The Complete Guide to SANITARY CONVEYORS *in Food Processing*

Cablevey® CONVEYORS

The Gentle Way to Convey®

The food industry is one of the most important and highly regulated industries worldwide. The safety and quality of products that we consume depend on a variety of factors, including the cleaning and sanitation processes used to prepare them. The importance of cleanliness and sanitation cannot be overstated – from raw ingredients being stored under sanitary conditions to final packaging for consumers.

In this white paper, we will discuss how conveyor systems can help maintain sanitary conditions in the food industry, as well as some common cleaning and sanitizing options available for these systems.

WHY IS SANITATION IMPORTANT IN FOOD PROCESSING?

According to the CDC, food-related illnesses and outbreaks caused by contaminated food cost the US economy $15.5 billion each year. The CDC estimates that there are 48 million cases of foodborne disease annually, leading to 128,000 hospitalizations and 3000 deaths per year on average in America alone.

Food contamination is a major public health concern not only for developed countries but also developing regions, where it is often difficult to maintain proper sanitation standards. The World Health Organization (WHO) states that foodborne diseases result in an estimated 600 million illnesses and 420,000 deaths annually worldwide.

The Food Safety and Modernization Act (FSMA) by the FDA is a major step forward in improving food safety requirements and preventing contamination of the US food supply. The FSMA establishes new controls for human and animal food to prevent intentional adulteration while also focusing on strengthening import/export inspection programs, among other initiatives.

The food processing industry is a place where cleanliness and sanitary conditions are absolutely critical, as the potential impact of contamination can be significant. Sanitation efforts must focus on ensuring that food processing equipment and facilities do not come into contact with contaminated products or other materials that could potentially transmit harmful bacteria or viruses from one location to another.

CLEANING VS SANITATION

Even though they are often used interchangeably, it is important to understand that there are differences between cleaning (washing) and sanitation. The word "sanitary" implies that an object or process has the potential to reduce microbial levels on a surface, which can help protect people from foodborne illness.

The key difference comes down to whether cleaning products kill microbes (sanitation) or simply remove them (washing). The proper level of sanitary protection will vary depending on the type of food materials being transported, but it is important to understand that even a cleaned conveyor can still contain microorganisms.

A well-designed sanitary conveyor system should be gentle enough not to damage fragile foods during transport, and it should also ensure safety for workers and consumers by removing and killing any pathogens that may be present.

SANITARY STANDARDS

So, what are the sanitary standards for conveying in food production?

The USDA and FDA have strict guidelines for sanitary frame designs and maintenance of conveyors in food processing facilities.

The FDA has a set of Recommended Good Manufacturing Practices that outline specific components required to maintain product safety, including:

- **The design** must not allow any contaminants into the product stream during operation.
- **Hazardous materials** cannot be used when constructing or assembling conveyor components. The FDA recommends stainless steel conveyors or those made from other corrosion-resistant materials.
- **The conveyor** must be easy to clean and sanitize at all times, ensuring that there is no chance of product contamination or adulteration during transport.

- **The structural design** should allow for the cleaning and disinfecting of any crevices between moving parts such as chains and sprockets without requiring disassembly by hand (which could lead to product contamination).
- **The conveyor belt and any rollers** should not have areas where product residue can collect, as this may result in cross-contamination of incoming goods while being processed.

These are just a few of the important considerations that companies must take into account when designing their conveyors systems. The FDA recommends consulting with a food safety expert to ensure compliance and best practices are met at all times, as product contamination can easily happen if these guidelines aren't followed properly.

3-A SANITARY STANDARDS

A useful set of standards to consult with when designing a sanitary conveyor system are the 3-A Sanitary Standards. They are voluntary guidelines for construction and design of processing facilities in the food industry. The standards are extremely thorough in their description of sanitation requirements with many illustrations included to better understand a wide variety of components involved in sanitary conditions within these different sectors.

Even though 3-A Standards are not regulatory, some state regulations may reference them. The standards were first introduced in the 1920s and have changed over time to reflect new technologies, best practices, and lessons learned from field experience.

