Efficiency takes off

With energy costs escalating, end-users are demanding savings in plant running costs. Enter the new Turbomiser chiller, whose claims to efficiency have been evidenced in two recent high-profile installations

Chillers based on the oil-less centrifugal Turbocor compressor have been around for a while. Their compact design, variable speed capability and magnetic bearings are known to deliver a combination of excellent performance and class-leading energy efficiency.

But now Italian manufacturer Geoclima claims to have harnessed the benefits of the innovative centrifugal machines in a way that takes the technology a stage further – and delivers unprecedented energy savings for clients.

Two recent high-profile installations in the UK highlight the performance of the Turbomiser chiller and substantiate the claims being made.

The first project was carried out recently at the Dorchester Hotel, on London's Park Lane. The installation has a combined chiller capacity of 3MW and involved the installation of three Turbomiser TMA 1050/34 chillers, each in turn housing three Turbocor compressors.

The plant was supplied by Wimbledon-based specialist Klima-Therm/LH, while consulting engineer on the project was Cudd Bentley Consulting and the installer All Group Services.

LH decommissioned and removed the existing water-cooled, R22-based Carrier chillers and cooling towers,

The Dorchester Hotel in London

which had reached the end of their working lives. This was done in stages to minimise cooling-down time during final changeover.

The new plant was sited externally, with one chiller positioned on the roof of the rear third floor, and two chillers on the roof of the 10th floor, freeing up the hotel's basement plant room.

Site constraints included limited roof space, with two chillers located in space previously occupied by the cooling towers. There were also strict planning conditions regarding noise. In addition, the main condenser water riser had to be converted for chilled water use.

Payback in first year

The key benefit for the client of the Turbomiser design was anticipated savings in running costs – to be achieved through improved chiller energy performance and use of an air-cooled condenser, saving on water and chemical treatment costs.

Since being installed, the system is reported to have delivered in excess of £10,000 savings in energy costs per month, compared with the previous system. With this level of saving, the installation is expected to deliver a payback in the first year on the premium over conventional chillers.

The other significant advantages of the solution were the compact dimensions and low weight of the Turbomiser chillers. This enabled the new machines to be sited on rooftops, freeing up the former plant room space for alternative use.

The chiller's outstanding energy performance is due to specific design features introduced by Geoclima. It uses a combination of flooded evaporators to maximise heat exchange, and therefore cooling capacity, and employs control technology fully integrated with the compressor control, plus high-efficiency fans.

Ian Mundie of Klima-Therm says: "The Turbocor compressor is a superb and innovative piece of engineering, but Geoclima has taken it a stage further. By harnessing its capabilities to the full, Turbomiser builds on an already impressive machine and delivers truly outstanding performance."

The approach ensures maximum COP is delivered at all times, optimising chiller performance in response to changing ambient temperatures and load.

Ray Pask, chief engineer at the Dorchester Hotel, says: "The installation has delivered everything promised – and more. I am a strong believer in Turbocor technology, having specified it before. It offers major efficiency benefits and the oil-less bearings make start-up from stand-by mode straightforward. The Turbomiser

chillers installed at the Dorchester Hotel have worked superbly and the energy savings already achieved are substantial. They should result in an even better payback time than anticipated."

The second Turbomiser installation was carried out recently at the Hilton hotel in Stansted Airport. Again, a key design consideration was maximising energy savings in order to minimise running costs.

With only one existing machine on site, a further important requirement was to ensure chiller replacement caused as little disruption to the hotel as possible. With careful project management, Bristol-based Cool-Therm achieved the changeover with less than a 12-hour interruption to chilled water services.

The existing machine was a 630kW York air-cooled chiller, which had served the hotel well for 20 years. However, being based on R22 and with compressor problems beginning to arise, the decision was taken to replace it.

Cool-Therm identified that the typical base load was around 150kW, with chilled water required 24/7 throughout the year. Part-load performance would therefore be critical to achieving energy savings.

The Turbomiser chiller selected provides 630kW of cooling 6/12 at 35 deg C ambient, based on two TT300 Turbocor compressors, working with a flooded evaporator and operating on R134a refrigerant. On the controls side, the client has access to the machine via a GSM gateway for remote troubleshooting and setting adjustments.

The plant is anticipated to deliver 30 per cent energy savings compared with traditional designs based on reciprocating, screw or scroll-based compressors.

Remarkable COP

Ken Strong, managing director of Cool-Therm, says: "The flooded evaporator design maximises the benefits of Turbocor, enabling a high evaporating and low condensing temperature. In this application, at the typical part-load point, we find the machine running with 5degC saturated suction and 25degC condensing temperature.

"This delivers a remarkable COP of around five, including fans. This compares with the previous machine's part load COP of around two. It takes chiller performance into new territory."

Trevor Bennett, facilities manager at the Hilton said: "The project has been an unqualified success, and executed with great professionalism by Cool-Therm. It combines innovative engineering, outstanding performance and serious energy savings – in one compact package. We are delighted with the result."

Noise was not a critical requirement in the project, but the results impressed the client. "When running at part load, the machine is so quiet you have to check the display to see if it is operating," says Mr Bennett.

Further similar projects for Turbomiser installations at other Hilton hotels are currently under discussion.

With energy costs predicted to rise significantly in the future, end users are increasingly demanding solutions that deliver savings on the cost of operating building services plant.

Ian Mundie says: "There is no doubt that Turbomiser is a technology whose time has come. We believe it has an important role to play in delivering what the market needs, and with a payback that is shortening with every rise in energy prices."

Mr Strong adds: "With end-users under pressure to reduce costs and their carbon footprints, we are convinced that the future of medium-capacity water chillers will be oil-less technologies, based on small compact centrifugal compressors with flooded evaporators, coupled and high-efficiency fans. Turbomiser delivers this in a compact package."