

# Australia's Alumina ports solve air pollution



**Alumina is converted from Bauxite and is the raw material used in the production of Aluminium although it has many other uses from abrasives to toothpaste. Over 48 million tons of Alumina are shipped each year, 38% of which comes through Australian ports. Alumina is a difficult-to-handle, free-flowing material which is prone to causing dust pollution during handling operations such as the filling of ships holds. Unless precautions are taken, air-pollution levels as high as 200mg/m<sup>3</sup> can easily be exceeded. Air pollution at these levels is a real health hazard to people working in the vicinity, causes a nuisance to adjoining properties and over time leads to marine pollution resulting in potential loss of endangered species.**

Historically, Alumina was loaded into ships holds by dropping it down vertical loading chutes often 25m or more in length which, unsurprisingly, caused huge quantities of dust to be generated when it hit the hold floor. Some loading systems incorporated a complex dust extraction system which was not particularly effective, required regular maintenance to filter packs and consumed large amounts of energy, clearly a more effective loading system was required.

A more effective ship loading technology became available to Australian Port Facility operators when the Cascade loading chute was developed in the UK, originally to handle Potash, another notoriously difficult-to-handle, dusty material just like Alumina. The Cascade system overcomes these problems by directing the material to flow down a chute incorporating a series of inclined cones which limits the flow velocity thereby preventing the entrainment of large quantities of air which would otherwise lead to dust production. Using this technology dust production is practically eliminated at source without the need for expensive

and energy intensive dust extraction and filter systems. So effective is the technology that the manufacturers, Cleveland Cascades Limited guarantee that dust emission levels will not exceed 5mg/m<sup>3</sup> when the system is operating. Port Operators considering the installation of this technology can request for very accurate air pollution measurements to be taken before and after installation to demonstrate the improvements that have been made, this is very useful when complying with environmental protection legislation. In some ports where many widely different materials must be handled, the VariFlow system is available. To optimise flow rate the VariFlow can operate in three modes. In standard mode, cone inclination is maintained at a fixed angle to suit the range of materials anticipated. In remote mode, the cone angles are adjusted to optimise flow rate for a particular material. In intelligent mode, sensors in the system monitor the materials speed of descent and the cone angles are constantly adjusted to optimise the flow rate.

In common with many other materials, Alumina is highly abrasive and special precautions must be taken to protect the running surfaces within the loading system. Cleveland Cascades Ltd has developed a process to attach a ceramic tile lining system to internal surfaces to provide protection. So effective is this system that installations can be guaranteed to handle many millions of tons of material before any attention is required. Because the requirements of every port operator are different, Cleveland Cascade Ltd chutes are bespoke, tailored to meet each operators needs. Many optional features can be provided including camera monitoring of the loading operation, particularly useful if the shiploading machine operator's view is obstructed. Rotating trimming devices can also be fitted to fully utilise hold space under deck coamings and to help operators to adhere to ship loading plans.

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To date Cleveland Cascade Ltd loading chutes have been installed by operators and port authorities in several of Australia's main bulk terminals where dry dusty bulk material has to be handled effectively. Coal, fertilisers, grain are among the dozens of materials for which Cleveland Cascades Ltd has provided solutions.