

Implementation and Automation of Air Blaster

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Abstract - As we all know that in today's world there are lots of functions, parties and ceremonies which are taking place. The essence of these occasions is the way these are presented in front of their guests. Air blaster plays a very significant role in adding to the kernel of these occasions by making them look extremely beautiful. However there are many instances where the beauty of the show is spoiled when the synchronization of air blasters is disturbed where in either the gas supplied freezes or there is some miscommunication amongst the labors. This happens when these cannons are operated by using a two way valve. In order to avoid such errors automation of these air blasters has been introduced in the industry. This is done with the help of a solenoid valve hence making its working a treat to the eyes because of a highly illustrious proceeding displayed. Automation of air blasters also finds its use in the industry where it is used to eject heavy load. Today there are many industries which manufacture these solenoid valves with all types of coils in it but these are very expensive and at times out of reach of the customers or the event hosts who are trying to gain its possession. We have however sifted through the market and have acquired a solenoid valve which meets all the demands to carry out the operation without any hindrances.

Key Words: Air blasters, significant, synchronization, labors, automation, illustrious, solenoid

1. INTRODUCTION

1.1 Air Blaster

An air blaster or air cannon is a de-clogging device composed of two main elements: a pressure vessel (storing air pressure) and a triggering mechanism (high speed release of compressed air). They are permanently installed on silos, bins and hoppers walls for all powdery forms of materials, and are used to prevent caking an allowing maximum storage capacity. Air blasters do not need any specific air supply. Available plant air enough with a minimum of 4 bar pressure (60psi or 400kPa), although 5 to 6 bar pressure are preferred for better results (75 to 90 psi). The average air consumption is moderate. It depends on the number of firings per hour, size of the pressure vessel, and the number of air cannons installed.

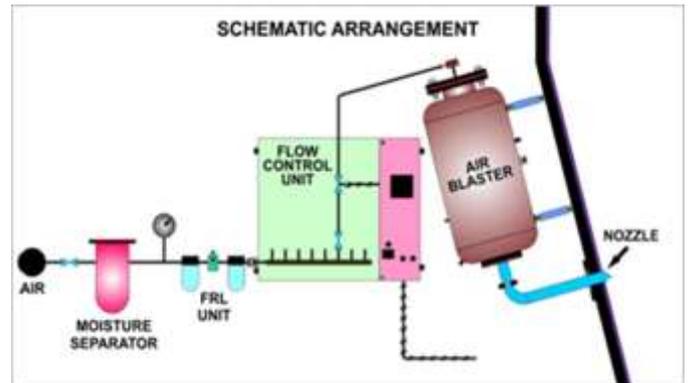


Fig -1: Schematic arrangement of mechanism

1.2 Confetti

Confetti are small pieces or streamers of paper, mylar, or metallic material which are usually thrown at parades, sporting team winners, and celebrations, especially weddings (and game shows, following the end of a milestone or the occasion of a big win e.g.: *Who Wants to Be a Millionaire*). The origins are from the Latin *confectum*, with *confetti* the plural of Italian *confetto*, small sweet. Modern paper confetti trace back to symbolic rituals of tossing grains and sweets during special occasions, traditional for numerous cultures throughout history as an ancient custom dating back to pagan times, but adapted from sweets and grains to paper through the centuries.

1.3 Theatrical smoke and fog

Theatrical smoke and fog, also known as **special effect smoke, fog** or **haze**, is a category of atmospheric effects used in the entertainment industry. The use of fog can be found throughout motion picture and television productions, live theatre, concerts, at nightclubs and raves, amusement and theme parks and even in video arcades and similar venues. These atmospheric effects are used for creating special effects, to make lighting and lighting effects visible, and to create a specific sense of mood or atmosphere. If an individual is at an entertainment venue and beams of light are visible cutting across the room, that most likely means smoke or fog is being used. Theatrical smoke and fog are indispensable in creating visible mid-air laser effects to entertain audiences. Recently smaller, cheaper fog machines have become available to the general public, and fog effects are becoming more common in residential

applications, from small house parties to Halloween and Christmas.

2. OPERATING PRINCIPLE OF AIR BLASTER

- **Phase 1:** Air feeding Air supply from the air compressor passes through a 3/2 way solenoid valve feed, the Quick Release Valve, and reach the triggering mechanism with its piston disc in closed position. The air reservoir is then pressurized in less than 15 seconds, depending on the air pressure and air volume used.
- **Phase 2:** Waiting: An air pressure equilibrium between air circuit, triggering mechanism, and pressure vessel is created.
- **Phase 3:** Blasting: When activated, a solenoid valve purges the air circuit, thus creating an air vacuum. Then, the piston inside triggering mechanism is abruptly pushed back by negative pressure, thus creating a sudden blast from the air contained in the pressure vessel. This phase is measured in milliseconds.
- Then the cycle repeats again at Phase 1.

3. FEATURES OF QUICK EXHAUST VALVE

The quick exhaust valves are designed to be highly sensitive and exert differential pressure across the diaphragm to open the exhaust. The latest valves are now being design with a lightweight material, which can easily be supported by the piping of the system.

4. WORKING OF QUICK EXHAUST VALVE

1. These valves work by increasing the speed of the cylinder rod in order to dump the exhaust air, at the port of the cylinder directly.
2. The air is not directed at the back through the control valve.
3. One quick exhaust is used in each port of the cylinder to ensure an increase in the speed of the rod in both directions.

5. DESIGN CRITERIA & CONSTRUCTION OF AIR BLASTER

An efficient air blaster should be designed to ensure:

- Complete safety for the operators, thus avoiding harsh rodding or other manual cleaning methods;
- A sturdy design, able to cope with the most severe operating conditions;
- Easy maintenance, due to an easily accessible triggering device.
- A metal-to-metal construction design, making the air blaster extremely reliable even in harsh environment (such as exposed to heat and/or dust)

- A cost effective solution to all customers that prevents hopper, bin, and silo discharge interruption, as well as process disc.

6. MATERIAL SELECTION

Selection of material is main objective for fabrication of machine. Choice of materials depend upon following factors:

1. Availability of materials
2. Suitability of materials for working condition.
3. Cost of materials
4. Physical, chemical & mechanical properties of material.

7. AUTOMATION OF AIR BLASTER

Instead of solenoid valve, we will be using quick exhaust valve due to its low cost & easy availability. The valve which is used for on/off is connected to relay circuit & to control the relay circuit we will be using arduino circuit. On the arduino circuit we will be connecting the bluetooth device of any electronic devices. Using any applications from electronic devices we can control our system with wireless connection.

8. APPLICATIONS

- Solving bulk flow problems in silos, hoppers
- Used to physical shake out materials
- Clearing out Clogs
- Used for cohesive materials
- Used to Aerate Material sitting in bins hoppers and silos

9. CONCLUSION

No machine in the universe is 100% maintenance free machine. Due to its continuous use it is undergoing wear and tear of the mating and sliding components. Also due to the chemical reaction takes place when the material comes in the contact with water, makes its corrosion and corrosion. Hence it is required to replace or repair. This process of repairing and replacing is called as maintenance work. Air Blasters can be used at parties as well as in Industries for various purposes.

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