

TRANSVAIR AERO-MECHANICAL CONVEYOR FACTS

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HISTORY OF THE AERO MECHANICAL CONVEYING

Introduction

The Aero Mechanical Conveyor currently marketed in the United States of America is a distant relative to the original unit designed in the early 1950's in Australia. Throughout the years, the unit has been improved dramatically, to be used in the food, pharmaceutical and chemical industries. It is believed that the original idea for Aero Mechanical Conveying was developed by an Australian farmer. The principal of the age-old sludge pump which used chains and discs to transfer the sludge and slurry materials was used for transferring agricultural products. By incorporating a wire rope and disc assembly and running at a slightly higher speed, the aero mechanical conveyor was introduced for transferring dry free flowing materials.

Agricultural Background

The aero mechanical conveyor was manufactured and marketed by a small company in Australia. It was developed for conveying dry, free flowing grain, meal, and various animal feeds. At this point in the evolution of the aero mechanical conveyor, the maximum length was approximately 20 feet. Most of the units manufactured then were usually much shorter in length. More often than not, the units were powered by small gasoline engines for use in farming. During the beginning stages of the aero mechanical conveyor, very few units were sold to industry. The few units supplied to industry were to handle flour and similar materials. The design at this stage was extremely basic, and the components of the machine were of a "light duty" design. The Australian firm which marketed this unit was reluctant to export it or offer it to industry because the design at that time had definite limitations.

Marketing in The United Kingdom

In 1966 Entecon located in the UK, imported an aero mechanical conveyor for use in the United Kingdom. They started to sell this unit for agricultural purposes. Some problems arose in the first applications. Most problems were attributed to the light duty components of the machine, and shortcomings in the design of the unit. The aero mechanical conveyor which was developed in Australia was re-designed and sold for handling dry products.

Advancement for Food and Chemical Industry

With the increasing success of the unit in the food and chemical industry Entecon decided to limit its use in agriculture and manufacture their own conveyor for the UK market specializing in the food and chemical markets.

Expanding Market in the United States of America

In the early 1980's, Entecon Limited entered into an agreement with Beltyne, Inc. to market the aero mechanical conveyor in the United States. Beltyne did not have much success in marketing the aero mechanical conveyor. One unit was purchased by The Young Industries, Inc. It was used to convey powder from the discharge of a self-contained filter/bag dump station. Young Industries found that this machine had great potential in the food and chemical industries. Entecon Limited severed the marketing agreement with Beltyne, and in 1984 entered into a formal marketing agreement with The Young Industries, Inc.

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For several years components were imported from the UK and assembled by Young Industries. It was increasingly evident that the equipment standards for the UK did not meet the requirements for most of our customers in the US market. After several years of association with Entecon, the agreement was dissolved and in 1990 Young Industries began manufacturing the Aero-Mechanical Conveyor in the US, changing the name to the Transvair Mechanical Conveyor. This is when most of the current development started. We changed, expanded and improvised the design to meet the custom needs of our customers.

Since the introduction of the Aero-Mechanical conveyor to the US market, we have manufactured hundreds of machines for the food, pharmaceutical, and chemical industries. In many applications however the Transvair Aero-Mechanical conveyor does not meet standards for food or pharmaceutical powder handling. It is mostly used to transport powders in the chemical industry.

CURRENT DESIGN:

In 2019 Young Industries re-designed the Transvair Aero-Mechanical Conveyor to incorporate new features. New additions

- a. Outboard bearing design
- b. Option to purge the shaft seal
- c. O-ring tube seals are standard to make the conveyor dust tight
- d. Shaft mounted gearmotor drive replaces the v-belt drive

SIZES - The Conveyor is available in Size 3" and 4". The size notes the size of tubing used for the system. 3" uses 3" O.D. tubing and 4" uses 4" O.D. tubing.

CONVEY CAPACITY – The estimated convey capacity of the 3" Conveyor is up to 10 cu. ft. per minute. The 4" conveyor has a capacity of up to 20 cu. ft. per minute. The capacity of the conveyor is directly related to the flowability of the powder.

