HARMONICS AUDIT REPORT
BY DELTA CLEAN-TECH

SAMPLE REPORT

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SUMMARY OF THE AUDIT

CUSTOMER DETAILS

XXX

TYPE OF INDUSTRY

SPINNING MILL - TEXTILE VERTICAL

TECHNICIAN PRESENT DURING AUDIT

XX

ELECTRICAL INFRASTRUCTURE DETAILS

LOAD DETAILS	KW	KVA
INSTALLED CAPACITY	--	2600
ACTUAL LOAD DURING TESTING	--	2100
MAXIMUM DEMAND REGISTERED ON UTILITY	--	2250

TRANSFORMER DETAILS I		
RATING	1000	KVA
IMPEDANCE	4.69	%
PRIMARY / SECONDARY VOLTAGE	11000/433	V

TRANSFORMER DETAILS II		
RATING	1600	KVA
IMPEDANCE	6.7	%
PRIMARY / SECONDARY VOLTAGE	11000/433	V

CAPACITOR BANK DETAILS		
NUMBER OF BANKS	10	NOs
RATING	100 each	KVAr
CAPACITOR SWITCHING	Fixed	AUTO / FIXED
SERIES REACTOR	No	YES/NO

AUDIT DETAILS

INSTRUMENTATION USED : FLUKE 1735 POWER ANALYZER & FLIR I5

ENGINEERS ONSITE : SRINIVASA VIVEK, VIGNESH BABU

MEASURED AT LOAD : 90% OF INSTALLED CAPACITY

NUMBER OF READINGS TAKEN : 900~

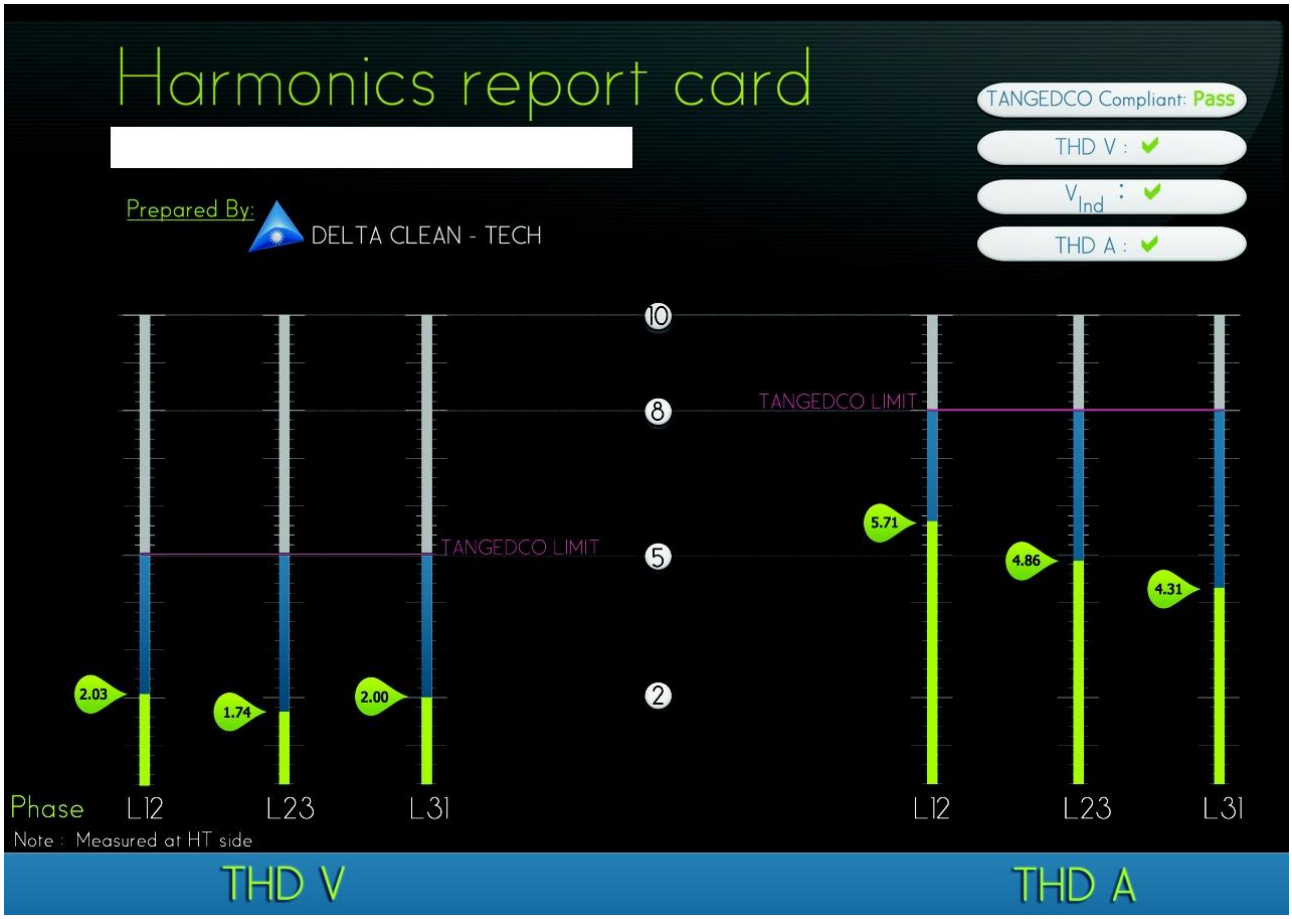
NUMBER OF POINTS MEASURED : 11

MEASURED AT VOLTAGE LEVELS : BOTH HT & LT SIDE

EXECUTIVE REPORT

As specified by the TANGEDCO supply code, a penalty of 15% will be levied if the consumer dumps harmonics into the distribution system beyond the limit as specified by CEA regulations. As per our Harmonics Audit, we are pleased to inform you that your facility is **within the limits and comply with TANGEDCO regulations.** Your report card is attached below.

