

## Ask Joe! Column

### Advantages and Disadvantages of Aero-Mechanical Conveying

Guest article by Michel Podevyn



The Aero-Mechanical Conveyor (AMC), most commonly known as a “rope and disk” conveyor, has been around since the early 1960’s. Now used in 30+ countries, the AMC has made a name for itself for conveying everything from coffee beans, tea leaves, malt, and plastics to titanium dioxide. This article outlines the advantages and disadvantages of using AMC’s and notes some recent equipment developments that reduce maintenance cost.

An Aero-Mechanical Conveyor (AMC) is a high capacity, totally enclosed mechanical conveyor that handles powders, granules, pellets and flakes. In the AMC, a continuous rope, with a series of equally spaced disks secured to it, travels through a flow and return tube arrangement.

A constant speed motor moves the rope and disk assembly creating a conveying action that draws material into the slip-stream behind the disks rather like the dust that is drawn into the slip-stream behind a fast moving automobile! It is essential that material that is ‘stream fed’ into the Aero-Mechanical Conveyor. That is to say, it must be fed at a controlled rate. The high speed disc mechanism fluidizes all flowable solids in a recirculating air stream which provides low shear conveying of powders or particulates up to 5/8”.

The AMC can be used with multiple inlets or outlets, move product vertically, horizontally or at varying angles and up to distances of 60 feet depending on variables. AMC’s are easily connected to other equipment such as Bulk Dischargers or Fillers and can be mounted on a mobile support frame so that one machine can be used on a multiplicity of applications. One of the most noted successes of the AMC is its ability to handle powders that have notoriously difficult characteristics such as Titanium Dioxide (TiO<sub>2</sub>).

Successful handling of inherently sticky, cohesive materials like TiO<sub>2</sub> is due to the way that an Aero-Mechanical Conveyor mimics the fluidization process of a fully pneumatic conveyor without the potentially degrading high speed pneumatic action and cost associated with lean phase pneumatic equipment in particular. The gentle fluidization process of an AMC reduces degradation dramatically and works well with inherently sticky, cohesive materials.

An additional reason for AMC’s success with difficult materials is its stream feeding process, which doesn’t allow powders to cake up or otherwise be problematic compared to plug fed systems.

#### Aero-Mechanical Conveyor Basics

The AMC consists of six main components: inlet housing, outlet housing, set of two conveyor tubes, rope & disk assembly, electric drive and a gravity inlet.

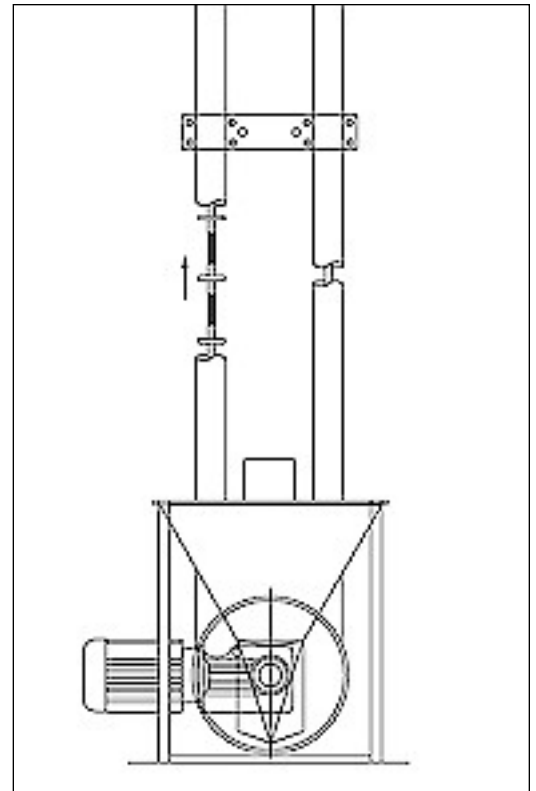
The rope & disk assembly is completely enclosed in the conveyor tubes and is wrapped around sprockets at each end of the conveyor within the inlet & outlet housings. Typical rope & disk flights are manufactured out of stainless steel strand rope and plastic disks molded on to the rope at regular spacing.

