

DUST RETENTION IN INDUSTRIAL PLANTS

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ASRTACT: This article discusses ways to trap dust in industrial plants and reduce their impact

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It is known that today it belongs to any industry companies, no matter how they work in various aggregate cases - gaseous, liquid and solid wastes they are the ones thrown into the environment. But any even in perfect technology, waste separation is inevitable. That is why it is necessary to create such a technology in this case the wastes generated during the production process are environmentally friendly harmless and does not pose a serious threat to the environment. that is, the wastes formed are easily biological in nature do not disturb or harm the environment. But a thousand, unfortunately, now in manufacturing industries and in our daily lives this is not possible.

Most industries, without which it is impossible to imagine modern life, emit huge amounts of emissions into the atmosphere - dust, gases and other impurities.

Dust is a type of aerosol, volatile solid particles of various sizes. Even in small quantities at home, it is harmful to health, to say nothing of production. Dust particles pollute the air, settle on surfaces, penetrate the soil with precipitation, adversely affecting plants and water bodies.

President of the Republic of Uzbekistan Sh. Mirziyoyev on January 24, 2020 In his address to the parliament, he said: “Twelve industry leaders network modernization and competitiveness programs are in full swing is being done. As a result, economic growth last year was 5.6 percent. The volume of industrial production increased by 6.6%, exports - by 28%. Our gold and foreign exchange reserves will increase by \$ 2.2 billion in 2019 to \$ 28.6 billion billion dollars. Ensuring macroeconomic stability in 2020 and curbing inflation is our main task in the process of economic reforms.

Green plants play an exceptionally important role against air pollution. They are functioning as a “living filter” for trapping smoke, dust, soot, and soot, as their leaves absorb many toxic substances. Therefore, one hectare of green plant species cleans

about 18 million m³ of air per year. Primary mechanisms by which vegetation is considered to improve air quality are dispersion involving the transportation and dilution of pollutants from the pollutant source; and deposition, the process by which pollutants are deposited on the plants solid surfaces by reducing pollutants atmospheric concentrations. Leaf microstructure is characterized by groove area and trichomes which are significantly influenced dust deposition comparing to leaves with the smooth structure; foliar surface morphology has direct effects on the dust capture by leaves which is consistent with a degree of leaf roughness and the number of trichomes in the upper and lower epidermis of a leaf determined the dust retention capacity.

In winter, dust accumulates under the canopy of parklands by 8% - 30% more than in open areas [6], which has been experimentally proven for one hectare of green plant territory per year filtering out 50 - 70 tons of dust from the air, reducing its concentration by 30% - 40%.

Thousands of industrial environments create airborne particles, ranging from sub-micron size smoke to large chunks of plastic, paper or wood. While some dust is hazardous and presents a safety issue, other dust reduces visibility and needs to be removed. Operations creating fumes and smoke use industrial dust collection systems to clear the air.

Open-pit coal field, blasting and demolition dust, construction site dust control, coal pile dust reduction, open-pit mine mining, ports, railway station freight terminals, open-air material storage yards, coal logistics parks, power plants, coal shed closed unloading areas, truck unloading Dust pollution control at the port, dump truck unloading dust, coastal port loading and transportation, coal transportation, stone yard, cement plant, quarry, bulk powder handling and other dust pollution control; expressway service area, steel slag waste unloading, shipping, transportation, Local dust control for mechanical operations, road dust pollution control during vehicle transportation; airfields, public places, stations, schools, airports, steel mills, casting and other high-temperature industries such as spray humidification, cooling, and dust removal places. Landscaping, flower and grass nursery, pesticide spraying, municipal sanitation and haze treatment, garbage dump site sterilization and deodorization, disinfection and epidemic prevention, etc.

In the production process at numerous industrial enterprises, polluted air is released into the atmosphere. Depending on the technological process, harmful solid, gaseous and liquid products, substances, chemical compounds are emitted into the environment. Spreading over a large area under the influence of wind and water currents, they adversely affect human health, poison the air, soil and water bodies. Reclamation (restoration) of the soil of large areas requires a large amount of financial investment and a lot of time, and contamination with certain types of hazardous

substances and chemical compounds makes the area unsuitable for the existence of flora and fauna for hundreds of years.

The ability of growing plants to retain dust and particulate substances is depending on their species, leaf and branch density, and surface properties related to the microstructure, and explained by several factors. Firstly, the biological processes taking place in plants allow assimilation of gases, binding, and deposition in the assimilation apparatus of leaves or even move along the branches.

