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Tired of high repair costs for motors and transformers ?

We are imposed to upgrade ourselves and our industry as smart to compete with the worldwide technology revolution. But the cost plays a role in slowing down the growth of upgradation in a single stretch.Still, we are on the correct way to achieving world trends. In this step-by-step process, the development of power electronics converters has replaced conventional control methods with advanced Smart Starters and Variable Frequency Drives (VFDs) for all clauses of duty pumps and drives.This transformation marks a significant leap toward achieving higher productivity and enhanced product accuracy. The low rated motors and equipment's were failing their winding frequently and sometimes high rated motors and transformers were aged quickly.

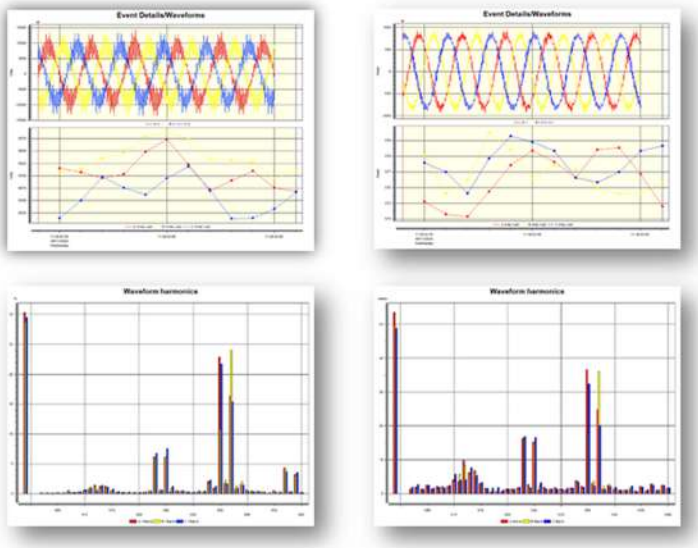
" Harmonics: Silent disruptors in your grid, 'driving up hidden costs. "

Root Causes :

We consistently monitor critical parameters such as voltage, current, power, and power factor. Relays and contactors play a vital role in effectively managing these parameters within the grid and local PCC.However, one critical aspect often overlooked is the presence of harmonics. Low-order harmonics (3rd, 5th, 7th, 9th, 11th) and higher-order harmonics (>15th) travel through the local grid, posing risks to system stability and efficiency.Many plants address reactive power management by installing APFC systems or hybrid systems with small Harmonic Filters (HF). Unfortunately, these installations are frequently carried out without prior energy and power quality assessments.This oversight leads to higher-than-expected maintenance costs, such as replacing windings or equipment, caused by harmonic distortions. These harmonics not only circulate within the local grid but also propagate towards the main grid, amplifying their impact

Case Study:

More than 900 steel plant and more than 5000 foundries in India. Not only steel plants or foundries, the ARC and induction furnaces are installed in glass making industry, plastic industry,oil and gas industries,food processing industries, etc.A detailed PQ study was conducted in the plant which has furnace and VFD drives. We found a higher order harmonics dominates the lower order harmonics.



The Figure shows the higher order harmonics are presented in the voltage and current of main incomer of a plant which has furnace and drives. The voltage harmonics and current Harmonics are recorded at 24% and 52A respectively. In this case, the 23rd, 25th, 35th, and 37th order harmonics are presents and derating of transformer lies between 0.48 to 0.89. The value of current may less but it leads to the frequent failure of capacitor bank, increase the temperature and failure of motors winding in the plant.Also, the 35 MVA transformer derated to maximum of 31 MVA and minimum of 16 MVA.

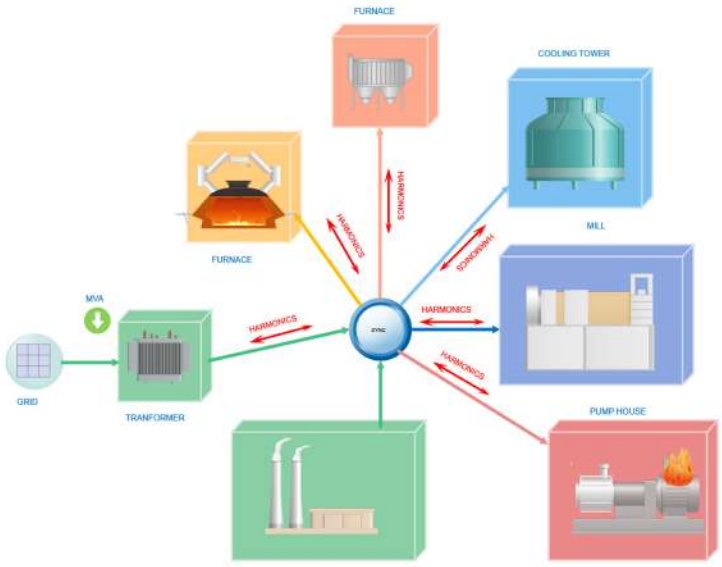


Figure 1.Flow of harmonics in a PCC.

Effects:

Frequent failure of motors and equipment.
Heating of Drives.
Derating of motors and transformers.
Failure of Capacitors in the APFC.
Higher maintenance costs will lower profits
Penalties for exceeding IEEE 519 standards.

Solution :

The solution is very simple and very economical when you compare the spending on repairing and replacing. Proper energy and power quality study to be carried out for understand the behavior of plant. Then the required rating of APFC and AHF to be installed or modification to be carried out in the existing APFC and HF. Continuous monitoring the PQ parameters and evaluating the performance of equipment avoids the shutdown of a section or entire plant.