The four associations in charge of the standards are the American Dairy Products Institute, International Dairy Foods Association, Food Processing Suppliers Association and the International Association for Food Protection, with support from both trade associations, government agencies like USDA and FDA, as well as various equipment manufacturers.

Some examples of 3-A Standards include specifications for materials that conveyor systems can be constructed with, proper installation and maintenance of equipment that comes into contact with food products, and procedures for receiving new conveyor systems to ensure they are sanitary. The standards also include specifications for design elements like the slope of a floor (to avoid water accumulation), types of doors on an enclosure (for ease in cleaning), light levels inside processing areas or storage rooms (for safety and to more easily see and inspect the processing environment), and more. The list goes on!

FEATURES OF A SANITARY CONVEYOR

Keeping the above-outlined guidelines and conveyor knowledge in mind, there are several features that sanitary conveyor systems should have in food processing facilities.

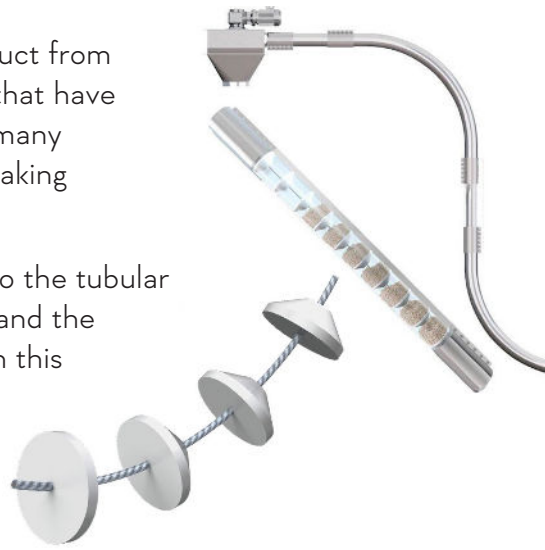
The following should all be included:

- **Enclosed system** – The entire system should be enclosed, ensuring that no contaminants can enter the production line. Enclosing all areas where product is handled or transferred (i.e., ingredient feeders and discharge points), as well as any open spaces along the length of the conveyors will help to keep the system sanitary.
- **Few moving parts and cracks, holes, or crevices** – The fewer moving parts there are in the conveyor system, the easier it will be to clean and sanitize. There should be as few nuts, bolts, screws, and joints as possible to reduce the risk of product accumulation. The conveyors should also be smooth and seamless to prevent any hiding places where food residue can settle.
- **Stainless steel connectors** – As mentioned above, stainless steel connectors are best to use when constructing the conveyors, because these materials do not corrode or rust.
- **Clean-in-place technology** – CIP technology is the automated cleaning of machinery with chemical solutions. The conveyors should be equipped for CIP technology, which allows food processors to implement a thorough sanitization program based around pre-set cycles and schedules. The application of chemicals during this process will remove any residual product particles or residues that may have built up over time on the system. Another great feature of CIP is that the conveyor system doesn't have to be disassembled to clean, allowing for less downtime and a more efficient cleaning process.

BEST SANITARY CONVEYOR OPTIONS

Which conveyors are the most sanitary for food processing?
To sum up our features from above, the best option would be a stainless steel conveyor system (or one made from other corrosion-resistant materials) that is enclosed, has few moving parts and crevices, and is equipped for CIP technology. The following conveyor systems would meet some or all of these requirements:

- **Belt conveyors** – These are one of the most common types of conveyors used in industries today. Food grade conveyor belts should be made of non-porous material, and they could also be enclosed if need be. However, they do require quite a bit of floor space, because they can only operate on the horizontal or near-horizontal plane.
- **Tubular drag cable** – Depending on what type of food material you are transporting, tubular drag cable and disc conveyors can be the best option. The cable is often made of stainless steel coated in smooth nylon where food products are in contact with it. Nylon is resistant to acids and other chemicals, so it is a good choice for food processing.



The cables are enclosed in tubes to further protect the product from contaminants. Material is moved with the help of solid discs that have no crevices, nuts or bolts. The system can be designed with many options to accommodate different types of food products, making it versatile.

