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Multipurpose Suction Machine

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***Abstract*: Vacuum units are capable of handling the most difficult materials and feature a unique delivery system. Powered by compressed air, the "Multipurpose Suction Machine" easily move products such as gravel, sand, rocks and sludge, and are capable of delivering them to any desired location. Our vacuums have been used in a number of applications, from mining solutions to environmental and factory spill clean-ups. There are endless possibilities and applications.**

***Keywords*: Blower, Cyclone separator, Frame, Pipes, Suction.**

1. Introduction

Now a days conveying of materials are the biggest problem facing in the sceniario of the market. Because of no use of proper technology. Also faced high labour cost for transferring material as well as manual work requires a lot of time. Jcbs and cranes are used for soil removal from ground that results to higher energy waste and problems created in small areas for conveying. For digging in small areas like for plantation or gardening the JCB's are not capable for working in small areas so the problems of enough working space also the problems. Not only the problems of conveying but there were several foreign particles also comes during the time of conveying so separation of that materials also needs time and labours that also results in high labour cost and energy. The bucket conveyor, belt conveyor, mini JCB these ideas involves high costs, not portable, and require high maintenance and skilled labours required.

Pneumatic conveying system is a conventional material handling system like belt conveyor or chain conveyor. The main advantage of pneumatic conveying system is that material is transferred in close loop, thereby preventing the environmental effect on the material and vice versa. In these topic different parameters like air velocity, pressure, particle size and shape, distance to be conveyed, which govern the design of the system, are described. The research work carried out on the pneumatic conveying system in the last decade considering these parameters are also presented. No standard procedure is available for the design of pneumatic conveying system. As the configuration of the system changes, variable involved also changes and one has to change the design considerations based on the applications. So there is wide scope for experimentation in the field of pneumatic conveying system.

2. Literature review

N. S. Prabhath, Sharma, K. V. Muralidhar Sharma, Balasubrahmanya: With proper care and thought, pneumatic conveying systems can be designed and operated to give excellent performance with minimal product degradation. There is considerable science behind how these systems work. A properly designed air flow system to transport bulk material from one point to another is often the most practical and economical means. Pneumatic conveying systems usually require less plant space, can be easily automated, and can be readily installed. Pneumatic conveying systems do have their limitations, such as material size and temperature. However, they still provide many benefits. In addition to being very economical, they are also useful in controlling or minimizing product loss, improving dust control, and thus improving overall plant conditions.

P. R. Barbosa and P. Seleghim Jr.: A technique for the adaptive control of gas-solids flow regimes occurring in pneumatic transport systems was proposed in this work. The control algorithm is based on two independent neural models, the first one being responsible for assessing the flow regime by defining proper target and gain values for the controller, the second one mimics an optimized gain scheduled PID loop and is dedicated to the calculus of the flow rate corrections in order to have optimal flow conditions. This technique allows the operation near the minimum pressure drop line in the state diagram and a significant reduction in the power consumption for the same solids charge, when compared with a non-controlled system operating at fixed nominal conditions. This is so because without adaptive control the carrier phase velocity must be 2 or 3 times higher than the light to dense phase transition to avoid the formation of dense structures such as dunes and plugs, which, depending on the characteristics of the material and on the availability of a pressure head from the carrier phase may cause a violent pressure surge or a possible line blockage. Experimental testes performed with Setaria italic seeds in a 45 mm i.e. pneumatic conveying line show that the proposed control technique is capable of producing power optimization.

3. Plan of project work

A. Cyclone separator

It is a kind of separator used to separate the materials

from the air. Also it's pressure difference act as separation principle. Cyclone separator separate the material coming from the outside with air.

B. Blower

Blower is equipment or a device which increases the velocity of air or gas when it is passed through equipped impellers. They are mainly used for flow of air/gas required for exhausting, aspirating, cooling, ventilating, conveying etc. Blower is also commonly known as Centrifugal Fans in industry. In a blower, the inlet pressure is low and is higher at the outlet. The kinetic energy of the blades increases the pressure of the air at the outlet. Blowers are mainly used in industries for moderate pressure requirements where the pressure is more than the fan and less than the compressor. In this stage based on Pressure requirements and material transfer capacity, a combination of blower and motor is used of similar capacity.

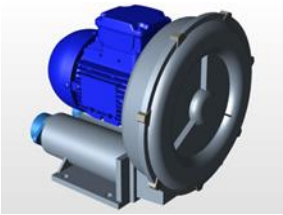

Fig. 1. Blower

C. Air filters and suction pipe

Air filters and suction pipes are the other components used for connecting the whole cycle of the process. The design of the pipeline is probably one of the first tasks to be undertaken in pneumatic conveying system design. The conveying distance and material flow rate for the plant are usually specified, and so it is necessary to determine the pipeline bore and the air supply pressure required. The starting point in this process is generally test data or some previous experience with the particular material to be conveyed. If the conveying characteristics are available for a material in a known pipeline they can be scaled, for the same material, to another pipeline, with a reasonable degree of accuracy. Use of Air Filter in the suction line prevents sand particles to enter the main blower.

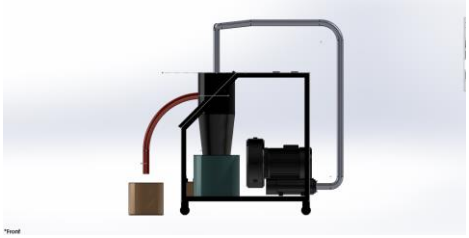

Fig. 2. Air filters and suction pipe

D. Final design

So the final design is based on the above components by which the material is sucked with the help of pipe through which material is transferred into cyclone separator where the material and air is separated in it. The vaccum created inside the mechanism is done with the help of blower. There is also filter assembly between the pipes and before blower, so that particles mixed with air doesn't come into the blower that will cause failure to the blower.

4. Conclusion

This paper presented design and implementation of multipurpose suction machine.

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