

Case Study //

Kmart Rowville, Victoria



Kmart is one of Australia's largest retailers, with 234 stores throughout Australia and New Zealand. Kmart has more than 31,000 team members and 2.5 million customers on average are served by Kmart each week. Kmart Rowville is located in the Stud Park Shopping Centre, which services the outer southeastern suburbs of Melbourne.

The Challenge //

HCFC-22 is the world's most widely used refrigerant. The Montreal Protocol has set out a mandatory timetable for the phase out of ozone-depleting substances including almost all imports to Australia of hydrochlorofluorocarbons (HCFC), such as R22 by 2016 with a complete phase out by 2020. There are many ageing PAC units with R22 Refrigerant which is in phase out and is increasing in cost and subject to increased regulation due to its high ODP. The challenge was to find a cost effective solution for Kmart which avoided full replacement of existing R22 PAC units which is cost prohibitive for many building owners.

The Solution //

Airmaster carried out a retrofit, called a PAC Revive, on one of the existing R22 PAC units at the Kmart store in Rowville, Victoria. The solution involved the installation and replacement of the R22 refrigerant with R427A, new electronic TX valves, new Ecobee WiFi enabled controls and a full overhaul/system check of the unit. An Ecobee controller was also fitted to an existing R22 unit. This was done so in order to monitor various performance measures of each unit including energy consumption, return and discharge air temperatures, compressor run hours and ambient conditions. These were all logged at 5 minute intervals.

The Results //

The challenge of finding a more cost effective solution that avoided a full replacement was successfully implemented by way of the PAC Revive. This was achieved from both an investment and running cost perspective.

| Cost Performance | New Unit (60kW) | PAC Revive Solution | Cost Saving |
|------------------|-----------------|---------------------|-------------|
| Investment | \$45,000 | \$8,623 | \$36,377 |

| Running CostsR | 22 | R427A | Saving |
|-----------------------------------|---------|---------|--------|
| Environmental Impact (Ton CO2 pa) | 19.31 | 6.23 | .1 |
| Energy Usage (kWh pa) | 27,372 | 22,292 | 16% |
| Electrical/Refrigerant Costs (pa) | \$4,105 | \$3,448 | \$657 |

Figure 1 - Investment and Running Cost Savings
Shows the relative cost savings in investment into the PAC Revive Solution over a new unit, and the resultant running costs of R427A versus R22.

The implementation of the PAC Revive solution generated positive results in terms of Unit Performance (Figure 1).

Furthermore, the power output from the R427A unit was higher than that of the R22 unit. When these inputs are calculated to a COP value, we find that the R427A unit has a COP rating (3.72) which is 16% higher than the R22 unit (Figure 2).

R22 vs R427A Enthalpy Results

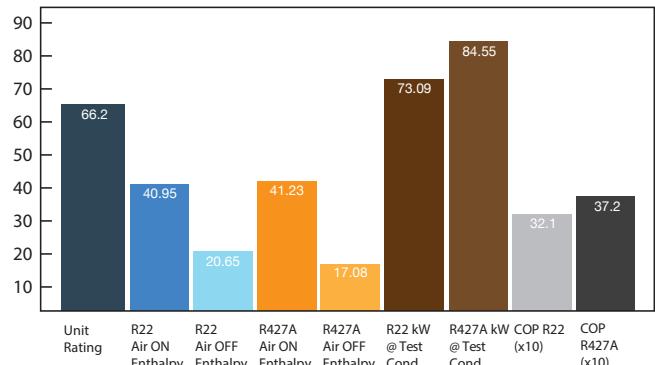


Figure 2 - R22 vs R427A Enthalpy Results

Shows that the R22 enthalpy results when compared to the R427A results are inferior.

Discharge / Supply Air Trends

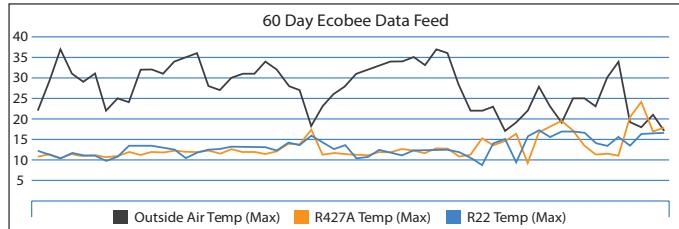


Figure 3 - Discharge / Supply Air Trends

Shows that as the outside temperature increases, the revived unit responds by taking over the load from the r22 unit.

This was due to increased performance of the revived unit over the R22. When both units were running on full cooling the revived unit was achieving a lower supply air temperature by 1-1.5deg compared to the R22 unit (Figure 3)

About Us //

Airmaster is an award-winning technical solutions company, delivering end-to-end management of heating, ventilation, air conditioning, industrial and process cooling and building automation across Australia and South East Asia. Based in Melbourne and with 12 branches Australia-wide, Airmaster's commitment to sustainability is achieved through a proactive, integrated approach to helping organisations achieve energy efficiency in innovative ways.

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