

WHITE PAPER:

Horizontal motion or vibratory conveying

How to select the best conveyor for your products

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For the food industry, conveying has become more sophisticated than simply moving product from point A to point B.

Factors to consider when looking at an upgrade or a new conveyor line include:

- System layout
- Provision for accumulation
- Feed modulation
- Methods to divert product
- Sanitation
- Operator safety
- Cross-contamination
- Sustainability
- Product quality control

However, for this white paper we will discuss how to determine which of the two most common methods of moving product – vibratory or horizontal motion conveying – is better for your product. While price, delivery and other commercial considerations are important, technical performance is certainly the primary factor when evaluating a conveyor choice.

Vibratory conveyors

Vibratory conveyors move product forward by bouncing it. Different magnitudes of amplitude (vertical lift) and frequency (forward pitches) produce different product travel rates.

Vibratory conveyors use two basic drive types, each of which provide different actions and suit different products. Electromagnetic drives produce variable speed movements with short amplitude (lift) and high frequency (speed). Electromagnetic drives are best suited for lightweight, easy flowing products, and for conveying limited bed depths, spreading product, and fines removal.



Vibratory conveyors are ideal for dewatering, grading, and spreading.

Mechanical drives produce fixed speed movement with long amplitude and low frequency. They are well suited for conveying large quantities of heavy, sticky products. Direct or indirect mechanical drive designs are available. Choose direct for sorting, grading, and bi-directional conveying applications. Indirect is the best choice for applications involving product transfer, dewatering, spreading, laning, and fines removal.

Because they bounce product, vibratory conveyors offer advantages in the following applications:

- Achieving vertical separation of product pieces, such as scalping, grading, sizing, and separation of fines
- Spreading product across pan width
- High travel rates (with high amplitude conveyors)
- Leveling product piles
- Moving sticky products, such as raw potato slices or gummy bears
- Conveying product uphill, as much as 7 degrees

While vibratory conveying is useful, the constant bouncing and impact of product on the pan is rough and reduces the quality of finished products in the following instances:

- Fragile products will be damaged or broken
- Pre-mixed product blends may separate
- Seasonings and coatings will shake off
- Vibration can cause microcracks in some products, making them more susceptible to breakage later in the packaging or delivery process

Besides the effect of the vibratory conveyor on the product, high noise levels (79 dB - 90 dB) can be a consideration when hard products are bouncing in the pan. Also, travel rates decrease as the bed depth or product weight increases, although some vibratory conveyors can partially overcome this.

Horizontal motion conveyors

Rather than bouncing product, horizontal motion conveyors slide product along the pan. This has become the preferred means of conveying for fragile and coated foods such as snacks, fresh produce, and frozen prepared foods.

Horizontal motion provides the following advantages in these applications:

- Virtually eliminates product breakage and cracking
- Does not shake off coatings, breadings, seasonings
- Seasonings, oil, and other coatings do not build up in the pan, reducing downtime for cleaning
- Reduces conveying noise with product (typically to 70 - 74 dB)



Coatings build up on a vibratory conveyor pan (left), but not on horizontal motion conveyors (right).

- Maintains product blends and does not segregate product pieces
- Maintains travel rates consistent with bed depths and product weights
- Conveys large quantities of product without bogging down
- Transmits less vibration, allowing the use of lighter, less expensive support platforms and no ceiling supports
- Conveyor pan is not susceptible to stress fractures
- Some horizontal motion drives accept different pan lengths and configurations, adding flexibility for future changes

While sliding product prevents breakage, coating loss, and noise - it also limits the application of horizontal motion conveyors in these areas:

- Product spreading can only be achieved with specially shaped pans
- Product travel rates are slower than aggressive mechanical drive vibratory conveyors, but may be faster than high frequency electromagnetic drive designs
- Uphill conveying is usually limited to about 1.5 degrees, although one manufacturer now offers a pan that conveys product up to 8 degrees
- Does not level piles of product without pan modifications
- Difficulty conveying limp or sticky products



Horizontal motion allows gentle short term product accumulation.



Uphill horizontal motion conveying reduces product damage in return loops.

Horizontal motion conveyors are available with direct and inertia drives.

Direct drives use long strokes, producing travel rates up to 40ft/min (12.5 m/min). In addition to greater throughput/pan size, direct drives stop and start instantly, offer modular expandability, provide fast travel rates to reduce stale product complaints, and improve the efficiency of seasoning applicators, weighers, bagmakers, and overall packaging room performance.

Inertia drives generally deliver slower product travel rates, have delayed stop and start operation, and do not work well in modular and packaging feed applications.

Selecting the proper type of direct drive will greatly reduce maintenance and energy usage, and will improve safety and packaging feed efficiency. All direct drives use mechanisms that change the speed and reverse the motion of the pan. Some drives utilize servo-gearbox, linear motors, or rack and pinion devices which are prone to rapid wear. One patented design uses an elliptical pulley and Kevlar-reinforced belt drive that has proven extremely reliable, has the lowest energy usage, requires no preventative maintenance, and is warranted for 5 years.

Before you buy

If possible, consider testing your products on the different types of conveyors before you buy. Some suppliers have equipment set up and ready for customer testing to help prove capabilities such as gentle handling, conveying uphill, or moving large quantities of product. If this service is available, making use of it can be of value in the decision making process. During a product test or demo, you can also get firsthand experience with other features such as operator interface, ease of use, and possibly sanitation.

Choosing a supplier

As with any equipment purchase, the buyer is not just purchasing a piece of equipment but also entering into a long term relationship with the vendor. Choose a reliable supplier that understands your industry and offers up front assistance with such things as system layout, sanitation procedures, and avoidance of cross-contamination. Be sure that you are comfortable with the vendor's ongoing assistance such as warranty, training, spare parts, and technical support capabilities.



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