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ijirset@gmail.com

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Design and Development of Sand Blasting Machine

Parekh Madhavin¹, Soni Vraj¹, Neel Bhadiyadra¹, Gopal P. Patel², Sandeep S. Patil²

Diploma Student, Department of Mechanical Engineering, Tapi Diploma Engineering College, Surat, Gujarat, India¹

Professor, Department of Mechanical Engineering, Tapi Diploma Engineering College, Surat, Gujarat, India²

ABSTRACT: When a metal is exposed to the atmosphere, it gets corroded by atmospheric air. To overcome these sandblasting processes are used. When machining leaves sharp burrs or edges on an object, a sandblaster can smooth it until it is safe to handle. a method used to clean, polish, or strengthen metal with the help of abrasive material. Sandblasting is used in almost every industry that uses metal, including aerospace, automotive, construction, shipbuilding, rail, and many others. The sandblasting machine uses abrasive materials like steel grit, glass bead, sand and. The blast media is pneumatically accelerated by compressed air and projected by nozzles onto the component to roughen a smooth surface shape a surface or remove surface contaminants.

For the blasting process on a big component, which may require secondary surface treatment, which is carried out in a confined space, we often have to shift jobs to a confined room. Due to this material handling cost increases. To avoid this, there is an end to the design of portable type of stand-blasting machine.

KEYWORDS: Work Handling System, Compressor, Components, Sand Blasting Process.

I. INTRODUCTION

Sand Blasting is a surface treatment process using high-velocity steel abrasive. Sandblasting is used to obtain excellent cleaning and surface preparation for secondary/finishing operations

1. The cleaning of iron, steel, non-cast parts, forging, etc.
2. Mechanical cleaning of sheets, rods, coil wire, etc.
3. Shot peening to alter mechanical properties (increasing resistance to fatigue for springs, gears, etc.)

Sandblasting is also known as abrasive blasting. It is the process of bombarding a stream of abrasive material to the surface which we want to clean. The sandblasting operation is done with high pressure to smooth a rough surface. There are several types of sandblasting processes soda blasting is an extremely useful process in welding applications and industries for removing excess weldments as well as for cleaning the surface. Whether a material needs to be cleaned, deburred, shot-peened prepped for powder-coating, de-rusted, shot-peened, or just have its paint removed, sandblasting is the job's process.

These machines are mainly useful in the auto industry, ships and rail yards, and various industrial applications. Certain degrees of skill and safety training is required to use the sandblaster as abrasive material may cause some injuries. The sandblasting machine which was used in the industry are big in size and cannot be mobile so the main objective of our project is to make the machine mobile and with less space occupying the machine reducing weight also reducing the cost of the machine making it budget friendly for small scale industries too.

II. LITERATURE REVIEW

The study shows that the portable sand blasting machine is very economical & useful for heavy fabrication company. Big size products require sand blasting process before painting. The sand blasting machine are generally immovable and used in confined space, so everytime we need to shift such big products in confined space of blasting after welding small components, this increases the material handling cost.

The surface after blasting is more susceptible to corrosion, hence the abrasive slurry should contain corrosion inhibitors. The highest residual stress and surface roughness was found after sandblasting perpendicular to the surface.

III. PROCESS WORK

The process for used in the Cabinet Sand Blasting Machine following steps:

2.1.1 ABRASIVE:-

Sandblasting, sometimes known as abrasive blasting is the operation of forcibly propelling a stream of abrasive material against a surface under high pressure to smooth a rough surface, roughen a smooth surface shape a surface, or remove surface contaminants. A pressurized fluid typically compressed air or a centrifugal wheel is used to propel the blasting material. the first abrasive blasting process was patented by Benjamin Chew Tilghman on 18 October 1870.

There are several variants of the process, using various media; some are highly abrasive, whereas others are milder. The most abrasive is shot blasting.

