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METHODS FOR CLEANING DUST IN THE AIR FILTER

Igamberdiev Anvarjon Uktamovich
Andijan State Technical Institute
(PhD). Igamberdiev@mail.ru
+998 90 253 23 59

Abstract
The article presents several types of airborne dust collection systems that are an important part of industry. They are designed to clean and filter air before it is released into the environment or the workplace.

Keywords: Dust collection system, cleaning equipment, dust filter, centrifugal fans, dust collection device.

Introduction

Dust Filter Cleaning System It can be imagined that the filtration system of a dust collection system can become clogged and clogged due to the accumulation of particles on the filter surface. Various methods are used to clean the filters, some of which involve shutting down the system. For systems that require continuous operation, alternative methods must be used during operation. Optionally, the system includes a controller with a pressure sensor to monitor the static difference across the filter. The system measures the pressure difference between the clean and dirty air plenums. When levels are too high, it sends a signal to a diaphragm valve to release compressed air into the filter to remove the accumulated particles. This is called a pulse jet bag or pulse jet dust collector and is the most common form of particulate air pollution control equipment. Other systems provide an alarm to notify operators when significantly high pressures have been reached. Most systems have controls that notify operators of a collection failure or pressure drop across the filter, whether requested or not [1].

Dust collection container After the particles have passed through the system and are removed from the filter, they fall into the collection container. The design of the container depends on the type of material being filtered and its loading rate. The main types of mechanisms are:

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Figure 1. Dust collection device.

-Closed box - the collected material is poured into a container.
-Drum or bag - a mechanism that requires changing the drum or bag that collects the material.
-Rotating shaft - used to replace the sliding door, which allows you to change the container without worrying about the hopper being full.
-Screw conveyor - a conveyor system that transports the material to a storage or disposal location.
-Pneumatic conveying systems - used to move the collected dust and particles to another location. A centrifugal blower is an engine or pump that moves air using centrifugal force generated by the rotation of an impeller that draws air or liquids into the blower and expels it through the blower outlet [2]. They consist of an impeller, a housing, and a drive mechanism, with the impeller being the main element with a series of blades mounted on a central hub connected to the fan shaft. The drive design of a centrifugal blower, which may be belt or direct driven, determines the speed of rotation of the impeller. This is the force that turns the impeller, which draws in air and expels it at a right angle. The drive mechanism in a centrifugal blower can be directly or indirectly driven by a belt [3,4].

Methodology

At the center of a centrifugal blower or fan is its airflow. A centrifugal blower draws air, liquid, gas, or particles into an inlet. The blades of the blower rotate to expel the air through an outlet. This airflow pattern is very different from a conventional fan or blower, where the airflow is parallel to the fan axis. The

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motion of the airflow is caused by the rotating blades, which create a low-pressure area at the center of the blade and a high-pressure area at the edge of the blade that adds kinetic energy to the air. The low-pressure area at the center of the blade creates a vacuum that draws air in [5]. The air drawn in flows from the low pressure to the high pressure area at the edge of the blower and travels around the impeller and out the housing. or enclosure. In the diagram below, the blue arrows show the air being drawn into the low pressure area. The green arrows show the movement of air from a low pressure area to a high pressure area, where it circulates and is expelled from the blower. Centrifugal blowers are used in areas where there are requirements for air movement. Any fan with a high pressure ratio is called a blower. The main application of blowers is in processes that require a constant and stable air flow, such as in pneumatic conveying systems. Of all the fan options, centrifugal blowers have several advantages over other types due to their wide operating range and high speed. Centrifugal fans vary in airflow capacity, blower type, fan dimensions, and operating pressure. Regardless of the options, centrifugal fans can be customized and adapted to suit any industrial application [6,7].

Results

Cyclone dust collection systems are a form of inertial separator that uses centrifugal force to separate particles. The cyclone is created in a self-contained chamber, where the air is cleaned by the action of the cyclone. The circulating air flow pushes the heavier contaminants against the walls of the chamber. Once collected, they slide down the sides of the chamber into a collection bin. They are used by lumber yards, paper mills, blasting operations, and grain mills.

Figure 2 Cyclone dust collector

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Discussion

The most common form of dust collection system is the baghouse. This is the most efficient system and uses a vacuum to draw contaminants through a filter in a bag. Baghouse methods are classified according to how they clean their filters. The shaker method shakes the filter to remove collected dust, while the pulse jet version uses a burst of air when a sensor detects that the filter is full [8]. The main components of a dust collection system include a blower, a dust filter, a cleaning system, a container, a duct, and particle collection devices.

Conclusion

Common types of dust collection equipment include fabric filter bags, inertial separators – sometimes called mechanical cyclones, wet scrubbers, and electrostatic precipitators. Baghouse dust collectors are the most commonly used because they have an efficiency of 99%.

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