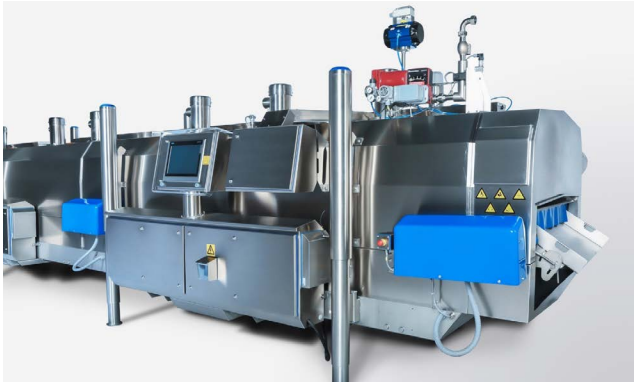
Tyson Foods Boosts Individually Quick-Frozen Throughput Using New Messer Wave Impingement Freezer.

Tyson Foods' North Little Rock, Arkansas, further processing facility produces, among other items, individually quick-frozen (IQF), par-fried and raw-breaded poultry products. Faced with production challenges, the company decided to convert its IQF line that used carbon dioxide (CO_2) to a new liquid nitrogen (LIN)-based cryogenic technology. By upgrading to the new Messer Wave Impingement Freezer, Tyson Foods significantly increased production throughput while reducing the cost to freeze by up to 43 percent per pound in some instances and improved freezer reliability – all in a reduced footprint.



By upgrading from a carbon dioxide tunnel freezer to a nitrogen Messer Wave Impingement Freezer, Tyson Foods enjoys improved production capability and IQF quality while reducing the cost to freeze, labor requirements and footprint.

The Problem

The North Little Rock facility sought to increase production and reduce cost per pound on the IQF line. The plant manager, Wesley Simpson, who has been with the company for 28 years, knew from Tyson Foods' plant metrics he "had the ability to run more capacity but [he] also wanted to keep freezing costs down."

To maintain 4,500 pounds per hour (lb/hr) of raw poultry products, the facility was forced to restrict the belt loading on the former CO_2 tunnel to make the transition into the mechanical freezer. "Managing the transition from the transfer belt to the mechanical freezer belt limited our ability to run more product. Additionally, CO_2 snow was carrying over into the transfer belt which hindered production quality and drove up labor costs to spread and separate product. We actually stopped the CO_2 freezer between shifts and cleaned out buildup inside the tunnel. The freezing capability wasn't applicable to the product," Simpson notes. To compound the problem, the CO_2 tunnel could only reach -90 °F, making it incapable of adequately crust freezing the product without losing efficiencies.

A new cryogenic technology

Messer understood the challenges posed by the CO_2 freezer during an on-site consultation and were determined to find an optimum solution. The Messer team ran baseline product tests on the CO_2 tunnel freezer by measuring production, cycle time, labor, IQF quality, and footprint, to calculate freezing efficiency and the cost to freeze. After diagnosing, the Messer team recommended the new Wave Impingement Freezer, which is especially designed for high-capacity freezing of IQF products. The North Little Rock facility would be among the first poultry processing plants in North America to incorporate this cutting-edge technology.

The patented high-capacity Wave Impingement Freezer combines the benefits of wave product agitation with impingement gas flows to achieve elevated levels of IQF productivity and quality in a small footprint. The wave-like motion agitates the product, maintaining product separation throughout the freezer. The high-velocity convective airflow increases heat transfer while reducing nitrogen consumption, and overall cost to freeze. The hygienically designed Wave Impingement Freezer requires minimal maintenance and its top lifts vertically for easy access to the tunnel for cleaning.

Measurable results

In the summer of 2021, Messer installed and commissioned the Wave Impingement Freezer, validated its operation, and established metrics for comparison with

the CO_2 tunnel freezer. Compared to the CO_2 tunnel freezer, the Messer Wave Impingement Freezer significantly increased throughput and at the same time reduced the cost per pound of chilling. The wave action reduced product marriages, reduced product sticking or tearing on the belt which increased finished yields. It also reduced the required labor to spread and separate product avoiding costly downtime during normal production hours.

"Historically, with a three-line operation, we operated 80 hours per week and produced roughly 1 million pounds per week (lb/week) or 52 million pounds per year (lb/year)," says Simpson. "Now, we're processing six days per week, 20 hours per day, up from four days per week, and we increased production from 4,500 lb/hr average production to rates of 6,600 lb/hr, with peaks of up to 8,000 lb/hr. These production increases help give us the flexibility to respond to demand increases and tight labor markets."

"We were hoping to run 1.5 million lb/week," says Simpson, "but we're actually averaging 1.7 million lb/week. We're on track to produce roughly 85 million lb/year – absolutely a record for the plant."

"Being a small plant," Simpson concludes, "we don't always see the latest equipment and new technologies. I'm very thankful Messer gave us the opportunity to compete with larger facilities with state-of-the-art equipment." The project's success has brought a very positive focus on the North Little Rock facility.

After several months of operation, the Messer Wave Impingement Freezer has achieved increased production, equipment reliability at a lowered cost per pound. Furthermore, the new freezer improved not only IQF quality but also workplace spirit.

"Our people aren't coping with the previous freezer, so frustration levels are down, and morale is up," Simpson observes. "It is literally a win for everyone. It's been a game changer for North Little Rock."

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