Answers to nine common questions about horizontal-motion conveyors

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A horizontal-motion conveyor can smoothly and efficiently move a huge variety of materials, such as polymers, hot potash, borax crystals, potato chips, and breakfast cereal, without damaging, segregating, stratifying, or aerating them. This article answers common questions about horizontal-motion conveyors and how to apply them.

对卧式输送机九个常见问题的解答

一个卧式输送机可以流畅的有效的输送种类广泛的材料而不会将其损害，分组，分层和流散到空气中，如聚合物，热钾化合物，硼砂水晶，土豆片，以及早餐谷类食物。本文将解答有关卧式输送机的九个常见问题。

水平連動コンベアについて、９つの質問と回答

水平連動コンベアは、ポリマー、高熱ポタッシュ、ボラックスクリスタル、ポテトチップス、朝食シリアルなどの多様な物質をスムーズ、効率的に、且つ破損、分離、塊、通気も無く搬送する事が可能です。この記事では，水平連動コンベアについての一般的な質問への返答と、適用について説明しています。

Réponses à neuf questions fréquentes sur les convoyeurs à mouvement horizontal

Un convoyeur à mouvement horizontal peut déplacer en douceur et avec efficacité une grande variété de matériaux tels que les polymères, de la potasse chauffée, les cristaux de borax, les chips ou encore les céréales de petit déjeuner, sans provoquer de dommages, de ségrégation, de stratification ni d'aération. Cet article répond aux questions courantes au sujet des convoyeurs à mouvement horizontal et leur utilisation.

Respuestas para nueve preguntas comunes sobre cintas transportadoras horizontales

Una cinta transportadora horizontal puede mover con suavidad y eficacia una enorme variedad de materiales -como polímeros, potasa caliente, cristales de bórax, patatas fritas y cereales- sin dañar, segregar, estratificar o airearlos. Este artículo responde a preguntas comunes sobre las cintas transportadoras horizontales y también sobre cómo utilizarlas.

Antworten für neun der üblichen Fragen bezüglich Horizontalförderanlagen

Eine Horizontalförderanlage ist fähig, eine Vielzahl von unterschiedlichen Materialien, wie zum Beispiel, Polymere, heiße Pottasche, kristallines Borax, Kartoffel-Chips und Frühstücks-Zerealien problemlos und effizient zu transportieren. Ohne diese zu schädigen, voneinander abzusondern oder sie mit Luft zu durchsetzen. Dieser Artikel beantwortet die üblichen Fragen bezüglich Horizontalförderanlagen, und wie solche Anlagen benutzt werden können.

The horizontal-motion conveyor (also called a *horizontal differential-motion conveyor, differential motion conveyor,* or *differential conveyor*) uses a two-cycle slow-advance–quick-return motion to smoothly convey any free-flowing bulk material horizontally. The conveying surface, which can be an open pan or a fully closed conduit, is a seamless, one-piece unit. During the advance cycle, the conveying surface moves slowly forward. As it does, the material remains at relative rest on the conveying surface, even as it's being moved forward. During the return cycle, the conveying surface moves quickly back to its original position and slips beneath the material, in much the same way as a tablecloth that's quickly jerked out from under a table setting. This differential action is continually repeated, giving the horizontal-motion conveyor the ability to smoothly convey materials as fast as 12 m/m over distances up to 61 meters.

Along with the differential motion, the horizontal-motion conveyor's overall mechanical simplicity gives the conveyor several advantages over other conveyors, such as vibrating, drag, belt, screw, and pneumatic conveyors. The horizontal-motion conveyor has no moving parts other than its sealed drive unit. This reduces safety risks and simplifies cleaning and maintenance. The conveyor also has intrinsic advantages for applications that require dust control, reliable and gentle handling of fragile materials, and more. The following questions and answers provide more detailed information about the horizontal-motion conveyor's capabilities and applications.

Can the horizontal-motion conveyor transport materials at an incline?

Yes. Although the horizontal-motion conveyor is more

commonly used in horizontal applications, it can also be used in applications that require transport at a slight incline or decline. The physical characteristics of the material being moved determine the practical incline. Different particle shapes will convey better up inclines than others. For example, round or spherical particles tend to roll and lose conveying energy on inclines.

The material travel rate and resulting conveyor capacity will be lower when conveying material at an incline. The drop in capacity can be countered by increasing the conveyor's operating stroke or pan width.

2 What if multiple inlets and discharges are required?

A single horizontal-motion conveyor can readily incorporate multiple inlets and outlets. Multiple inlets can be used to introduce materials from different storage vessels or to meter several materials onto one conveyor. Because of the conveyor's slow-advance, quick-return cycling, materials neither mix nor separate during transport. If the inlets deliver blended materials, they'll stay blended; if they introduce the material in layers, it will stay in layers.

The horizontal-motion conveyor can also be fitted with multiple lanes so that a single conveyor pan and drive unit can be used to transport different materials.

One or more discharge outlets can be located at any point along the conveying section's bottom to distribute the material. Each outlet can be fitted with a mechanical discharge gate to start and stop material discharge. These gates, typically pneumatically actuated, can be slide gates, butterfly valves, or tip-style drop gates.

Individual discharge outlets can be set up to distribute variable amounts of the total flow, ranging from "all" to "none" and anywhere in between. The conveyor can also be designed to accumulate a predetermined amount of material before each discharge for an immediate delivery during demand. This capability is useful in applications such as discharging into packaging scale feeders.

