

IMPACT OF HARMONICS ON NEUTRAL LOADING - ACTIVE HARMONIC FILTER SYSTEMS

CHEMICAL INDUSTRY

PREAMBLE

The Plant has Single Phase Loads connected in considerable number. The problem of high neutral loading was reported which was leading to subsequent operational problems in the Loads connected. Hence Power Quality Analysis Study was conducted at site to identify the root cause and provide suitable Solution.

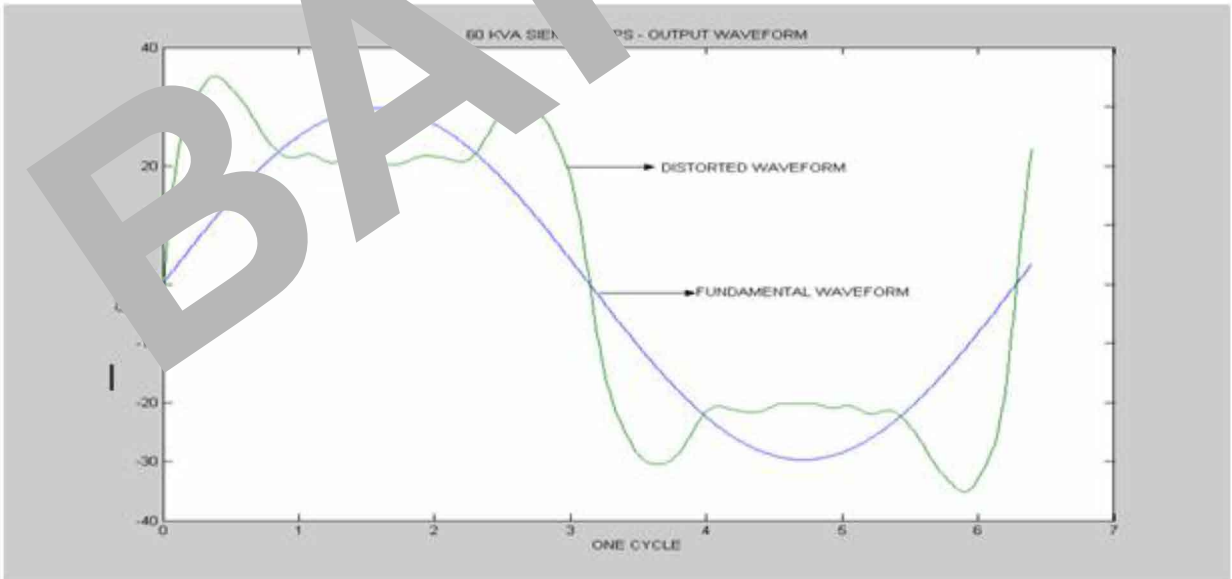
SITE ANALYSIS AND OBSERVATIONS

Parameters	Readings at UPS Outgoing
Average KVA	26
Average Phase Voltage (Volts)	230
Average Phase Current (A)	26
THD-Voltage (%)	1.7
THD-Current (%)	50.1

The Total Harmonic Distortion – Current and Voltage recorded high of values 60% and 1.7 % respectively at the UPS outgoing.

From the recorded level, it is clear that the Total Harmonic Distortion at UPS is high, which will enhance the distribution losses due to high current flow.

The 3rd Order Harmonic Content of 50.1% is high.



Order of Harmonics	%	Order Of Harmonics	%	Order Of Harmonics	%
2	3.2	10	1.4	18	0.5
3	50.1	11	3.5	19	1.2
4	4.6	12	0.2	20	0.5
5	27.9	13	3.3	21	0.9
6	4.1	14	0.7	22	0.2
7	11	15	1.5	23	0.4
8	3.2	16	0.4	24	0.3
9	2.5	17	0.9	25	0.4

INFERENCE

Due to considerable amount of single Phase Loads fed through UPS System, Higher order Third order Sequence Harmonics has lead to heavy neutral loading.