- **Chain drag conveyors** – The chain drag conveyor is similar to the tubular cable drag conveyor, in that there is a stainless steel chain and the system itself can be enclosed. The main difference between this conveyor type and tubular drag cable, however, is that the chain is not the best option for transporting food material. The chain can accumulate product residue, which can cause contamination issues down the line if not cleaned properly.
- **Pneumatic conveyors** – A pneumatic tube is usually made of stainless steel, and it can be either horizontal or slightly inclined (for gravity flow). The top-end should have a filter to eliminate any particles that might make their way in during operation. Pneumatic tubes could also be equipped with CIP technology which makes them sanitary conveyor options. However, without the CIP technology, the pneumatic tube is largely inaccessible and could make cleaning difficult.

CLEANING PROCESSES

Regardless of which conveyor system you decide on, a thorough cleaning process should be a part of your cleaning and sanitation program.

The most important aspect to focus on when it comes to cleaning conveyors is that all remnants from the product are removed completely, no matter how small they may be. The benefits of establishing a regular cleaning schedule are many, including protecting the product from contamination, extending conveyor life, and ensuring safety for workers.

What cleaning options exist for conveyor systems?

The two primary choices could be divided into hand cleaning and automated cleaning.

Manual cleaning

Unfortunately, plenty of facilities still use cleaning by hand. The people who do the cleaning can wear gloves and use brushes or scrapers to remove any visible residues.
The process varies depending on the type of food product being transported (snack foods, frozen foods, specialty grains, etc.), and

it can be done more or less frequently based on the amount of residue left from previous runs. This type of cleaning is less than ideal. The process is not effective for removing all contaminants, and it can take up a lot of time. The employees themselves are also at risk if they do not wear the proper safety equipment or follow sanitary guidelines when cleaning with brushes and scrapers.

CIP and COP cleaning

Automated, easy cleaning comes in the form of CIP, or Clean-In-Place, systems. Compared to manual washing, CIP doesn't require too much time and effort, and it can be done without the risk of contamination. The food product does not come into direct contact with any tool or machine outside of its normal conveyance process.

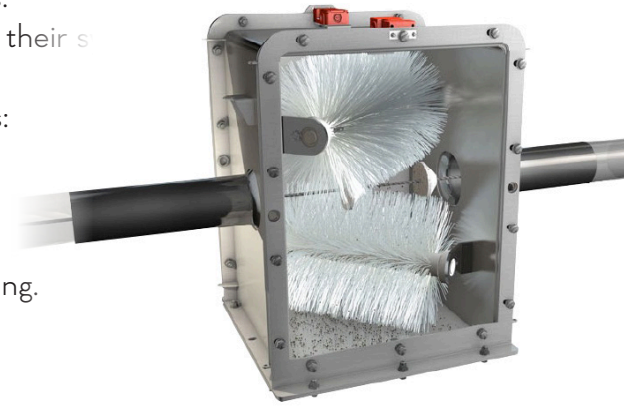
Another significant benefit to CIP technology is the fact that conveyor systems don't have to be dismantled to be cleaned (no tools required). The system is hooked up to a CIP unit and the product runs through it, which means that there's no downtime during cleaning.

Cleaning out of Place (COP) systems are also an automated option for conveyor clean-up. The difference between this technology and CIP is that COP has smaller pieces that are removed from the conveyor and taken to a separate area for washing. The time required is greater when using COP instead of CIP, but it's still more efficient than manual cleaning techniques.

CLEANING PROTOCOLS

Every conveyor manufacturer has its own set of cleaning protocols that must be followed when it comes to sanitizing their conveyors.

The manufacturer should also provide thorough instructions on how to install and operate the system, as well as perform regular cleaning procedures.
For example, Cablevey offers two types of cleaning for their s



Dry cleaning may include one or several of these items:

- **Air knife** – Using compressed air to blow off the conveyor line.
- **Brush box** – A line insert with brushes used for cleaning.
- **Sanitizing cleaner and sponge box** – A combination of sponges and sanitizing chemicals.
- **Urethane wiper disc** – The wiper disc is used to wipe off any remaining residue from the inside of the conveyor.