Example: TIO₂ has very poor flow properties will be on the low end of the capacity chart. Products that Are Cohesive we will normally de-rate the capacity to ½ of free-flowing products. Graphite powder is the other end of the spectrum and can be conveyed more toward the high end of the capacity.

Note: By using Transflow® on the inlet of the conveyor, the capacity of the conveyor on most powders less than 100 mesh size is greatly increased. When conveying cohesive powders from a Transflow lined hopper we need to install a feeder to meter at a controlled rate into the conveyor. Reason is that the Transflow causes over-feeding of the conveyor and will ultimately stall out with the very cohesive powders.

CONVEYOR DISC VELOCITY – The conveyor is not a drag conveyor and runs more like a fan in that powder is in suspension during transfer. The discharge of the system requires centrifugal force to carry material around the sprocket to the discharge. The standard conveyor runs at a shaft speed of 250 RPM. This equated to a velocity of the discs in the conveyor running at a minimum of 750 ft. per minute.

CONVEYOR ONLY – The Transvair Mechanical Conveyor is strictly a conveyor and cannot be slowed down to meter products. If a specific metering rate is needed a feeder will need to meter into the conveyor.

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CONVEYOR ANGLE OF INCLINE- Because this conveyor runs at a velocity of 750 ft. per minute, it is capable of conveying powders at any angle from horizontal to vertical with no loss in efficiency or capacity. This offers significant advantages over inclined screw conveyors and can save users floor space in placement of equipment in many cases.

CONVEYOR INLETS – The conveyor has a single inlet which is on the side of the inlet sprocket housing. This inlet has a 45- degree slope into the inlet sprocket as standard. The slope may be fabricated metal, or live rubber pad with vibrator. The most effective inlet for powders is a Transflow® lined inlet slope which makes the powders fluidized and free flowing as it enters the conveyor thus increasing convey capacity. Other inlets and feeders are available

CONVEYOR DISCHARGE – The conveyor has a single discharge. The standard size for both size conveyors is 8” O.D. The large size is due to the volume discharging and the velocity at which the material is being discharged. On occasion we will use a 6” O.D. discharge but that is the smallest recommended for most products. It is important that the discharge ducting from the conveyor to the customer process vessel be designed for the high-volume high velocity discharge. Long shallow ducting or transitioning to smaller inlets to vessels can be an issue. Remember that material is discharging at 750 ft. per minute, so it needs to exit the conveyor easily.

CONSTRUCTION:

The sprocket housings are available of cast aluminum construction or 304S/S construction. The sprocket and shaft are 304S/S construction. For cost efficiency we have eliminated carbon steel sprockets since we are able to run larger quantity stock orders of 304S/S sprockets.

The bearing housings for the conveyors are either cast aluminum or 304S/S. The S/S bearing housings for the 3” & 4” conveyors are fabricated.

For the hard to handle cohesive powders we manufacture special patented sprocket housings utilizing Transflow® in strategic areas of the housing to eliminate product packing. On these nasty products we also Silverstone coat the sprocket rims. The Transflow on these end assemblies typically will run at a slightly pressure when handling pigments than the standard Transflow hopper. Air pressure is usually between 5-10 PSIG.

Note: on occasion we manufacture 316S/S conveyor’s, but 316S/S is not standard, and delivery can be more than standard and if we do not have any 316S/S spinning’s in stock. Spinning’s are used for the corners of the sprocket housing,

CONVEYOR MODELS

MODEL SL (Dwg.D-2118-09.01) Straight Line Conveyors, no turns. These units can Convey at any angle horizontal thru vertical due to the velocity at which the powder is being Conveyed.

MODEL VH (Dwg. D-2118-10.01) VH designates vertical- horizontal conveyor. This means that from the inlet, the convey tubes go vertical, then by using sprocket housings the conveyor makes a 90 degree turn to convey horizontal.

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MODEL HV (Dwg. D-2118-11.01) HV designates horizontal- vertical conveyor. This means that from the inlet, the conveyor tubes go horizontal then by using sprocket housings the conveyor makes a 90 degree turn to convey vertical.

