
INDUSTRY SEGMENT PROFILE – CHEESE MAKING

Dorner

Segment Overview

Cheese manufacturing can be broken into two sub-segments, cheese making and cheese processing. Each of these sub-segments can produce cheese that is intended for direct consumer purchase or institutional/commercial customers. Dependent on the business plans of manufacturers, these two sub-segments could potentially be located in the same facility.

Cheese making is the process where milk is received, the fluid milk is processed and transformed into cheese. The cheese is typically formed into larger blocks, being as large as 640 lbs. Many of these large blocks are made for cheese processors where they are often cut down to more manageable sizes, with 40 lb. blocks being among the most common. Smaller, artisan or limited production operations may form their cheese into wheels. Sizes and weights of these wheels will vary depending on the type of cheese and the production scope of the manufacturer.

The second sub-segment, cheese processing, take the blocks of cheese and process them further. Processing includes reducing into smaller blocks, shredding, slicing, and blending cheese. Many of the largest consumer brands in the United States tend to be only cheese processors. The cheese is made by one then processed and packaged within a different facility for commercial use. We have created a separate Industry Segment Profile for Cheese Processing.

Whey comprises 80 – 90% of the total volume of milk entering the cheese making process and contains about 50% of the nutrients from the original milk which includes soluble protein, lactose, vitamins and minerals. For this reason, whey is a very good source of nutritional supplements. Many cheese manufacturers are reclaiming the whey produced in the initial stages of the cheese making process. It is often dried and sold as a secondary revenue stream for cheese making operations. Smaller cheese making operations may sell the whey to local farmers to supplement animal nutrition plans.

According to the American Cheese Society, 76% of cheesemakers reported annual cheese production of 50,000 pounds or less, indicating that the growing industry largely consists of smaller businesses.



Cheese continues to top U.S. specialty food sales, at more than \$4 billion in 2017, per the Specialty Food Association, profitability remains a challenge for the artisan and specialty cheese industry. According to the ACS, only 80% of cheesemakers operated profitably in 2017, and average profit margins were slim. Additionally, 92% of cheesemakers reported that maintaining profitability is an area of concern.

Typical Manufacturing Process

The cheese making process primarily consists of fluid handling. The basic process cheesemakers follow include these steps:

- Standardize milk to make it as uniform as possible.
- Pasteurize or heat treat milk to reduce the potential for spoilage. Time and temperature will vary based on type of cheese.
- Cool the treated milk to a temperature that is optimal for culturing (typically 90 F). Again, temperature depends on the type of cheese.
- Add starter bacterial ingredients and hold for approximately 30 minutes. The bacteria starts to grow and fermentation begins. Fermentation lowers the pH of the cheese and develops the flavor.
- At the end of the prescribed time interval Rennet or other enzymes are added to initiate the curdling process. Once these enzymes are added the curd is not disturbed for approximately 30 minutes. During this time it coagulates and continues to ferment.
- At this point in the process the product is referred to as curd. As the curd reaches a specific pH (generally 6.4) it is cut into smaller pieces and heated to help separate liquid whey from the curd.
- When the liquid whey has been separated, and is completely drained from the vats the remaining curd forms a mat.
- Once the mat is formed there are several operations that can occur depending on type of cheese. Most often the curd is cut into sections. The size of the pieces are determined and piled on top of each other, an operation that is referred to as cheddaring. Cheddaring is also used to eliminate more whey. The curd is left to continue fermenting until desired pH is reached – generally between 5.1 – 5.5. While the curd is fermenting the mats begin a process called knitting, in which the cheese forms a tighter matted structure. In place of knitting, stretching and pressing may be used, which produce cheese with different textures and flavors. Very soft cheese such as cottage cheese tend to skip this step.
- Once the curd mats are processed the cheese will be dry salted or brined.
- Following the salting step, the curd pieces are placed into forms and pressed into blocks to form the cheese. Depending on the sophistication of the manufacturing operation this process may be either manual or automated. A wide range of containers are used to form the cheese such as wood, plastic, stainless steel, or other materials. The shape of container will vary as well.
- In large industrial cheese making operations the curd is formed into blocks using equipment called block towers. Round blocks are referred to as wheels, but shapes and sizes of the blocks can vary.



- Once blocks are formed they are typically sent to a controlled environment area for a process called aging. During the aging process the cheese develops the flavor and texture profiles. Length of the aging process depends on type and style of the cheese.

When the aging process is complete the cheese is considered finished. It can be sold as a complete block or wheel, or it can be subjected to further processing – such as shredding, slicing, and blending. Those processes will be covered in a separate Industry Segment Profile.



Regulatory Concerns

The U.S. dairy industry is a highly regulated industry. The Food and Drug Administration (FDA) has overall regulatory authority in the U.S for the production of safe foods, including cheese. Additionally, many cheese manufacturers voluntarily participate in a program administered by the United States Department of Agriculture (USDA) whereby cheese plants are regularly inspected and approved by that federal agency. Lastly, individual states also perform regulatory oversight of cheese manufacturing facilities and dairy farms.

NSF, 3-A, and ANSI are notable third party agencies that have joined together to create a joint standard of design requirements for cheesemaking equipment and conveyors. This NSF/3A/ANSI Standard is administered by third parties, but once equipment is approved as meeting the standard it is automatically accepted by the FDA and USDA. At this time, there are no belt conveyor manufacturers whose have equipment that is certified to this standard.

There are several 3rd other party agencies that have similar - but not identical – guidelines and standards for production. The customers of the manufacturer may require certificates of compliance or inspection documenting compliance with SQF, GFSI, BRC, or other standards.

From a food safety standpoint the two principal concerns are preventing microbial contamination and ingredient cross contamination that can result in undeclared allergens in a product.

