

Abrasive Blasting for Cleaning in Industries

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ABSTRACT

A sandblasting system includes four basic components: the air source, the sandblasting cabinet, the dust collector, and the blasting media. The air source is usually bottle gas or an air compressor. The sandblasting cabinet holds the object being blasted, while the dust collector removes dust from the cabinet. The materials used in sandblasting, whether sand or not, are referred to as blast media.

KEYWORDS: -

Sandblasting, Abrasives media, Sandblaster gun, utilization in industries

1. INTRODUCTION

The technique of abrasive blast cleaning involves the utilization of hand-held or automatic equipment which directs a pressurized blast of wet or dry abrasive material against a metal, masonry, or synthetic surface in order to clean the surface, remove burrs, or develop a matte surface finish. Sandblasting can remove paint, rust, and residue from oxidation from materials quickly and efficiently. Sandblasting can also be used to change the condition of a metal's surface, such as through removing scratches or casting marks. Sandblasting as a cleaning method has been widely used for over a hundred years. Used in a variety of professions, sandblasting is the process by which the surface of an object is eroded by means of a concentrated stream of very fine sand. Sandblaster guns refine a surface while also giving a decorative finish to craft metals. It can be used to remove old paint, smooth a rough surface, roughen a smooth surface or give shape to an object. In and around the home, sandblasting replaces the use for sandpaper, eliminating the need for hand-sanding and the mess that goes along with it. Sandblasting is quick, efficient and delivers desirable results. The abrasives used for cleaning purposes vary from metal shot and grit, to a large range of non-metallic abrasives, such as garnet, flint, quartz, and silica sand. Organic substances such as nut shells, cereal husks, and sawdust are used to clean delicate surfaces.

2. SAND BLASTING MATERIAL

The Term Sandblasting Was Commonly Used in the Past Because Sand Was the Only Grit/Medium Utilized; However, As Trends in The Metal Fabrication Industry Continued to Improve Other Types of Grits Began Being Utilized.

Silicon Dioxide: - Silicon Dioxide Refers to Ordinary Sand, Which Is Also Known as Silica or Quartz. Silica Sandblasting Was a Commonly Used Method of Removing Impurities from Surfaces; This Is Because Sand Particles Are Almost the Same Size and The Edges of the Particles Are Sharp, Hence Making This Type of Grit Efficient in Abrasive Blasting.

Soda: - Soda Sandblasting Refers to The Use of Baking Soda or Bicarbonate of Soda in The Blasting Process. Soda Is Used as an Abrasive to Remove Rust from Metals Without Causing Depression or Damaging the Metal Beneath the Rough Surface. Soda Is Also a

Great Grit to Use On Delicate Materials That May Be Destroyed by Tougher Abrasives.

Steel Grit: - Steel Grit Is Used as an Abrasive in The Removal of Paint and Rust from Steel Metals. The Use of Steel Leaves a Smooth Finish. Steel Grit Is Often Preferred Due to Its Fast Cutting Nature.

Glass Bead: - For A Matte and Satin Finish Glass Bead Sandblasting Is Best; This Is Because This Grit Has Very Fine Materials That Polish the Surface of the Object Being Sandblasted. This Type of Abrasive Blasting Is Often Used On Cabinets.

Bristle Blasting: - Steel Wire Bristles Are Rotated On a Surface. This Rotating Action Aids in The Removal of Impurities, Hence Leaving the Surface Smooth. This Method Is Often Used to Clean Metal Surfaces with Some Form of Corrosion.

3. REQUIREMENT SANDBLASTING

1. remove the oil, grease and scale from a surface.
2. easiest and the fastest way to remove old paint and rust from the metal surface
3. Provides quality finish surface condition which has easy adhesion to the paint.
4. prevent damage and provide perfection before the material is coated with a protective layer.
5. quick process of rust removing at low cost.

