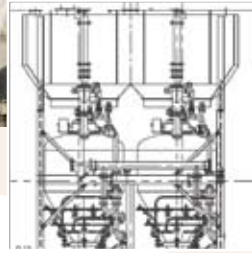


Enhancing Customer Operations for **Bulk Ash Handling, Dosing and Injection**





Overview

What We Do

The Clyde Mineral Technologies Division of Clyde Materials Handling provides low energy, low maintenance, and environmentally enhancing solutions for the material handling requirements of customers in process-based manufacturing environments such as cement.

Clyde Materials Handling specialises in providing dense phase pneumatic conveying and pneumatic dosing/injection solutions that strive to reduce energy and maintenance costs, reduce the emissions of dust and harmful pollutants while helping their customers to improve productivity.

Clyde Materials Handling today employs over 150 people from locations in the UK, US, Brazil, China, South Africa and India. Its parent company, Clyde Process Solutions plc, is listed on UK's AIM stock market. Clyde Materials Handling's expertise in developing innovative solutions is complemented with design study, testing, project management and after sales service capabilities.



Experience and Excellence in Ash Handling

With more than 30 years of experience in developing and implementing customised bulk ash handling solutions for the cement industry, Clyde Materials Handling has become an internationally recognised leader in two core technologies: dense phase pneumatic conveying and pneumatic dosing/injection.

Clyde Materials Handling has extensive experience and expertise in handling bulk ash since its inception in the mid 1970's, having established its technologies in the power industry, moving ash from industrial boilers to other elements of the power generation process. Furthermore, Clyde Materials Handling has developed spin-off material handling solutions in the shape of the ISO-Veyor, an intermodal form of transporting bulk materials, like ash, in a tank container than can be deployed on a truck, railcar or ship. It is clear that Clyde's expertise in transporting bulk ash is unrivalled in the material handling industry with all these technologies being utilised by some of the world's largest cement producers.

This year, following an extensive cement materials development program, Clyde Materials Handling has enhanced its existing range of dense phase pneumatic conveying solutions to ensure even greater energy savings and operational efficiencies can be generated for the cement market. This ultra dense range of pneumatic conveying solutions has the ability to transport significantly more ash down a single conveying pipeline than alternative technologies, across substantial distances and at high throughputs.



Dense Phase Pneumatic Conveying – Continuous, Reliable, Low Energy Ash Handling

Clyde Materials Handling's Dense Phase Pneumatic Conveying technology is suitable for transporting materials, such as ash, along a pipe in a plug form at very low velocities. This means minimal wear on pipes / bends, promoting minimum maintenance and long life.

Efficient use of compressed air creates low energy, low maintenance solutions which can be designed to transfer ash from a single collection point to either a single or multiple reception points. Systems are available for materials at temperatures up to 450°C, rates of over 300 tonnes / hour, and for distances up to 1.5 miles, all in a single pipeline.

Clyde Materials Handling's Dense Phase Pneumatic Conveying technologies provide the cement industry with the following benefits:

- Lower Energy
- Lower Maintenance Costs
- Lower Operational Costs
- Increased Productivity
- Increased Process Reliability
- Reduced Emissions and Material waste
- Reduced Risk of Material Spillage
- Reduced System Footprint
- Flexibility to Extend Application

Clyde's continuous, reliable, low energy Dense Phase Pneumatic Conveying technologies have been applied in handling ash across the following scenarios:

- Train/Truck loading and unloading
- As a low headroom, multiple vessel conveying systems, specifically designed to replace high maintenance, ageing and inefficient drag chain conveyor systems used for discharging material from ESP filters. These systems will also convey direct to storage
- Long distance, high capacity conveying



Pneumatic Dosing/Injection – Accurate, Adaptable Ash Injection Technology

Clyde Materials Handling has powered pneumatic dosing/injection solutions across many industries and has consistently improved productivity rates, system reliability, availability and performance for organisations that operate within the minerals market.

Products, such as ash, can be continuously dosed into process environments at smooth, easily controlled rates up to and over 150 tph, over long distances, with accuracies of $\pm 1\%$, and against back pressures of 20 barg or more if needed. Materials can be injected using lean phase (high velocity) or dense phase (low velocity) providing cement producers with agility and flexibility to adapt the means of injection that best fit their process environment.

Clyde's range of pneumatic dosing/injection technologies provides the lowest wear for repeatable, predictable and accurate transportation of ash into process. In addition, these technologies have the capacity to blend materials in the conveying pipeline, creating a consistent, homogenous mix of material to process.

Furthermore, Clyde's pneumatic dosing/injection technologies can save significant investment in additional technologies. For example, a single Clyde pneumatic dosing/injection unit replaces the requirement for a feed hopper, loss-in-weight feeder and rotary valve. This not only generates savings in investing in additional capital equipment but also helps to reduce system footprints and energy costs.

Clyde Materials Handling's Pneumatic Dosing/Injection technologies provide the cement industry with the following benefits:

- Increased Process Control
- Increased Dosing/Injection Accuracy
- Increased Productivity
- Increased Process Reliability
- Increased Utilization of Raw Material
- Reduced Air Leakage and Reduced Energy Consumption

Clyde's accurate, adaptable injection technologies have been applied in handling ash across the following scenarios:

- Dose pulverized fly ash and other additives into the cement mill system or separators
- Blend raw materials in the conveying pipeline and then dose directly to process
- Inject pulverised fly ash into a cement kiln





References

Clyde Materials Handling has many reference systems in the cement industry covering both dense phase pneumatic conveying and pneumatic dosing/injection technologies for ash handling. Examples of typical cement references secured by Clyde Materials Handling include:

Location	Application	Distance (m)	Throughput
Poland	PFA Conveying	300	150tph
UK	PFA Injection to Cement Mill	85	50tph@±0.5%
UK	Ash Handling & Separation Plant Conveying	170	83 tph
UK	PFA Injection to Cement Mill	50	15tph@±0.5%
UK	PFA Conveying from Separation Plant	1500	50tph
Israel	PFA Conveying	350	250 tph
UK	Classified Fly Ash Conveying	50	45tph
UK	Boiler Ash Conveying	250	100tph
Japan	Fly Ash Conveying	550	100tph
Japan	Fly Ash Ship Loading	680	150tph
UK	Cem II Conveying	42	75tph
UK	PFA Conveying from Blending Plant	65	120 tph



Clyde Materials Handling – Enhancing Customer Operations

Clyde Materials Handling’s Dense Phase Pneumatic Conveying and Pneumatic Dosing/Injection solutions have an ‘eco’ message at its core. The drive towards enhancing the range of technologies was to help the cement market respond to the increasing need to reduce energy, emissions, maintenance and operational costs while improving process reliability and production performance.

Clyde Materials Handling’s ‘eco’ range of solutions has been developed to: • Enhance our Customers Operations • improve Energy Conversation and process Optimisation, and • Be Economically designed to consume low volumes of air and energy, and at reasonable capital costs.



Contact Us

Clyde has global coverage, through direct offices and representatives. Please contact us if you wish to speak to a Clyde cement expert or to a representative in your region.



CLYDEMINERAL
TECHNOLOGIES

Clyde Materials Handling Ltd

Carolina Court
Lakeside
Doncaster, DN4 5RA

Tel: +44 (0) 1302 321 313

Fax: +44 (0) 1302 554 400

E-mail: solutions@clydematerials.co.uk

www.clydematerials.com