Business Issues

Cheese makers face several overarching business concerns that will influence their buying decisions.

- Volatility of milk prices can have a dramatic impact on scheduling of capital equipment projects. This tends to have a higher impact on high volume producers than smaller, artisan producers.
- Several European countries are making efforts to trademark the names of cheeses that originated in their countries. When they are successful this means that North American producers cannot use the product names that are recognized by the public. In turn, this impacts consumer demand for these products due to uncertainty about the quality or origin of the cheeses. With uncertain demand companies are more cautious about capital expenses.
- Current labor markets are very tight. Manufacturers are having a hard time finding not only skilled labor for positions such as maintenance or supervision, but also for direct labor on the production floor. Production areas need to be set up to allow the workers they have to be as productive as possible. Turnover is frequent and work areas need to be reconfigured frequently to accommodate the dynamic number of workers on the line.

- Ergonomic issues are avoiding employee turnover and worker injuries. Repetitive motion injuries are common for long term workers. This can result in worker's compensation claims and rising insurance premiums. The work can be very physically demanding if work spaces are configured poorly, which also impacts employee turnover.
- The need to provide a wide variety of products for different customers creates a higher risk of cross contamination. Product changeovers happen more frequently and the lines must be cleaned effectively. This process needs to be as fast as possible to ensure maximum production availability.
- Waste issues are a drain on profitability. Production systems must be set up to add their ingredients with the least amount of spillage or damaged product. During sanitation cycles water usage and chemical usage are costs that need to be managed. Equipment that is difficult to clean results in longer sanitation cycles and accompanying labor costs. It also means that the factory uses more chemicals and pays higher surcharges on their wastewater stream.

Production Challenges

Due to the saltwater rinse required to cure many types of cheese as it moves through the extruder, a salty mist often coats the entirety of cheese production rooms with a thick condensation. Cheese makers have to be concerned about selecting material that will hold up under these conditions.

Production capacity is directly tied to space concerns. Almost all manufacturing processes are time dependent, and are directly tied to holding time periods. There is a strong correlation between production throughput and space. As a result, effective use of production space is critical.

Factors Influencing Purchasing Decisions

The cheese industry is perhaps the industry most concerned with hygienic design. While there are no specific 3-A standards for the type of conveyor Dorner manufacturers, customers tend to request that conveyor manufacturers comply with 3-A design guidelines and principles for weld and surface finishes.

Operator safety is very important. Customers are interested in finding the best balance between open designs for ease of sanitation and having sufficient guarding so operators cannot be harmed by the conveyor system. Line workers wear lab coats and other PPE (Personal Protective Equipment), which have a higher chance of getting caught on moving belts or rotating shafts.

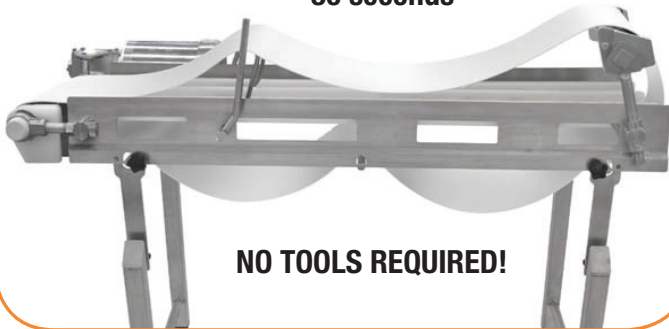
Clean ability is another key consideration. Cheese makers want to reliably sanitize their conveyors and ancillary equipment thoroughly in the shortest amount of time, using the minimum amount of water and chemical agents. To streamline the sanitation process it is commonplace for the cleaning team to run the belts during the sanitation cycle – even if they are raised from the bed with belt lifters.

Speed and ease of teardown and re-assembly are also crucial. Customers prefer systems that can be broken down and re-assembled intuitively, utilizing interchangeable parts that do not require specific orientation.



How Dorner Delivers Value for the Customer

Total time for cleaning preparation:
30 seconds



NO TOOLS REQUIRED!

AquaGuard and AquaPruf Ultimate conveyors offer a wide range of belt options to address the specific needs of the customer's application.

AquaPruf and AquaPruf Ultimate conveyors are designed to allow users to thoroughly and effectively clean the conveyor in the shortest amount of time using only as much water and chemical agents as necessary.

Tool-free disassembly eliminates the need to bring in tools that could carry contaminants from outside the room.

Robust conveyor framework and supports stand up to the most demanding production environments.

Patented sprocket alignment guides make it easier and faster to break down and re-assemble modular belt conveyors.

Solid conveyor frames with cut-outs for cleaning balance accessibility and safety for operators

Dorner equipment designs comply with very stringent regulatory standards - including options available to comply with 3-A.

Dorner is also the only supplier that backs their equipment with a 10 year warranty.

In addition to Dorner's standard products there is a dedicated Engineered Systems Group that can modify standards, create entirely new equipment, or integrate third party equipment to ensure the right technical solution for the customer's specific requirements.

Dorner has extensive experience providing cheese production systems. Our engineers understand the unique systems needed for these very specific type of applications. Dorner Customers Include:

- Southwest Cheese
- Marathon Cheese
- Schuman Cheese
- Mullins Cheese
- Relco (OEM of Cheese making equipment)
- Glanbia Cheese
- Sargento
- Hilmar
- Agropur
- Baker Cheese
- Kraft!
- And More!



Dorner is one of the very few conveyor companies that are ISO 9001:2015 Certified. This means independent authorities have verified that Dorner has established and maintains a quality management system for the Design and Manufacture of Precision Conveying Equipment for Industrial, Packaging and Sanitary Conveyor Automation Needs. Customers are assured that Dorner will consistently deliver high quality, reliable equipment – especially when it is a unique solution for a customer's requirements.



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