

Winning the war on dust

A sensible way to minimise dust pollution is to design materials handling systems in such a way that the problem is as far as possible removed at source, rather than to persist with a poorly engineered plant arrangement which requires ancillary dust suppression or filtration equipment resulting in added costs, not only in terms of purchased equipment but also labour, maintenance and energy consumption.

A typical example is the new generation of enclosed belt conveyors (pipe conveyors as well as suspended pouch-type designs) which completely envelope the material being transferred, thus eliminating any risk of dust nuisance except at the loading and discharge points where traditional dust control measures

Dust pollution can be largely controlled by containment, aspiration or surface treatment of the airborne particles, although the best solution is to eliminate it through improved plant design

can be taken. Because this type of belt conveyor is capable of negotiating horizontal and vertical bends, there is normally no need for transfer points, which are a notorious source of spillage and dust pollution.

Economic factors

For economic reasons it is not always viable to invest in state-of-the-art modern belt conveyor systems, and plants have to put up with second best – rectilinear, troughing idler belt conveyors which often require one or more transfer points.

Air Control Science (ACS) of San Antonio, Texas – a di-

vision of CCC Group – has just launched the Vari-Load Transfer System. This is claimed to allow operators of conventional belt conveyors to transfer material from one conveyor to another with dramatically reduced dust emissions. The system features a variable “controlled flow” design that significantly reduces the flow of dust-laden induced air at the transfer point, which is a major source of turbulence.

Key features of the Vari-Load Transfer System, which has initially been conceived for coal handling but is suitable for other bulk materials, are its

ability firstly to manage the material stream and secondly to adjust the flow path to reduce induced air created by friction between particles and the surrounding air and, thirdly, to adjust the loading angle and load centring.

“This is a very elegant conveyor transfer point design,” said John S Fischer, vice president of CCC Group. “One benefit is the accessibility for ongoing inspection and maintenance. The system is completely adjustable to cope with extreme variances in climate and moisture content of coal throughout the year.”

Versatile loading

Denmark-based Cimbria Moduflex suggests that flexible loading solutions are a key element in the cost-efficient handling of dry bulk materials.



DSI Dry Fog system installed alongside a rotary car dumper

The capability of performing a variety of different loading tasks from the same outloading station optimises the loading process, resulting in reduced operating costs.

A primary advantage of the Moduflex loading chute is its modular construction, allowing units to be customised for specific applications while employing standard stocked components. The product programme also includes a wide selection of accessories which further extend the versatility of the system.

In both the following examples of two recent installations, flexibility of the loading equipment proved a key factor in securing the order.

Cimbria Moduflex has just delivered loading chutes equipped with FlexPositioners as part of a rail loadout station at the BEGA terminal in the Port of Klaipėda, Lithuania. The complete loadout facility was installed by sister-company Cimbria Videback, which has wide experience in engineering dockside bulk handling systems.

Here the loading station, which was developed in close consultation with the BEGA stevedoring company, was designed to handle a wide range of dry bulk cargoes. It has been equipped with a central filter system, with dust emission and flexibility key factors in its design.

This loadout station has four outlets which are fitted with Moduflex H300 loading chutes. They were supplied with heavy-duty multi outlets, providing the flexibility of loading into both closed railcars and flat-bed trucks. In order to optimise the loading operation further, each chute has been mounted on a FlexPositioner which allows the operator to provide precision adjustment of the chutes to accommodate different railcar and truck dimensions. This is achieved via a remote control unit carried by the operator.

Fast turnaround

The chutes were recently successfully commissioned and BEGA technical director Laimonas Rimkus commented: “Having a specific need for loading rail wagons and trucks of various sizes and construction from the same silo battery, we needed a flexible loading solution.

“Our decision to choose Moduflex loading chutes was based on previous experiences of Cimbria Moduflex being an experienced supplier with the capacity of delivering special customer-based solutions.”

He explained that in bulk material transfer operations, faster load turnaround is every organisation’s objective. For example, if as little as two to three minutes can be cut from the process of coupling a loading chute’s discharge outlet to a rail tanker – and subsequently uncoupling it – the time saved for loading a 20-tanker train could amount to three-quarters of an hour, or even an hour. He went on: “Measured by the contributions made to increased loading productivity and greater workplace safety, the investment payback time the new discharge unit is able to demonstrate is understandably short.”

Filter system

Cimbria Moduflex was also recently chosen as a supplier of loading chutes for the Borealis petrochemical plant in Sweden. The company had a requirement to maximise filling of plastic granulate into containers and the answer was found to be a Moduflex D300 chute equipped with a FlexFill.

