

From **reducing maintenance costs** to **increasing revenues**, how **connected coolers** are **transforming** commercial refrigeration.



www.alsensefoodandbev.danfoss.com

After years of predictions about the way the Internet of Things (IoT) would transform commercial refrigeration, the change has now started to become a reality.

By Alberto Pravato and Allan Chara, Danfoss Cooling

Worldwide, major brands are now using connected devices to change the way they manage, and service refrigerated assets, control stock and engage with consumers. And the return on investment is significant – through reduced costs and increased sales alike.

At Danfoss, we're actively involved in this process, working with global food and beverage brands to make their equipment smarter. It has given us a clear view of what the future is likely to hold for the sector, and where the best results can be found.

In this article, we'll examine the opportunity that IoT presents to commercial refrigeration and highlight the four key areas where the technology can help transform end-user operations.

The IoT opportunity in commercial refrigeration

Even as legal requirements and legislation around commercial refrigeration management and servicing are developed and become more stringent, manual cooler management has served end-users well for decades.

But there's now a real chance to speed up processes, reduce downtime, improve efficiency, and save money. Having seen the initial results, we believe brands that seize this opportunity have a natural advantage in the market.

By working with OEMs to integrate IoT connected devices, operators can take control of each of their assets – with complete visibility – from a single remote location.

Real-time monitoring enables instant action to be taken if something unusual is spotted: an unauthorized asset movement, a compressor problem, or an unexpected change in temperature or refrigerant level.

Data-based decision-making means refrigerator performance can be adjusted remotely – or a service team can be sent to the site to investigate.



Figure 1. In a Glass Door Merchandiser, **Alsense® Food & Beverage IoT** completes Danfoss portfolio of components.

It also provides limitless opportunities to extract greater cooler productivity at lower cost; from energy and maintenance savings to stock optimization and upsell opportunities.

And because IoT devices are connected to the internet, software and security upgrades can be carried out remotely.

It's possible that, in some territories, remote monitoring could eventually become a legal requirement under food safety regulations, so anything you can do today to anticipate these changes will likely benefit your operations tomorrow.

Four areas where IoT is changing commercial refrigeration



Figure 2. Danfoss **Alsense® IoT** solutions: a complete service, from heterogeneous Equipment to Enterprise processes.

Based upon experience working with commercial refrigeration OEMs and brands, we've identified four key areas where IoT can already help improve your operations.

1. Asset management

With many devices spread across various locations, it can be challenging to keep track of each one. No sooner have you

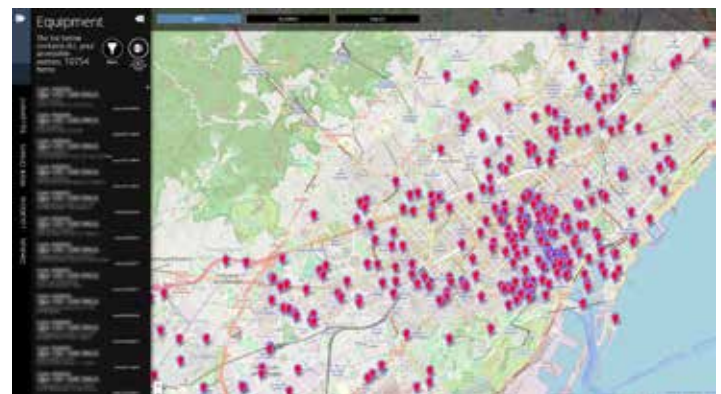


Figure 3. The Danfoss **Alsense® Food & Beverage IoT Portal** offers equipment localization, useful for logistical processes, detection of unauthorized movement, and geo-marketing.

optimized the position of each unit for maximum coverage, then a retailer has decided to move a merchandiser away from the agreed spot.

And the more equipment you have in the field, the harder the job becomes.

Previously, a moved asset would have taken days, or even weeks to identify – costing a significant amount of revenue which you're unlikely to recover.

With connected equipment, that uncertainty is eliminated.

At their most basic, telemetry devices in beverage dispensers, vending machines, ice cream cabinets, and other commercial refrigeration equipment can enable you to keep track of each asset's exact position and ensure they're in the approved location to maximize usage and efficiency.

► How do you measure the ROI?

Danfoss has a range of devices which broadcast data in real-time, via a cellular or broadband connection, into our Alsense® Food & Beverage cloud-based infrastructure. This means end-users can instantly monitor the status, viability, and productivity of each piece of equipment.

The data gathered from each device is converted into deep, actionable insights, which enable sales, marketing, and engineering functions to optimize their systems and extract maximum efficiency.

What's more, with a full-service package – like the Danfoss Alsense® Food & Beverage IoT solution – you can be alerted when a cooler is moved without your consent. It also enables you to remotely block the asset, pinpoint the exact location of the device via GPS, and quickly dispatch a service engineer to recover it.

2. Service management

Servicing commercial refrigeration assets can pose significant challenges for both end-users and technicians. It takes careful monitoring and preventative maintenance to avoid an unexpected and costly breakdown – but each service visit adds downtime and cost.

With remote proactive servicing, however, service resources can go when they're needed most – and solve small problems before

they become serious.

It's one of the reasons why a major global ice cream brand we're working with estimates that IoT monitoring has doubled the lifespan of its refrigerated assets.

Consider a conventional unconnected ice cream freezer today. In the event of an issue or breakdown, the unit stops working, an engineer is called, and the stock is either wasted or – at best – is relocated to another unit.

It's a highly reactive process and causes operators countless hours of downtime and lost revenue.

Now picture an IoT-connected freezer. Not only does the unit send real-time temperature and operational readings to the cloud for automatic monitoring, but any unusual activity in the data can also trigger preventative maintenance before the unit breaks down – saving time, money, and ice cream.

