

COLT TELECOM SAVES £230,000 WITH TURBOMISER CHILLERS AT POWERGATE

Energy savings of 55 per cent have been achieved following replacement of existing chillers with new Turbomiser chillers at Colt Telecom's Powergate data centre facility.

Monitoring of power consumption by the client shows that the annual electricity bill for the existing plant before replacement was £321,200 a year. Following replacement with Turbomiser chillers, power consumption fell to £146,000 a year. This represents a saving of 55 per cent, amounting to a saving of £175,000 a year. According to Colt, adding in savings in breakdown and servicing costs gives a total annual saving of £230,000.

Project details

The project, carried out by Bristol-based Cool-Therm, demonstrates the exceptional performance and efficiency of Turbomiser chillers, running on virtually friction magnetic bearings.

The previous system comprised 3 x 1200kW chiller packages based on screw compressors, DX evaporators, copper tube/aluminium fin condensers and basic electro-mechanical controls. Two of the three chillers were to run with one as "standby". The units had been in service for 10 years and were considered to be inefficient and expensive to maintain.

Problems with existing system

- Energy consumption: very high due to a relatively low EER of 2.5-3.0-1 (the ratio of power input to cooling output);
- Poor reliability: compressors kept failing resulting in concern over related risks for continuity of cooling;
- High maintenance costs: in order to minimise the risk of compressor failures, engineers had to visit site many times to ensure oil filters and refrigerant filter driers were kept clean;
- High running costs: these were escalating as the air-cooled condensers became choked with dirt, causing inefficiencies within the system and resulting in overheating condenser fan motors.
- Oil contamination: due to compressor burn-outs, reducing heat exchanger efficiency.

The brief

The brief was to replace the existing three 1200kW chillers with new Turbomiser chillers as a turnkey package, matching the existing Data Centre cooling load and maintaining cooling to the centre at all times during the changeover.

"AS THE YEAR PROGRESSES, AND THE AMBIENT TEMPERATURE INCREASES, I BELIEVE THE SAVINGS WILL BE EVEN GREATER THAN SEEN SO FAR."
PAUL KELEHER, COLT TELECOMS



Before: The existing chiller before the arrival of the Turbomisers



After: A new Turbomiser chiller is lowered into position onsite

EQUIPMENT List

The three existing 1200kW chillers were replaced with six 600kW Turbomiser chillers, dramatically improving resilience.

All chillers are operated together under inverter control, to gain maximum compressor efficiency and use all heat exchanger surfaces to reject heat.

Key requirements of the project:

- New chillers to have an ESEER at least 25% better than the existing;
- New chillers should not require intensive maintenance to keep them operating at design conditions;
- New chillers must be reliable at all times;
- Overall performance of new chillers must be significantly better than those they replace.

System design and approach

After careful analysis of the requirements, the replacement system proposed consisted of six x 600kW Turbomiser chillers to replace the existing 3 x 1200kW onsite, thereby dramatically improving resilience.

It was decided to operate all six chillers together to gain maximum compressor efficiency under inverter control, at the same time achieving maximum condenser efficiency due to the utilisation of all heat exchanger surfaces to reject heat.

The same logic also applied to the chilled water evaporators. Increasing the chilled water temperatures into and out of the Data Centre was also examined and it was thought that it could be raised from 6/12 deg. C (original design) to 8/14 deg. C, improving efficiency even more.

The client wanted to prove the performance of the new chillers against the old. Therefore, a monitoring system was put in place to measure energy consumption against the previous system

Results

Reduction in energy use: By the time all six Turbomiser chillers were operational, energy consumption had gone down by 55%. This is supported by independent monitoring carried out by the end user. Annual energy consumption by the previous system was 4,015,000 kWh, costing £312,200; with the new system, annual energy consumption was 1,825,000kWh, costing £146,000 – representing an annual saving of £175,000 (55 per cent).

Improved reliability: To the energy savings must be added the reduction in breakdown costs, running at £50,000 a year.

Lower maintenance: Maintenance in the future will be significantly reduced mainly as a result of the absence of oil in the refrigeration systems.

Overall savings: The client estimates that annual savings will be in the region of £230,000 a year.

Future plans for Turbomiser

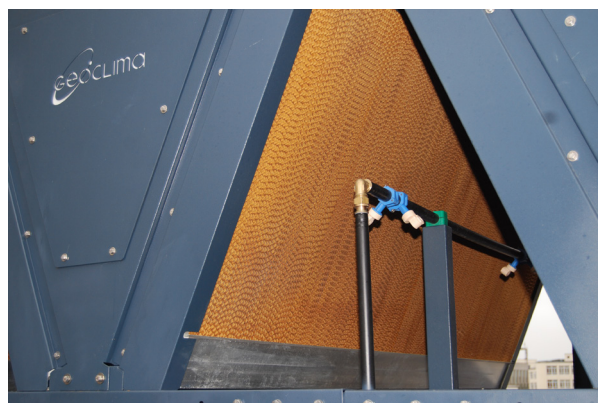
Colt has been highly impressed with the result of its first replacement project. The company is now evaluating the potential for application of Turbomiser chillers at its other Data Centres across Europe.

“ONE MUST ALSO ADD IN THE REDUCTION IN BREAKDOWN COSTS, WHICH WERE RUNNING AT £50,000 A YEAR AT THE SITE.”

PAUL KELEHER, COLT TELECOMS



Before: The old chillers had become inefficient and subject to breakdowns



After: Six new Turbomisers provide 55% power savings for the end user

SAVINGS Summary

Annual energy consumption by the previous system was 4,015,000 kWh, costing £312,200.

With the new system, annual energy consumption is 1,825,000kWh, costing £146,000, representing an annual saving of £175,000 (55 per cent).

In addition, a reduction of £50,000 in breakdown costs must be added.