

Plug & Play Refrigeration at Melbourne's First Asian Specialty Supermarket

David Goodwin

Melbourne's largest Asian specialty supermarket at Box Hill needed a refrigeration system design that would handle issues of restricted space and power supply.

The manager of the new supermarket, Michael Chen, said the supermarket started trading in December and that 80% of what they sold was imported from Asia. The Freshland Supermarket's building was originally part of the Box Hill TAFE College

"There is a big population of Chinese and other Asian people in the Box Hill area and demand for local and imported Asian good is high in this area," Chen told *Celsius*. "We now have four full time staff and three part-time. We also have live fish and lobsters for sale in the supermarket and wholesale produce to local restaurants.

"We were advised to contact Wei Da Xu of Ausinter Refrigeration and Air Conditioning Wholesalers of Clayton from contacts we had in the Melbourne markets."



The Freshland Supermarket at Box Hill

As reported in May *Celsius* last year, Xu completed his apprenticeship in China where he worked on some large industrial refrigeration including an ammonia plants for an abattoirs. He immigrated to Australia and first worked on supermarkets as a contractor before joining Ausinter.

The Engineering

Consulting engineer for the project, Dave Redden has an extensive background in supermarket refrigeration. "I was brought into the project in August 2005 by Wai Da Xu on the advice of John Mignano, managing director of LU-VE Contardo," he said.

"Wai Da was concerned about the restricted area to build a refrigeration plant room on the roof of the building. I decided we needed a plug-and-play refrigeration rack to fit these dimensions and be made offsite so it could be lifted into position on the roof and cut back on installation time," Redden said.

"The building was just a huge open area over 4000 m² when I first came to the site last year. One of the other considerations in designing the refrigeration system was that it was a bit tight on power. The supply authority said we

could not exceed the given average of the main breaker into the supermarket without significantly upgrading the main power supply to the building which would have cost more than \$100 000," he said

"The supermarket management decided not to upgrade and to stay with the existing power supply and would not go to air condition the building. Without air conditioning there was a lot of retained heat when the place is locked up at night. Luckily there were some disused ducts out the back of the old building so we installed some ventilation fans to suck the hot air out.

"I put 10% on all the ratings of the merchandising display units. I needed to rate the building for 32°C instead of 25°C if the building had been air conditioned.



Dairy coolroom with TGD doors

"I worked out the heat rejection needed for each of the merchandiser units and for the cool rooms. We needed two suction and liquid lines through the risers. We needed to reduce the pipe work because there is 7 m between floors in the three story building," Redden said.

"We set the pipe size and oil return and made sure the pressure drops were correct. There is minimal pressure drop equal to 1°C whatever the suction pressure is running at.

"The refrigeration pipes selected were all copper with 35 mm Easyfex insulation.

CONTINUES ON PAGE 30



LU-VE's John Mignano with the plug and play refrigeration rack and the SHVN 165 Air Cooled Condenser

CONTINUED FROM PAGE 29

"There was a freezer room and coolroom in the design specs. For the freezer room we ran a separate line for a dedicated condensing unit located on the roof to run the freezer. Everything else is connected to the new refrigeration rack."

John Mignano organised to have the rack specially built by Doug Collins, a refrigeration contractor from Broadmeadow: "He is semi-retired and one of the old school having done a lot of chiller and refrigeration fabrication work. He is particularly good with a welding rod," Mignano said.

Redden selected a six fan LU-VE SHVN 165 Air Cooled Condenser for the rack which was to have a total heat rejection of 86.3 kW. "We sized the condenser for a good temperature difference in degrees kelvin (TDK) which gives us some spare capacity without being oversized, so even on a 44°C day the plant kept running. The ambient condition was for 38°C and the condenser is worked out so it will condense at 45°C.



The Three Copeland Scroll Compressors

"TDK is the difference between the condensing temperature and the ambient temperature.

"There are some energy savings on the scrolls but one of their main advantages is the inrush current needed is a lot less than reciprocating compressors, because they don't need as much start-up current to get each motor going.

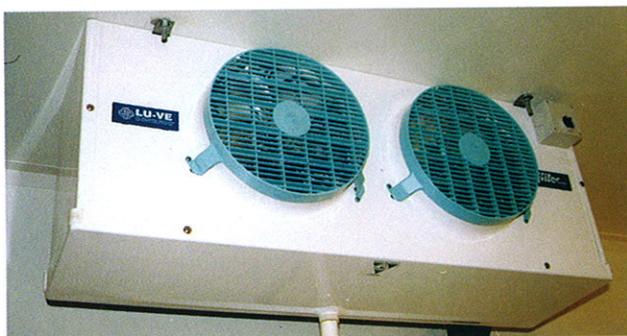
"The rack has three Copeland EVI Scroll Compressors totaling 63.4 kW with two 23.2 kW and a 17 kW unit.

"There is no maintenance at all with the three Copeland scroll compressors with the Traxoil protection on each," Redden said.

The Installation

Wei Da Xu enlisted Stewart Seville of SW RYOL Commercial Refrigeration & Air Conditioning to install the rack, merchandising units, coolrooms and freezer room using R404 refrigerant: "The rack has a larger receiver to take the full pump-down charge," he said.

"The system is working down below design saturation



A LU-VE S2HC 49N50 with a capacity of 2.2 kW

condensing temperature all the time but even on the 40°C plus days there is no problem and we were pretty pleased about that.

"I organised the switchboard for the system which we placed on the end of the rack

The control panel on the end of the unit controls the whole store from there. Defrost temperature, cool rooms, lighting, everything. There are two sets of Phasefale controls, one runs the rack and the other the freezer room. It's weather sealed and neat and compact. Everything is IP rated.

"The refrigeration rack was professionally built and whole thing was pre-piped in the factory, spray painted, fired up and brought to the supermarket and lifted on to the roof with a crane and all we needed to do was attached the two sets of pipes.

"Installing the Copeland Scroll compressors we used the technical information supplied by Copeland.

"The system cycles off just one compressor most of the time," Xu said.

"With the condenser on a mild day you will only find one or two fans running. It went above 40°C recently in Melbourne and the whole refrigeration system passed the test with flying colors."

However, there is more in the pipeline: "The Supermarket management plans for more supermarkets in the area in the near future.

"Without the refrigeration racking system we developed the customer would have paid a lot more money on power," Xu said.

"That's a beast of a unit!"



The island display cases



Dave Redden with 10m Dairy Run

Acknowledgement

This article appears with the consent of RACCA Australia Inc., the owners and publishers of Celsius. It first appeared in the March 2006 issue of Celsius.