



ENSURING SAFE TRAVELS

Following proper procedures protects belts and conveyors from a host of operational issues.

by Dan Malovany

As baked goods race along a production line at hundreds of pieces an hour, mishaps quickly multiply to mayhem, accidents become chain reactions and unanticipated incidents snowball into an avalanche of unscheduled downtime or something worse. In plants running on a 24/7 schedule, preventing problems from steamrolling into a train wreck on fast-moving conveyors requires a well-established protocol for sanitation and maintenance that's designed to leave nothing to chance.

Often that process begins by answering a question about belts and conveyors that don't receive the due diligence mixers, dividers and other systems get. "Ask yourself, 'Why do I need to clean the conveyor?'" suggested Bobby Martin, executive product manager, conveying systems, AMF Bakery Systems.

The query sounds simple, but the answer is a bit more convoluted. "Some conveyors need to be cleaned to ensure optimal performance and efficiency" Mr. Martin pointed out. "Some conveyors need to be cleaned for food processing or food contact, and others need a simple basic cleaning to remove dust and dirt."

And it gets more complicated depending on the type of bakery or snack operation. "Dough can be sticky and cling to equipment, drying out over time and becoming harder to remove," said Cari Rasmussen, food safety specialist, Commercial Food Sanitation, an Intralox company. "Some products are developed to include glazes, fillings and toppings, which can be difficult to clean because of product characteristics such as being sticky or oily; even very small particulates may get into cracks and crevices of equipment. These can all make sanitation a little harder to execute."

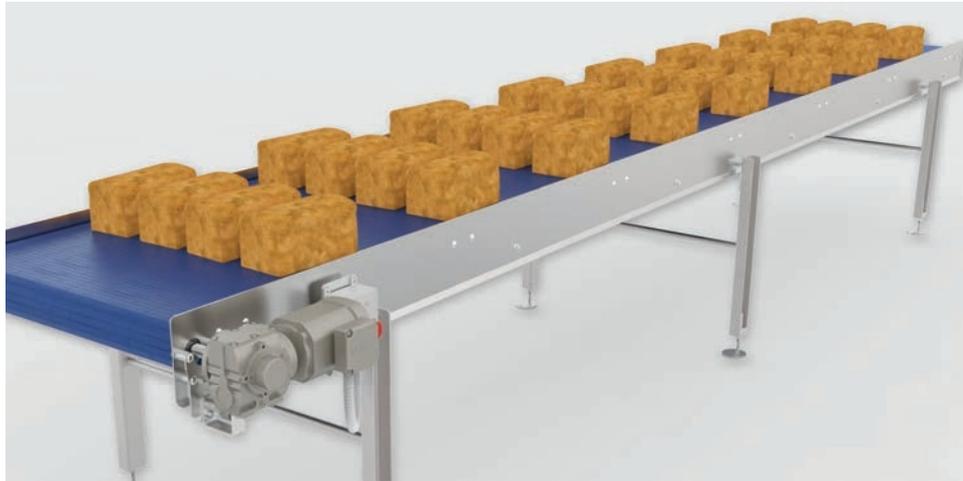
Even in bread and bun bakeries, failure to clean on a regular basis could damage a conveyor's performance. "Flour in the atmosphere and sugar are abrasive, and you're going to have a lot of wear between the belt and other components on the conveyor," said Jonathan Lasecki, chief engineer, Ashworth Bros. "Pins may wear, or you might see metal or plastic debris that can cause the belt to abrade quicker than if it were cleaned."

As a result, scheduled cleaning is directly linked to a conveyor's reliability, even with ambient spiral coolers that don't seem to need a ton of TLC to do their jobs. "These

Predictive monitoring systems track a conveyor's performance and schedule maintenance to reduce unscheduled downtime.

Ashworth Bros.

Transitioning to more hygienically designed equipment that's easier to inspect and maintain could slash sanitation and changeover time.



New sanitary-designed conveyors reduce changeover times, labor costs and food safety risks.
AMF Bakery Systems

systems are designed with specific friction factors in mind, and if the system is not routinely cleaned, these friction factors can change considerably, adding tension to and shortening the life expectancy of the belt,” said Bryan Hobbs, Ashworth’s sales and service manager of North America.

From a product safety perspective, the oven’s kill step has provided a longstanding drape of security for the baking industry. As a result, it’s only been since the implementation the Food Safety Modernization Act that many bakers have ramped up their sanitation procedures to meet regulatory requirements. “In the baking industry, the type of complete washdown and sanitation performed in the protein industry, particularly in meat and poultry, has not been the traditional method of cleaning” said Rick Spiak, vice-president of sales and marketing, Wire Belt Co. of America.

