

# READY MADE, NATURALLY COOL

Jewel Fine Foods strives to provide Australia with the freshest and highest quality ready meals. This commitment to excellence extends to production, where the food manufacturer is turning to ammonia to improve sustainability.

— By Devin Yoshimoto

Kishore Matta,  
Managing Director,  
Jewel Fine Foods



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**F**or more than twenty years, Jewel Fine Foods has strived to offer Australians fresh ready meals of the highest standard. This passion for excellence also extends to sustainability, with the leading Australian chilled food manufacturer keen to show leadership on reducing greenhouse gas emissions.

“At the core of Jewel Fine Foods is the desire to feed people really good food,” said Managing Director Kishore Matta upon receiving the national Telstra Australian Medium Business Award in 2016. The Telstra Business Awards recognise Australia’s most remarkable small and medium-sized businesses.

“Jewel currently produces a range of meals, soups and salads in the Thai, Indian, Malaysian, Vietnamese, Chinese, Mexican and European cuisines, to name a few,” Matta told *Accelerate Australia & NZ*.

Jewel Fine Foods’ new 16,200 m<sup>2</sup> production facility in Banksmeadow, Sydney – where production capacity is expected to double – is demonstrating how using natural refrigerants helps growth and sustainability to go hand-in-hand.

Jewel’s customers include all of Australia’s largest supermarket chains – including Coles, Woolworths, IGA, Costco, Metcash and Aldi. The firm also has partnerships with large global organisations and airlines.

“Years ago, we made it a priority to simplify the work of chefs in large kitchens,” Matta told *Accelerate Australia & NZ*.

“Today, we continue to simplify the lives of families – providing high quality, affordable, freshly prepared, convenient and ready-to-eat meals,” Matta says. “All you have to do is add heat.”

The heat addition process is an easy one for many people to imagine, reminding them of preparing food at home. It is the heat removal process – which takes place in food manufacturing facilities worldwide – that is harder to understand.

Yet it is here that Jewel Fine Foods deserves recognition for taking its place among industry leaders whose use of natural refrigerants is contributing to advancing energy-efficient and environmentally sustainable refrigeration technology around the world.

Matta epitomises such leadership. He founded Jewel Fine Foods (JFF) in 1997, and today serves as the firm’s managing director. He is currently leading the business through a significant period of growth.

Jewel Fine Foods presently operates in Sydney, but its origins are in New Zealand, where Kishore and his wife Indrani opened a small restaurant called *Jewel of India* in 1991.



Factory floor at Jewel Fine Foods Banksmeadow, Sydney.

The restaurant's success led Kishore and Indrani to open up a one-room food production facility, where they began making samosas for customers to eat at home.

### Naturally powered growth

Fast-forward to today and the company has grown to more than 250 employees, producing 30 million meals per year and boasting annual revenue of A\$100 million.

Underscoring this growth is an ambitious target of increasing current production to 40 million meals by 2019.

To achieve this, in January 2017 the company opened a new 16,200 m<sup>2</sup> ready meal production facility in Banksmeadow, Sydney, where an ammonia-based refrigeration system serves all the site's cooling, freezing, and air conditioning needs.

The ammonia system plays a key role in achieving the company's operational growth and sustainability goals, which Matta sees as going hand-in-hand.

"As a natural and highly-efficient refrigerant, ammonia is key to Jewel being environmentally sustainable," he says.

The new site is capable of producing over 50 million ready meals per year.

The ammonia pumped recirculation system is fitted with propylene glycol and water chillers, as well as evaporative condensers. The total operating ammonia charge is 5,000 kg.

It was commissioned in two stages, firstly in January 2017 with the second stage beginning operations in July.

### Efficiency through design

Prior to opening the new factory, JFF had already decided that its refrigeration system would operate on ammonia.

"Within the [project] tender, ammonia refrigeration was non-negotiable due to its high efficiency as well as it being natural," says Peter Sayer, head of engineering at Jewel Fine Foods.

Sayer says the decision to use ammonia stems directly from the company's philosophy of actively reducing its environmental impact wherever possible. (See box on facing page: *Natural refrigeration, aerobic digestion and recycling*).

"We are working towards this by utilising ammonia as our refrigerant together with other initiatives," Sayer explains.

JFF selected local industrial refrigeration contractor Tri Tech Refrigeration Australia (TTRA) to support the company during this major installation. TTRA's previous work with natural refrigerants, as well as with JFF itself, made itself the right fit.

"Jewel had a smaller ammonia system installed at our old site on Gardeners Road, Mascot by TTRA in 2012/13 and its capacity was upgraded in 2016," says Sayer.

"Due to this relationship TTRA was asked to quote on the system for the new factory."

As with most industrial applications of refrigeration systems, the biggest factor in achieving optimal energy efficiency comes down to good system design.