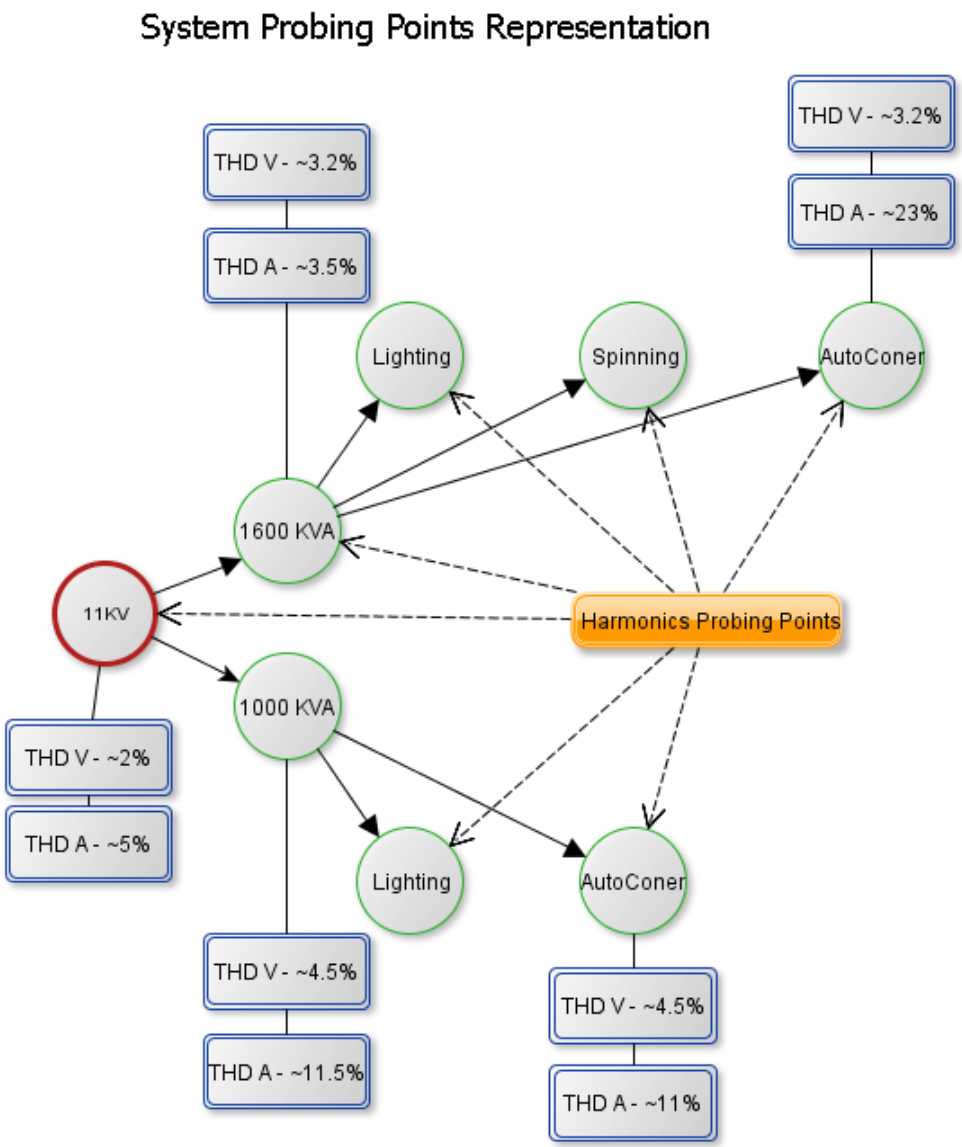
We would like to bring into your attention that even though it is within regulations, we had data that points to some undesirable effects of harmonics in your electrical infrastructure. Mitigating harmonics present in your system will reduce overloading of transformer, motors, cables, PF correction capacitors and also reduce power electronics failures. Also we can quantify ROI on deploying filters as it improves system energy efficiency.