And there is more. With remote troubleshooting, you can even avoid the need to call an engineer to resolve any issues. It helps prevent asset downtime and reduces your operational costs.

And it's not just for ice cream, of course. While refrigerated asset downtime for non-perishable goods won't create food wastage, it will affect the quality of the consumable product – harming sales and brand perception.



Figure 4. Detailed diagnostic analysis combined with weather conditions of equipment location is possible with Danfoss Alsense® Food & Beverage IoT.

Not only does IoT monitoring help eliminate unplanned downtime, but it can also have a positive impact on sales for both perishable and non-perishable grocery products.

In addition, the more data and insights that are available to service engineers, the better prepared they are for future jobs, and broad knowledge base of previous service tickets will make their service visits more effective going forward.

3. Sales management

With so much data being gathered from various refrigerators in different locations, IoT telemetry gives brands the ability to collate, analyze, and gain valuable insight from its data to get the maximum possible performance from every asset.



Figure 5. The Danfoss **Alsense® Food & Beverage IoT Portal** provides sales reports that can be sorted by location, point of sale type, brand, and more.

For example, say you're a soft drink marketer, with 100 bottle coolers operating across a city. Traditionally you choose locations based on footfall and local amenities and wait for sales reports to see if your assumptions were correct.

By using IoT devices, insights from your data can tell you which coolers are performing better than expected, and which are underperforming – in real time. It means you can fine-tune your location planning based on hard data, rather than relying on instinct and experience alone.

Meanwhile, built-in cameras can scan each cooler's contents, and send you a planogram and stock purity analysis every time a door is opened. So, you can confirm that each cooler has the best possible product mix.

At Danfoss, our equipment performs this comparison on site and sends the results, rather than just a picture – saving you time, and reducing data communication costs by more than 99%.

There are other uses. Fountain drink dispensers and beer taps can use active monitoring to highlight low stock levels – prompting the site manager to replenish and avoid costly out-of-stocks.

What's more, the real-time data that's being collected can give you minute-by-minute sales analysis of any product. It allows you to monitor the immediate impact of a promoted campaign and optimize it accordingly.

4. Consumer engagement

Connected coolers and freezers can also engage with consumers directly, notifying them about relevant offers and discounts – for example, as they sit in a café or as they walk around a grocery store.

It's the next generation of consumer engagement that's designed to target individuals in real-time, in the right location, rather than broad demographics using traditional shelf-edge or point-of-sale advertising.

Thanks to geofencing capabilities, where a virtual geographic boundary is created using GPS, software in consumers' mobile devices can be triggered, enabling notifications to be pushed based on exact location, time of day, purchase history, and interests.



Figure 6. Example of interaction using Danfoss **ProsaLink** smart app.

The result is a message that's highly relevant, and effective.

And you can confirm that effectiveness, too. Because the connected device can tell the brand's sales and marketing teams exactly which varieties and offers are performing best – allowing them to optimize operations in real time.

Security at the forefront

With any connected device, cybersecurity should always be a priority. For commercial refrigeration equipment, this is not just because of the data that's being transmitted, but also for the protection of an asset and the food itself.

Danfoss IoT systems are designed to be as secure as possible from end-to-end. For example, a virtual private network (VPN) is used to protect data security in transit from the asset to the data center.

This VPN connection ensures a high level of security, privacy, and restricts access from outside intruders. When the VPN is installed

and configured, it can help protect against malware, hacking, data theft, and other cyberthreats.

It's likely IoT devices become increasingly common in commercial refrigeration – presenting a greater potential target. That's why IoT security is such an integral part of our end-to-end system design from the outset.

How to calculate return on investment from connected refrigeration?

The possibilities of smarter equipment are endless, but every brand is different. To find the right solution and get the most out of connected IoT commercial refrigeration, it can, and should, take months to quantify the technology's value in the field.

Once the idea and proof of concept are agreed, a field trial can help to quantify the potential return on investment. We generally find that 100 or more connected assets is sufficient to gather good quality data in the pilot stage.

However, we typically find the investment quickly pays dividends in sales uplift, reduced costs, and asset protection.

Because the technology is constantly developing, we work alongside brands to manage and integrate their IoT solutions across their asset portfolio, optimize how they use the technology, and roll it out to the wider organization.

And if they're collecting data, they're continually contributing to a vast bank of insights.

Indeed, one major global food and drink manufacturer now uses 50,000 Danfoss telemetry devices in its refrigerated assets, all producing invaluable data-led insight, continually improving its cost savings and efficiency.

Connected refrigeration: the competitive advantage your customers want

IoT connected commercial refrigeration is already helping countless end-users manage and optimize their refrigerated assets.



Figure 7. ERC112 Electronic Controller.



Figure 8. Danfoss OCTO telemetry device.

And while manual processes and Bluetooth-enabled refrigerated assets still have their place, none come close to providing the deep levels of insight that IoT devices can deliver.

From monitoring and maintenance to the overall security of your data, Danfoss Alsense® Food & Beverage IoT solutions hold the key to next-generation insight and limitless possibilities in commercial refrigeration operations and management.

Alsense® Food & Beverage IoT solutions can be factory-fitted into refrigerated assets – which is recommended to achieve optimum results.

But they can also be retrofitted by installers on-site, enabling you to give older systems a new lease of life.

In addition, when Alsense® Food & Beverage IoT solutions are installed with ERC controllers, TXVs, variable speed compressors and MCHE heat exchangers, operators find they can achieve energy savings of up to 50%.

To learn more about Alsense® Food & Beverage IoT solutions and to discuss your own requirements, concepts, and pilots, contact our team of experts for a consultation.

www.alsensefoodandbev.danfoss.com