Interpreting the Results of a Power Quality Analysis

The best possible outcome is a direct timestamp correlation between equipment fault logs and power quality data. This correlation is even stronger if multiple events can be correlated. The stronger the correlation is, the more motivated all stakeholders will be to act.

Example: Water-cooled chillers have experienced recurring over-voltage shutdown faults. Power quality analysis showed voltage spike events that matched timestamps from the chiller fault log. Further investigation showed that power factor correction capacitors had been switched on at those times. The building owner worked with the utility provider to adjust timing of the power factor correction capacitors, resolving the shutdown issues.

In many cases, power quality analysis is conducted in response to equipment failure. Unless power quality meters were connected when the fault happened, it will not be possible to show a direct correlation between electrical power quality and equipment fault logs. The following strategies may be used to help:

- Record fault logs from the failed equipment. Contact the manufacturer to determine if the equipment can be returned for forensic inspection.
- Check replacement equipment for similar faults as the original. This may allow correlation between new power quality data and ongoing fault events with the replacement equipment.
- Instead of focusing on root cause investigation of the original equipment, focus on best practices for the replacement equipment. Use new power quality data to guide improvements to the electrical system. Refer to “potential solutions” for each transient type in the next section of this EN.
- Consult with the equipment manufacturer to determine acceptable power transient levels. If the manufacturer cannot commit to acceptable levels, the CBEMA, ITIC and SEMI curves are a good starting point (see Figure 1).

Making corrective action to the electrical system requires that the source of electrical power transient be known. Capturing the event does not necessarily prove what caused it. The Dranetz *Handbook of Power Signatures* shows dozens of waveform examples that can help identify the root cause based on waveform shape. If the data is still inconclusive, the following strategies may help:

- Measure voltage further upstream. Transients caused by *upstream* events will also show up in the upstream voltage.
- Measure the total current drawn from the feeder. Transients caused *downstream* by other loads on the feeder will show up in the feeder supply current.