Heightened allergen awareness and possibilities of pathogens getting into the process — much of it spawning since the Peanut Corp. of America salmonella outbreak in 2009 — has prompted a renewed era of due diligence. “Food industry personnel are now considering the need to do a thorough washdown and cleaning between allergens, especially with peanuts,” Mr. Spiak said. “While warning labels may say, ‘This product may contain peanuts,’ processors are also looking at how a thorough washdown can be conducted in a plant where that has not traditionally been done. Where dust or other types of remnants from ingredients are present, some are thinking about a vacuum clean-up and then perhaps a washdown.”

He added that potato chip, pretzel and other snack facilities need to carefully monitor changeovers between seasonings, spices and flavorings that contain various dairy, egg, wheat or other allergens. Even greater caution is recommended with certain other products. “Energy and nutrition bars are a whole different animal with nuts and allergens,” Mr. Spiak said. “You have not only all the allergens but also all the ingredients that hold the snack bars together, which is usually some conglomeration of sugars and that, because of its stickiness, could complicate equipment maintenance.”

Processors have become keenly aware of food safety risks, and how they can reach well beyond the internal costs of a recall itself. “Those risks to the processor include fines from government regulatory bodies, the bad press they may receive, or the damage to the brand name,” Mr. Spiak said.

Know when to clean

A well-developed cleaning protocol will extend the service life of the belts. But when something is about to go wrong, the belts and conveyors typically provide signs that indicate service is needed, according to Kevin Quinn, sales manager, Douglas Machines Corp.

For example, watch out for spills that not only put a dent in efficiency but also present hazardous working conditions, affect employee safety, and cause equipment damage. Likewise, look for mistracking. “Buildup on the conveyor belt can cause it to misalign, get off-track or result in uneven belt wear,” Mr. Quinn explained.

Carryback is a root cause of cross contamination. “During the manufacturing process, product moves along the conveyor belt, and inevitably residue will stick to the belt surface,” Mr. Quinn said. “It builds up daily and eventually causes damage and/or downtime, lost productivity and health issues for workers and consumers.”

Moreover, belt slippage caused by a lack of improperly cleansed conveyors results in using excess energy and could spark costly interruptions in production. Mr. Quinn noted that Douglas Machines’ Cyclone belt washers are designed to remove fats, sugars, allergens and oils from a wide variety of open mesh and solid conveyor belts. Although the inline washer does not sanitize, he added, a chemical disinfectant sprayed during post-cleaning will remove pathogens.

Sometimes it takes more than power washing. During a scheduled deep-cleaning process, sticky and oily residue requires rubbing, brushing or scraping, according to Mr. Martin.

Bakers sometimes forget to use a little extra elbow grease



Inline belt washers remove fats, sugars and allergens from a wide variety of conveyor belts.

Douglas Machines

for proper sanitation. “To effectively remove the proteins, oils and other materials from the surface of the belt or conveyor, use manual scrubbing or spray bars for some components,” Ms. Rasmussen said. “If mechanical action isn’t regularly applied, excessive buildup and the formation of bio films can occur, making it more difficult to clean.”

Moreover, Mr. Lasecki cautioned that using bleach, sanitizers and other chemicals may make belting and conveyor components embrittle over time. “A sudden movement or vibration can then cause a belt to fracture or break, potentially affecting the operation of the belt,” he said.

Additionally, Ms. Rasmussen observed, chemicals may cause rusting of non-compatible metals, which can lead to foreign material contamination. Using wet-cleaning methods on some belts such as fiber-backed or fiber-reinforced, will allow water to soak in, which makes them difficult to dry out and leads to molding inside.

Wire Belt recommended a three-step process for cleaning, starting with dislodging and removing visible large food or debris from the belt and paying special attention to drive and idler components, shafting, belt support and conveyor frame. Pre-rinse with water between 125 to 130°F with pressure between 150 and 300 psi. Then apply the detergent at 150 psi or per the manufacturer’s directions. Remove detergent from the conveyor system before it dries but after the recommended amount of time has elapsed.

Proper rinsing is often overlooked, which leaves a residue that raises friction values and tension on some systems. “When processors clean their equipment, we noticed they don’t properly rinse off chemicals that they use,” Mr. Hobbs said. “They may not have adequate water supply to rinse, or hoses may not be at full pressure and water may be leaking out of clean-in-place (CIP) systems. As a result, belts don’t get rinsed off very well to remove all of the cleaning chemicals.”

