PowerCET Canada
CONSULTING EDUCATION TRAINING
Better Technologies Corporation

PowerCET Canada
82 Sai Cres.,suite 101,Ottawa, ON, K1G 5N9
Tel: (613) 739-8084 Fax: (613) 739-0232
www.bettertechnologies.com

PARTIAL Power Quality Report Sample

This report contains the results of our initial study. Power quality data was collected at three locations for a total of five 7-day periods as follows: (please note that ##### site was monitored for comparison only – the analysis and recommendations in this report do not apply to this site)

1.	Office Tower 600v bus Meter location	June 05 to June 12
2.	Perimeter Drive #8	June 14 to June 21
3.	Perimeter Drive #8	June 25 to July 02
4.	Perimeter Drive #8	July 03 to July 09
5.	(######## Tower)	July 11 to July 18

Based on the scope of the monitoring performed so far in this study, we were able to identify two significant power quality problems:

1. Sustained high median RMS voltage levels (i.e. 610 to 650 Vrms).
2. Transient over-voltages caused by utility power factor correction capacitors (peaks up to 1500 V).

Sustained high median RMS voltage levels (i.e. 610 to 650 Vrms).

RPM power monitors installed at ##### recorded many voltage anomalies that could affect drives within the facility. Figure 4 shows a seven-day recap of voltage levels at the site. RMS (root-mean-square) voltage levels reached 650 volts on more than one occasion and the median voltage is routinely around 610 volts.

These high rms voltage levels are high and can/will contribute to the effects of transient over-voltages. Further, the high voltage levels can cause the drive to trip off-line (as occurred on more than one occasion).

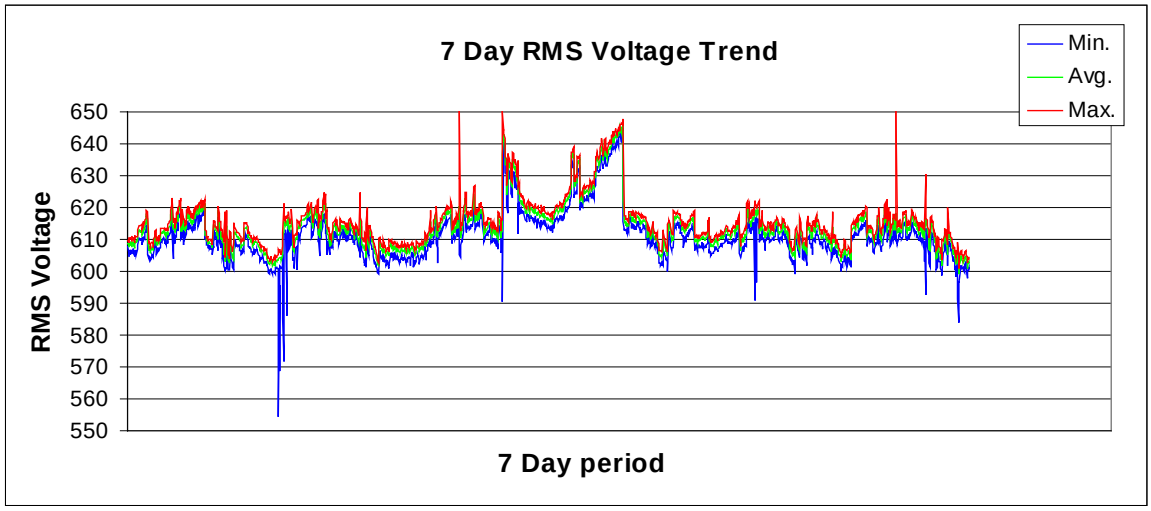
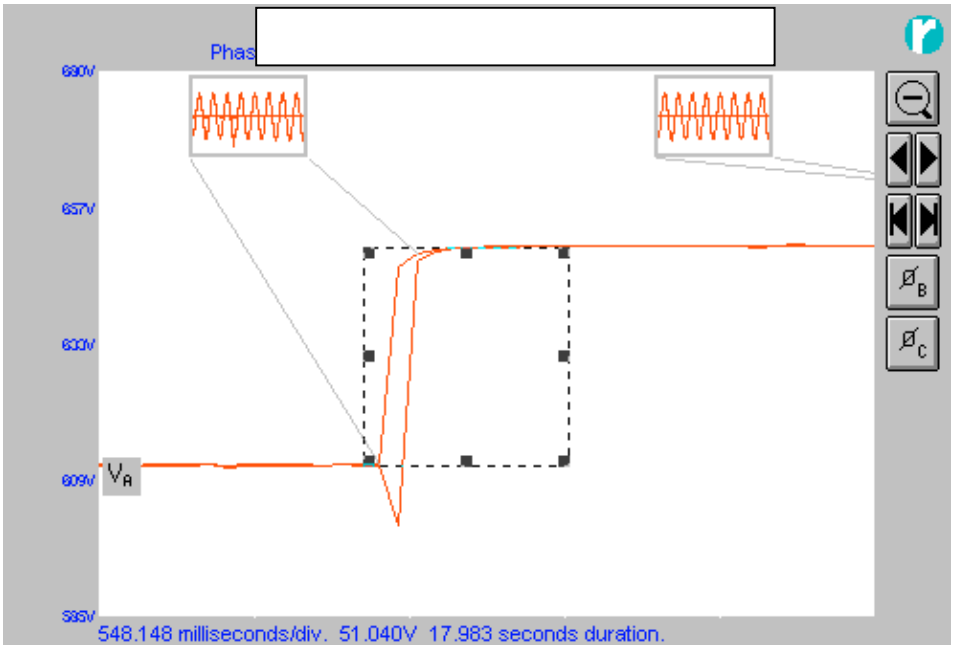