This latter device is employed to spread product with poor flow characteristics inside a tanker truck or container, ensuring that every square metre inside the vessel is used. Apart from dispersing the product, the FlexFill also functions as a closing cone and thus prevents spillage when the chute is being retracted. Additionally, the unit’s distributor wing acts as a level indicator.

The plastic granules are potentially explosive so there was a requirement to protect the equipment from risk of explosion. For this reason the chutes were supplied with antistatic strips and earthing cable in compliance with the ATEX directives.

In addition, these chutes were supplied with an integrated fully self-contained filter system containing nine filter cartridges which provided a total filter area of seven square metres. Thanks to this new Moduflex system it is now possible to fill the containers with 24t of granulate instead of the previous 20t, allowing an increased loading volume of 20% and thus greater cost efficiency.

In favour of fog

A radical alternative to containing and aspirating dust during loading operations is to treat it in such a way as it ceases to be airborne. Dust Solutions Inc. (DSI) of Beaufort, SC, reports that it has successfully implemented its Dry Fog agglomerative dust suppression system to eradicate dust

pollution from a wide range of bulk handling applications. These include transfer to and from ships, railcars and trucks where traditional dust collection is either costly or impractical.

The DSI system employs compressed air and a special design of nozzle to produce a blanket of water droplets that are the same size as the floating dust particles (1-10 microns). These droplets impact the particles, adding sufficient weight to cause them to fall back into the process.

To give an idea of its efficiency, it is claimed that the DSI system can produce enough 'fog' to cover the surface area of half a football pitch with just one gallon of water.

Unlike some competitive dust treatment systems, no chemicals are required to increase the wet-ability of the water to overcome surface tension since the system functions at a sub-micron level. It is also said to be effective in below freezing temperatures as the 'fog' lacks sufficient mass to freeze.

High efficiency

DSI sales manager David Gilroy says that dust reductions in many bulk handling applications have exceeded 96% efficiency without wetting the material. Typical moisture addition is said to be less than 0.05%, making the system attractive to organisations handling moisture-sensitive materials such as coal, clinker and cement. He mentions that the Dry Fog system has recently allowed cement ship unloading operations to be continued at a number of environmentally sensitive sites which otherwise would have to be closed down because dust pollution exceeded statutory limits.

DSI employs a modular format that simplifies installation. This saves time and money by allowing most of the installation work to take place with the plant in operation, thus reducing shut-down time to a minimum.

For ship unloading, the system was made portable to allow it to be easily located in the vicinity of the ship hold. The control module is mounted on wheels so that it can be easily moved to the next hold. Manifolds are draped over the side of the hold so that fog is directed over the open hatch, capturing airborne dust particles before they can escape.

Filtering advances

Donaldson Torit, a leading international supplier of dust filtration systems, has introduced several innovations. Among these is the new triple-sealed bag-in/bag-out (BIBO) system for its Downflo dust collectors. This is designed to ensure dust contain-

ment during filter replacement in chemical and pharmaceutical applications, especially where potent compounds have been collected. The BIBO system is mounted on the outside of the dust collector, in such a way that the clean-change bag is stored on the clean air side and is never exposed to the dirty air plenum.

The company's BIBO bags are made of a rugged, proprietary material called Armoflex which is designed to withstand tough handling operations.

Paul Kojetin, director of engineering at Donaldson Torit, explains that his company's filters are designed dimensionally to be easier to handle

when dirty, compared with competitive systems. "Bagging out the larger filters of our competitors into one oversized bag needs at least two operators due to the weight and volume involved. No one wants to risk the exposure if the lighter-weight bags tear during replacement."

Another new product from this company is the Ultra-Web SB cartridge filter which incorporates nanofibre technology. It has been certified by independent laboratory tests at MERV 15 efficiency, delivering longer filter life, cleaner air and greater energy savings than previous designs.

In addition to the high surface-

loading and dust release capabilities provided by the efficient Ultra-Web technology, this latest filter features a strong spunbond polyester substrate for improved durability, moisture and chemical tolerance compared with traditional spunbond or meltblown filter media.

To cater for a wide range of applications, Donaldson Torit offers an extensive Ultra-Web line that is capable of filtering submicron dust particles (0.3 micron and larger) with MERV 13, 14 or 15 efficiency ratings.

Pulse cleaning control

New from Farr Air Pollution Control, which is also based in the USA, is the

FDC Controller which has been designed to provide reliable pulse cleaning control for all types of cartridge and baghouse dust collection systems. The unit monitors pressure differential across the filters to ensure more efficient pulse cleaning, reducing compressed air energy usage and extending filter life.

The device is said to be easy to operate. A pulse cleaning switch on the front of the box allows the user to turn off the pulsing operation, to pulse continuously based on pre-determined settings or to clean on demand when the high pressure setting is reached and a dirty filter alarm sounds. □