pfc engineering

Power Quality Case Study – Electronic Component Distributor

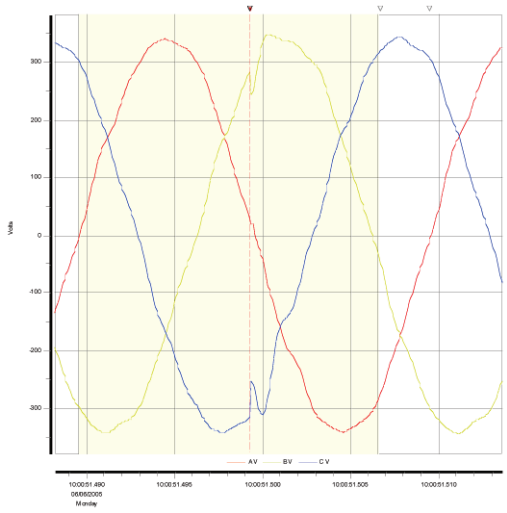
We received a request from a major electronic component supplier to investigate a possible power quality issue resulting in the repeated failure of the communication system that controls the operation of the various conveyor systems within the warehouse. Every time this failure occurred a major re-boot of the warehouse control system had to be carried out with the result that a significant amount of time was lost.

> “BY IDENTIFYING AND RECTIFYING A CAPACITOR SWITCHING TRANSIENT PFC ENGINEERING MANAGED TO PREVENT THE SHUTDOWN OF THE PRODUCT PICKING PROCESS, EACH OCCURRENCE OF WHICH COST THE COMPANY £50,000 PER HOUR IN LOST PRODUCT THROUGHPUT.”

As the occurrences of conveyor shutdown were quite frequent we recommended that a power quality analysis be carried out for the period of one week during which time we asked the site engineers to log the time of any conveyor system faults so that any power quality events occurring at this time could be investigated further.

During the power quality logging period a failure of the conveyor system was logged at about 10am on the morning of June 6th 2005. Upon inspection of the data recorded it was apparent that a voltage transient occured at the time of the conveyor system failure. This voltage transient is shown in Figure 1.

Figure 1: Profile of voltage total harmonic distortion captured during initial harmonic analysis period.



Event#5008 at 06/06/2005 10:00:51.489
CV Mild Phase Shift Neg 1/4 Cyc

	A	B	C	D	A-B	B-C	C-A
Vrms	241.5	241.5	241.2	0.05347	417.9	417.3	418.9
VPeak	340.9	343.4	343.0	0.1366	344.5	346.5	347.2
Irms	948.8	952.9	877.3	152.3			
IPeak	1550	1556	1584	342.8			

The regular occurrence of such failures and the likely coincidence with transient voltage events lead us to suspect that the switching of an item of plant was responsible for the conveyor system failures. In order to determine whether this was the case the power consumed in cycles immediately before and after the transient event recorded.

Figure 2 shows the reactive power consumption immediately before and after the transient event associated with the conveyor system failure. It can be seen that there is a step change (reduction) in the consumed reactive power at this time. This fall in reactive could mean either an inductive load being turned off (possibly a motor) or a bank of power factor correction capacitors being energised. As there was no appreciable drop in kW during this time it was felt most likely that a capacitor bank was responsible for the transient event recorded.

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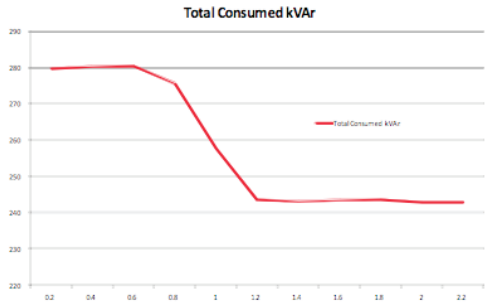
Figure 2: Reactive power consumed immediately before and after the transient event associated with the conveyor system failure



Further power quality recording and logging of conveyor system failures yielded the same pattern, i.e. a step change in reactive power coincident with transients occurring at the same time as system failures. As a result of this we recommended that the old power factor correction incorporating 50 kVAr steps switched with non-soft switching contactors was replaced with 25 kVAr steps incorporating soft switching.

This recommendation was implemented and immediately the instances of conveyor system failure reduced dramatically, saving the client many tens if not hundreds of thousands of pounds.

The Energy Solution Specialists.

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