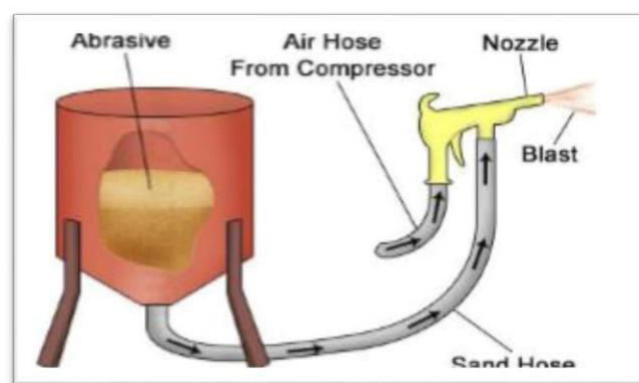


Fig.1. Sand blasting machine

4. HEALTH AND SAFETY HAZARDS IN INDUSTRIES

There are many different hazardous situations and conditions created by blast cleaning operations. The use of metal shot and grit and mineral substances and to a greater degree silica sand is hazardous to health if the dust created during blasting is inhaled into the workers' respiratory tract.

4.1 Health Hazards

The three most significant health hazards are those which relate to dust, noise and chemical & It generally is agreed that dust is the most serious health hazard in abrasive blasting operations.

4.1.1 Dust: - Dusts result from broken-down abrasives, pulverized surface coatings and encrusted substances, and abraded material the object being blasted. The solid particles which comprise the dusts range in size from less than one micron (1/25,000 inch) to more than 1000 microns. Under normal conditions, dust particles of 10 microns or more in diameter settle relatively quickly. Those smaller than 10 microns remain airborne longer and are easily inhaled. Smaller dust particles often settle in the lungs and sometimes small soluble particles dissolve into the blood stream.

4.1.2 Noise: - lengthy exposure to noise levels of over 90 dB(A) from noises that originate within the operators' breathing helmet at the abrasive discharge nozzle, from the impact of the abrasive on the surface being cleaned, and from noisy dust exhaust systems on cabinet and automatic blast cleaning machines

4.1.3. Chemical: - Although not a direct element of the abrasive blasting process, the blast operator may be called upon to clean a surface -- particularly an oily surface -- with a chemical such as trichloroethylene. Improper use or storage of this and similar chemicals can lead to serious health hazards through inhalation of vapours or ingestion or skin absorption of the liquid.

5. COMPONENTS OF SAND BLASTING MACHINE

1. Large Air Compressor
2. Air hose, couplings, and valves
3. sand blast machine
4. sand blast hose
5. nozzle
6. remote control valves
7. moisture separator
8. high nozzle air pressure
9. abrasive material
10. air-fed helmet
11. breathing air filter

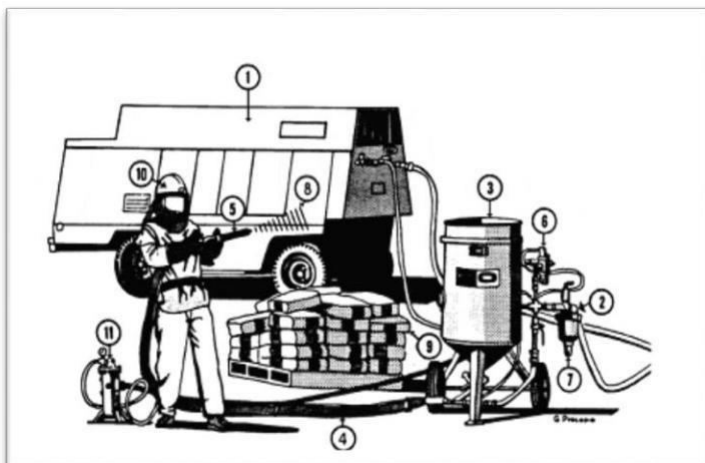


Fig.2. components of sand blasting machine

6. TYPES OF BLASTING

6.1. Dry-blasting: - There are two methods used for dry-blast cleaning; mechanical blasting and air pressure blasting.

6.1.1 Mechanical Blasting: - Mechanical blasting most frequently employs the use of cabinet-type equipment. It is available in either batch, semi-automatic or automatic versions. Typically, the cabinet houses one or more blast wheels which direct the abrasive at the workpiece by centrifugal force. The wheel is positioned to ensure maximum coverage and high efficiency of the blast pattern in consideration of workpiece design.

6.1.2. Air Pressure Blasting: - Air pressure blasting uses compressed air to apply abrasive to a surface. Air pressure blasting uses either a direct pressure or an induction method that may use either the siphon or gravity method.