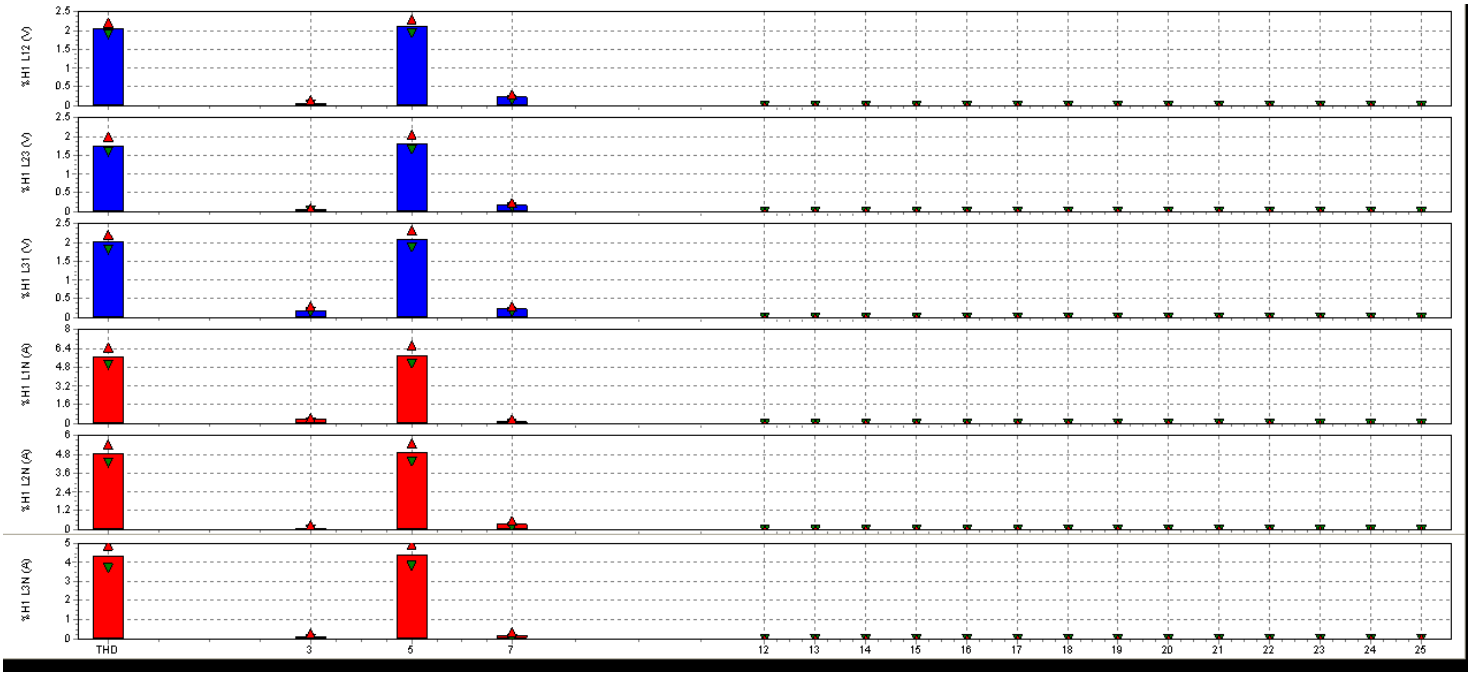
AUDIT TECHNICALS & DATA

MEASUREMENT POINTS

CEA regulation specifies that harmonics will be measured at point of coupling. Harmonics has been measured at 11KV HT side and also at various LT feeders. LT feeders are measured not for regulations but to understand the overall harmonics distribution in the system. The diagram shows harmonics at various point in the electrical system.



