Refrigeration

Background

Refrigeration is the process of lowering or maintaining the temperature of anything below that of its surroundings. Major users of refrigeration include the food, chemical, pharmaceutical and HVAC (heating, ventilation, and air-conditioning) industries.

Refrigeration is essential in the production of many perishable foods. Over 40% of the world's food production undergoes some form of refrigeration prior to consumption. Refrigeration is an essential step to reducing microbial growth that would otherwise result in food spoilage and possible increase in pathogens. Refrigeration is also essential to maintain the nutritional content of food and to retain characteristics such as flavour, colour and texture.

Foods are complex substances that have varied thermal properties and physical characteristics. frperc's strength is an excellent understanding of both food technology and refrigeration systems, which is essential for creating optimal food refrigeration solutions.

Our refrigeration systems expertise has also been successfully applied to other industries such as buildings air conditioning, non-food product processing and cosmetics.

Refrigeration systems

Refrigeration is an extremely broad and complex subject. Today, ozone-depleting refrigerants are being phased out, new refrigerants are emerging and knowledge on how best to use them is essential. Safety, leakages from plant and energy conservation are all issues that have increased in complexity over the past few years. These are in addition to the 'traditional' tasks of ensuring plant is operating to the design specification and is achieving the ideal process conditions.

Food technology

The interactions between refrigerated foods and their surroundings, and these surroundings and the refrigeration system, are often as important as the technical aspects of the refrigeration system itself.

The food will often have characteristics that require a certain type of refrigeration, for example, a sauce could be cooled in many more ways than a pie, some meats can not be cooled too quickly and some foods require a high-humidity, non-drying environment.

How frperc can help

frperc has a great deal of expertise in the interaction between foods and refrigeration systems and so can provide a complete package to help design, troubleshoot and optimise food refrigeration systems. frperc have also carried out safety evaluation on refrigeration systems and acted as expert witnesses in legal cases.

frperc have been involved in projects that include:

heat removal and temperature reducing operations of primary and secondary chilling, freezing and crust freezing

temperature maintenance operations of chilled and frozen storage, transport, retail display and consumer handling

thawing and tempering under refrigerated conditions

optimisation of domestic and commercial refrigerators and freezers

design, optimisation and testing of commercial refrigerated cabinets

reducing energy consumption

troubleshooting refrigeration system problems throughout the cold chain

We often use tools to help us with our work on refrigeration systems and food refrigeration. These tools include computer modelling such as:

computational fluid dynamics (CFD) for predicting temperatures, airflows, and energy requirements in rooms and refrigerated cabinets

heat and mass transfer models of foods and cold storage spaces

refrigeration system models

Our experience, and the combination of modelling and measurement that we use in most of our projects enable us to save our customers considerable time and money.

To discuss any aspects of developing a new refrigeration process, optimising an existing process or solving a food or other refrigeration problem, please contact us on +44 (0)1472 582400 or email us on frperc@grimsby.ac.uk