CONVEYORS, PACKAGING & SORTING EQUIPMENT: Understanding Your Options
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Vibratory, vacuum, pneumatic, indexing, incline, tubular — when it comes to product transfer, belt conveyors are merely the starting point of available options for moving foodstuffs through production.

Regardless of the type of conveyance, a power source is necessary, and that can be a point of vulnerability in terms of hygiene, traction or product integrity.

Belt conveyors are most closely associated with product movement, and food companies have two basic options for driving those conveyors: gear motors or drum motors. Both have their strengths and vulnerabilities, and engineers and plant operations professionals tend to be passionate about the one they favor.

Drum motors are a rarity once food is safely tucked away in its primary package, but they are becoming the drive technology of choice in the processing zone and raw-materials handling areas. Hygienic considerations are driving the shift from gear motors, though not all manufacturers consider drums a food safety cure-all.

Besides moving parts, lubricant is inside the drum, and that is a concern. “It’s not if the oil is going to leak, it’s when,” says Paul Kuharevicz, engineering manager for Dynamic Conveyor Corp., Muskegon, Mich. It should be food-grade oil, and improvements to radial shaft seals restrict initial leakage to a miniscule drip. Maintenance personnel have a chance to react before serious failure occurs. Nonetheless, the potential contamination and the
product destruction that might be required make drum motors anathema to some food professionals.

Another limiting factor is power takeoff. While drum motors measuring 15 ft. in diameter can be found in industrial applications like mining, food-grade stainless drums deliver limited torque. Power levels typically top out at 1 hp, inadequate for carrying heavy loads over extended distances. Bundling all the drive components in a single unit has an inherent drawback: If the shaft is damaged, the entire assembly has to be replaced, points out Kuharevicz.

That said, drum motors offer clear advantages, above and beyond hygienic design. In a study conducted by academics at the University of Parma (Italy) and commissioned by Interroll Corp., ease of installation and maintenance, ability to fit into restricted spaces and superior energy efficiency were among drums’ advantages over gear motors, though not necessarily in all applications. Other than possible lubricant contamination, drums clearly provided superior sanitary design, the authors concluded. Drainability, the ability to clean in place, reduced likelihood of cross-contamination and reduced soil accumulation were among the evaluation criteria where drums excelled.

The researchers rated gear motors quieter in some applications, although that may reflect the type of drums they evaluated. Steven Olszanowski, product engineer-drum motors at Interroll Corp.’s Wilmington, N.C., facility, says the latest version of Interroll’s synchronous drum motor utilizes a servo, accommodating fast acceleration without overheating. Additionally, a leak detector in the shaft provides an alert before there is a seal failure.

Dynamic Conveyor recently standardized on Van der Graaf units for drum motors, although food clients also can specify gear drives. Interroll builds both gear and drum motors, though it is emphasizing the latter in food industry discussions.
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“Food processors want drum motors’ seamless design, with no cracks and grooves between the sprockets,” according to Justin Caris, Dynamic Conveyors’ senior sanitary design engineer. “Gear motors are hard to clean and require a lot of disassembly.

“The Food Safety Modernization Act is pushing more companies to pay the up-charge for a drum,” he adds. Processors of dairy and ready-to-eat products are most likely to standardize on those motors, though companies sensitive about brand protection also are trending toward them.

HIGH-VELOCITY CONVEYANCE
Protecting product from the surrounding environment is another concern. When Malt-O-Meal commissioned its Asheboro, N.C., cereal plant, it went to the extraordinary length of specifying stainless-steel canopies over belt conveyors that carried product through processing areas.

Pneumatic conveyors provide even better environmental protection by completely enclosing the product. The downside is the potential damage that can occur: Dense-phase vacuum conveyors pull particles 4,000-6,000 feet a minute, points out Nick Hayes, president of Volkmann Inc., Bristol, Pa. That sounds innocuous, but it’s roughly equivalent to 60 mph. When the particles reach a bend, the impact is considerable.

“It’s all about the velocity,” intones Hayes. “If you have enough velocity, you can pick up anything. The challenge is that you always have turns, and when the material reaches a bend, particles hit the wall and bounce back and can suffer damage. If you slow down the speed, heavier particles fall to the bottom of the pipe and you reduce the passage way, causing segregation.”

If appearance isn’t an issue, particle damage isn’t a concern. Unfortunately, people eat with their eyes, and candy-coated chocolate, freeze-dried coffee and other human consumables won’t pass quality checks if there are cracks or shattered particles.

