Back to Basics: Choosing the Right Media

Got a question about shot peening, abrasive blasting, or sample processing? Herb can help.

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Over the past few months, we've all become painfully aware that bullish times are behind us for a while. And thanks to this new cycle, we recognize that along with it comes the need to think differently. We need to make better choices because the choices we make do matter. We're all trying to do more with less and to figure out how to be more efficient. This new way of thinking has a lot of relevance to the blasting business.

For the purposes of this article, we'll take for granted that our customer is going to choose the right equipment, which will be a blast cabinet or blast room—although some customers may need to be reminded that an efficient operation requires efficient equipment as well as an efficient process to deliver the benefits to the bottom line. Buying the least expensive equipment is not always the economical choice. And something as simple as choosing the right media for the job can make an enormous difference.

Every once in a while, it doesn't hurt to revisit even the most basic of principles, and I think now is an appropriate time. How do we choose the right media? Because the sizes and types of surfaces to be blasted are varied and range from small medical devices to enormous earthmoving equipment components, media is not one-size-fits-all. The important considerations are:

- The surface, its composition, hardness, etc.
- The goal of the surface treatment process—paint removal, rust removal, improving surface appearance, shot peening, prep for painting, plating, or bonding.
- The shape and size of the surface.
- The specific requirements of the process that will follow blasting, such as the profile necessary for a specific coating.

Blast media come in many types, sizes, and shapes, all of which are appropriate in different circumstances.

Type:
Media ranges from natural, non-aggressive, soft material to manufactured plastics, glass beads, steel shot, steel grit and aluminum oxide to extremely hard and aggressive silicon carbide.

Size:
Media size is measured in standard sieves, and is described as certain mesh sizes. Mesh refers to the number of openings per square inch in the sieve. The higher the mesh number, the smaller the particle. Media size can also be expressed in microns. Micron refers to the actual size of the particle, so the higher the number the larger the particle. Some media manufacturers label the material in a range of sizes, for example, 20/40 mesh, which will include mostly particles within the specified range, with some particles larger, and some smaller.

For most applications, a working mix of media is used to achieve the desired result. This working mix represents the average media size that results from adding new media to media that has been through a number of cycles. The blast process fractures particles upon impact with the surface, breaking them down to a smaller size. The smaller size will carry less force to the surface and produce a different finish. So, to achieve good results, companies will closely monitor the surface and establish a process to add a certain amount of new media at determined intervals.

It's important to note that larger particles do not necessarily do the job faster. They may cut more deeply or produce a greater indentation, but there will be

Abrasives Characteristics Comparison

Material	Mesh Size	Shape	Density lbs/ft^3	Mohs	Friability	Initial Cost	No. of Cycles	Per Use Cost	Source	Typical Applications
Sil. Sand †	6-270	✸	100	5.0-6.0	high	low	1	med.	nat.	Outdoor blast cleaning
Min. Slag	8-80	✸	85-112	7.0-7.5	high	med.	1-2	med.	b-p	Outdoor blast cleaning
Steel Grit	10-325	✸	230	8.0	low	high	200+	med.	mfg.	Removing heavy scale
Steel Shot	8-200	●	280	8.0		high	200+	low	mfg.	Cleaning, peening
Al. Oxide	12-325	✸	125	9.0	med.	high	6-8	med.	mfg.	Cleaning, finishing, deburring, etching
Silicon Carbide	12-325	✸	110	9.5	med.	high	5-6	med.	mfg.	Surf. prep on extremely hard substrates
Glass Bead	10-400	●	85-90	5.5-6.0	med.	med.	8-10	low	mfg.	Cleaning, finishing
Plastic	12-80	✸	45-60	3.0-4.0	low/med.	high	8-10	med.	mfg.	Paint stripping, deflashing, cleaning
Wheat Starch	12-80	✸	45	3.0	med.	med.	12-15	high	mfg.	Paint, adhesive removal; composites
XL-Corn Hybrid Polymer	16-60	✸	45	3.0	low	high	14-17	med.	mfg.	Composite paint removal, adhesive deflash
Corn Cob	8-40	✸	35-45	2.0-4.5	med.	low	4-5	low	b-p	Removing paint from delicate surfaces

✸ = Angular ● = Spherical nat. = Natural b-p = By-product mfg. = Manufactured

† Consult OSHA regulations before using silica sand as a blast abrasive.