Figure 1: RMS voltage levels

We have also noted that the rms voltage level during the sample time shown in figure 4 shows that at times the rms voltage either increases or drops by almost 40 volts within a few cycles. The exact cause of this phenomenon has not yet been determined. In this particular case the drives at the site shut down due to a high voltage condition and did not restart until rms voltage dropped below 630 volts (i.e. likely 575 +10% tolerance of drive). Sever voltage adjustment such as these can have an obvious serious operational impact on equipment sensitive to rms voltage swings. Further investigation of this situation should be performed to determine if this is an internal site problem or utility problem.



Time: 196.3 ms Freq: 5.09Hz Min: 611.8V Max: 650.1V Pk-pk: 38.22V

Transient Over-Voltages

Figure 5 below shows one of the many transient over-voltage events recorded at the facility. This type of event is caused by the actuation of a bank of utility power factor correction capacitors. For this particular event the peak voltage reaches almost 1500 volts! Other similar events were recorded regularly (daily) with varying peak amplitudes depending on timing of capacitor bank switching (i.e. occurring at peak of voltage waveform). One must bear in mind, however, that the front-end components of the drives must survive the peak-to-peak voltage so the effects of the event are intensified by that condition.

During our monitoring period, we attempted to determine if internal facility power factor correction capacitors were an aggravating agent in terms of the magnitude of the recorded transient over-voltages. Results we inconclusive. We would require simultaneous monitoring with a monitor at "pre" and "post" internal capacitor bank locations at the site in order to determine if transient voltages are actually less when out of circuit. It was beyond the scope of this study to provide multiple monitors for this analysis.

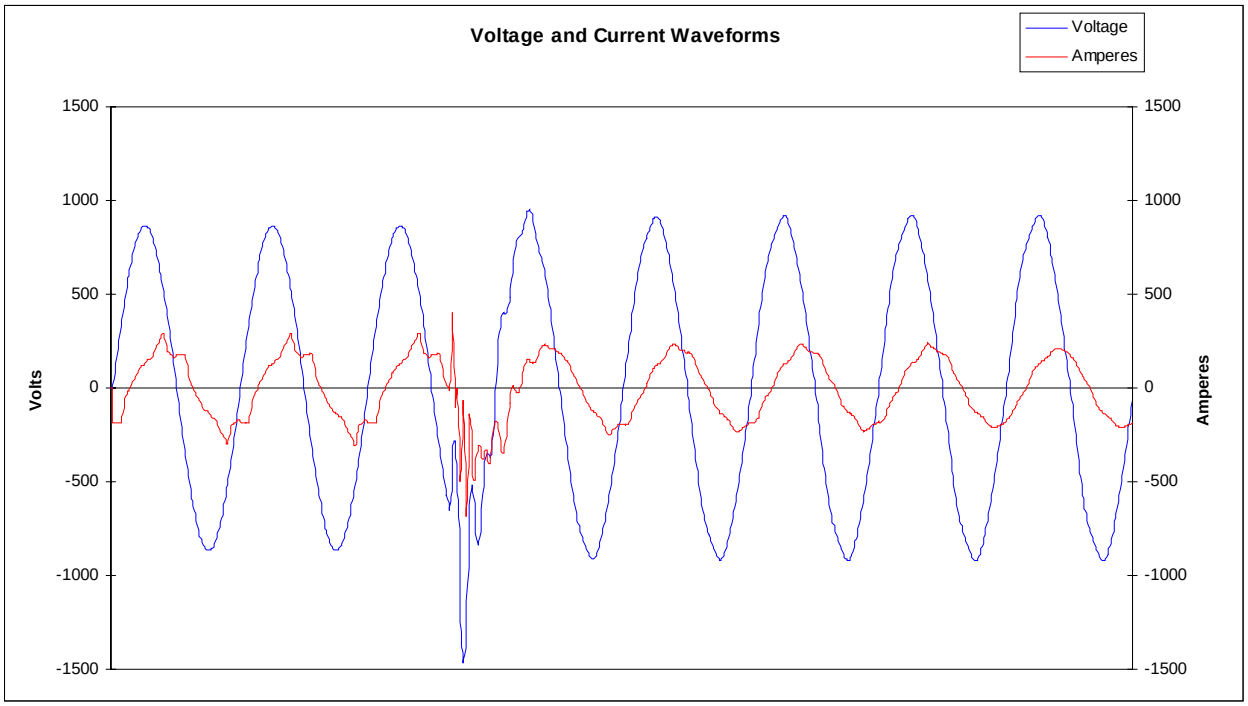


Figure 2: Event 890 (June 26th @ 07:28)

END OF SAMPLE