Secondly, the physical and mechanical properties of leaf surfaces and branches can retain and deposit dust. In this case, the dust deposition capacity depends on the total quantity of the leaf surface area and the structure of the leaf surface. Under equal conditions, rough, folded, drooping, and sticky leaves retain more dust comparing to smooth leaves. For example, 2.3 times more dust settles on the elm leaves comparing to the poplar leaves, and 1.5 times more than on white ash leaves.

The third factor is explained by the ability of plantations to influence the wind regime in a green area. Above a warmer open space, the air rises upward, while cool air from the green mass rushes to replace the one that has risen. Therefore, a horizontal airflow arises, contributing to the ventilation of the territory, and the dispersion of harmful impurities, a decrease in their concentration. Additionally, it was shown that during growing season average dust concentration in the open area is 42.2% higher compared with the area under the trees. Referring to the dustproof properties of various rocks, it was indicated that quantitative scales of dustiness are depending on the square of the plant growing area and the density of plantings.

According to the method of air purification from pollution, all dust-collecting equipment is divided into two types:

- wet;
- dry.

Wet technology for trapping dust pollution is used in scrubbers, Venturi pipes, bubbling-foam dust collectors. These devices are characterized by a high degree of purification of dust and contaminants (up to 99.9%) with a particle size of 0.3 to 1.0 microns, as well as the ability to purify explosive gas mixtures and gases with high temperatures. The principle of operation of these devices is based on the wetting of particles of pollution with water, their further coagulation (adhesion) and flushing into the drainage system. Depending on the operating conditions, dust concentration, particle size and the volume of air to be cleaned, the dimensions, design and type of the dust cleaning apparatus are selected. The design can use wetting the surfaces of the inside of the device or use nozzles to spray liquid.

For the efficiency of wetting and coagulation of the particles of contaminants, counter, passing or perpendicular flows of liquid with respect to the flow of dusty gas can be used. At enterprises where the air flow is polluted with dust, harmful chemicals,

special liquids can be used that act as neutralizers or catalysts. In this case, the use of wet cleaning devices brings a double effect: dust removal and neutralization of harmful substances and gases. Filter-ventilation units are very popular due to their versatility, high technical characteristics and the possibility of installation near the source of dusty air. The units are a very successful combination of a dust collector and a built-in fan to create a vacuum. Inside the unit, there can be a bag, cartridge or electrostatic filter, a cyclone, a device for accumulating and unloading dust, a fan with different performance and power, and a shaking system. Under the action of the fan, the dusty flow is fed through the air ducts into the housing and, passing through the filter elements, is cleaned to the required MPC value. The purified air exits through a separate chamber to the outside, and the dust is shaken off into the lower part of the housing, where it enters the storage hopper and is subsequently removed. The body of the filtering unit is mounted on several vertical supports, the height of which allows placing a box for dust discharge under the unit or driving a truck.

The small size of the device and the ability to place it near the source of emission make it indispensable for cleaning gases with a small volume of dusty air (up to 10,000 m³) in any production. It is possible to buy a filter-ventilation dust collector for use as a second or main purification stage in metallurgy, mechanical engineering, chemical and pharmacological industries, woodworking enterprises, in the production of fertilizers, bulk building materials.

The low cost and high efficiency of the devices allows not spending significant funds at the initial stage of production start-up, significantly reducing the amount of harmful substances emitted and significantly reducing the payback period. Due to a large number of models and the ability to equip filter-ventilation units with fans of various power and performance, as well as to choose the type of filter element, it is possible to select equipment for specific operating conditions. If necessary, the installation can be quickly transported to another location and used in another production.

Dust collecting units

Dust has a number of characteristics that must be considered when selecting a dust collector.

- Dispersion
- Density (kg/m³)
- Specific surface area
- Stickiness (autohesion)
- Flowability
- Dynamic/static angle of repose
- Hygroscopicity
- Moisture content

- Wetting of dust
- Abrasiveness
- Electrical/electrical resistivity
- Combustibility and explosiveness

Depending on the set of characteristics for each production, their own dust collecting installations are selected.

The simplest dust collector in its design is a cyclone. Cyclone dust collectors clean the air from industrial dust. Effective in processing a number of materials: metals, hard alloys, stellite, aluminum, copper alloys, leather, rubber, polyurethane, PVC. Perfectly clean the air during the operation of machines.

Dust collecting plant "Buran"

Bag filter "Buran" for starch production

One of the most effective means include scrubbers and bag filters. Scrubbers do an excellent job with inorganic dust and other impurities - phenol and formaldehyde, aerosols, vapors, acid mixtures, etc.