Back to Basics: Cabinet Selection

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

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Especially these days, companies carefully evaluate each and every capital expenditure, hopefully considering value and the long lifecycle of this important industrial product. Many of our cabinets, sold more than 30 years ago, are still going strong and we attribute that longevity to good decision-making on the front end and, of course, to good, consistent maintenance practices. But good maintenance is a topic for another day. Blasting fits into a variety of industrial processes, and its role varies from customer to customer and application to application. Some customers blast a few hours a week; others three full shifts per day. Either way, making the right decision is important. It may not be obvious that buying a blast cabinet can involve a complex decision-making process.

What are the basic decisions in selecting a cabinet? They involve the anticipated use of the cabinet, the parts to be blasted, the size of the parts, the weight of the parts, how frequently the cabinet will be used, the media to be used, etc. You might think that the first consideration is the size of the part and the cabinet to suit it, but that's not really the case. The primary consideration involves the application. It is the application that impacts the size and characteristics of the enclosure in several ways.

The Application

Suction blasting is best for light-duty cleaning, deburring, or deflashing on thin or delicate substrates and for smaller parts that will likely be manually manipulated. Suction blasting involves lower air/media delivery velocity, which makes it suitable for light-duty blast applications with glass beads, aluminum oxide, and other media in finer to medium mesh sizes.

Pressure blasting is best for larger parts or for removing durable, tightly-adhering coatings or heavy corrosion. Pressure is also needed for blasting small, deep holes, often with a probe or side-angle deflection tip. Surface preparation applications, which call for deeper surface profiles for coating, bonding, or plating call for pressure blasting. Pressure blasting is best for these types of applications where the velocity of suction blasting is insufficient.

Enclosure Size

Blast cabinets enclose the blasting environment to provide efficient blasting while maintaining a clean surrounding work area. Production rates are influenced by the size of the nozzle or air jet, compressor output, type and size of blast media, as well as angle and distance of the nozzle from the blast surface. Rules of thumb exist to guide enclosure sizing based upon allocation of free space around the part. That distance surrounding the part allows the operator to have full view of the part and be able to manipulate it as needed to blast and blow off all necessary surfaces. The size of the enclosure depends upon which mode of blasting is chosen: suction or pressure.

How Suction and Pressure Impact Enclosure Size

Once the application considerations are noted, the enclosure size can be determined.

In suction systems, a smaller enclosure compared with the part size can be chosen because the suction blast gun is held relatively close to the part, usually 4 to 6 inches, due to the low air/media velocity. With that distance in mind, we normally suggest that it is most efficient to have a clearance around the part of about 16 inches. With small parts, suction blasting is more forgiving when occasionally blasting the gloved hand, though even suction blasting will wear holes in the gloves over time.

In pressure systems, the nozzle to surface stand off distance must be greater, approximately 12 to 14 inches, to take advantage of the larger blast pattern and increased power generated by greater media velocity. Pressure blast systems use larger hoses and deliver more media, providing 300% to 400% higher production rates compared with suction blasting. We generally recommend a distance of 30 inches around the part when choosing pressure-blast systems.

Other Considerations - Utilities

Suction systems operate using the induction principle, the creation of a vacuum from the movement of compressed air through an air jet and nozzle that draws media through a hose

from a non-pressurized container. These systems are characterized by two hoses connecting to a blast gun, one hose delivers compressed air to the gun; the other transports media from the receptacle. In the gun, the air and media mix and together they exit the nozzle. In suction systems, blast media travels at lower velocity, estimated at 136 mph at 80psi. Along with lower velocity when compared with pressure-blast systems, suction systems consume less compressed air. For example, at 80 psi with a 3/8" nozzle and 3/16" air jet, a suction system consumes 48 cubic feet per minute of compressed air.

Pressure systems utilize a pressure vessel to contain the blast media. When the operator steps on the foot pedal, compressed air enters the blast machine and blasting begins. Theses systems are characterized by a single blast hose with a pressure-blast nozzle as the air and media delivery system. Pressure blasting velocity is averages 450 to 500 mph at 80psi, three to four times that of suction blasting. With the increased velocity and production, the volume of air increases. At 80 psi and a 3/8" nozzle, pressure systems consume 161 cubic feet of compressed air per minute.

Pressure blasting is used for tough cleaning jobs and paint stripping of tightly adhered coatings. Typically, pressure blasting performs four times the work of suction blasting in the same amount of time. But as illustrated in the air consumption examples, pressure systems require a larger compressor, consume more air, more media and consequently require more maintenance.

Shot Peening to a Specification

The considerations for choosing suction or pressure systems in shot peening applications are entirely different. Shot peening in certain industries, such as aviation, automotive, power generation, and others often involves strict adherence to written specifications to achieve exact, consistent, repeatable results. The size of the shot governs which type of system can get the job done. When using up to 230 mesh shot, suction systems will generally be acceptable. When using larger shot sizes, pressure systems will provide more consistent results. Pressure systems are required in shot peening applications involving small holes or restricted areas.

Try Before You Buy

We offer in-house sample processing as do our better distributors. Sample processing is the ideal way to determine which system will be right for your application. Your local distributor can guide you through the decision-making process, taking your application and any budget or location constraints you may have into consideration.

Think Long Term

It's always best to try to anticipate your future; and while that's not always easy or even possible, it is one very important consideration for any investment you make. Rather than live with a hastily-chosen product, take the time to work through the proper decision-making steps. That will pay off for you and your company for a long time to come.