Temperature requirements and cooling applications for industrial vary much more widely than they do in commercial food retail applications, such as supermarkets and convenience stores.

JFF worked closely with TTRA not only to precisely identify the proposed new factory's refrigeration needs, but also to do so with a view towards possible future upgrades and expansion.

Sayer describes the key factors that influenced the system's design.

"The scope of the project was to convert the warehouse to a high care, chilled, ready meals facility – including processes that required the use of chilled water, spiral freezers and chilled areas," he explains.

TTRA's previous work with Jewel Fine Foods included the installation and commissioning of an ammonia chiller system at the company's old facility in nearby Mascot.

"The chiller was used to chill water to serve a rice cooker vacuum heat exchange system," says Ananth Arkal, senior project engineer for Tri Tech Refrigeration Australia.

"In early 2016, the water chilling system was converted to a glycol chilling system to serve tumble chillers for indirect cooling of pouched products," he adds.

At the new factory in Banksmeadow, ammonia serves as the primary refrigerant in a traditional centralised, pumped configuration that recirculates the refrigerant while secondary heat transfer fluids – propylene glycol and water – are also used for other cooling processes.

The factory's soup spiral freezer and impingement freezer are cooled directly by the pumped recirculating liquid ammonia.

The propylene glycol, chilled by the primary ammonia system, is used to cool the storage rooms as well as several types of 'critical process equipment'.

The company employs a 'Cook, Quench, Chill' machine (used to cook and cool rice, pasta and vegetables) and a tumble chiller, which is used to quickly chill batches of food wrapped in flexible plastic wrapping.

Chilled water is used for air conditioning in the facility's cooking area, as well as in the 'rice cooker vacuum heat exchange system'.

The ammonia system was commissioned in late January 2017 and was expanded in July that year, to add production capacity.

"Start-up and commissioning went very well," says Sayer. "Tri Tech Refrigeration Australia supported us all the way through, and continues to do so. The system is reliable and performs as per specification."

Going forward, Sayer says that the company is looking to gain even more energy efficiency by using heat reclaim to "pre-heat our sanitation water".

## Natural refrigeration, aerobic digestion and recycling

The emphasis that Jewel Fine Foods places on using natural refrigerant ammonia goes hand-in-hand with other sustainability initiatives that the company has put in place to reduce its environmental footprint.

One of these, explains Jewel's head of engineering, Peter Sayer, is the facility's use of a so-called 'ORCA aerobic digester' for organic food waste. The system uses microorganisms to safely break down waste food into a liquid that is discharged through existing plumbing infrastructure.

The system "can divert up to 378 tons of food waste per year from landfill".

In addition, the company strives to minimise waste from plastic used for packaging.

Jewel's managing director, Kishore Matta, says the company uses 100% recyclable packaging for all its products.

"We try to use as much recycled sleeves and materials as possible to support reduction in landfill," he adds. "In addition, film scraps which are left over from sealing trays are sent for recycling."



Jewel Fine Foods' Indian ready meals.

## ▶ Designing ammonia systems

Industrial refrigeration systems generally require a higher level of system design consideration, for example compared to systems used in commercial food retail.

This is especially true in factories and production facilities with widely varying requirements for cooling and freezing temperatures, which is the case at Jewel Fine Foods.

“It is well known that ammonia is the most energy-efficient refrigerant due to its thermal properties, when the system is appropriately designed and installed,” says Ananth Arkal, the senior project engineer at Tri Tech Refrigeration Australia who led on the JFF project.

That’s why TTRA went the extra mile to install additional features at the Banksmeadow facility that maximise the already excellent energy efficiency of ammonia as a refrigerant itself.

Variable speed drives (VSDs) are increasingly being used in industrial and commercial refrigeration systems. VSDs help control the output of each component in a more precise manner according to the degree to which it is needed, as opposed to switching completely on or off.

At the Banksmeadow facility, all of the main compressors, condenser fans, chilled water and glycol pumps, and under-ceiling air-cooling units were fitted with VSDs.

An automatic air purger was installed, “to ensure any non-condensable gases in the system are promptly removed, so as to have the system operating at its best possible efficiency by minimising head pressures to the furthest extent possible”.

Future maintenance costs were kept to a minimum by installing a “thermosyphon oil cooling system, which has no ongoing maintenance requirement”.

In the refrigeration system plant room, a ventilation and leak detection system was installed along with additional leak detectors in the roof space.

Arkal explains that, “crossover piping and valves were installed to ensure back-up in the event of compressor failure or maintenance”.

The second-hand compressor packages and condenser were installed during the second stage, for equipment lead time reasons.



GEA Duo Pack compressor package for propylene glycol chilling duty.

