

# Problem Solving Forum

## THIS MONTH'S QUESTION

**When using a vacuum reclaiming steel grit blast system, we often find a residue on the surface referred to as "smut." Some of this contaminant remains on the surface (in the profile) even after repeated vacuuming. I have heard individuals state that it is magnetic dust; others claim that the material is held on the surface by a static charge. Is there a method of eliminating this problem? If permitted to remain on the surface, how much is acceptable and what effect will it have on coatings in immersion service? Are there any documented failures due to this condition?**

—submitted by  
**Jack Oeschle of  
Spec Worldwide**

**From H. W. Hitzrot  
of Chesapeake Specialty  
Products  
Baltimore, MD:**

Surface residue, or smut, does not occur only when vacuum reclaiming of steel grit. Surface residue or smut can occur with all types of abrasive.

Millions of tons of steel are blast-

cleaned with vacuum-reclaimed abrasive without creating a surface residue or smut problem.

Blast residue or smut develops from mill scale, rust, and coating fines produced by the blast-cleaning process. These fines will settle on adjacent surfaces if there is insufficient air circulation to pull the fines out of the area being blast-cleaned. This problem is compounded if the relative humidity is very low and the fines become electrostatically charged. The airborne fines then cling to the blast cleaned surface.

Smut generation is further compounded if the abrasive reclaiming system does not adequately remove fines from the reclaimed abrasive. On blasting, recirculated fines combine with abrasive fines to increase the smut generation problem.

To solve the residue or smut problem, I suggest the following actions.

- Maintain a good flow of clean air through the area being blast cleaned (at least one air change every five minutes).
- The abrasive reclaimer should be designed to remove all dust, scale, paint, and other debris so that only clean abrasive is recycled to the blaster.
- Relative humidity in the blast area should be below the dew point but not so excessively low as to create electrostatically charged particles.

If the smut is essentially mill scale and fine paint, it is relatively inert and should create no coating problems. Furthermore, smut is extremely fine, in the micron to submicron range, and will be assimilated into the coating system as if it were a part of the coating pigment.

To summarize: Smut can be eliminated by adequate ventilation, good abrasive cleaning during reclamation, and maintenance of a relative humidity in the blasting area that is below the dew point but not excessively low. If the steps outlined above are followed, then the coating system should not be affected by any trace residue left on the surface.

**From David Hale of  
Ervin Industries, Inc.  
Ann Arbor, MI:**

From the description of the problem, it appears that dust has been allowed to accumulate on the grit operating mix and has redeposited on the surface. The vacuum reclaiming system must include an abrasive separator or air washing system that is capable of removing all rust, dust, paint chips, mill scale, and abrasive fines from the used abrasive before it is reused for blasting. Any dust or paint particles are very small and light, and when they remain in the recirculated abrasive, have a tendency to redeposit and cling electrostatically to the surface, and may even be peened into the surface. Vacuuming would remove most of the loose portion, but could not remove the portion that would be peened into the surface.

This is not an uncommon problem, but properly set up and maintained separators are more than capable of removing all of this contamination so that redeposition need not be a problem. An ounce of prevention is worth a pound of cure.

Also, there is a very different appearance of steel blast-cleaned with steel grit as opposed to surfaces cleaned with sand. This is due to a higher light reflectance from the finer texture and imbedded sand particles, which cause the sand-blasted surface to appear much whiter. Whiter is

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*This "Problem Solving Forum" provides the readers of the Journal with a number of answers to difficult technical questions. Answers are provided by experts in the particular field being discussed. The discussion about the question will not necessarily stop at the time the answers are published, however; for at the end of the "Forum" each month, readers' comments regarding the answers provided to previous questions will be published. In this way, the Journal will promote a long-term exchange of ideas and opinions regarding problems faced by the users of protective coatings and linings.*

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cleaner in the minds of many people.

SSPC-SP 10, (1985) Near-White Metal Blast Cleaning, Section 2.2, says that stains may remain on no more than 5 percent of the surface, which also may create an illusion of "smut" remaining on the surface.

## From Dwight Lutsko of Jet Wheelblast Equipment Adrian, MI:

Normally, the wheelblast manufacturers concern themselves with abrasive removal/recovery in a very big way. If we did not, our equipment would run out of abrasive and starve the wheels.

Our normal method of removing abrasive consists of brush or blow-off or a brush and blow-off combination. With either of the above, some of the smut can be removed from the surface, but never 100 percent.

We have found a couple of schools of thought through polling our customers.

- The people who apply red oxides or zinc-rich primers tend to use brush and blow-off and coat the remaining smut on the surfaces being protected.

- Parts coated with E-Coat systems all go through elaborate washers, some as much as 7-stage units for smut removal and for insuring bonding through phosphate applications.

Smut appears to be magnetic dust that is statically charged. It is comprised of broken down abrasive, mill scale, etc. The static charge seems to dissipate rather quickly as it moves down the conveyors, especially in the areas on the bottom or contact faces.

When washers are being used, the smut definitely has exhibited oily characteristics.

I do not think anyone could guarantee 100 percent removal by any means, brush, blow-off or vacuum.

Coatings manufacturers are best able to judge the effect of smut on coatings performance, but our company is not aware of any documented failures at the present time. ■

We invite your participation in "Problem Solving Forum."

- Comment about the question on the existence of "smut" when recycling steel abrasives, or about the answers provided. Responses will be published in upcoming issues.

- Submit a question about a difficult problem involving coatings and linings. It may be selected for consideration by a panel of experts in a future issue of the *Journal*.

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*Send comments and questions to Kenneth A. Trimmer, Forum Editor, Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.*

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