

AIR POLLUTION CONTROL

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There is little disagreement that the control of dust into the atmosphere will continue to be one of the major challenges of any type plant handling seed.

"Air Pollution", the term most commonly used, is fast becoming a by-word in every community in the nation. In most areas, the law now requires that a permit be obtained from the local Environmental Protection Agency for any new facilities that have a potential of polluting the atmosphere. To obtain the permit, data must be furnished to assure the agency that adequate control will be included in the plans.

Air pollution authorities are also checking many existing plants, particularly in populated areas. Most citations are the result of an inspector's observation, or a citizen complaint.

Practical dust control is the application of common sense to the known characteristics of air and dust. If dust is escaping from a processing machine it is obvious that air is being blown out at this point, as dust will not come out unless it is carried out by movement of air, indicating that the internal pressure of the machine is higher than the outside pressure surrounding the machine.

The solution is to apply suction to the machine to exhaust the air displaced by seed moving into the machine, resulting in reduction of the internal pressure to a point as low, or lower than the surrounding area outside the machine. Under other conditions, such as belt transfer points, a series of hoods and piping must be applied to capture the dust that would be thrown into the atmosphere. The volume of air required for either application is directly related to the rate of flow of seed in the plant.

A typical dust control system will usually consist of the following:

1. A separating device to separate the dust from the air stream, usually a cyclone collector or a fabric filter.
2. Centrifugal fan to move air through the system.
3. A system of piping with branch ducts through which air is withdrawn from equipment or processes that generate dust and carried with the entrained dust to the separator.
4. Dust retention device - usually a housing or a hood to which the suction duct is connected.

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In years past the normal practice has been to use cyclone collectors as the separating device. Basically there are two types - low pressure (low efficiency) and high pressure (high efficiency). The low pressure cyclone is recognized by its large diameter and relatively short cone, and the high pressure cyclone has a smaller diameter with a long cone. With the stricter air pollution codes in effect, cyclone collectors are no longer adequate. Some codes specify a maximum of 0.1 grain emission for each cubic foot of air exhausted, which results in an efficiency requirement of over 99%, and cyclones are not capable of this efficiency.

With the demand for the higher efficiencies, the bag filter has proved to be the answer to compliance. There are several types of bag filters on the market, the difference is principally in the method of continuously cleaning the filter bag.

Fabric filter performance involves several factors regarding materials, systems and cleaning methods. The precise function of each factor is not easily defined mathematically. Thus, dust collector application remains somewhat of an art, with field experience playing an important role.

The HSC Jet filter, using a momentary jet of high pressure air (100-125 psi) injected into the filter bag through the venturi, provides the impact or shock to loosen the dust from the bag, and the flow to remove it efficiently.

To arbitrarily establish a maximum air to cloth ratio under all conditions is unrealistic, however, it is realistic to maintain a maximum air to cloth ratio for a given type filter under known operating conditions.

Field experience over a five year period with our jet filter has proven that it is capable of operating at air to cloth ratios in excess of 15 to 1, handling grain dust, even under heavy dust loading, and maintaining minimum resistance across the filter. We normally select filters to operate in the range between 10 to 1 and 15 to 1, which in addition to the proven field experience, is within the range of the Filter Rate Guide published by "Air Engineering".

The HSC Jet Filter is equipped with a solid state sequential timer that is adjustable, permitting decreased or increased time intervals between purges, depending upon the dust loading on the bags, making this filter more flexible than the low pressure back purge type filters. In addition to the efficient bag cleaning, this type filter is distinguished by its absence of moving parts resulting in less maintenance.

The fan is the power unit of the system. The most desirable application is to locate the fan on the clean air side of the filter unit. This will prolong the life of the fan because no material is passed through the fan. By handling only clean air, a backward curved centrifugal fan can be used. The backward curved fan is highly efficient

and the horsepower requirement is self limiting, thus when the resistance of a complex system is frequently changed because of production demands, the self limiting power requirement prevents overloading the motor.

With the tendency to emphasize the importance of high efficiency dust collection to prevent loss of dust from the plant into the atmosphere, even the most efficient filter made cannot do much for dust control within the plant, without an efficient piping system to connect the dust source to the filter. Hoods must be designed to adequately capture fugitive dust and all piping must be sized to maintain transport velocities to insure the dust of moving to the filter area. It is absolutely necessary to completely balance the system to insure adequate airflow to all points of collection.

The most obvious points of dust emission to the atmosphere are usually the truck receiving pits and the exhaust from existing cyclones.

With the dumping of the grain into the pit, air displaced by the inrush of grain into the pit carries large amounts of dust into the driveway area and out into the surrounding atmosphere. In addition to polluting outside, it creates an undesirable condition for people in the truck dump area.

This condition is corrected by aspiration of the pit from below the grating. In addition to the aspiration it is advisable to install inverted "V" shape baffles below the grating: to restrict the amount of open area of the grating; to keep the volume of air at a reasonable level, and to create the vacuum in the pit area.

If dust control systems within the plant are adequate and the problem is the exhaust from cyclones the obvious solution is to either replace the cyclones with bag filters or to install a central bag filter and connect the exhaust from the cyclones to the filter. In either case, additional fan power will be required to overcome the resistance of air passing through the filter. In most cases it is advisable to closely evaluate installing a complete new system. Good dust control reduces plant maintenance, significantly reduces housekeeping costs, improves general conditions and improves worker efficiency.

The effect of dust and air pollution upon humans must not only be considered from a health standpoint, but also from a nuisance standpoint. Even though grain dust may or may not be guilty of causing asthma, it certainly is a nuisance, and there is no question that in many cases it may cause allergic reactions or irritations which, although, not injurious to health, certainly causes discomfort. There is no argument over the fact that it would certainly be beneficial to everyone if pollutants of this type could be eliminated.

If you have an air pollution problem it is suggested you consider the following action:

1. Work closely with your local air pollution authority. While they cannot endorse any product they can offer their suggestions for a given problem and possibly steer you away from bad equipment.
2. Select a competent dust control contractor with the technical ability to evaluate your problems, design an efficient system, balance and start up the system, and instruct operating personnel proper operation and maintenance of the system. A detailed operating and maintenance manual should be supplied.
3. Set up a maintenance program, because a poorly maintained dust control system will not operate efficiently.

We would suggest each company familiarize itself with local air pollution codes to avoid any misunderstanding, which at a later date could have serious consequences. When the requirements are known, a progressive program of conversion should be initiated. Areas causing the greatest emissions should be given priority.

In spite of the relatively high cost, the savings in clean-up labor, better working conditions for employees, better community relations, and the satisfaction of knowing you are making your community a better place to live, make an air pollution program worthwhile.