DATA POINT 1 : 11KV INCOMER



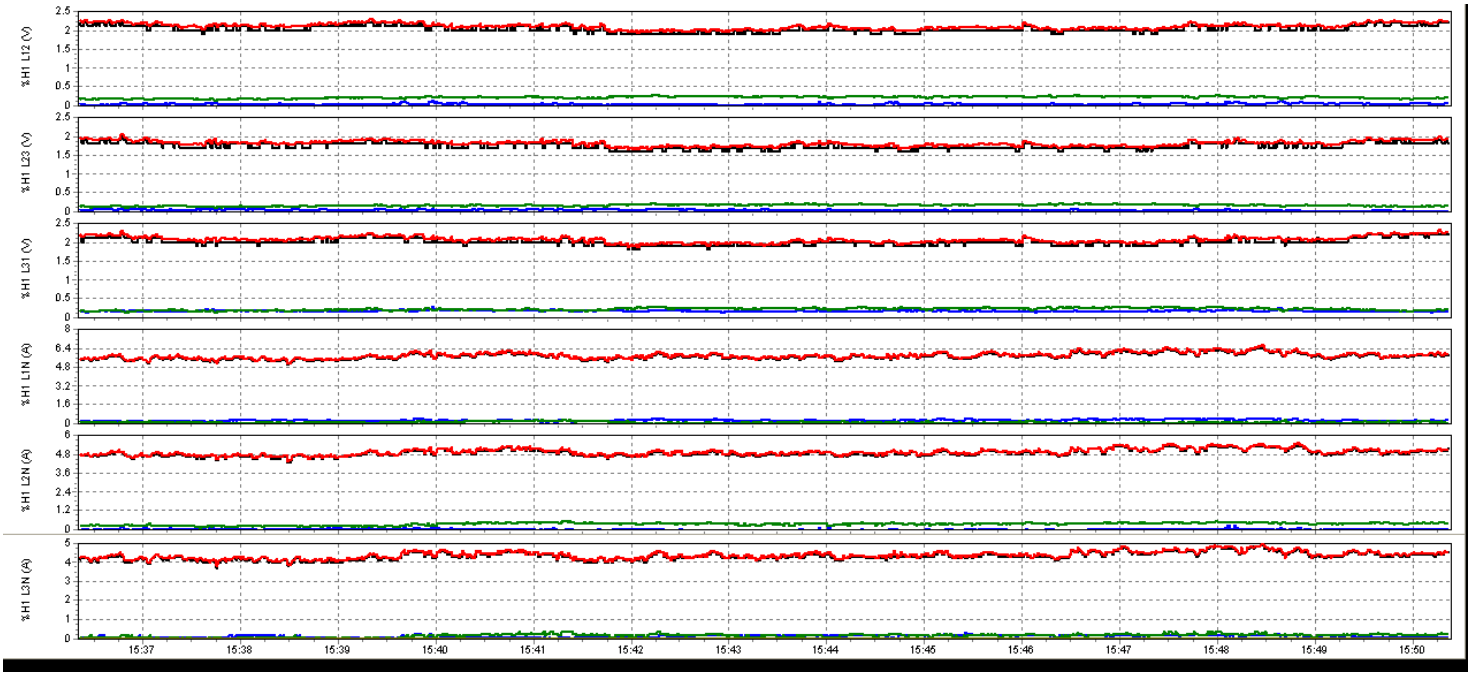
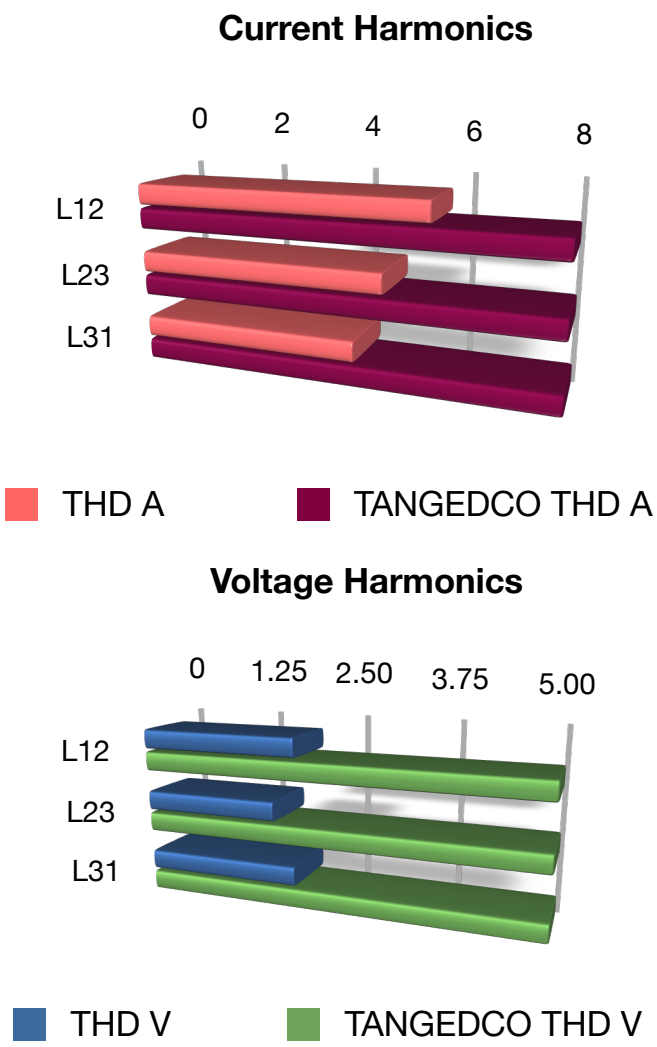


Chart below shows readings taken at 11KV incomer and presence of 5th harmonics. As per CEA regulations THD V, V ind and THD A are within limits.

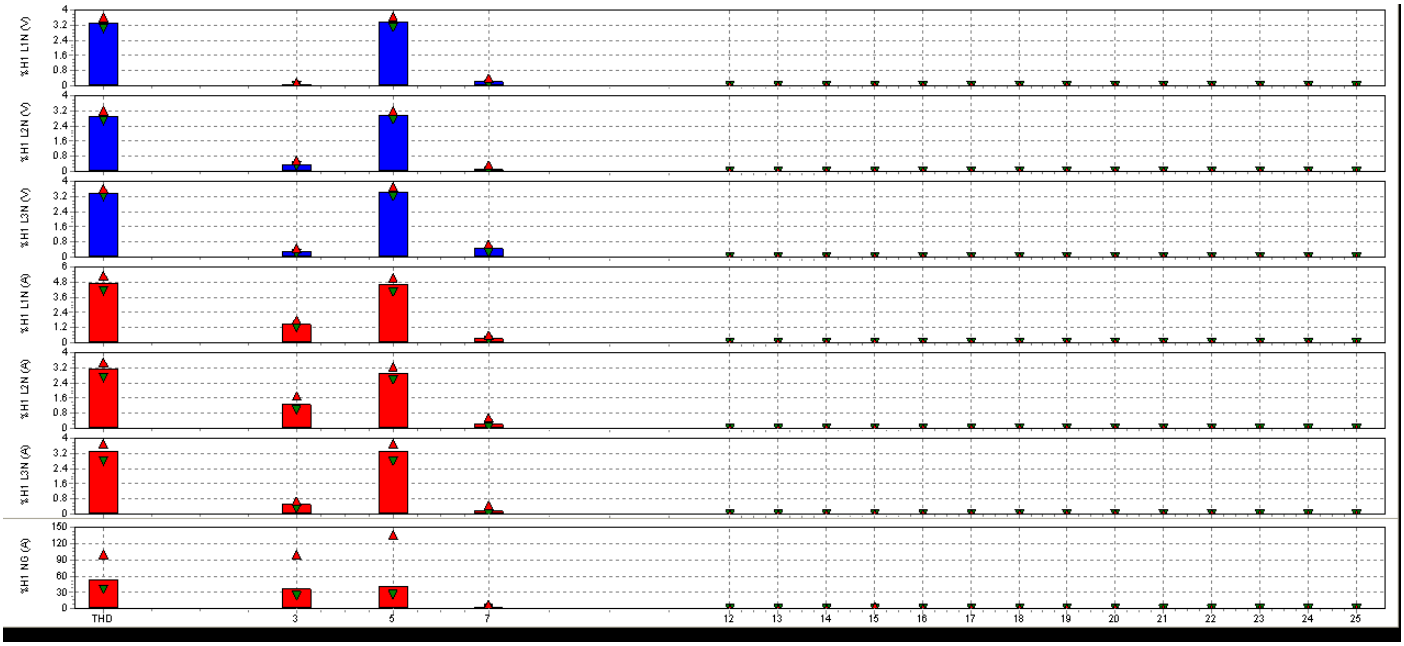
Harmonics Analyzer data is shown below :