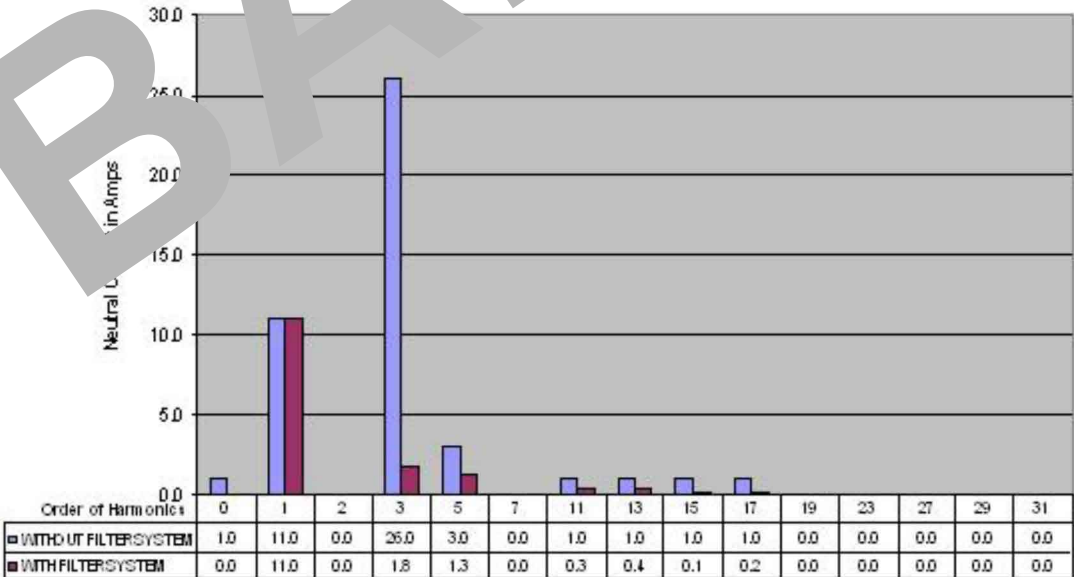
SYSTEM DESIGN AND RECOMMENDATION

The root cause being the Third Order Harmonics, the basic necessity was to implement a Harmonic Filter System which can Block the Third order harmonics, thereby reducing the neutral loading. Following Predominant Third harmonics and other wide range of significant harmonics, recommendation is done to implement 60A Active Filter System at the output of the UPS System.

PERFORMANCE

The following harmonic spectrum shows that the significant Third order Harmonics have reduced significantly on installation of the Filter System thereby reducing the loading on neutral.

NEUTRAL CURRENT WITH & WITHOUT FILTER SYSTEM



IMPACT OF HARMONICS ON DISTRIBUTION CABLE LOADING AND SUPPLY DISTORTION - ACTIVE HARMONIC FILTER SYSTEMS

PREAMBLE

The facility has several sensitive Loads like Broad Casting Units, which are fed through Online UPS Systems, which was resulting in High level of harmonic loading on distribution cable and supply voltage distortion.

SYSTEM DESIGN AND RECOMMENDATION

Basic necessity of the system is identified as

Suppression of wide range of Harmonic orders at the point of generation and thus reduce the Harmonic Loading in the cable and reduce Distortion at Source.

Hence recommendation was done to install 150A Active Harmonic Filter System at the UPS Feeder Incomer.

PERFORMANCE

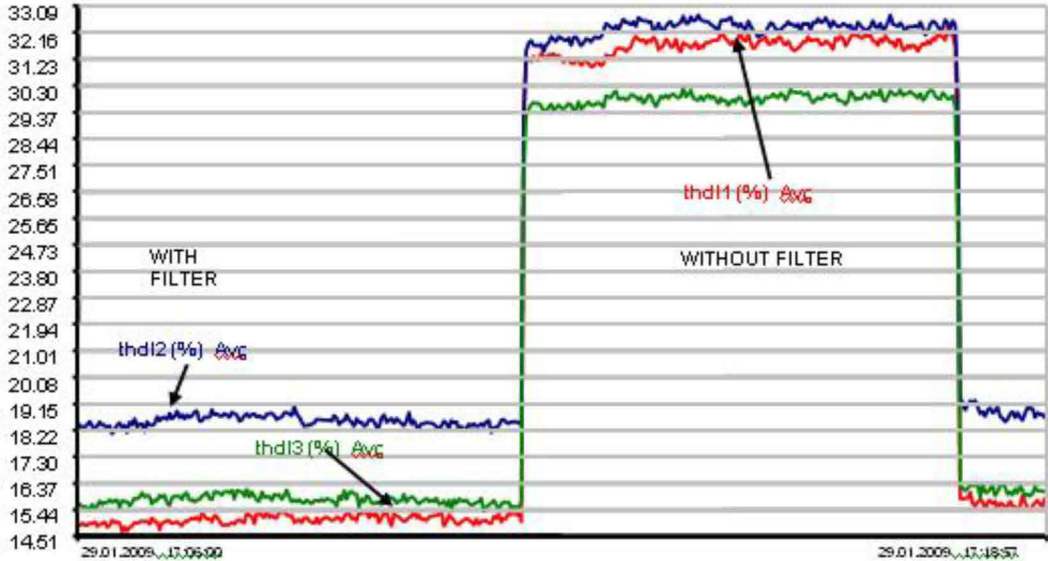
parameters	without 150 A	with 150 A Active Filter
KVA	292	273
CURRENT	433	393
PF	0.83	0.91
THD VOLTAGE HARMONICS (%)	8.64	4.54
THD CURRENT HARMONICS (%)	31.26	16.64

The above tabulation clearly indicates that on installation of Active Filter System at the UPS Feeder, the Apparent Current has reduced from 433 A to 393 A, with kVA reduction from 292 kVA to 273 kVA.

The Voltage and Current THD have reduced significantly from 8.64 % to 4.57% by the suppression of wide range of Harmonics by the Active Filter

The following Trend Graphs clearly indicates the reduction of Harmonic Distortion levels at the UPS in-comer with the implementation of the Active Filter System at the Point of Generation.

3 PHASE AVG. THD VOLTAGE (%)



3 PHASE AVG. THD VOLTAGE (%)