Various belt designs require different cleaning methods.

Mr. Lasecki pointed out that the open structure of mesh overlay and wire belts lend themselves to high-pressure washes where the water deflects away. However, high-pressure spray on solid belts will result in backsplash where the stream of water shoots back toward the nozzle, resulting in a less than satisfactory cleaning.

Dry vs. wet cleaning

Most bakeries follow dry cleaning methods — or, at least, minimize the use of water as much as possible — as a part of their standard operating procedures for cleaning. “In bakeries, you have flour and yeast, and when you add water, it grows,” Mr. Lasecki said. “Some bakeries may think that water is not the best cleaning solution because it’s going to create more problems than alleviating them.”

Many older bread and bun bakeries also don’t have adequate floor drainage or wastewater reclamation, according to Steve Collison, senior account manager, MK North America. “And we’re not sure they should because there are current methods to clean without lots of water,” he said.

While most bakeries urge “less is more” when using water, wet cleaning is an option that many effectively employ. “At Ashworth, we recommend the use of water to remove contaminants from the belt,” Mr. Lasecki said. “Otherwise, use a CIP system to clean the belt and also thoroughly clean the belt support structure.”

Some bakeries now separate the handling of raw ingredients and product from production of finished items for food safety reasons. “The traditional thought is that the heat-cycle kill is the answer to food safety. However, if processors are not diligent about the separation of steps in the appropriate order, and most are, but for those who have yet to consider process changes, the kill step is not always the silver bullet,” Mr. Spiak said. “Products may get contaminated after baking or frying. The right temperature kills almost all bacteria, but what if some raw ingredient gets onto

the equipment and/or a finished baked good, and that ingredient has an allergen contaminant or a pathogen? Surely wet cleaning will become a consideration for any processor that has these types of risks.”

Several bakeries rely on CIP systems. “CIP systems are more commonly used on a conveyor when running a modular belt,” said Greg Stravers, senior vice-president and head of PFI, a division of Precision Inc. “This helps to clean the niches that are created by the many hinges and modules that make up the belt.”

Mr. Stravers added that positive-driven extruded thermoplastic belting has much less need for the CIP systems because it’s a solid, homogeneous material. “However, in some positive-driven applications, the conveyors can be installed in areas that are elevated and less accessible for cleaning, and CIP systems can be installed in those areas that are difficult to access.”

Using CIP systems on conveyors requires the infrastructure and utilities to support it, such as proper drain placement and sufficient water supply. “Additionally, the design of the conveyor itself may not allow for the use of CIP systems,” Ms. Rasmussen observed. “Upgrading to CIP systems can address hard-to-clean areas, such as sprockets. An additional incentive is that these automatic systems decrease the resources and time needed to manually clean a conveyor, allowing sanitation personnel to focus on other tasks. Keep in mind, however, that the CIP cycle does need to be monitored.”

As a result, bakers need to balance out what type of cleaning is most effective and economical for their operation. That’s why many companies today incorporate sanitary design into their return-on-investment (ROI) calculations for new equipment. “A more sanitary design offers a better ROI because even though labor is still required to clean each conveyor, the time for cleaning is heavily reduced,” Mr. Martin said. “Less time required to clean is less expensive on labor and may result in more uptime production.”

Mr. Stravers recommended designing conveyors to eliminate any hidden areas. Additionally, rounded or sloped surfaces will prevent product buildup. “Conveyors should have removable bed rails — by hand, no tools required — to not only clean the rails more effectively, but to access the framework,” he said. “Conveyor take-up assemblies should be simple and made with no threaded rod — acme threads, if necessary — to make it easier for sanitation.”

He added that any conveying equipment that isn’t easily dismantled in order to effectively clean unavoidable harborage poses a risk to production.

Replacing those worn parts

Because belting carries finished goods, it receives the most attention, but bakers need to ensure that the conveyors’ frames and key components are adequately scrubbed.

Playing it safe with acetal belting

It’s easy to see why acetal belting is popular for conveying products through freezers and other areas of the plant. “It is strong, tough and has a low coefficient of friction against many materials available,” said Adam Bannerman, lead engineer of Intralox’s food new product development group.

However, it’s also flammable. “If acetal ignites, the flame it generates is really hard to see,” said Bobby Martin, executive product manager, conveying systems, AMF Bakery Systems.