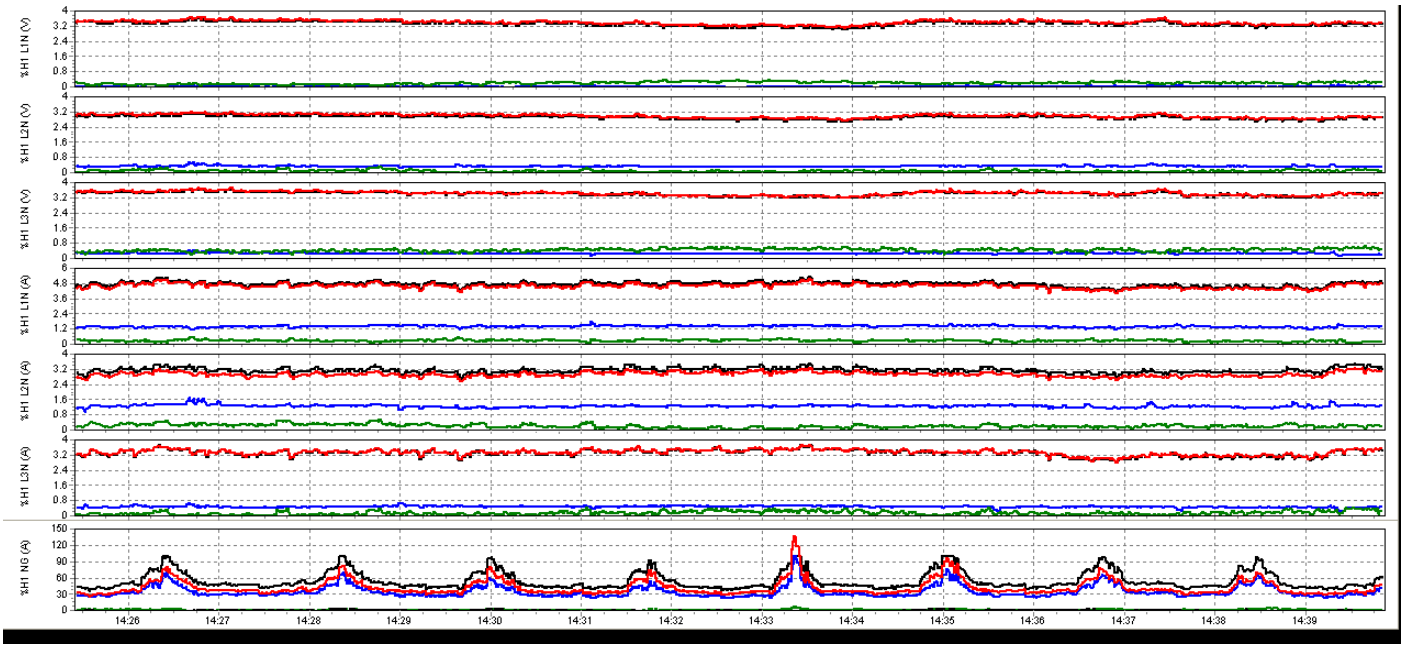
THD V L12 Avg	THD V L23 Avg	THD V L31 Avg
2.034244946	1.743043995	2.007372176
Volts H5 L12 Avg	Volts H5 L23 Avg	Volts H5 L31 Avg
2.099926278	1.808850178	2.06412604
THD A L12 Avg	THD A L23 Avg	THD A L31 Avg
5.713793103	4.86313912	4.317241379



