

Frozen Ready-to-eat Cookie Dough.

## Rhino Foods Finds 'Sweet Spot' for Freezing Cookie Dough

Rhino Foods, Inc., based in Burlington, Vermont, supplies more than 60 percent of the U.S. market for frozen ready-to-eat cookie dough used in scores of ice cream brands from coast to coast. When the company needed to expand production, Director of Operations Gene Steinfeld knew that a cryogenic wave freezer from Messer (Bridgewater, N.J.) would be a strong fit.

A European affiliate was already using the technology to efficiently quick-freeze cookie dough inclusions. The affiliate tested spiral freezers before moving to the new wave freezer. "It was after seeing their operation that we decided to look at it here," Steinfeld says.

The small bits of cookie dough move through the freezer on a belt with a proprietary wave action and are rapidly frozen with liquid nitrogen (-321 °F) and a flow of nitrogen gas swirling around the product. The fully adjustable wave gently vibrates the products as they travel to keep items separate as they are individually quick frozen. The motion contributes to a high heat transfer rate and lower operating costs.

The initial plan was to simply replace one of the existing cryogenic spiral freezers at the Burlington processing plant. However, with demand projec-

tions pointing higher, Rhino Foods decided to keep those running and harness the new wave freezer to boost overall production capacity.

Product temperature is key to Rhino Foods' production process, from start to finish—and beyond. After mixing, dough is extruded and pelletized with equipment specially designed for the product, and it must be kept within a narrow range for smooth processing. However not all cookie dough inclusions are the same.

There are different recipes depending on the particular ice cream and manufacturer. Some cookie-dough recipes use all butter; others use all or some margarine or oil, or some combination of the three. Beyond fat content, the pellets vary in diameter by a factor of three, again depending on the product, and this, too, can impact the processing parameters.

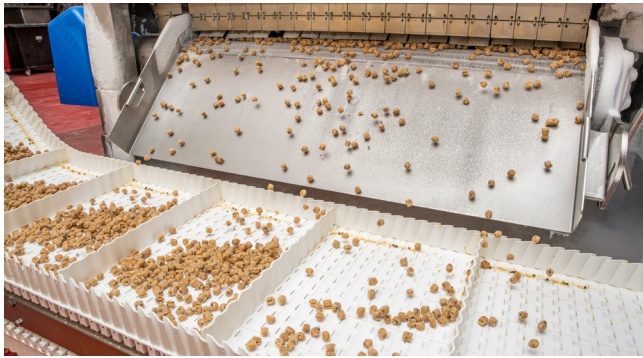
### **Getting to the Sweet Spot**

The cookie dough pellets are frozen within moments of forming. "That's a critical part of the process, because the product has very little moisture. It is really the fat that holds it together so it can warm up very quickly. That means quick-freezing and keeping the product cold is not only important to us for our production process, but it's important throughout the supply chain," Steinfeld says.

Rhino Foods has specific guidelines for distributors and customers about how the product must be maintained. "If the dough pieces stick to each other, that can affect their process," he says. Steinfeld is well acquainted with the challenges of mass producing ice cream after 20 years with a best-selling brand, including 10 managing plant operations.

The vibratory action of the belt was a key feature that attracted Rhino Foods to the wave freezer, since achieving a consistent, full-surface freeze helps avoid product sticking. "It actually took a fair amount of testing on our part to find the right mix of kinetic energy without creating a pellet frenzy," Steinfeld recalls. "There is obviously a balance: You want to use enough motion to take advantage of the better heat transfer, and yet you don't want to overdo it. The vibration also helps maintain spacing on the belt."

"The design and flexibility of the freezer is also a huge plus in handling multiple SKUs in Rhino Foods' growing operations," he said. Installed in 2018, the hygienically designed Messer Wave Freezer includes a base unit, and two modular sections which provide the needed dwell time for full freezing at the desired production rate. Steinfeld notes that in addition to controlling the intensity of the wave, the freezer system is divided into



Perfectly frozen, chocolate-chip cookie dough pellets tumble from Messer's cryogenic Wave Freezer ready for packing. Rhino Foods' frozen morsels add texture and flavor to ice creams from coast to coast, and are now being packaged for one major brand as a separate item.



Rhino Foods can preset the wave frequency, speed of the conveyor belt, and other process parameters for rapid change-outs between products. Messer's versatile Wave Freezer is also modular; freezer tunnel sections can be added as production needs grow.

three zones which can be independently controlled. Processing parameters are adjusted and stored for each product through a touchscreen panel on the base unit.

### Cleanability

Food safety is a prime concern in shifting to any new process with fresh ingredients, and especially so for Rhino Foods. As Steinfeld explains: "This is a bakery-style product, but cookie dough is not generally designed as ready-to-eat. Think about our ingredients. They are pasteurized, but we still use liquid eggs, butter, margarine or oil, and uncooked flour. So we are keenly aware of food safety, and cleanability is super important to us."

The plant shuts down all its cryogenic freezers for cleaning every day and performs multiple tests, pre-and post-processing, to make sure

sanitation procedures are effective. Steinfeld calls cleanability one of the greatest advantages of the new wave freezer.

"First, there are the internal surfaces and belt area to clean. The spirals we're running have from 120 to 200 feet of belt that needs to be cleaned on a daily basis. Our 35-foot wave freezer has about 70 feet of belt, so there is only about half to a third as much area to clean. Plus, the entire top of the freezer rises, and that gives us complete accessibility to all internal surfaces and the entire length of belt," he said. Below the belt, sloped sides channel directly to the floor drain.

In comparison, there are three doors on the spiral freezers, but workers need to get in and reach to spray all the inside surfaces. Both types of freezers use belt sprayers for cleaning, but there is more belt on the spiral

freezers and more ice buildup in the bottom which must be manually removed.

Although Steinfeld will not disclose how many thousands of pounds per hour the new freezer is processing, he says, "We have more potential than we realized. We designed this freezing system with the ability to grow and to produce substantially more than our current system."

He said the Messer food team is working with his manufacturing team to expand freezer capacity as demand builds. "We picked a target that we hope to reach sometime in the next year, and I'm confident that with Messer's support, we are going to hit that."



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