



Technical Information

Abrasive Blasting of Automotive (and other) Parts Shop Equipment Requirements

There is no other surface preparation method which is more useful, more efficient or more economical than abrasive blasting. Before you attempt abrasive blasting, there are many things you should consider.

Until the book is finished, this 3 page paper will have to suffice. First: If you read nothing else, read and understand the following:

Abrasive blasting of any part or surface other than castings with an abrasive which is harder than that part or surface will cause some distortion of that surface. Yes, that sounds severe, and probably contradicts everything you have ever heard about sandblasting. One more basic: Sandblasting is now called abrasive blasting. In my opinion, sand (silica) is never used by anyone who knows what they are doing.

Abrasives:

There are many types and sizes of abrasive used for blasting; I have blasted with most of them, including walnut shells, corn cob shells, rice hull ash, fly ash, sugar (yes, table sugar), Portland cement, crushed lava, olivine sand, aluminum oxide, staurolite, boiler slag, copper slag, nickel slag, CO₂, dry Ice, baking soda, plastic media, glass beads, steel shot & grit, garnet, silicon carbide, and, yes, 35 years ago I used silica, not knowing its' hazards.

To further complicate matters, blasting media comes in sieve sizes of Very fine (#600) to Very coarse (#8) Sieve sizes represent a screen with holes of varying sizes, indicating the size of the hole; #8 grit is a 1/8" hole 180 grit 1/180"holes, etc. Think of grit on sandpaper... same rating scale. The size of the abrasive should never exceed more than one third of the nozzle diameter.

The hardness of these materials is rated on the Mos scale of 1-10; 1 being talc, and 10 being diamond. For reference, soda and walnut shell 3, glass is 6, plastic 3-4, garnet 7-8, silicon carbide 9. Why is hardness important? The media, grit, abrasive, (I will call it abrasive) you call it must be harder than the surface to be removed. If you want any profile (roughness) on the blasted surface, the abrasive must be harder than the surface to be blasted. If you put any profile on the surface, you slightly alter the molecular structure of that surface.

Proper selection of abrasive, blast pressure, angle of blast and distance between nozzle and surface all contribute to the results produced. Metal castings, fabricated heavy metal parts, car rims, and suspension components can be safely blasted with a hard abrasive. In our blast room, we use 60 mesh garnet, which produces from _ to 2 mils of profile and will remove rust and paint from anything.

I generally refuse to blast flat sheet metal parts, with very few exceptions. Edges of car doors, areas around window frames with windows removed, floor pans; in other words, things that will not significantly change shape from warpage. Years ago I formed a replacement top for a '53 Ford truck. I started with a piece of #18 gauge sheet metal roughly cut to size, and blasted around the edges on one side with steel shot warping the metal in a controlled pattern until it matched the old piece. Blasting one side of a piece of sheet metal stretches that side. Heat, as some think, is not the cause of warpage!

Baking soda is softer than sheet metal, glass or chrome. I have blasted automobiles to remove paint, and could see the original grinding marks from the factory. Caution; Baking soda will damage plastic. and It can warp aluminum if too high a pressure is used. It will also corrode electrical parts.

Glass beads are generally used in a blast cabinet for blasting of non ferrous (aluminum or brass) parts which are not going to be painted afterwards. It does not leave the best profile for painting, nor is it the best choice for removing paint. I use glass beads to blast engine valves (not the stems), threaded parts, fittings, etc. I like to blast head bolts to relieve stress and smooth the threads for more consistent torquing. I use garnet for most other parts.

Blast equipment Selection:

Abrasive blasting equipment comes in many flavors. Pressure pots range from capacities of 25# to 40 tons. You can find 25-50# pots in mail order catalogs for less than \$200. A typical contractor's 600# pot will be in the \$3,000 range. A decent hobbyist pot with a 100# capacity and a simple control system will be in the \$500 range. A better option may be a high quality suction feed blaster such as the MSI "Bucket Blaster" in the \$200 range. Suction feed blasters can be found in the \$20.00 range.

Abrasive blast cabinets have a similar range. Heavy duty large cabinets including dust collectors can cost over \$15,000, while on the other end, you can build your own for less than \$100. Again for comparison, the cabinet found in most repair or machine shops will be in the \$1,800 range.

Cabinets over 48" wide usually do not make sense since your range of motion through the gloves is limited. If you regularly blast objects over 36" long, you should consider a blast room.

