



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 5, Issue 3)

Available online at: www.ijariit.com

Development of shot blasting filter cleaning machine

Ashwini Jadhav

ashrj1996@gmail.com

Dr. D. Y. Patil Institute of
Technology, Pune, Maharashtra

Shreya Pujari

shreyapujari1996@gmail.com

Dr. D. Y. Patil Institute of
Technology, Pune, Maharashtra

Chetanraj Patil

chetanraj.patil@gmail.com

Dr. D. Y. Patil Institute of
Technology, Pune, Maharashtra

ABSTRACT

The purpose of this project is to change the filter cleaning method from manual to auto cleaning, in order to increase the efficiency of the filter in shot blasting machine, to improve the filter life. Presently the filter cleaning of shot blasting machine is carried out manually on a fourth-night basis. The improper collection of dust creates fatal fire accidents as well as hazardous for human health and the environment. As filter cleaning is carried out in an open area which creates Air pollution and Land contamination. This manual filter cleaning method is not safe. The filter cleaning machines are available in the market which did not cost efficient and not as per required standards; it was decided to manufacture it in-house.

Keywords— Cartridge filter, Air cleaning method, Nozzles, Brushes, Pneumatic motor

1. INTRODUCTION

The final stage in the manufacturing of cast products involves the surface treatment and finishing of castings to remove the residues of the moulding and core mix to obtain the required surface quality and condition. Among surface treatment methods, mechanical methods seem prevalent, particularly the abrasive (or shot blasting) methods. Blasting is a very diverse application containing wheel blasters, air blasters, cabinet blasters and sand blasting. The blasting media also varies widely from sand, steel, plastic, slag and various shot. The basic function of Dust Collector is to recover the unused shots and fine dust particles for the chamber or room. Dust collectors come with following parts:

- Cartridge Type Dust Collectors to save space and for increased life
- Pre Separator to recover unused shots
- Internal Baffle Chamber to prevent damage of filter element

1.1 Traditional system

In previous days the filter used in shot blasting machine was directly scrapped after shot blasting of 1.5 lakh carburettors. But the method of scraping of the used filter was not economical and hence it was decided to get the filter cleaned manually.



Fig. 1: Traditional manual cleaning of filter [1]

The figure (1) shows the manual cleaning of the filter of shot blasting machine. The manual cleaning of filter has the following drawbacks;

- Time-consuming method
- Low efficiency of dust removal
- The cob is not properly cleaned manually
- Health hazards
- Fire hazards

2. AUTOMATIC FILTER CLEANING MACHINE

Considering the drawbacks of manual cleaning the alternative of automatic filter cleaning machine was taken into consideration. The machine designed is a closed system and overcomes all the drawbacks of the manual cleaning method. The objectives of the filter cleaning machine are mentioned as follows;

- To remove the silicon particles entrapped in
- To remove dust and cob-web entrapped in the filter
- Make the cleaning process environment-friendly
- Reduce the health hazards
- To increase the filter life

- (f) To change the filter cleaning method from manual to automatic
- (g) To increase the frequency of filter cleaning for more effective shot blasting, filter life improvement etc.



Fig. 2: Automatic filter cleaning machine

3. BASIC COMPONENTS OF THE SYSTEM



Fig. 3: Basic components

3.1 Sheet

The Material selection is a step in the process of designing any physical object. In the context of product design, the main goal of material selection is to minimize the cost. While meeting product performance goals. Systematic selection of the best material for a given application begins with properties of that particular material and its cost.

3.2 Nozzle

Correct nozzle selection is essential in order to achieve the applicator's goals. Selecting nozzles that produce the largest droplet size, while providing adequate coverage at the intended application rate and pressure, can minimize drift.

3.3 Pneumatic motor

The pneumatic motor was selected for following reasons:

- **Weight:** Compare the weight of several valves and cylinders to that of the motors, gears, belts, and chains used on some lift mechanisms and you will find the weight comparable, if not much lighter.
- **Simple to Design:** Using pneumatics is much easier than building a motor; gear, chain and sprocket lift mechanism. Once you have reviewed the layout you will find it very easy to build a circuit.
- **Adjustable Force:** To adjust the force of the cylinder, all you have to do is adjust the regulator in front of it.

4. CONCLUSION

The silicon particles entrapped in the filter and cob-web like structure is cleaned effectively with the use of air cleaning method. Automatic filter cleaning machine is designed. This will eliminate manual operations. This made the cleaning process of time-saving. The filters are reused instead of replacing them as previous practice. Nozzles selected are cheaper & achieve maximum efficiency from the air applied while reducing the off-target (drift) movement of air to a minimum. This can be achieved only if the right nozzle type and the proper size of the nozzles are on the sprayer, and the sprayer is operated properly. To determine the exact nozzle flow rate (gpm) required for your spray application some parameters such as spray pressure, droplet size, spray coverage on the target, and drift, all of which should be given serious consideration when selecting the best nozzle for a spraying job.

The pneumatic motor used in the machine reduces fire hazards and reduces the weight of the motor and also power saving. The new machine designed will improve the overall efficiency of the process and ultimately the increase in productivity, wastage control, and reduction in rejection. The design is approved by the company and the manufacturing cost will be app 3 lac as compared to machine cost 5 lac if purchased.

5. REFERENCES

- [1] Snehal Dattatray Sutar, Rohini Vinayak Vader, Juber Mustak Shirgave, Uday T Patil, "Automatic Shot Blasting Process", International journal of recent trends in engineering and research (Volume 04, Issue 03; March-2018 [ISSN: 2455-1457])
- [2] Deepanshu Prasad, "Review on Shot Blasting Processes", IJSRD - International Journal for Scientific Research & Development (Vol. 6, Issue 02, 2018)
- [3] Mitul Malli, "Review on Shot Blasting Processes", IJSRD - International Journal for Scientific Research & Development (Vol. 2, Issue 03, 2014)
- [4] Eric Gamble, Dwain Terrell, P.E. Rich "NOZZLE SELECTION AND DESIGN CRITERIA"(2004)
- [5] Kartik D. Gandhi, Vivek B. Raut, B.D. Sarode, "Review on Automatic Air Filter Cleaning System" Journal of Network Communications and Emerging Technologies, Volume 7, Issue 3, (March 2017)
- [6] Robert.N. Klein, Greg R. Kruger Nozzles, "Selection and Sizing"
- [7] FIRST Robotics Pneumatics Manual