Silica carbide exists in about 250 crystalline forms. Through the inert atmosphere pyrolysis of preceramic polymers, silica carbide in a glassy amorphous form is also produced. The polymorphism of sic is characterized by a large family of similar crystalline structures called polymorphism of sic is characterized by a large family of a similar crystalline structure called polytypes. They are variations of the same chemical compound that are identical in two dimensions and differ in the third. Thus, they can be viewed as layers stacked in a certain sequence.

Alpha silicon carbide is the most commonly encountered polymorph, is formed at temperatures greater than 1700°C, and has a hexagonal crystal structure. The beta modification, with a zinc blende crystal structure, is formed at temperatures below 1700°C until recently, the beta form has had relatively few commercial uses, although there is now increasing interest in its use as a support for heterogeneous catalysts, owing to its higher surface area compared to the alpha form.

Pure sic is the colourless brown-to-black colour of the industrial product that results from iron impurities.



FIG 2.1 ABRASIVE

2.1.1 HOSE PIPE:-

A proper explanation of how the hose works will cover the complete description of the cooling system because with them coolant circulates all over. In the various types of hoses used in automobile cooling, we've somehow covered their working but you can check out the complete article on how cooling system work to have a more clear understanding.



FIG 2.2 HOSE PIPE

2.1.1.1 Advantages: -

- Very Easy & More Efficient.
- Time-Saving Method.
- More Abrasive Action.
- Easily Performed.

- sophisticated geometrical areas without much effort.
- Reduces the cost.

3.1 Project work: -

3.1 SAND: -

- White ALOX is available in grits 12 to 240. Sized by the current FEPA/ISO and ANSI sieve standards.
- White Aluminium oxide can be used for applications such as floor coatings, abrasive blasting, and grinding.
- Bulk Density: 112 lbs per Cu Ft. approx. Grain Shape: Blocky Hardness: 2450 Knoop
- Our White Aluminium Oxide is packaged in drums at a weight between 385 lbs and 400 lbs each, depending on the ALOX size you choose. DESIGN AND DEVELOPMENT OF SAND BLASTING MACHINE 13 2022-2023/TDEC, SURAT

While Aluminum Oxide is a very pure abrasive. For this reason, it is being used more frequently for high-performance microdermabrasion equipment. It can be recycled many times in use and is very cost-effective, making it widely used as a sandblasting media. It is also widely used because it is safer to use than sand and its consistent size makes its finish smoother. In addition, because it is harder than other materials, it is attractive for its ability to cut deeper into surfaces more effectively.



Fig 3.1 Sand

3.2 NOZZLE: -

As Compressed Air Enters the Converging End of a Straight Bore Nozzle. It Accelerates, Accelerating the Abrasive media particles suspended in the flow. These abrasive media particles exit the nozzle in a tight stream and produce a narrow, concentrated blasting pattern upon the impact surface.



Fig 3.2 Nozzle

3.3 AIR COMPRESSOR:-

Air compressors work by forcing atmospheric air under pressure to create potential energy that can be stored in a tank for later use. Just like an open balloon, the pressure builds up when the compressed air is deliberately released, converting the potential energy into usable kinetic energy.



Fig 3.3 Air Compressor

OBJECTIVE:-

1. To reduce the cost of the machine so that these machines can also be used in the small industry and it does not occupy more space.
2. These machines are used to reduce the weight and reduce the time by manually removing the rust from the object.
3. The main aim of our project is to make it compactable by reducing the size of the workpiece and make it movable.

Final project: -



IV. CONCLUSION

In conclusion Today's sandblast cabinet suppliers provide a vast range of product variations manufactured with high-quality materials and methods.

Blasting equipment suppliers are constantly upgrading equipment with new technology innovations.

Novel blast media types such as dry ice, soda, and high-durability media are available to further reduce environmental impact.

Sandblasting experts at the leading suppliers know how to select the specific blasting and peening systems, media types, media recovery equipment, and material handlers for a broad range of industry applications.

Sandblasting manufacturing experts are willing to work with customers on the development of new applications that would benefit from abrasive blasting and peening technology.

The outlook for increased use of abrasive blasting and shot peening equipment is extremely promising considering the broad range of capabilities that modern equipment OEMs can provide to their customers as well as the benefits to the environment.

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