A drive at either the inlet housing or outlet housing drives one of the sprockets and in turn rotates the rope & disk assembly around the sprockets. The drive is typically mounted to the inlet (bottom) housing for conveyors up to 20 feet long, whereas any conveyor over 20 feet would rely on an outlet (top) housing mounted drive. By adding corner housings, "turns" can be made in the conveyor.

In addition to being configurable to have angles of operation from 0° to 90°, up to two sets of corner housings can be added to provide a horizontal-vertical-horizontal configuration. Other configurations are possible and depend on the application needs and material being conveyed.

Additional inlets can be positioned along the length of an AMC for batching applications. Product is ejected centrifugally via the outlet housing. Additional intermediate outlets, each with its own valve, can be installed along the conveyor tubes for multiple discharge points.

The speed of the rope & disk assembly is about one quarter of the air speed in pneumatic systems, but very much faster than the speed of most mechanical handling equipment. Aero-Mechanical Conveyors should not be confused with low speed Drag-Link Conveyors some of which appear to be similar in construction but which operate at much lower speeds.



## Advantages



The Aero-Mechanical Conveyor has proven to be one of the most cost efficient methods of conveying materials in terms of its high productivity and dust-free operation. Features include total batch transfer, flexible operation at any angle without loss of capacity, dust-free sealed system for contaminant free delivery. Capacity of material handled varies up to 120 tons per hour.

The AMC can conveyor up to 60 feet without any problems. A major advantage is that degradation to the material is almost negligible with this type of conveyor, since it creates a moving current of air in which the material is conveyed, similar to the effect of a vacuum or pneumatic system.

However, the Aero-Mechanical Conveyor does not need a cyclone or filter system to separate the product from the air – this fact alone is a major advantage. Not only is there no initial cost of a filtration system, there are neither filtration running costs nor the possibility of environmental contamination. Aero-Mechanical Conveyors convey product wholly with no losses.

Other than free flowing powders such as acrylics, flour and carbon black, the system can also convey difficult materials such as titanium dioxide. In addition, it has no problem with granules, flakes or chips. Unlike screw conveyors that tend to allow the material to cake and compact, the fluidizing action of the aero mechanical efficiently moves the material without problems.

## Disadvantages

With this type of conveyor, maintenance needs are moderate to high depending on the amount of time the conveyor runs as well as the material conveyed. The rope must be tensioned occasionally. Rope life also depends on the conveyor length, the number of starts and stops, solids loading and whether routine inspection and tensioning are properly performed.

The only other disadvantage is the rope itself. Being a series of strands, it is not the easiest component to clean. Having said that, this is usually only an issue where cross-contamination cannot be tolerated between frequent batch changes. AMC's can be dry cleaned or more often they are washed through with a suitable cleaning fluid and then dried by running them empty for a period. Most manufactures offer a variety of access panels for dry cleaning or connection and drain points for an integrated clean-in-place system.

Now used in 30+ countries, the Aero-Mechanical Conveyor has made a name for itself for conveying everything from coffee beans, tea leaves, malt, and plastics to titanium dioxide. Consistent performance and operational reliability have endeared aero mechanical conveyors to a wide audience of industries. From the seemingly simple task of transferring food ingredients to the abrasive and corrosive nature of conveying chemical industry products, AMCs are well-equipped to be the ideal solution for a broad spectrum of bulk solids conveying applications.

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**Welcome to Ask Joe!**, a monthly column by our resident materials handling guru, Joe Marinelli of Solids Handling Technologies. Joe addresses the issues that bug you the most. And Joe knows!! Formerly with Jenike & Johanson, Solids Flow and Peabody TecTank, Joe is an expert on materials handling.

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Guest articles for the **Ask Joe!** Column are always welcome, for more information please contact Joe Marinelli directly at his email address: [joe@solidshandlingtech.com](mailto:joe@solidshandlingtech.com).

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