6.2 Wet Blasting: - Wet blasting involves high velocity, compressed air propulsion of a slurry directed onto a workpiece. The slurry normally consists of fine abrasive suspended in chemically treated water. It usually is kept in continuous agitation to prevent settling of the abrasive. As with direct pressure dry blast units, compressed air is fed to the vessel containing the mixture at a pressure equal to that fed to the blast hose. Equalizing the pressure enables the abrasive mixture to feed through the mixing valve into the air line. The abrasive flow is controlled by a full flow valve situated between the hopper and mixing chamber.

7. METHODOLOGY

Sand blasting machines generally require a high-volume air supply (usually in the 90 to 100 psi range); a container or pressure vessel to contain the abrasive; a metering device to control air-to-abrasive ratio and flow; a flexible hose to deliver the abrasive, and a hand-held nozzle to aim the abrasive onto the workpiece. Many portable units also have large hopper-fed storage tanks which enable multiple blasting operations from a single source of supply. The first step in the sandblasting process is to determine what kind of material and equipment are necessary to complete the task. It is also important to clean the surface upon which you will be working to ensure that there is no residue which will result in a marred finish.

- Analyze the degree of work that is required, the type of blasting media that is required, and what tools will need to be used.
 - ↳ Wipe down the surface of the object.
 - ↳ Ensure that all the correct safety apparel is available.
- Explore the different types of blasting media – for materials that are more difficult to work with, abrasive mediums will need to be used. These include plastic abrasives, glass beads, aluminium oxide, steel grit, and silicon carbide. Prepare your surrounding area to avoid an unnecessary mess.

Sandblasting accessories include a sandblasting cabinet that is used to contain the blasting media and stops it from flying all over the work area.

- Place duct tape over the areas that are not to be blasted.
- Open the cabinet and place the item in the centre while ensuring that it is stable. Close the compartment.
- Ensure that any delicate surfaces are removed from the direct working area to avoid damage.
- Use protective covering for areas of concern.

Blast off! Once you have prepared your equipment and surroundings, get started with your project. It is important to keep in mind that sandblasting is a process that requires practice before being able to perform the task properly. It is always a good idea to practice before you begin with a major project.

- ✓ Turn the sandblaster on using the switch on the side.
- ✓ Place your hands into the glove openings and pick up equipment.
- ✓ Use the lever on the top of the sandblaster's nozzle to start the process. Ensure that you coat the object evenly, keeping the blaster six to twelve inches away.

8. CONCLUSION

Sandblasting is used to clean the surface of any material, mainly for the metallic surface. It is one of the most efficient and quick method which uses compressed air to blast fine sand through a nozzle to shape and smooth surface of any foreign material. It is well suited for the removal of rust which causes property damage. It is used not only to remove rust but to prepare surface for high performance coatings or to treat final products to give them lustre and surface texture desired by the retail consumer. Materials used in sand blasting are sand, copper slog, steel grit, pieces of walnut, powder abrasive, pieces of avocado and many others. Still there are many hazards for workers in industries. There are many different hazardous situations and conditions created by blast cleaning operations. As in so many other cases, however, numerous hazards can be greatly minimized if not eliminated altogether by applying mown operating and maintenance techniques and engineering controls.

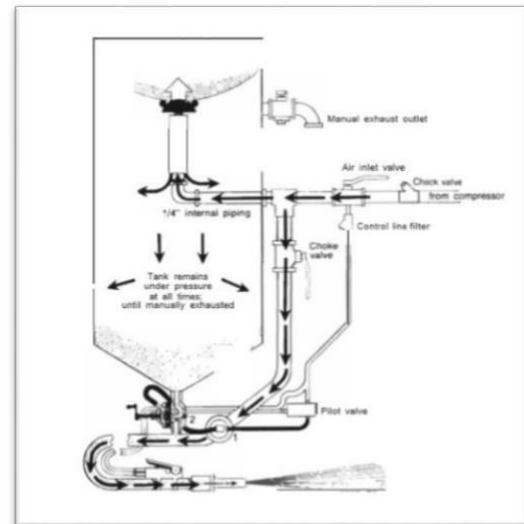


Fig.3. working Methodology for sand blasting

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