3 Is this conveyor suitable for large-capacity, heavy-duty applications?

Horizontal-motion conveyors more than 61 meters long with pan widths up to 3 meters have been used successfully for many years. In applications requiring the conveyor to carry enormous loads of heavy materials such as scrap metal, structural trusses and impact beds are incorporated into the conveyor and the conveyor pan is constructed of abrasion-resistant plate metal 2.5 centimeters or more thick. As a result, the conveyor can handle massive impact loads and carrying capacities. One such horizontal-motion conveyor weighs in at more than 160,000 kilograms and its conveyor pan — 35 meters long, almost 2.5 meters wide, and 1 meter deep — moves more than 272,000 kilograms of scrap metal per hour.

4 Can the horizontal-motion conveyor handle material being fed from a full hopper?

Yes, the horizontal-motion conveyor has tremendous load-carrying capability. Some units can convey as much as two to three times their own empty weight. Unlike a vibrating conveyor, the horizontal-motion conveyor isn't "detuned" by typical increases in material loading on the conveyor pan. What's more, because it isn't a "tuned" system, the horizontal-motion conveyor can be operated at variable speeds to control the material's travel rate.

5 Can this conveyor be used to meter product?

A properly designed horizontal-motion conveyor can be set up to accept material from a full hopper and meter it without any intermediate equipment, such as a rotary valve. The discharge rate can be controlled by varying the conveyor's motor drive speed. Because the conveyor can handle deep material bed loads, the conveyor pan can also function as a self-discharging storage unit.

In addition to metering material, the horizontal-motion conveyor can be equipped to provide product aligning, *singulating* (separating multiple rows of individual products or pieces from a mass), or *deshingling* (producing a single layer of product from a mass or stack of product). For example, a food processor making chocolate-covered pretzels was using a vibrating conveyor in its production line. The vibrating conveyor — which uses a vertical pitching motion to move material forward — was shingling (stacking) the pretzels. However, the processor had to assign several operators to manually align and deshingle product downstream from the conveyor. By replacing the vibrating conveyor with a horizontal-motion conveyor equipped with aligning lanes and special deshingling ramps, the processor reduced labor costs and increased productivity. What's more, they significantly reduced the number of pretzels damaged by shingling.

This horizontal-motion conveyor pan is fitted with multiple lanes that can singulate products during transport or transport different materials from multiple inlets to the same destination.

You can further regulate discharge from the conveyor pan by installing pneumatically actuated dams or manually adjustable flow baffles on the conveyor to accumulate and meter material to other downstream equipment. When equipped with dams or baffles, the horizontal-motion conveyor's gentle motion eliminates product degradation and enables the conveyor to accumulate large amounts of material like snack foods or breakfast cereals behind the dams and baffles.

6 Will the horizontal-motion conveyor work well with abrasive materials?

Yes; in fact, the horizontal-motion conveyor performs much better than a vibrating conveyor in terms of maintenance and overall conveyor wear. A vibrating conveyor's motion presses the pan against the material, inducing a gouging action that abrades the pan surface. Abrasive wear to the horizontal-motion conveyor's conveyor pan is two to four times less than that in a vibrating conveyor.

The horizontal-motion conveyor can also be adapted for transporting chemically corrosive materials, such as chlorinated bleach powder, by fabricating the conveyor pan from a corrosion-resistant material, like titanium.

7 Can moist or sticky materials be conveyed on the horizontal-motion conveyor?

The horizontal-motion conveyor will work for a moist or sticky material, provided you use the right materials for the conveyor pan or use a liner with it. For example, for some materials, such as powdered dishwashing detergent, a conveyor-pan liner made of ultrahigh-molecular-weight polyethylene will prevent sticky particles from adhering to the surface.

8 Can the horizontal-motion conveyor be easily cleaned?

Because of the way it's constructed, the horizontal-motion conveyor is typically much easier to clean than other conveyors. Because the horizontal-motion conveyor commonly consists of a one-piece, seamless conveyor pan riding on suspension points spaced periodically along its length, both the pan's interior and exterior surfaces can be easily accessed for wipe-down cleaning. There are no support frames or springs under the conveyor pan (which would introduce cracks, crevices, and other dirt-holding surfaces) that need to be cleaned. The material's gliding action over the conveyor-pan surface discourages material buildup. In fact, the material's continuous sliding action on the conveyor's surface typically scours the pan clean. As a result, less cleaning time is required between production cycles than with other conveyors.

When the horizontal-motion conveyor is totally enclosed (in either a rectangular or tubular shape), the unit is equipped with a clean-in-place (CIP) system. The CIP system uses water nozzles located at intervals along the conveyor's length so an operator can wet-clean the interior between production runs.

9 Is this conveyor energy efficient?

Very much so. The horizontal-motion conveyor uses less energy than a slider-belt conveyor and substantially less than a screw conveyor. The horizontal-motion conveyor is very competitive with roller-belt, vibrating, and drag conveyors in energy consumption.

One reason the horizontal-motion conveyor is so energy-efficient is that the drive motor, which is sized to start the drive, typically draws a full power load only during startup. The rest of the time, the motor usually runs at 50 percent or less of its rated capacity. (For most materials, the motor load is independent of the amount of material conveyed.) The exception is for applications conveying very heavy materials, like scrap steel or castings. Then, increasing material loads will increase the motor's amp draw. PBE*I*

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