

AEROCON

Aero-Conveying System Engineering

From Concept to Production; Aero-Conveying TiO₂ for Paint Production Requires an 'Imagineering' Approach



When a leading paint manufacturer from the Gulf Coast of the USA decided to consolidate and modernize its paint production facilities it became obvious that the diverse handling characteristics of TiO₂, Calcium Carbonate, Resins, Talc and Clays would require a special approach. Each material possessed different conveying properties and in one case lumps 'the size of a basketball' could be encountered in the raw material. Delivered in 2000 lb (910 kg) bulk bags each of the ingredients had to be off loaded and transferred to one of 10 Hockmeyer Mixers.

In order to accommodate a large number of variable recipes of paint and to allow for the addition of minor colors a site visit was arranged to discuss the best layout and equipment specification. The difficulty of breaking down the large lumps yet handling TiO₂ was of concern to the Aerocon Staff. A lump breaker system could be used as a particle size reducer, but presented a problem for the difficult flow properties of TiO₂. Using typical Imagineering techniques the concept shown in the original site notes in Fig 1 was established. In addition the practicalities of the site layout demanded that a total of four bulk bag unloading and transfer systems would be needed. With a required unloading time of just 5 minutes for a 2000 lb bag of TiO₂ and with a minimal delay in loading the mixer as multiple bulk bags were changed, there evolved a further requirement to avoid wasted time when changing bags.

Given that the entire system operated in an Explosion Hazard area the engineering challenges for the conveyor system were significant.

Aerocon Aero-mechanical conveyors are well suited to the transfer of a variety of products at the same transfer velocity. Unlike pneumatic

systems they can accommodate a wide variety of product bulk densities without the need to change conveying parameters. In addition the conveyor does not pump air and therefore requires no filtration. The designed system consisted of an Aerocon Bag Dump Station, unique Twin Hopper Screw feeder, Purpose Built Gravity Diverter Valve, Split-Frame Type Bulk Bag Unloader, Lump breaker and two Aero-mechanical conveyors. The Bulk Bag Assembly was some 20 foot high to accommodate the diverter valve. Material was unloaded from Bulk Bags, with minors hand dumped via a integrated reverse jet filter type

Special points of interest:

- Conveys TiO₂, Talc, Clay & Resins in the same conveyor.
- Split Frame Bulk Bag Unloader minimizes the bag change over time by allowing a second frame to be staged ready for loading.
- Empties 2000 lb of TiO₂ in five minutes
- Special Diverter Assembly handles included lumps

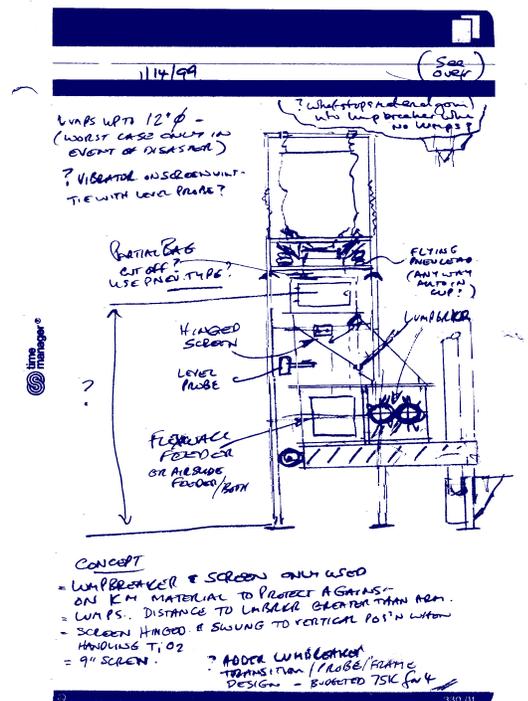
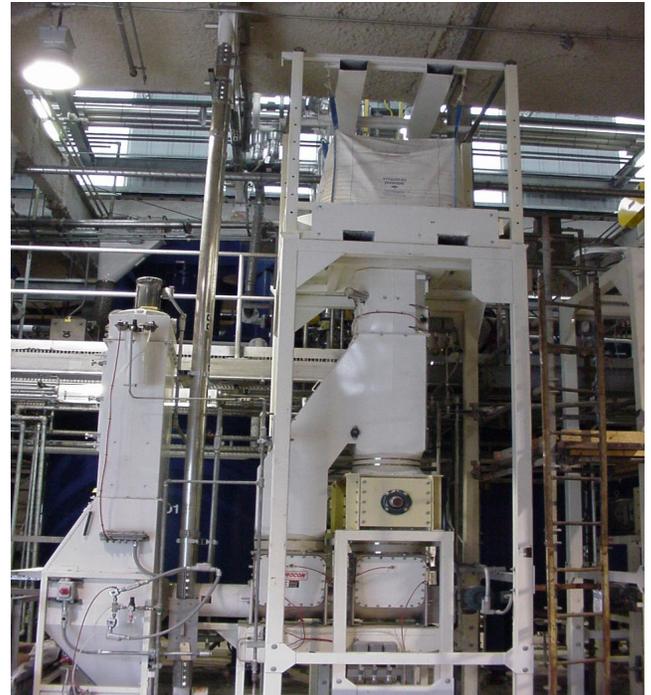