MODEL HVH (Dwg. D-2118-15.01) designates horizontal- vertical- horizontal conveyor. This means that from the inlet, the conveyor tubes go horizontal then by using sprocket housings the conveyor makes a 90 degree turn to convey vertical, and then makes a second turn to horizontal.

CONVEYOR LENGTHS – Typically for the Straight-Line Model SL Conveyors we limit the length to approximately 40 ft. long. This length is the distance between the centers of the inlet and discharge sprocket housings.

For the Model VH, HV and HVH Conveyors we limit the overall length (adding the horizontal and vertical lengths) to approximately 60 ft. With these Conveyors we also limit the length between sprocket housings in any one direction to 40 ft.

CONVEYOR CONSTRUCTION – Both the 3” and 4” Conveyors are available with sprocket housings in cast aluminum construction or fabricated 304S/S construction as standard. The sprocket housings are product contact surfaces. The remainder of product contact surfaces can be either carbon steel or 304S/S. These conveyors can also be manufactured of carbon steel, 316 S/S or other materials as needed by the application.

ROPE CONSTRUCTION – Rope can be galvanized or 304S/S const. and as a standard the rope itself is nylon coated. The rope is also available as non-coated bare metal.

DISC AND BOSS CONSTRUCTION STANDARD – Polyurethane disc with nylon boss is the standard disc and boss used

OPTIONAL MATERIALS AVAILABLE

- A. Static conductive polypropylene disc and boss (black in color)
- B. Magnetic attracted nylon –Polymag disc and boss (gray in color)
- C. Custom engineered plastics can be supplied as application requires.

CONVEYOR DRIVES – For most applications either 1.5 HP, 2 HP, or 3 HP motors are used. The actual HP requirement is established based on properties of the powder being conveyed, and conveyor length. The standard drive is a shaft mounted gear reducer with TEFC 1750 RPM motor.

Motor voltages, special enclosures or customer preferred motor manufacturers can be used.

MATERIALS THAT CAN BE CONVEYED

PARTICLE SIZE – Submicron powder to ½” granules, best to handle granules ¼” or less. For Handling plastic pellets, it is best to open the clearance between disc and tube. We have used 4” conveyors with discs for 3” Machine (2.5” diameter) for pellets and on occasions machined The standard disc for the 3” conveyor (2.5 O.D.) to 2.25” diameter.

BULK DENSITIES – 2-250 lbs. per cu. ft.

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NOTE: This conveyor will convey liquids since it runs at a velocity to keep products from settling during transfer. This is notable for times when the conveyor needs to be thoroughly cleaned and water wash-down is acceptable.

APPLICATIONS

The conveyor is best suited for conveying batches of product since it has a relatively high convey rate. The rope assembly is normally considered the major wear item that will require maintenance and possible replacement every 2000 to 3000 operating hours. The rope assembly will wear even if running with no product in the conveyor. The constant bending of the rope around the sprocket caused fatigue that ultimately will cause failure.

OTHER GENERAL DESIGNS AND OPTIONS

1. **HIGH PRESSURE** – When needed the units can be designed for high pressure which may be necessary for some areas where the conveyor must be considered as a possible path of a deflagration for combustible powders.
2. **PORTABLE UNITS** – Typically portable units are available for the Model SL Conveyors. The base can be supplied with fork-lift pockets or with casters for portability.

MISC. NOTES:

1. Rope assemblies in most cases are manufactured in stock orders. The standard stock order is for a “spool” of 300 ft. long.
2. There are standards and work procedures for rope manufacturing.
3. The standard disc for the 3” conveyor is 2.5” O.D and the 4” conveyor is 3.1” O.D. Since the conveyors use 3” O.D. and 4” O.D. tubing having .065 wall there is clearance between the disc and the tube which allows the discs to move and basically self- clean the tubing as the discs move at +750 ft. per minute through the tubes.
4. Young Industries discs are a two-piece design and use rivets to join the boss to the disc.