ALCAN INTERNATIONAL NETWORK

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RAW MATERIALS & EQUIPMENT

Alcan International Network creates worldwide business links between manufacturers and their customers in speciality metals, materials & equipment

AIN Industrial Filtration

The Industrial Filtration team enables customers to meet key environment, health & safety challenges. We provide complete turnkey solutions for:

- **Airborne dust control**
- **Removal of industrial debris**
- **Noise control**

Operating throughout Europe, our team specialises in heavy industrial applications and has particular expertise in aluminium, steel, foundry, concrete and cement industries.

Case Study: Airborne Dust Control in Concrete Block Making Plants

Concrete plants face a number of environmental and operational problems as a result of excessive fine dust. Manufacturers are obliged to adhere to local government requirements on air quality standards, usually by applying for an environmental permit for pollution prevention and control. In most cases these permits are bespoke to the plant, being dependant on a range of environmental factors. Operating criteria along with monitoring and control procedures are usually recommended by independent laboratories that will carry out air quality assessment and risk analysis at key areas of the site.

Employers also have an obligation to ensure safe working practices for plant operators. In the UK, the Health and Safety Executive have commissioned a study into the harmful effects of respirable crystalline silica, which is considered a potential carcinogen. Whilst the use of respirators may alleviate the issue, there is increasing pressure on manufacturers to reduce arisings of fine dust at source.

Finally there is the ongoing challenge of maintenance and cleaning, along with the possibility of premature wear to expensive capital plant. In terms of total operating costs, a well designed system for control and removal of concrete dust offers an economically viable route to meeting these challenges.

Sources of airborne fine dust in concrete block-making plants

- Cement and fly ash silos
- Mixing plant
- Block making machine, wet product side
- Pallet brushing machine
- Ageing rumbler / effects machinery and shot blast plant

As a general rule: if you can see fine dust floating in the air, the emission will be in excess of 10 mg/m3.

There are of course a number of variables for fine dust emission, such as particle size distribution in the raw material, atmospheric conditions, production method and many processing parameters associated with the final product specification. For a typical block making plant we observe the following basic issues:-

- Higher production throughputs naturally yield higher levels of atmospheric dust.
- At the mixing plant, dust emission will increase each time feedstock is weighed out and transferred into the mixer.
- At the block making machine, heavy vibration generates fine dust mainly from the pallets.
- Where pallets are cleaned with a rotating brush, large quantities of fine dust may be generated.
- Product rumblers and conveyor belts also generate dust which can affect operators in final palletising areas.

AIN Industrial Filtration specialises in the design, supply and installation of bespoke dust filter systems which will significantly reduce fine dust emission at the key extraction points and guarantee compliance with local environmental requirements. In most applications, our systems achieve dust emission levels below 1 mg/m3 at the clean air outlet.

Dust Filter System Design

Efficient and cost effective system design usually begins with a detailed consultation at the client's site to establish:-

- Location and type of key emission sources on the plant.
- Assess dust generation patterns, key extraction points.
- Number and location of extraction points; calculation of airflow requirements and filter surface area.
- Requirements for features such as dust collection, noise control, filter unit location etc.
- Handling of the filtered clean air (i.e. externally to atmosphere internally to redress air pressure losses).

Once these basic parameters are understood, we can proceed with the design of the installation:-.

Ductwork
Specification and layout is optimised to provide sufficient negative pressure at each extraction point and minimal internal turbulence (thereby avoiding excessive noise, build-up of residual dust and eventual erosion of key areas of the duct). Particular attention is given to measurements, optimal mounting points and any obstructions between the filter unit and the various extraction points – this helps to ensure minimal disruption during installation.

Smooth wall ducting is usually specified and sliding dampers are used to balance the system.

Extraction points

Custom made steel fabrications are designed around the plant and operator needs for optimum performance and practicality.

Left: Extraction point for rotating brush is connected by flexible hoses.

Below left: Suction hood for a block making machine – fabricated with castors and connected by flexible hose to allow free movement without demounting from the ducting system

Below & inset: Airborne dust is created when operators clean down machinery. In this block machine housing, we have installed a multi aperture duct which is connected to the filter system via a diverter valve. When required, extraction capacity is diverted from the suction hoods and the block machine is cleaned with compressed air, blasted in the direction of the duct for safe & efficient cleaning.

Outdoor installation for block making & pallet brushing stages

Filter

Typically a cassette type filter would be specified for concrete applications, with size and electric fan power defined by overall air flow requirement and dust emission levels. Any additional features can be specified at this stage (e.g. support structure, platform, noise enclosure, silencer, inspection doors, hopper arrangement). In most cases the filter is equipped with an electronically controlled pressure sensitive ‘clean on demand’ system which uses compressed air to remove built-up dust from the filters. This ensures efficient operation and maximum service life of the filter cassettes, emitting a warning signal when they need replacing.

Indoor filter dedicated to a mixing plant

Dust disposal
There are numerous options for collection and disposal according to the quantity of filtered dust and operational preferences. For example, a rotating flap valve at the base of the hopper will constantly remove dust from the filter without pressure loss or operator intervention. Average extraction from a pallet brush can be 300-1000 litres of dust per 40 hours of production, therefore we usually specify a larger steel tipping container or a steel frame to support big bags. At the block making machine point, average extraction is usually lower - around 100 litres per 40 hours. In applications where the filter is dedicated only to a block making or rumbler machine, a 50 litre bin will often suffice.

Dual tipping container with flexible attachments to minimise forklift damage during removal.

Rotating valve with big bag support.

Water Mist Treatment
Product rumbling machines inherently produce fine airborne dust, which can be removed using a suitable extraction system. However a layer of dust will usually adhere to the product surface; this can become airborne during further conveying and packaging operations, creating another problem for the operator environment. In such cases, we can specify a series of water mist nozzles which are configured to blow a fine vapour onto the product and allow the dust to agglomerate and settle, without fully wetting the product or machinery.

Installation & Commissioning

Once a system specification has been agreed, we work closely with customers to schedule in the installation, ensuring on-time delivery of all key components and availability of the installation engineers. Frequently this is planned to coincide with shutdowns or scheduled plant maintenance dates in order to keep disruption to an absolute minimum.

After installation, we will fully commission the system to ensure that the optimum operating parameters are selected. We also ensure that operating instructions and guidelines are well understood by the client's operators and plant managers.

Finally, clients are able to test the system and where necessary take the appropriate air quality analyses to ensure that any mandatory environmental and health & safety requirements are properly met.

Service & Support

In practice the filtration units are extremely reliable and require little or no maintenance other than routine filter replacement. Nevertheless we are geared to respond to any urgent requirements for spares and service.

Plant References

AIN Industrial Filtration has over 350 installations in plants throughout Europe. Some of our clients are open to receiving visitors to view our systems in the operating environment. For prospective customers this can provide valuable insight into system efficiency and reliability - please contact us for further details.

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