough or Substantial Cleaning."

- WJ-3 "Thorough Cleaning."

- WJ-4 "Light Cleaning."

Written Standards for Abrasive Blasting:

- SSPC SP-5/NACE No. 1 "White Metal Blast Cleaning."

- SSPC SP-10/NACE No. 2 "Near-White Metal Blast Cleaning."

- SSPC SP-6/NACE No. 3 "Commercial Blast Cleaning."

- SSPC SP-7/NACE No. 4 "Brush-Off Blast Cleaning."

- SSPC SP-12/NACE No. 8 "Industrial Blast Cleaning."

Photographs for Abrasive Blasting:

- SSPC VIS-1

- Clemco Inc., Washington, MO, or Clemtex, Inc., Houston, TX, "Standards of Surface Finish."

Photographs for Waterjetting:

- SSPC-VIS 4 (I) NACE No. 7 "Interim Guide and Visual Reference Photographs for Steel Cleaned by Waterjetting." • Schiffbautechnische Gesellschaft, e.V., text in English; STG Guide No. 2222, "Definition of Preparation Grades for High-Pressure Waterjetting, without Addition of Solid Abrasives; of Corroded and Coated Steel Surfaces, at Different Initial Conditions," (Hamburg).

Photos and Text for Waterjetting:

- The Advisory Council offers three volumes of pictures and text covering removal of paint, stain and discoloration, and profile adhesion.

- *Journal of Protective Coatings and Linings, JPCL*, January 1995, "Visual Standards for Wet Blasting" developed by International Paint.

The following can be obtained from technical representatives:

- Hempel: "Photo Reference for Steel Surfaces Cleaned by Water Jetting."

- International Paint: "Hydroblasting Standards."

- Jotun-Valspar: "Degrees of Flash Rusting."

- Hammelmann: *HAMS Guide*, "How Hammelmann Achieves Metal Surface Standards with UHP Water Jetting Systems." This combines information from NACE, Hempel, and International Paint

- NLB Corp.: "Surface Preparation with High Pressure and Ultra-High Pressure WaterJetting," 1997, includes full size photos of coatings removal.