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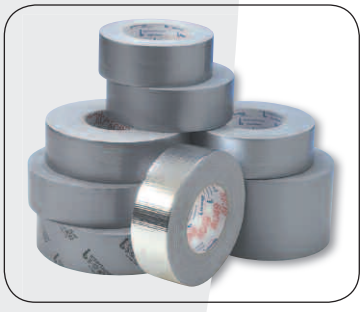

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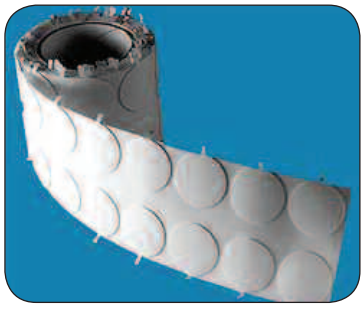

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fewer particles exiting the nozzle or blast gun and hitting the surface, producing areas that are not blasted.

Just as I do in the lab, you should try a variety of sizes to determine what produces the results you are seeking.

Shape:
Media shapes vary and produce different surface effects. Round particles for shot peening create a dimpled effect, and when used for cleaning, do so by impact. Angular particles make defined peak-and-valley patterns, and actually clean by cutting the surface. Angular media may have a variety of configurations, varying in aggressiveness. Other media are oblong.

Density:
Density refers to the mass of the particle or the weight for a specified dimension, usually cubic foot. Glass beads are about 90 pounds per cubic foot, yet steel grit weighs 250 pounds for the same volume. It's true that among the varying media characteristics, density is frequently less important; however, it is critical to match the media to the substrate, as dense media on a thin substrate will distort the surface, damaging it.

Friability:
The friability characteristic has to do with the breakdown rate, which dictates the number of cycles or wear life of the media. The friability of media can be determined by its composition, hardness, and brittleness. Most manufactured media is recyclable. Glass bead, aluminum oxide, steel, and plastic are reusable. Natural media, such as sand, is so friable that it pulverizes in its first pass, creating an extremely dusty work chamber. For this reason, it becomes immediately obvious that sand is a poor choice for blast cabinets and rooms. For safety sake, silica sand should not be used for blasting, due to the free silica that is released upon impact which can cause a fatal lung disease.

Hardness:
The hardness of the media affects its friability as well as its effect on the blast surface. Most media are hardness-rated on the Mohs' scale, which goes from soft, rated 1 (talc), to hard, rated 10 (diamond). Plastic media is rated between 3 and 4; glass bead about 5.5 to 6; steel grit or shot is about 8 (usually measured on the Rockwell C scale); aluminum oxide between 8.9 to 9.2; silicon carbide is about the hardest, coming in around 9.5. The application will dictate whether you want to choose a media softer or harder than the surface being blasted. Media softer than the substrate will not alter the surface. Whereas, media harder than the substrate will alter the surface.

Wear Life:
It is very difficult to make any definitive statement about the number of uses for particular media, because so many factors affect wear life. These factors include air pressure, surface hardness, stand off distance from the part surface, operator skill, angle of impact and most importantly, the efficiency of the reclaiming equipment. Inefficient equipment or improper air flow can send perfectly good media into the dust collector. The chart that accompanies this article lists a general estimate of the number of uses, but a reputable media supplier or firsthand experience will prove to be your best reference.

As you can see, there are many reasons why one media is better than another for a particular application. And it is crucial to carefully evaluate your needs, make sure your compressor and reclaiming equipment are efficient and operating as designed, and your operator is well-trained. Media is a consumable and sometimes quite costly; therefore, ensuring you choose well and get as many uses from it as possible will save you time and money. There's no time like the present to check out your operation and make sure you are operating at peak efficiency.