Modulating particle speed isn’t an option — “with vacuum conveying, you only have one
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atmosphere to convey the product,” Hayes observes — leaving the feed pressure the best opportunity to minimize damage. Positive displacement pumps are fine for flour and other raw materials, but for goods at or near their finished state, Volkmann relies on a multijector pump outfitted with a series of venture that produce pressure that is close to a full vacuum.

In addition to pump selection, engineers of pneumatic systems incorporate filters and assorted “energy absorbing techniques” to minimize product damage. But striking a balance between velocity and gentle handling is an ongoing challenge, he says. “You never really know if any one product can be conveyed until you test it.

“I get powders I’ve never seen before every day, and I’ve worked with this technology since 1973,” Hayes continues. Size, shape, moisture content and other variables affect performance, which is why food
PROVEN. RELIABLE.
Manufacturers are advised to submit materials for testing in a lab before installing a system. “If you don’t test it, you’re just playing Russian roulette,” he emphasizes.

**TENSION RELIEF**

Spiral conveyors are used in multiple segments of food production, from bakery coolers to poultry freezers. They rely on friction between the rotating drum in the core and the belt to maintain tension and drive the conveyor through the spiral.

“You’re at the mercy of friction,” notes Achraf Elhassouni, global product manager-spiral platform at Intralox LLC USA, New Orleans, “and friction is a huge variable that you can’t control.” Variations in load, oil build-up and other factors cause belt slippage, and that leads to performance issues.

To take friction out of the equation, Intralox designed a spiral with teeth along the inside edge of the belt. Those teeth engage with sprockets on the drum, resulting in consistent belt tension, regardless of the load.

Intralox has retrofitted 300 friction drives to mechanical drives since introducing the concept five years ago, Elhassouni estimates. Potato processors are particularly receptive to the frictionless belt, in part because of the build-up of non-transfat oils that occurs when French fries and other value-added potato products move through a spiral freezer. The oil coagulates and “sticks like glue,” he says, forcing processors to take the spiral off line and apply hot water and mechanical scrubbing to dissolve the build-up. With potato processors targeting three weeks of continuous production, unscheduled downtime for cleaning is becoming intolerable.

Similar issues plague most processors who use spirals as blast freezers. In that case, oil, sugar and other ingredients that coat the product get sprayed onto virtually all moving parts.

Intralox named its system DirectDrive. The first installation was at Canada Bread’s Trillium bakery in Hamilton, Ontario. Belt vibration was enough to cause buns to slide and cluster, which became an alignment headache after the buns exited the spiral and were conveyed toward slicers and packaging. Positive belt engagement resolved the issue.

Given the variety of options to convey, no single drive option can serve all applications. The issues are as various as the types of conveyors, from reliability and throughput to cleanability and hygienic design. The only constant is the need for new solutions to the problems that inevitably arise.

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How to Select the Right Conveyor Belt for Your Next Food Conveyor

What to look for - and avoid - in specifying a belt for your food grade conveyor

By Dynamic Conveyor

Food grade conveyor belts are a very important part of any sanitary conveyor system; without them, quite simply, your product can’t be conveyed. When searching for a conveyor system supplier you need to consider the belt style options as well as conveyor features. These features include ease of cleaning, ease of maintenance, safety qualities and total cost of ownership.

The product you will be conveying is a big consideration when selecting the right belt for your food conveyor system. Food products come in all kinds of shapes and sizes and may be sticky, oily, greasy, wet, frozen or steamy hot. The form and temperature plays a critical role in the proper selection of belt type and style.

There are several food grade belt styles, but keep in mind that not all conveyor belts are equal. The following checklist will help you ask good questions when selecting the right belt for your next food grade conveyor system.

**TENSIONED VERSUS NON-TENSIONED FOOD GRADE CONVEYOR BELTING**

For the best access to the frame and internal components of the conveyor you should choose a conveyor system that includes a belt that doesn’t require any pre-tension. Tensionless food grade belting fits loosely and allows you to lift the belt for full access to the inside of the conveyor system. Easy access to the internal components allows the conveyor to be thoroughly
cleaned in place (CIP) thus reducing the risk of harboring harmful bacteria.

Look for conveyor systems with belts that are self-tracking. Sprocket-driven positive tracking systems eliminate mis-tracking issues and potential damage to the belt.