DATA POINT 2 : 1600 KVA TRANSFORMER LT SIDE

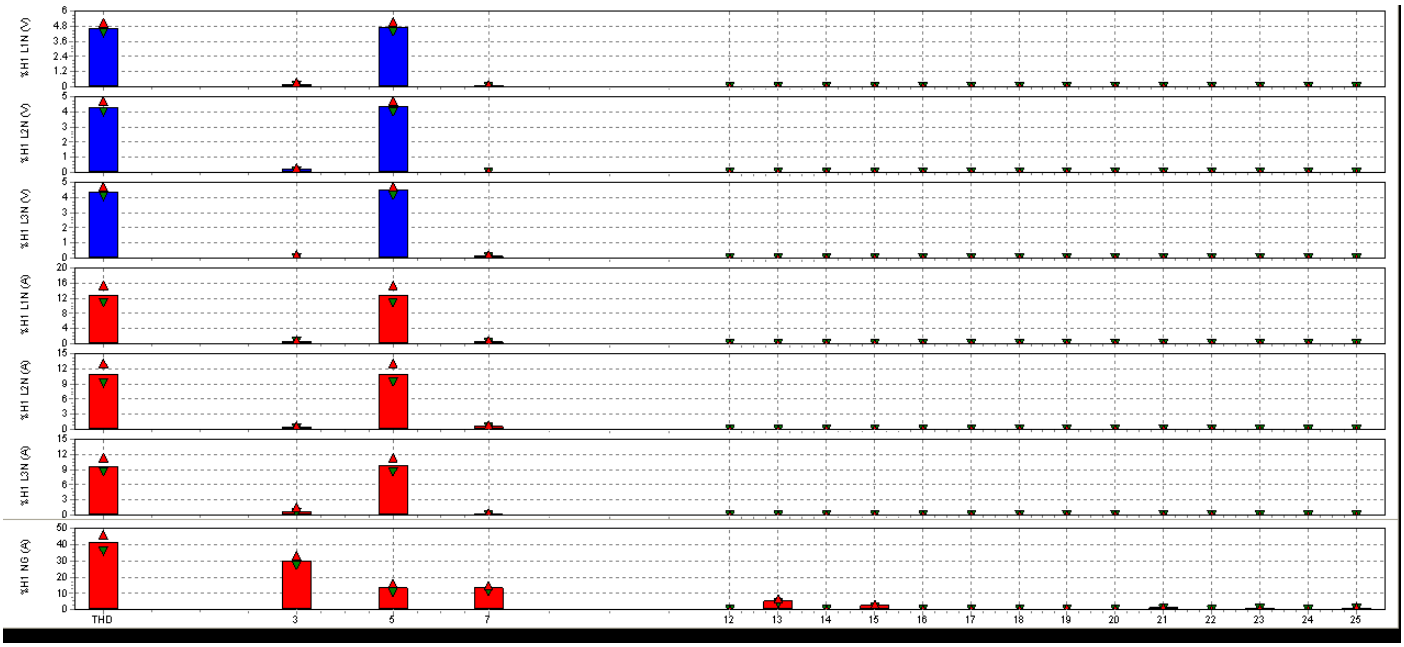
Chart below shows harmonics data at the 1600 KVA transformer LT side. Harmonics is within the permissible limits.

