Case Study

temperzone
climate innovations

TACO BELL

The 1st South Island Taco Bell site to open. Using hot water stratification to provide air conditioning and hot water with a combination of MAGNUS, OPA and fresh air duct coils.

Linwood, Christchurch, New Zealand

Working with Fin Sheet Metals, and using experience from a near identical system set up in KFC, Temperzone designed a highly efficient integrated hot water and fresh air tempering system - powered by a single pass heat-pump water heater. Combining a 50kW heat-pump water heater (HPWH) with a 500L thermally zoned storage system and a 31.5kW fresh air tempering coil the system has the ability to reduce electricity usage by up to 70MWh annually compared to previous installations.

Solution & Application

Restaurant | Hot Water Heat Pump | Energy Savings | Fresh Air Inlet | Single Phase | Environmental Products

MAGNUS®
powerhouse water heaters

ThermoShell®
technology

Version 1.0 July 2021

Fin Sheet Metal & Taco Bell

Key outcomes

- ✓ **Highly Efficient System** — This system is anticipated to achieved an annual reduction in electricity usage of around **68%**. The contribution of water heating and fresh air tempering to the total store electricity consumption is expected to be reduced from around **23% to 8%.**
- ✓ **Variable hot water demand** — Typically, minimal amounts of hot water are required throughout the day. Significant amounts of hot water are required at the end of the day for store wash-down. Using a zoned hot water tank in conjunction with a single pass HWHP hot water and fresh air tempering (FAT) demands can be simultaneously met.
- ✓ **Integrate Potable Water Heating and Fresh Air Tempering**
- ✓ **Tank temperature zoning** — The upper tank allows for water pre-heated to **62°C to be heated to 65-68°C to meet building code requirements** for kitchen hot water.
- ✓ **Remote system monitoring via integrated modem**
- ✓ **Kitchen Hot Water is required at a minimum of 65°C** — This temperature is designed to meet building code requirements
- ✓ **Reduced installation cost** - MAGNUS Single-Pass systems are designed to reduce installation costs compared with other water heating alternatives.
- ✓ **Washroom water is tempered to 55°C**

Our solution

This installation demonstrates an integrated hot water and fresh air tempering system using a stratified tank.

- Kitchen taps are 65°C— The kitchen taps are supplied with hot water at the required temperature is expected.
- Highly efficient system — The system is expected to provide an electricity usage reduction of 70MWh with an estimated savings of $10,000 annually compared to an electric system.
- Balanced system design — The zoned tank system has provided a good compromise between capital cost, maintenance of kitchen hot water and very limited reductions in fresh air tempering (FAT) services.
- Non-fouling Thermoshell heat exchanger technology
- Temperzone involved in commissioning of product.

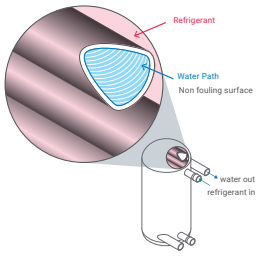
Why MAGNUS Potable Hot Water Systems?

The future is here, MAGNUS Single-Pass system design is revolutionising the way heat pump water heaters are applied to commercial potable hot water systems. Through adapting an integrated whole system design ethos MAGNUS solutions deliver convenience that is more cost effective, efficient and extremely reliable.

MAGNUS Single-Pass systems heat water to over 62°C in a Single-Pass. Single-Pass technology is ideal for commercial markets where meeting the peak demand for hot water is the key driver of system specification. Functioning like an instantaneous hot water system, MAGNUS is the most efficient system for meeting hot water demand in both high and low demand periods.

ThermoShell® Technology Heat Exchangers

Heat pump water heaters have at their core a refrigerant to water heat exchanger and its performance is critical to the overall performance of the system. Temperzone's ThermoShell® heat exchanger is designed to operate extremely efficiently under low water flow rates. This enables MAGNUS In-line systems, which require lower water flow rates, to provide superior performance. Alternative heat exchanger designs are highly prone to fouling over time which reduces performance and greatly shortens the life of the system. Temperzone's ThermoShell® eliminates this fouling risk and guarantees the same performance year after year.



ThermoShell® technology

Model	MWS 500
Nominal Heating Capacity kW *	40 / 54 **
Input Power kW *	14.3 / 13.5 **
COP *	2.8 / 4.0 **
Water Flow Rate l/min. *	12.2 / 18.5 **
Design HEX differential °C	47 / 42 **
Design Pressure Drop *	1 / 2 **
Max. Water temp °C	65
Min. Ambient Operating temp. °C	-10
Sound Power (w) dB(A) **	75
Heat Exchanger	ThermoShell™ (x2)
Compressor	Scroll (tandem)
Communication Options	BMS / Modbus / Tz Monitoring

* Rating conditions: 7/6°C db/wb outdoor ambient; EWT 15°C; LWT 62°C.
** Rating conditions: 19/16°C db/wb outdoor ambient; EWT 20°C; LWT 62°C.
*** Radiated. BS 848.2 Direct method of measurement (reverberant room).

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GENERAL INFORMATION

Customer
Fin Sheet Metal

Location
Linwood, Christchurch, New Zealand

Project
Restaurant Hot Water and Air Conditioning

Date of installation
May 2021

SYSTEM DESCRIPTION

Outdoor Units

ThermoShell® technology

MWS500 - 54.0kW

- 62°C water achieved in a single pass, ideal to meet hot water demands
- Liongella control compliant
- Low carbon emission
- Efficient single-pass design
- EEV
- UC8
- Outdoor epoxy coated coils
- Reduced water storage required
- Usable hot water in real time
- Reduced piping and storage requirements
- Lower servicing requirements
- Lowest running costs
- Low capital investment
- Compact design
- Non-fouling Thermoshell heat exchanger
- Durable Temperzone design

OPA 336 - ECO ULTRA
Heating Capacity - 29.3kW
Cooling Capacity - 28.3kW

- Reverse Cycle - heating & cooling
- Dry & Super Dry Mode
- Dehumidification Performance
- Dual Electronic Refrigeration Valve control (IP Protected)
- Simple control technology
- High levels of comfort and energy savings can be provided regardless of climatic conditions
- Variable capacity compressors allow for a precise load variation response
- EEV's for high response levels to conditions
- 2 & 4 Compressors
- Achieves up to 60% energy savings

www.tacobell.co.nz

www.temperzone.com

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