Voltage Optimisation Case Study Link Centre: Ice skating rink and leisure complex

The Link Centre is a large leisure complex, comprising an International sized ice skating rink, swimming pool, indoor courts, climbing walls, fitness studio etc and the local Library. The site operates seven days a week for fifty one weeks per year. The site would normally run anywhere between 400kVA and the maximum demand of approximately 750kVA, the over night base load was approximately 300kVA.

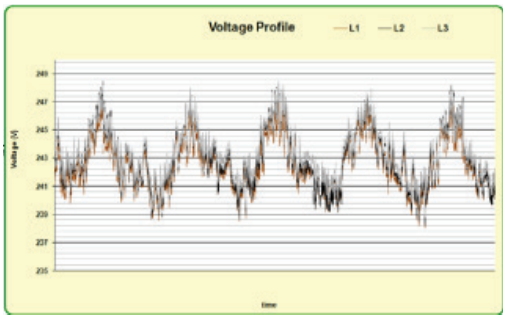
On site voltages were high, peaking at just under 250V (L-N). The whole site is fed by a single 1000kVA transformer. The Client has already implemented a number of energy saving measures typically fitting high frequency ballast lighting and variable speed drives to some of their larger motors.

> “VOLTAGE OPTIMISATION SAVED THIS LEISURE COMPLEX OVER £76,000 AND SIGNIFICANTLY REDUCED THEIR CARBON FOOTPRINT AS WELL.”

Project

Installation was reasonably difficult with the main switch room located in the basement plant room of the centre and existing plant equipment restricting access. An additional plinth as flood protection was requested.

The existing ACB main breaker was re utilized reducing the overall cost of installation. Due to the limited access it was decided to install three single phase units instead of the normal three phase unit. The Dynamic Voltage Regulator (Voltmaster Plus), was specified at 1441 Amps per phase, 318kVA at the 221V (L-N) set output voltage, complete with an external bypass switch allowing the Client full control and independence over their supply and with enough excess capacity for future growth. All preparations were carried out beforehand with the final connections made within a four hour period on a Sunday evening, causing the least disruption to the Client.



Conclusions

The Voltmaster Plus outputs were set to 221V (L-N) as the optimised setting, giving just in excess of 220V (L-N) at the furthest point on site as requested by the Client.

The initial survey estimated a saving of a minimum 14% of the overall consumption. The Client required proof of these savings as confirmation of their own long term tests. It was decided to utilise the Voltmaster Plus’s ability to adjust phase voltages whilst on-line and load. A medium and a short term test would be performed, in each case returning the site voltages back to near maximum and then reducing again to the optimised setting. Results from these tests combined with other test data will allow the actual savings to be calculated.

The site voltages were increased to the

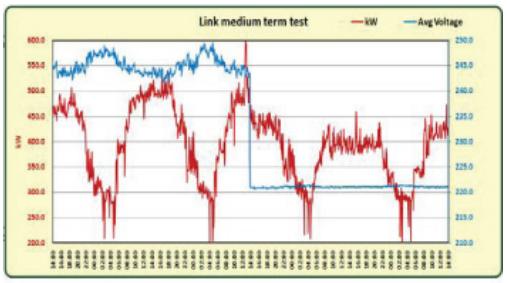
The Energy Solution Specialists.

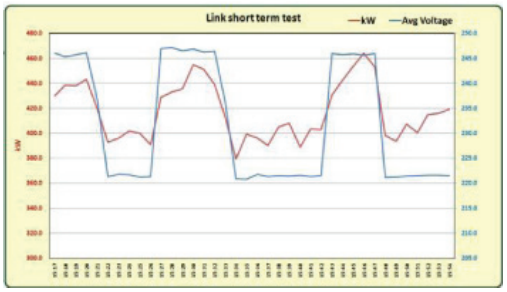
PFC Engineering
Station Road
Great Chesterford
Essex CB10 1NY

t: 01799 530728
f: 01799 530235
e: info@pfc-engineering.com
w: pfc-engineering.com

maximum and allowed to run for a period. Then reduced to the Optimised setting of 221V (L-N) within less than a minute and allowed to run for the same time period. The step change in voltage (all three phase voltages are summed and averaged for clarity) and the consumption are clearly visible. The results were analysed and comparisons made with the short term tests.

Again, the site voltages were increased to maximum and allowed to run for a short period and then returned to the optimised value, this sequence was repeated on several occasions in short succession. The step changes in voltage (again all three phase voltages are summed and averaged for clarity) and consumption can be clearly defined. Analysed together with the previous results from the medium term test and other data, the calculated savings for this site will be approximately 15% of the usage, an increase over the previous estimate.





Summary

The consumption of the Link Centre was 4,258,134kWh at an annual cost of approximately £510,310. The implementation of Voltage Optimisation utilising the Voltmaster Plus has now reduced this to 3,619,414kWh a saving of 638,720kWh, with a consequential reduction in emissions of 274,650kg of CO2 calculated at 0.43kg CO2/kWh. The cost savings of £76,547 pa will show a return on investment within less than 10 months.

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