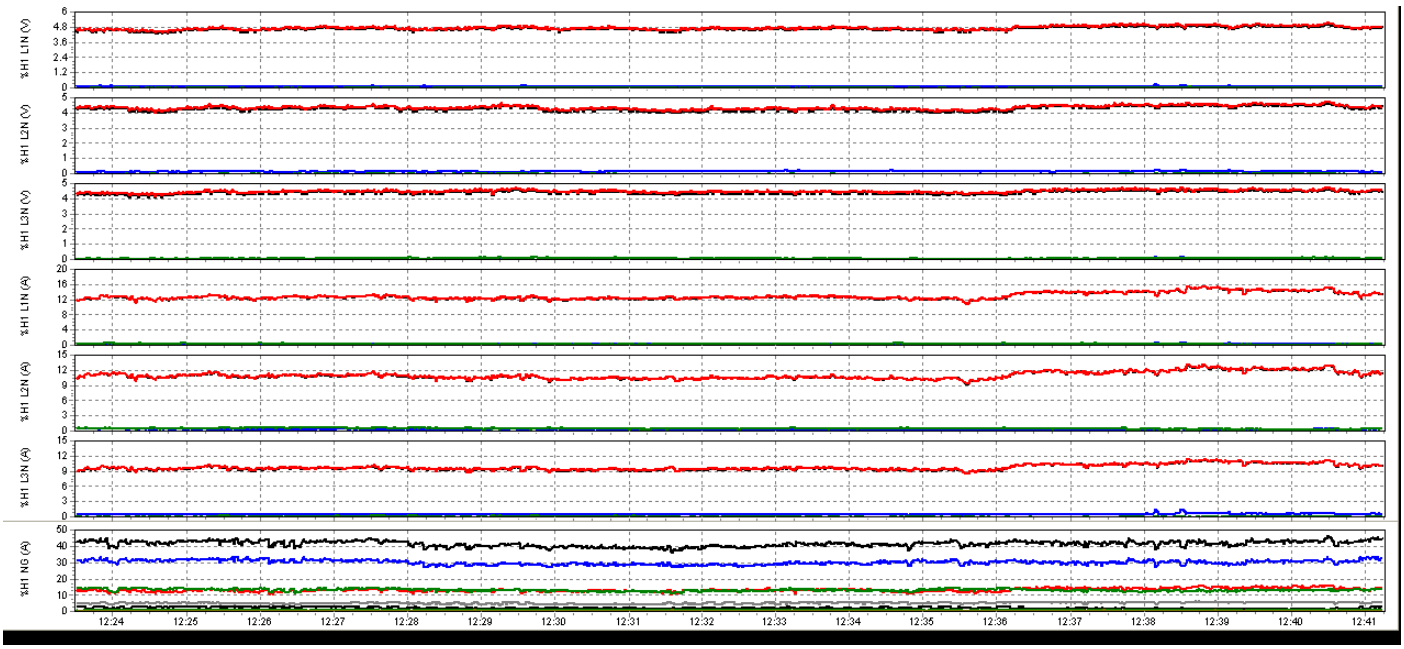




DATA POINT 3 : 1000 KVA TRANSFORMER LT SIDE

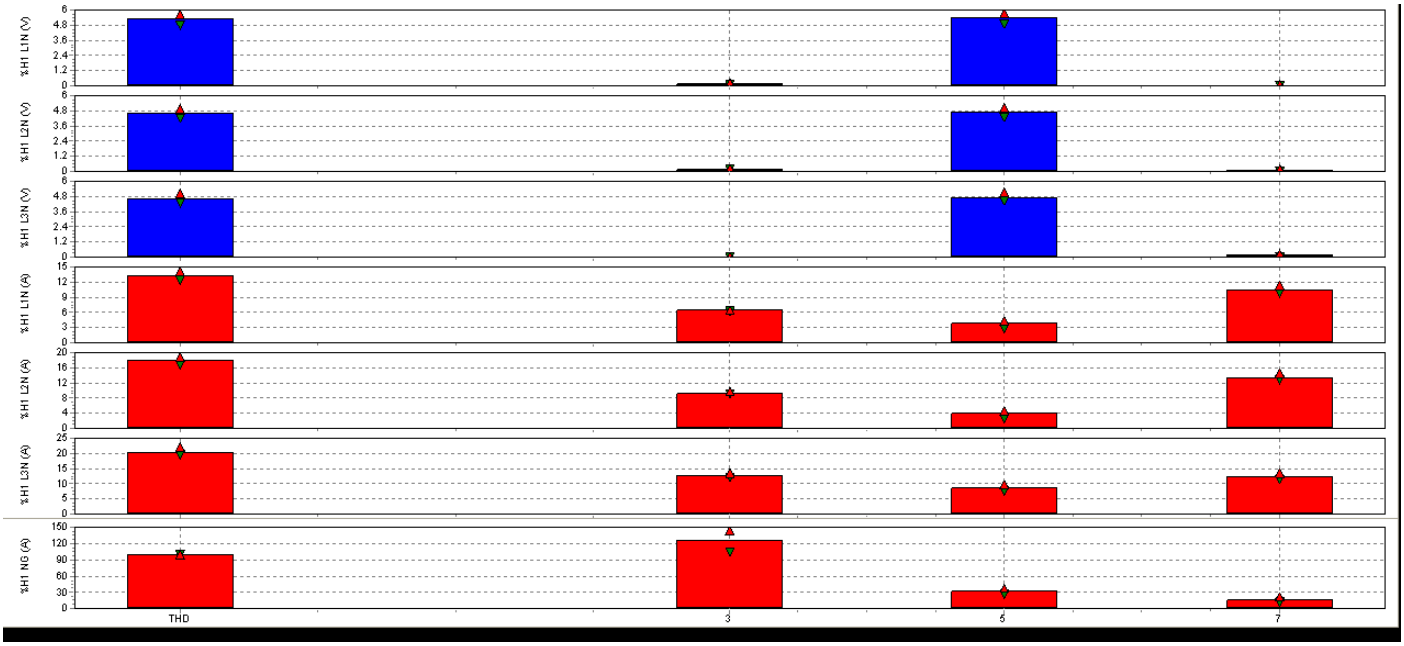
Chart below shows harmonics data at the 1000 KVA transformer LT side. **Harmonics is NOT within the permissible limits**.





