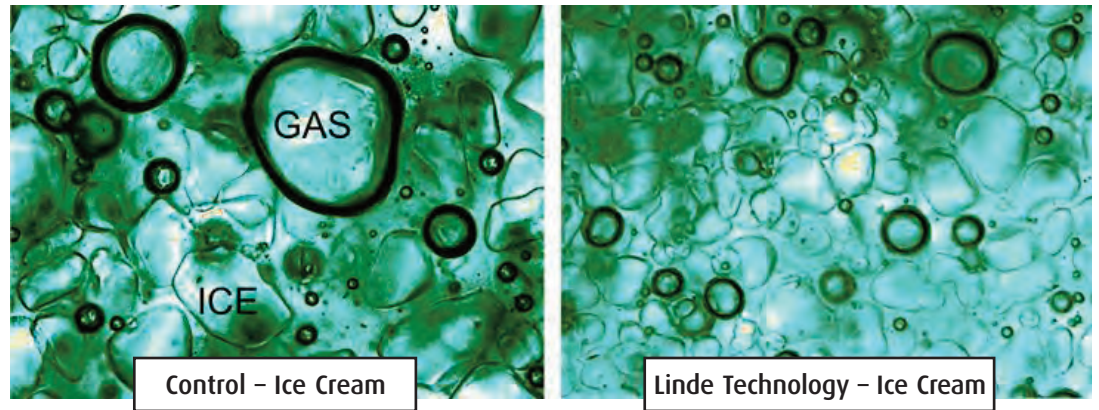




Cryogenic System for Ice Cream Hardening



Air bubble and ice crystal size comparison, control vs. Linde process.

Proven Concept Achieves Desired Results

Linde introduces a highly effective technology for hardening ice cream and other frozen desserts. The new hardening technology overcomes the poor thermal conductivity of the product, by cooling it from within, resulting in rapid and uniform freezing. Linde's process takes a side stream of ~10% of the total ice cream flow, portions it into small bits, deep freezes them in a specially modified liquid nitrogen freezer and adds them back into the main stream via a fruit feeder prior to packaging. This allows creation of new products with innovative colors, shapes and variable patterns. The technology has been successfully developed and demonstrated by Linde on multiple occasions.

Rapid Hardening Enables Cost Reduction

The rapid and uniform hardening enabled by the Linde technology provides many benefits to the ice cream processor. The cryogenic hardening **reduces the load on existing mechanical refrigeration capacity** and significantly **improves the quality and shelf life of the product**. The Linde hardening technology improves the microstructure of the product and produces approximately 35% smaller ice crystals and gas bubbles. The microstructure improvement also allows processors to increase overruns without sacrificing product quality. This is especially true for reduced-fat and natural products that have quality issues at higher overruns. Linde has successfully demonstrated 35% increase in overrun for reduced-fat ice cream with no loss in quality and, in many cases, an increase in quality.

Features

- Low capital cost system
- Technology can be implemented irrespective of formulation or packaging type or size
- Can be used with or without inclusions and variegates
- Easy installation, no production disruption
- Standard equipment used
- Technology can be used only when required; easy to bypass

- Benefits**
- Cost reduction due to overrun increase with no quality loss.
 - Up to 15% ingredient cost savings
 - Net savings per line of \$0.4MM to \$1MM annually
 - Allows creation of novel shapes and color patterns
 - Overcome existing hardening capacity limitations
 - Calorie reduction potential
 - Enables using less or no stabilizers – cleaner label
 - Improved product quality
 - Extended shelf life, reduced complaints
 - Provides temperature and altitude shock resistance

A Wealth of Experience

Researchers at our technology centers have identified the ideal freezing and chilling conditions for a broad range of food products. When you choose Linde, you're selecting more than the largest supplier of industrial gases in North and South America, you are also selecting a support team that includes:

- Experienced food scientists and engineers.
 - A complete array of services, including on-site evaluation, installation, design, start-up support and process optimization – Linde's Total System Approach.
 - A food technology laboratory to evaluate your product on full-sized production equipment.
- It's everything you need to improve the quality and consistency of your products.

Contact Linde Today

For more information about cryogenic, process analytical and industrial gases used throughout your operation, call Linde at **1-844-44LINDE**, or visit our website at www.lindefood.com.