**ALL BLUE BELTS ARE NOT THE SAME**

Blue food grade conveyor belting is popular in food processing plants because of its color. The blue color makes it much easier to identify soil impurities. There are blue homogenous solid surface plastic belts and those that contain reinforcing fibers. When non-homogeneous belts with reinforcing cords or fabric are damaged or worn, the reinforcements become exposed and can absorb fluids and harbor bacteria. What results is a source of contamination that is often difficult to detect and impossible to clean. Belts made from layers of different materials like fabric and plastic may have the layers come apart, which exposes the fabric and causes sanitation problems. Using a belt that is made from only one material eliminates these risks. There are many food grade conveyor belts that are blue in color, but remember they aren’t all homogenous.

Homogeneous blue belting includes options for dewatering, conveying small and/or fragile products and the quick release of sticky products. Options such as these will provide superior product conveyance and reduce product loss.

**MODULAR PLASTIC BELTING**

Choose a conveyor with modular plastic link style food grade conveyor belting when durability, cold or very warm temperatures are required. Conveyors with modular plastic belts offer maximum sanitation, as well as corrosion and abrasion resistance and customization opportunities. Modular plastic belting can be molded in materials that allow conveyance of product as cold as -50°C F or as warm as 200°C F. Belting styles include flat top, nub top, flush grid and a variety of drive flight options to create a belt to meet most every food application need.

**METAL MESH BELTING**

When there is a need to batter, bread, glaze, coat, cool, drain, dry or wash product then a food grade conveyor with metal mesh belting is the answer. Metal mesh belting is also transparent, metal detectable and allows for tight transfers which aids in the gentle transfer of small or delicate products.

No matter your food processing application, you want to look for a conveyor system that includes a belt that will reduce product loss, keep your sanitation and maintenance costs at a minimum and your food product safe.
REVOLUTIONIZING TRAY PACK HANDLING

New AIM™ technology allows processors to increase line speeds while reducing product damage and labor required for tray pack applications. AIM technology is a gentle, yet fast, and reliable tray moving solution that eliminates maintenance, downtime, and safety problems associated with similar technologies.

Other Benefits

Improved cleanability due to proven hygienic base belting which reduces cross contamination risk.

Maximized throughput from higher line speeds and no jams or product damage.

Optimized line flexibility with smart and safe layouts that maximize equipment utilization.

For more information, please visit www.intralox.com/aim.aspx
CUSTOMER OBJECTIVES
Washington Fruit Company grows, packs, and ships premium produce to customers around the world. When the company built a new apple-processing facility more than five years ago, it turned to R.H. Brown Co.—a Seattle-based material handling integrator with more than 100 years of industry experience—to handle the design and layout of its conveyance equipment.

Recently, the two companies partnered again to develop a new facility that would handle high-volume fruit distribution in Yakima, Washington. The project presented unfamiliar challenges. The apples were to be packaged into cartons that measured 22 in x 16 in x 14 in (55.9 cm x 40.6 cm x 35.6 cm) and weighed approximately 40 lb (18.1 kg) apiece.

To achieve success, R.H. Brown knew that its solution would need to achieve Washington Fruit’s desired throughput, protect product integrity, and automate carton sorting and palletization. The project would be on a tight deadline, so design and installation needed to be seamless and punctual.

INTRALOX EXECUTION
After seeing it work in another facility, Washington Fruit requested that R.H. Brown supply an Intralox® DARB Sorter S4500 for their new facility. Intralox helped the integrator design a layout using the DARB Sorter, an automated Intralox Activated Roller Belt™ (ARB™) solution that gently and precisely sorts and sequences a wide range of items at 90-degree angles.
By developing a system centered on the DARB solution, R.H. Brown was able to win the project.

The DARB Sorter S4500 proved ideal for the system, since it could handle cartons at the desired throughput rate in the required footprint while still adhering to the project’s budget parameters. The DARB solution sorts to 20 destinations, all on the same side of the sorter, which infeed to five robotic palletizing lanes without rails or confirmation photo eyes. The DARB sorter requires only one drive (regardless of the number of diverts), which significantly reduces the amount of field wiring and contributes to a lower overall project cost.

**RESULTS**

The new system allows the facility to process an average of 4.5 million apples per day at rates up to 50 cartons per minute. The DARB solution not only achieved Washington Fruit’s desired throughput rate, but has allowed the facility to increase its overall throughput and handle additional business. The automated sorter’s consistent, gentle product handling protects the integrity of the apples while enabling high-capacity automated sorting and palletizing.

“With the DARB Sorter, we can get a tighter gap between the boxes, and then more boxes through on a faster moving belt,” says Mikey Hanks, Operations Manager for Washington Fruit. “It’s a good system.”