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July/August 2002 | Energy & Technology | Vol. 24 No. 8

Workplace Tips

Getting The "Sand" Out Of Sandblasting

Think of how many people approach abrasive blasting as a generic process. To them, abrasive blasting is "sandblasting," where "sand" (as found on a beach) is sprayed through a nozzle to remove a coating or etch a surface. Today, sandblasting is referred to as "abrasive blasting" because the emphasis is on the word "abrasive." Much of the development work in this area for the past few decades has not been on the equipment but, rather, on the abrasives themselves.

Twenty years ago you could count the number of different types of abrasives on two hands; today it would require considerably more. Abrasives today range from steel (ferrous, stainless or conditioned) to silicon carbide, from plastic (be it melamine or urea or polyester) to aluminum oxide (pink, white, brown), from glassbeads to slag materials (copper, coal, etc.), from agricultural products (walnut shells, crushed corn cobs, apricot pits, etc.) to a myriad of starches and composite materials, from grits to shots... and these are just some of the commercial grades. Each of the different types of abrasive products provides its own unique characteristic of cutting capability, economy, and profiling ability, with a slight degree of overlap as one goes from softer to harder abrasives, weaker to stronger abrasives, and smaller to larger abrasive sizes. As you can imagine, things have come a long way since "sand" was considered the primary abrasive over 75 years ago (point of fact: due to its high silica content, "sand" must never be used for sandblasting operations).

With all of the work being done to develop new abrasives during the past 20 years, there are three that stand out due to their unique characteristics and those specific applications where they are particularly effective. We call these abrasives "niche" technologies due to their singular type of effectiveness and radical departure from the conventional.

Dry Ice

Available in pellet or block form, Dry Ice does not rely on kinetic energy as the motive force, as all other abrasives do. Dry Ice is solidified carbon dioxide (CO_2) that benefits from a process called "sublimation" (going directly from the solid state to a gas, thereby bypassing the liquid phase). When Dry Ice sublimes it experiences a roughly 800-to-1 volumetric expansion in going from the solid to gaseous phase. A Dry Ice particle, whether in the form of a pellet or shaving (from a block of Dry Ice), will instantaneously experience this expansion when it is accelerated from a nozzle and hits a surface. This volumetric expansion of each particle provides most of the energy for removing coatings, multiplied by the number of particles contacting the surface per unit of time. Dry Ice produces very good results in what are considered "light duty" blasting applications, and where low-temperature embrittlement of the working surface can aid the stripping process. One huge added advantage... there is no abrasive to clean up or recover, since it all turns to a gas. Therefore, in some applications, the equipment can be installed in-line as part of the process since it will yield little to no foreign contamination. Two simple precautions, however, must be exercised in using Dry Ice for blasting: (1) Dry Ice is -110°F and must be handled accordingly, and (2) CO_2 is approximately 50% denser than air, so adequate ventilation and make-up air must be maintained when working in enclosed spaces. Particularly good applications for Dry Ice include the removal of mold release in plastic and rubber molding operations (... works best in a hot mold rather than a cold one, and can be done in the molding press itself), the cleaning of inks and residues from printing presses and other complex machinery, the cleaning of food residues from automatic food processing machinery (when readily available FDA-approved Dry Ice is used), and the removal of lightly adhered paints and coatings in a variety of settings.

Sponge Material

Sponge material is exactly what it says it is... sponge, or more technically, an open-celled polyurethane material used either as-is, or impregnated with various types of conventional abrasives. Originally developed for blotting oily residues from surfaces and removing soot from fire-damaged buildings in restoration projects, sponge materials today have evolved into a family of products with broad applicability. The two major characteristics of sponge materials are (1) minimal rebound resulting in minimal jobsite containment and encapsulation requirements, and (2) low levels of dust generated. Sponge is available in a variety of forms, ranging from plain sponge, as in its original form, to sponge impregnated with abrasives such as plastic, Dupont Starblast® aluminum oxide, and steel grit, to provide ever-increasing levels of aggressiveness in the coating removal process. These impregnated abrasives can provide particularly interesting results due to the various hardnesses of the abrasive materials embedded in the very soft sponge particle. As a result, by varying the type of impregnated sponge used and the blasting parameters, one can achieve varying degrees of coating removal and substrate profiling to suit a wide range of applications, from industrial products to commercial building/structure restoration. All of the grades of sponge material are recoverable, and can be recycled in the blasting process, typically, six or more times, adding further to its utility and economy.

Bicarbonate of Soda and Kieserite

Bicarbonate of Soda is a chemically benign material based on baking soda with additional ingredients added to promote flow in a blast pot. Kieserite is also chemically benign, and is a naturally occurring mineral mined primarily in Europe. The two major and compelling advantages of both these materials are (1) they are both water soluble (i.e. they dissolve in water) in order to minimize waste material, and (2) they are relatively soft. Both abrasives can be applied either dry or with a water mist injection system; the latter, however, is the preferred method in order to (1) keep dust levels down, (2) promote the dissolving of the abrasive, and (3) introduce additional products such as degreasers or rust inhibitors to the process in those applications where these are required, thereby combining two steps into one. Due to the soft nature of the materials (BiCarb is about 1/2 the hardness of conventional abrasives, and Kieserite is about 1/3), they are particularly good in removing coatings from soft or delicate substrates in both industrial and restoration applications, and are used rather broadly for removing graffiti. BiCarb is also available with non-soluble additives, such as aluminum oxide, when more aggressive blasting is required. Both materials have gotten considerable "press" for their use in the cleaning and restoration of several historic sites, such as the Statue of Liberty. One note of caution, however... BiCarb has a pH of approximately 8, making it injurious to certain types of vegetation (adequate care should be exercised); Kieserite, on the other hand, is pH neutral.

It should be noted that all three of these "niche" technologies cannot be used in conventional blasting pots, and require special blasting equipment in order to be used. This, however, is a small price to pay for the unique benefits each abrasive can provide. It should be noted that, as with all abrasives, their range of applications is narrow... there is no such thing as a "universal abrasive." As long as the user stays within the prescribed application range, these abrasives will provide exceptional performance, utility, and economy.

Contact the Dawson-Macdonald Co. in Wilmington, MA (tel: 978-988-8034, fax: 978-657-8740, e-mail: info@dawson-macdonald.com, website: www.dawson-macdonald.com) for more product information, or information on equipment rental programs covering all of the above "niche" technologies.