Fig 1 Site Notes & Design Concept

Bag Dump Station, fed via a screw feeder and on to the first of two Aero-mechanical conveyors. This Type 450V unit elevates product 20' before turning through 90 degrees and running horizontally for 12' where product discharges into a second Aero-Mechanical unit. Running at a lower linear velocity this unit is equipped with three outlet valves. The low profile Rotating Tube Section Valves are pneumatically operated and allow the selection of the appropriate destination mixer. Overall height of each valve is 15" including the operator. (Compare this to the height of a typical filter receiver)

For products such as TiO₂ that smear inside conveyor tubes the Aero-mechanical conveyor has a unique ability to keep the bore of the tube clean simply because of the cable and disc assembly that generates the method of conveying.

Also essential to the success of this particular application was the design of the control panel. Aerocon is a UL approved panel manufacturer. Using a Micro Logic programmable controller housed within a 'Z' Purged standard enclosure, the panel incorporated controls for the motors, reverse jet filter, lump breaker and screw feeder. In addition selection of the appropriate mixer and isolation valves are made. The 'Z' purge enclosure uses positive pressure within the panel to protect against explosion risk.



Actual layout of Bulk Bag Unloader, Conveyor & BDS closely resembles the original sketch in Fig 1

How Aero-mechanical Conveyors Work

An Aerocon Aero-mechanical Conveyor is constructed of two parallel tubular housings (typically 3" or 4" tubes) containing a continuous loop of steel cable. Polymer discs smaller than the inside diameter of the tubes are mounted at equal intervals along the steel cable. One side of the housing is for conveying and the other is for return. Material inlets and outlets are suitably located for the application. Two sprocket assem-

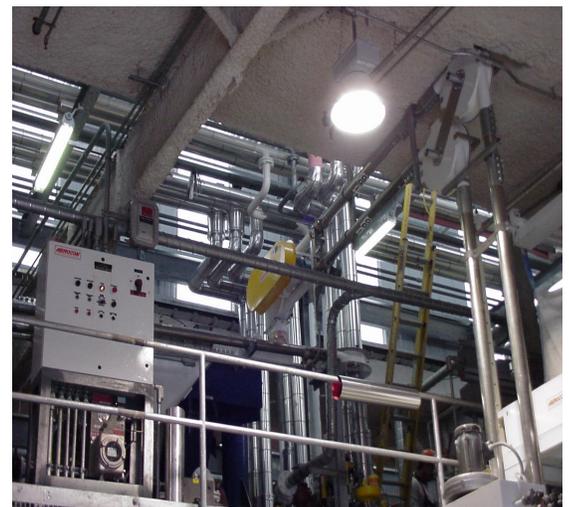
blies, one providing drive and linked to a small motor (Typically 2 or 3 h.p.) and the other guiding the return, complete a basic system.

Aerocon Conveyors have major advantages over competitive units by virtue of a superior bi-directional tensioning system that is independent of the drive assembly, easy clean self-draining housings and geared motors as standard.

“For products such as TiO₂, that smear inside conveyor tubes, the Aero-mechanical conveyor has a unique ability to keep the bore of the tube clean”



Transfer Point Between Type 450V and 250H Aero-Conveyors.



Aero-Conveyor and 'Z' Purged Control Panel