In contrast, wet cleaning consists of the following steps:

- **Water rinse** – A high-pressured water spray rinses the conveyor, getting it ready for the next wash step.
- **Foaming agent** – The purpose of the foaming agent is to clean the inside of the conveyor, removing any remaining residue.
- **Sanitizing agent** – The sanitizing agent is used to kill any microorganisms that may still be present on the conveyor.
- **Second water rinse** – The last step in the cleaning process is a water rinse, which makes sure all residues and chemicals are removed from the system before it can start operating again.

Before you settle on a new conveyor system, make sure to do some research first on the cleaning protocol capabilities of each manufacturer.

VALIDATION, MONITORING, VERIFICATION

A cleaning and sanitizing protocol cannot be effective without proper validation, monitoring, and verification methods. The purpose of validation is to make sure that the protocol will actually yield the desired results. The monitoring step consists of checking if all protocol steps are being completed successfully,

while verification is used to determine if there are any remaining residues left on the surface that should have been removed by the cleaning and sanitizing process.

Validation consists of microbiological and non-microbiological tests for assessing the cleanliness or contamination of a conveyor surface.

Microbiological tests include culture cultivation and molecular methods. The purpose of these tests is to determine if any microorganisms are left on the surface after cleaning. The most important aspect in this process is minimizing test variables, which means ensuring that there isn't any other source of contamination around when testing takes place.

Non-microbiological tests include visual assessment, ATP tests, protein tests, and other assessments. The purpose of these is to determine if the surface has been properly cleaned and rinsed, which results in a system free of residual soil.

Without proper validation and verification, you cannot be sure that your conveyor system is hygienic. The consequences of not properly validating and verifying can be extremely dangerous to the end user, as there may still be some types of bacteria and residual soil present on the surface even after cleaning and sanitizing.

ATP TESTS

One of the best ways to test whether or not your cleaning protocol is effective is by testing conveyor surfaces for molecules of ATP (adenosine triphosphate). ATP represents a source of energy in a living organism – it can be found in food residue, bacteria or mold, and even human skin.

ATP surface tests are highly efficient and sensitive. A simple swab of (vertical or horizontal) surfaces after the cleaning process (but before sanitization) is enough to verify whether the cleaning process is working. If there is a high amount of ATP, then the cleaning protocol needs more tweaking.

A unique feature of this testing process is that there is not one acceptable range for ATP that can be applied to every single surface or conveyor. The pass and fail numbers depend on the age of the surface, material of the surface, whattype of product came into contact with the surface, how it was cleaned, etc.

To set a reasonable ATP limit for your specific surfaces, you will need to perform intensive ATP swabbing and testing for a period of time (two or three weeks) to establish baselines for your use case.

CONCLUSION

In the food processing industry, sanitary conveyor systems are paramount for the safety of consumers. The best way to ensure that your system is fit for purpose, and can be cleaned thoroughly without having too much of an impact on productivity, is by doing research beforehand.

The manufacturer should also provide detailed instructions regarding all aspects surrounding installation and regular cleaning procedures of each particular material handling system.

The ideal sanitary conveyor for food processing should have an enclosed system, and no holes, crevices, nuts, or bolts for residue and bacteria to hide in. The conveyor should also be easily accessible for cleaning purposes, ideally without needing to be disassembled completely.

If you are interested in conveyors that are enclosed, with proper cleaning mechanisms, which are gentle on the materials, and energy-efficient, please contact us at Cablevey. We will be happy to help you find the best solution for your company.

ABOUT CABLEVEY CONVEYORS

Cablevey Conveyors, a division of Intraco, Inc., is the leading manufacturer of tubular drag cable conveyors and material handling systems for whole bean coffee, pistachios, almonds and peanuts, cereal, beans, seed, snacks, and powder and bulk solids.

Cablevey conveyors gently move through an enclosed tube without the use of air. Systems can convey up to 1,500 cubic feet per hour. Powders, chunks, flakes, pellets, prills, parts, shavings, crumbles, granules, fluff, regrind and dust can all be handled with ease. The company makes available numerous layouts using multiple inlets and outlets. Product separation and degradation are practically eliminated. Since 1971, thousands of Cablevey systems have been manufactured and installed in 49 states and 60 foreign countries.