Any blast cabinet or blast room must have some provision for removal of dust from cabinet interior. Simply venting or blowing dust to the outside of the cabinet is obviously not the best solution. Normally the answer is a dust collector ranging from a cheap shop vac to a pulse jet bag house. Dust collectors are high volume, low static pressure (vacuum), vacuum cleaners are low volume high static. Vacuums are a cheap fix for small cabinets. True dust collectors use either a bag or cartridge filter with some means of removing the dust "cake" from the surface of the filter media. This can be either a manual mechanical shaker on small to medium collectors, to an automatic pulse jet system on large collectors. A pulse jet uses a burst of compressed air blown backwards through the cartridge or bag to dislodge the cake. Air from the "clean" side of the filter is exhausted back to the atmosphere. There are many ways and opinions as to the proper size (CFM) for a dust collector.



Primary considerations are size (cubic volume) of cabinet or blast room, and level of dust loading anticipated. Obviously, if you are blasting precast concrete in a small room using a large volume nozzle you will need a higher dust collector volume than you would to blast surface rust from new automotive parts. A few common rules for sizing dust collectors are 9 air changes per minute or 125 feet per minute through a room. Do the math:

1. A cabinet 36" x 24" x 30" has a volume of 15 cu ft; $36 \times 24 \times 30 = 25980$ cu in divide by 1728 (cu in per cu ft) = 15; $15 \text{ cu ft} \times 9 = 135 \text{ CFM}$

2. A blast room 8' x 8' x 10' has a volume of 640 cu ft; $8 \times 8 \times 10 = 640$ cu ft. assume dust collector on one end of 10' long booth, air inlet on other end; $640 \times 9 = 5,841 \text{ CFM}$. recalculate this increasing width from 8' to 10' and see what happens.

OK, with the theory and math out of the way lets get back to the question that has preoccupied you while reading this: how much will it cost ME to get set up????? Ironically, it is not that complex, and now you know enough to avoid the mistakes made by most people who set up a small blasting operation. The following guidelines should make the process easy.

Budget and selection of equipment.

The good (or bad) news...and most difficult question is: "How much do you want to spend?" or "how much can you invest?"

The following is for the serious hobbyist or small shop: An investment of approximately \$5,000.00 will buy equipment that will probably meet your needs for the next 20 years

That investment would cost you a mere \$250 per year, or \$.68 per day! Less than the cost of a beer or a Coke a day! Borrow the money from your kid's college fund or your life insurance if necessary!

Air Compressor: If you are a serious hobbyist or have a small motorcycle shop, or a small machine shop or whatever, you are probably not ready for a \$50,000 operation. If your shop is in your home, you have a major limitation in that you probably have single phase electrical power which will limit you to a maximum of a 10 HP air compressor, probably 5 HP. A typical industrial 5 HP compressor will produce approximately 17 ACFM of air @ 175PSI You do not need 175 PSI! There are single stage compressors specifically built to produce larger air volume @ 100 PSI. You will not find these at your local big box store. The best investment you can make is an industrial 5 HP compressor on an ASME 80 gallon receiver. If you cheat here, the rest does not matter! Your cost, approximately **2,000.00**.

Dryer: Next, invest in a good refrigerated air dryer. Low maintenance, plugs into a wall outlet, quiet, and you will NEVER see water in your air lines again. tools will last longer, Paint jobs will not look like they were done with a garden sprayer. Blasted parts will be clean and mud free. Cost: **\$1000.00**.

Blast cabinet: If you are ready to take the leap, I suggest a good quality 36" (or 48") x 24" x 30" cabinet with a 150 CFM bag type dust collector. This will set you back approximately **\$2,000.00**.

OK, that was a fast \$5,000.00. When I set up my home shop, I installed a 5HP 22 CFM compressor, Dryer, 36 x 36 cabinet for Garnet and an 18 x 18 cabinet for glass bead. I also bought an imported \$2,500.00 9" x 40" lathe, a \$275.00 band saw and a \$1,800.00 milling machine and a \$2,500.00 Tig welder

My total shop cost was around \$12,000 plus a few bells & whistles. lathe tools, end mills, etc, If that sounds like a lot, think of what you get in a new car or truck for \$12,000 and how long it keeps its' value. The equipment in my shop will never depreciate or become obsolete

I can build nearly anything in that little 20' x 20' shop. I just don't have a lot of room to walk around. I would be totally crippled without the good air supply. I rarely build anything without using the blasting equipment. Life is good.

Mr. Sandman Inc. has it all in Honolulu Hawaii. We can deliver anywhere in the World. The combined automotive, abrasive blasting and compressed air experience of the sales and service staff of MSI is over 150 years!

There should be absolutely no question in your mind where you should go for your compressed air or blasting equipment needs.

Bob Freeman

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