Specifically, acetal burns with a bluish or clear blue flame. “You’re likely to smell the formaldehyde from acetal before you see the flame,” said Kenneth King, commercial support manager, Ashworth Bros.

Mr. Martin added that acetal is the go-to material up to the oven loader whereas nylon is used due to its proximity to the heat source. However, acetal should not be used post-oven for cooling or anywhere near high heat. Nylon material is preferred, sometimes up to the packaging area.

For spirals, Intralox uses a special material called SELM, which stands for self-extinguishing, low-moisture absorption. For other applications in a bakery, Mr. Bannerman said, heat-resistant nylon belting mitigates the risk of fire in hazardous areas.

Mr. King suggested placing fire systems in close proximity to spiral systems as a safety precaution when using acetal belting. Additionally, maintenance personnel need to shield the plastic belting, especially if they’re welding on, above or adjacent to a conveyor. “When you weld something, you’re going to get sparks,” he noted. “If that area is not shielded well and sparks lay on the belt, that’s the ignitor.”

Ashworth labels acetal belting to signal its risk of potential flammability.

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Scraping away residue and caked-on material along with other proper sanitation practices ensures food safety and enhances a conveyor's long-term performance.

Intralox

There's something to be said about having a mean, clean, smooth-running machine. "Often bakers overlook cleaning the support structure underneath the belt," said Kenneth King, commercial support manager, Ashworth. "Many bakeries use flour or sugar or glazed icings, and any of those materials that build up on the rails are going to cause dramatic increases in friction that could lead to damaging of the belt as well as the system. The support structure on any conveyor has to be focused on as much as the cleaning of the belt."

Often the top of the belt and side of the framework receive priority treatment. "The wear strips, sprockets and inner and lower framework also need to be cleaned to help minimize product buildup," Ms. Rasmussen said. "Buildup can lead to operational challenges and quality issues due to mold growth and pest infestation."

Mr. Martin advised storing a strategic supply of spare parts to swiftly repair the most common breakage. "Sprockets follow the belts in order of importance to keep in inventory, but most of the time, sprockets are replaced when they get worn out," he said. "The motors and reducers are to be kept in inventory, but these items can be considered predictable to fail. Some parts of a conveyor, such as wear strips or side guides, don't last as long and will need to be replaced."

For predictive maintenance, Mr. King noted that Ashworth's SmartSpiral spiral monitoring system tracks spiral system performance, allowing bakers to schedule maintenance before parts fail. This system will be featured at the International Baking Industry Exposition (IBIE), which runs Sept. 7-11 in Las Vegas. "You can go from a reactive maintenance approach to a more predictive one where you anticipate what needs to be attended to well ahead of time so that you can schedule downtime to do appropriate maintenance," he said.

Upgrading for uptime

Transitioning to more hygienically designed equipment that's easier to inspect and maintain could slash sanita-

tion and changeover time. Wire Belt's products are put through testing to earn acceptance certificates from the USDA Agricultural Marketing Service, Equipment Design Review Section, which relies on third-party private contractors. "That certification tells the customer that Wire Belt's product meets NSF/ANSI/3-A 14159-3-2014 requirements and shows the user that this is a product that is food-safe if properly cleaned and maintained," Mr. Spiak said.

At IBIE, AMF will be promoting a new rod-less horizontal bread diverter that is enclosed in a loop of S-Series, sanitary-designed conveyors. Additionally, the company will use augmented reality to allow bakers to virtually tour a bun and bread line to explore its conveying systems' dough, pans, products, baskets and basket stacks.

Mr. Collison noted that the type of food and its characteristics — low-moisture, wet, sticky, frozen, hard and soft — ultimately impact conveyor and belt selection. "Choosing the conveyor and belt is critical to reduce difficulty in cleaning and cross-contamination," he said.

Scott Swaltek, vice-president of engineering, Capway Automation, pointed out that conveyor and belt design — and their sanitary protocols — vary greatly by their application on the production line. "Make-up areas that tend to be in a washdown environment require belts that can withstand moisture," he said. "Plastic modular belting made of nylon or non-coated fabric belts — each of which can absorb moisture — have limited roles in these areas."

Because of a proofer's proximity to the makeup area, he added, its belts will have similar requirements while cooling conveyors need proper airflow with a higher open area in the belt construction. Each belting type may need different sanitation procedures.

Establishing proper cleaning protocol and standardized operating procedures for sanitation reduce the chance of nearly undetectable issues from exponentially expanding into a major mess when conveying snacks and baked goods on a high-volume production line. ●