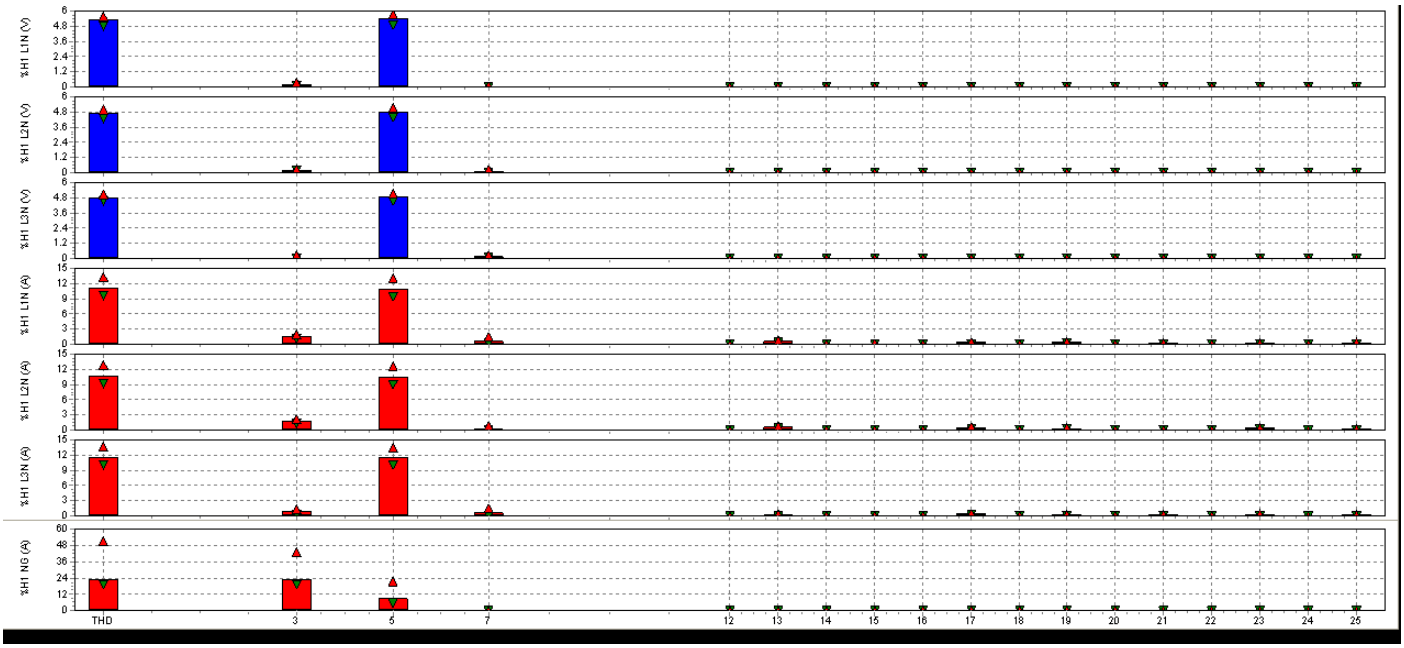
DATA POINT 4 : LIGHTING 12.5KW ON 1000KVA TRANSFORMER

With a further drill down on 1000KVA feeder, lighting has been probed. Lights with electronic ballast has more than 12% current harmonics. But the lighting system on 1600KVA feeder shows minimal harmonics due to ballasts with filters.



DATA POINT 5: AUTO-CONER 140KW ON 1000KVA TRANSFORMER

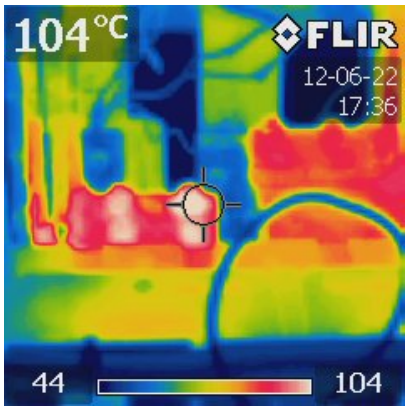
Auto-Coner machinery are equipped with Variable Speed Drives and they are the major source of harmonics in spinning mill electrical infrastructure. As seen in the chart below, it injects up to 13% of current harmonics in to the electrical infrastructure.

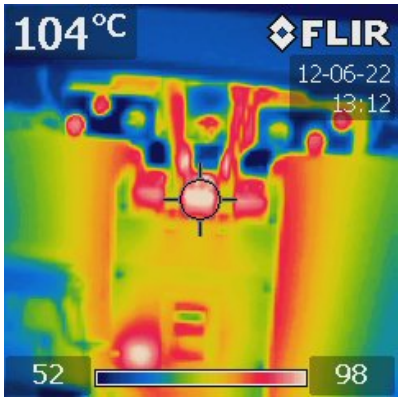


EFFECTS OF HARMONICS

1.HIGH NEUTRAL CURRENTS NOTED AT MULTIPLE PLACES IN YOUR FACILITY

2.HEATING OF BUS BARS BEYOND OPTIMUM AT FEW FEEDERS





3.CABLE HEATING NOTED AT FEW AREAS

4.ENERGY LOSS AT TRANSFORMERS, MOTORS & CABLES.

RECOMMENDATIONS

☑ 1000 KVA FEEDER NEEDS IMMEDIATE ATTENTION AS HARMONICS LEVEL IS BEYOND PERMISSIBLE LIMITS. DETAILED STUDY SHOWS PRESENCE OF LIGHTING LOAD WITH ELECTRONIC BALLAST AND DRIVES. NEUTRAL CURRENT IS ALSO RECORDED TO BE 16 A. BUSBAR HEATING IS ALSO NOTED. WE RECOMMEND TO DEPLOY AN ACTIVE FILTER FOR THIS FEEDER. IT WILL REDUCE THE LOSSES ASSOCIATED WITH HARMONICS AND IMPROVE RELIABILITY OF INFRASTRUCTURE WITH REDUCED CIRCUIT BREAKER NUISANCE TRIPPING, LIFE OF POWER ELECTRONICS ETC, THE INVESTMENT WILL PAY BACK IN TANGIBLE BENEFITS LIKE REDUCED UNIT CONSUMPTION, IMPROVED LIFE OF EQUIPMENTS.

☑ LOAD STUDY WITH THERMOGRAPHY AUDIT IS RECOMMENDED TO FIND INEFFICIENCIES AND POTENTIAL FAILURE IN THE SYSTEM.

DELIVERABLES

☑ WE WILL DELIVER A CD CONTAINING ALL THE AUDIT DATA AFTER DISCUSSING THIS REPORT WITH YOUR ELECTRICAL TEAM

FINAL NOTES

☑YOUR FACILITY IS COMPLIANT WITH TANGEDCO HARMONICS GUIDELINES

☑WE WILL DISCUSS THIS REPORT WITH YOUR ELECTRICAL SUPERVISOR TO IDENTIFY AN OPTIMUM MITIGATION STRATEGY & ALSO ONGOING MAINTENANCE PROCESSES

☑ 1000 KVA FEEDER NEEDS IMMEDIATE HARMONICS MITIGATION AND WE WILL PROPOSE A PLAN FOR THAT.

☑AS PART OF THIS ENGAGEMENT WE CAN SUPPLY DATA BASED EVIDENCE DURING TANGEDCO AUDIT