

Trends in food processing equipment in the US

Part 1. A Chart Industries perspective

By Jemima Owen-Jones

According to Tom Chromy, Chart Industries CO₂ Market Specialist, liquid nitrogen (LN₂) and liquid CO₂ (LCO₂) are becoming much more prevalent in the market due to four key influencers; environmental issues surrounding refrigerants; increased expense of mechanical refrigeration; increased supply of LCO₂; and improved purity of LN₂.

Chromy believes that environmental concerns and refrigerant supply concerns are driving out old refrigeration technologies and making them less 'interesting'. Customers are now looking at the total costs of refrigeration systems, which leads them to assessing LN₂ and LCO₂ as more economically viable supply options. Furthermore, demand for LCO₂ (from ethanol plants) and LN₂ supply (excess supply from ASU's) has become so prevalent and readily available, that the costs of delivery have now stabilised.

Tim Neeser, Vice-President of Customer Service & Marketing, has observed new trends for food processing equipment emerge in recent years. "The biggest change that I have seen has been the upgrading of the freezing equipment to accept LN₂ or LCO₂," he says. "Since LCO₂ flashes to dry ice, this is quite the design achievement. This allows the user to alter the supply, depending on the gas availability and/or cost."

In regard to new applications, Neeser noted the injection of liquid CO₂ to snow for the meat processing of sausages, a process which is now replacing the mixing of frozen meat with fresh meat to control the temperature during the final production stages of the sausages. Neeser explained, "To commit to this production change for this application, much of the processing equipment, if not all, must be upgraded. This is quite the undertaking and includes adding a liquid CO₂ supply to the equipment."

Another new trend in the food industry which appears to be 'popping up' in the distribution of refrigerated foods, is the shipping of frozen and refrigerated food directly to the consumer. Neeser believes that this is increasing the demand for dry ice. He

said, "From a safety standpoint, there are always concerns of burns with dry ice, but it appears this new trend is accepting consumer knowledge and the associated risk about safety – years ago, this was not the case."

Liquid nitrogen (LN₂) dosing

Nitrogen has been used in the food and beverage packaging world for decades, explained Tyler Jones, Product Manager of LN₂ Nitrogen Dosing Systems. N₂ is an inert gas and it makes up about 80% of the air around us – so of course, it makes for a perfect addition to food or a beverage without worrying about N₂ coming into contact with the consumer.

LN₂ expands nearly 700 times its size by volume when it converts to gas. The doser drops a small droplet of LN₂ into the food packaging or the beverage container and the liquid expands as it converts to gas. LN₂ is used to add pressure to packaging and/or reduce oxygen levels within the package. Adding pressure reduces packaging materials, lowering both costs and the impact on our environment. Reducing oxygen within the packaging or head space increases shelf-life of the products contents.

"The food and beverage industry is always getting faster and more efficient," explained Jones. "Filler machines are moving faster and faster and processing more and more food and beverages per minute. Customers need consistency and accuracy. These new filler machines are very precise, and the customer expects every accessory added on to that machine to perform to that same standard. Also, modified atmospheric packaging (MAP) was once very popular in the packaging industry. This practice involves N₂ gas being released into a tunnel as the food and beverage pass through. This was once the prime method for reducing oxygen levels in packaging. This is rather wasteful though, and dosing is taking the place of these systems as customers want to know how much money they are spending per container or package."

"LN₂ dosing is quantifiable – it saves the customer money and they seek more and more dosing opportunities because of this advantage," he informed.

Chart has a variety of LN₂ dosers as well as vacuum insulated piping used to transfer the LN₂ to the packaging operation and even food and beverage processing areas. There are two brand-new dosers called the CryoDoser FleX Craft Custom and Pack Premier. They are state-of-the-art with patent-pending technology. The new dosers were just launched at the end of 2017, with more improvements to come. "These are the most advanced dosers in the world", Jones enthused.

Applications


Within LN₂ dosing there are several markets that are taking off – yoghurt, fitness supplements, cold brew coffee, nitro coffee, and craft beer. The craft beer industry sky-rocketed a few years ago and it continues to grow. Chart offers specific technology for these customers with its new doser series.

Jones elucidated, "The cold brew and nitro coffee market is following in the footsteps of the craft beer industry. In a few years, we will see the same type of market and industry expansion within the coffee market as with the craft beer market. We are seeing more and more demand for applications involving yoghurt, protein powders, supplements, and even baby formula. There is a great deal of innovation within those industries and as food processing companies look to improve shelf life and product quality they look at every aspect. LN₂ dosing is a great way to provide stability and consistency within packaging."

Neeser believes that the future of the food processing equipment market will likely evolve slowly as the first movers typically hold back expanding best practices for a competitive advantage. This is nothing new and follows many other industries that rely on the use of gases to improve their processes.

He said, "In the near future, LCO₂ may start to increase in price as the demand may start to strip out the supply. If the cost of LCO₂ becomes more expensive than LN₂ in freezing food by weight, the supply and demand will take care of itself as users switch from one gas to the other. However, if the application requires the use of dry ice, there is no substitute. Thus, the cost of dry ice would rise if this was the case. These are the challenges that we may face and the opportunities to conserve on these gases to reduce costs will continue to drive technological advancements in the development and manufacturing of food processing equipment in the cryogenic space."

In the food processing department, Chart has developed the LN₂ and LCO₂ ChillZilla systems, python piping, and standard bulk LN₂ and LCO₂ tanks for gas and liquid applications. In addition, the company offers Perma-Cyl® MicroBulk systems for small gas and liquid applications, such as modified atmospheric packaging (MAP) and dosing.

The ChillZilla® LN₂ and CO₂ systems are Chart's most advanced pieces of equipment. The ChillZilla CO₂ system basically reduces the pressure and temperature of the LCO₂ by the use of mechanical refrigeration to reduce unnecessary flash lost – saving the customer money and reducing CO₂ gas loss to the atmosphere. The ChillZilla LN₂ is designed to provide consistent pressure to the application regardless of the tank level – this allows the user to freeze food more consistently and use most of the tank contents, reducing refills. 

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