## System specifications

There are four ammonia temperature levels in the system:

### APPLICATION 1: Soup spiral freezer, impingement freezer.

Refrigerant: Direct ammonia pumped recirculation.

Compressor package:  
1 x GEA 'L' compressor package. 1 x second-hand compressor package.

Refrigeration capacity: 640 kW

Ammonia temperature: -15°C

Operating air temperatures:  
-10°C (soup spiral freezer),  
-2°C (impingement freezer).



Plant room with ammonia pumped recirculation and water chiller compressor packages.

#### **APPLICATION 2: Cold storage rooms, air conditioning, 'Cook-Quench-Chill' and tumble chiller equipment**

Refrigerant: Propylene glycol cooled by a gravity-fed ammonia system.

Compressor package: 1 x GEA Duo Pack compressor package, including 2 x GEA 'S' compressors.

Refrigeration capacity: 1,900 kW

Ammonia temperature: -9°C

Operating air temperatures: Multiple between +2°C and +10°C (storage rooms), multiple between +3°C and +10°C (ventilated production/processing rooms).

#### **APPLICATION 3: Cooking area air conditioning, rice cooker vacuum heat exchange system**

Refrigerant: Chilled water cooled by a gravity-fed ammonia system.

Compressor package: 1 x GEA 'M' compressor package.

Refrigeration capacity: 1,100 kW

Ammonia temperature: +6°C

Operating air temperatures: Multiple between +15°C and +20°C (ventilated production/processing rooms).

#### **APPLICATION 4: Lasagna spiral freezer/chiller (Stage 2)**

Refrigerant: Direct ammonia pumped recirculation.

Compressor: Second-hand compressor

Pumps: GEA Witt liquid pumps

Refrigeration capacity: 200 kW

Ammonia temperature: -16°C or -42°C depending on operating mode (product chilling and freezing).

Operating air temperatures: -12°C or -35°C (depending on operating mode).

Evaporative condensers: 3 x new; 1 x second-hand.

Leak detection: Danfoss

Variable speed drives: Danfoss

Control systems: Allen Bradley PLC, Citect SCADA



(Left to right: Ananth Arkal, Senior Project Engineer, Tri Tech Refrigeration Australia; Peter Sayer, Head of Engineering, Jewel Fine Foods; Matt Atkinson, General Manager, Tri Tech Refrigeration Australia; David Herbert, Maintenance Manager, Jewel Fine Foods)

Sayer is confident that the company will look into further use of increasingly advanced ammonia-based refrigeration systems as it looks to grow its food production business in future.

Asked what advice he would offer similar businesses that are interested in adopting ammonia-based systems rather than their HFC-based counterparts, Sayer says, “the environmental and efficiency benefits of ammonia massively outweigh the risks”.

“Ammonia systems are flexible for different operations, processes and temperatures versus set systems, so you can also future-proof your factory.”

### **Ammonia: Jewel's key to sustainability**

Refrigeration and freezing systems are one of the most energy-intensive yet critical processes in delivering our food supply. Refrigerant leakages, meanwhile, can have a devastating impact on the environment.

None of this escapes Matta, whose business acumen – and perhaps sense of social responsibility too – comes from his unique background.

Born and raised in Mumbai, India, at the age of 18, Matta decided to set out on his own journey and join India's Merchant Navy, where he eventually worked his way up to ship captain.

“After sailing the globe for 14 years, I decided to quit my job and settle in Australia,” says Matta. “With no prior experience in the food manufacturing industry, I used my management experience from the Merchant Navy and love for food to create Jewel Fine Foods.”

Matta's core beliefs forged during his navy days continue to guide the company today. They encompass not just his company's bottom line, but also the true impact that businesses like his have on society.

“As Australia is one of the largest per capita contributors to climate change, we need to urgently and substantially reduce greenhouse gas emissions and actively support international mitigation measures to reduce global emissions,” he says.

Matta recognises that his work at Jewel Fine Foods – like that of Australian industry in general – has only just begun. “Australian companies are slowly introducing changes to support environmental sustainability for the future,” he says.

“For example, the recent shift in supermarkets no longer providing disposable plastic bags is a small step in the right direction. But in terms of energy efficiency, many improvements could be made through low-cost behavioural changes,” he argues.

Continual training and education is important. “Engineering and operational staff require the knowledge that is essential in order for them to implement these changes and integrate them into day-to-day operation,” Matta says.

Awareness of the role played by natural refrigerants in delivering sustainable food production is increasing among industry, yet few customers realise that their food can be cooled naturally.

The continued success and leadership of businesses like Jewel Fine Foods, therefore, is vital in communicating this message.

“Our focus is to continue doing what we do best, by growing and extending our capabilities in food, to deliver outstanding, superior quality, convenience meals in a range of cuisines,” Matta says. ■ **DY**

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