



# POWER QUALITY STUDIES

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## PURPOSE

This study is used to determine the control methods for harmonic distortion generated in an industrial system to the values established in the related standard IEEE-519 Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.

Harmonic distortion control is done by installing harmonic filters and other equipment. From electrical measurements at strategic points of the electrical system, a computational model is developed in which the proposed equipment is added to limit harmonic pollution.

## DETERMINATION OF HARMONIC DISTORTION OF CURRENT AND VOLTAGE

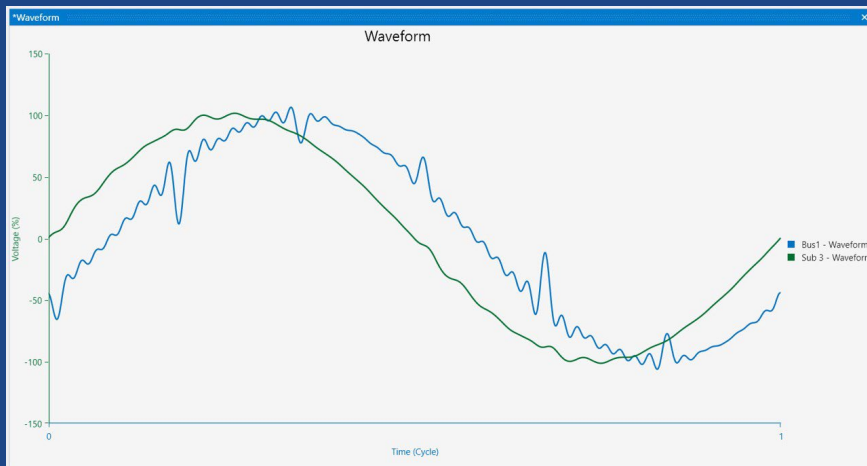


Fig. 1 Waveforms of the measured voltage and current.

In this first part, the results of the electrical measurements carried out are included in the computational model and the "current" harmonic distortion levels in the electrical buses are calculated, this establishes the starting point for calculating the final values of pollution after installing the filters.

## CALCULATION OF HARMONIC FILTERS

In this part of the study, the characteristics and size of the equipment necessary to reduce harmonic contamination are calculated to be within the limits of the IEEE-519 standard. The equipment that must be used to meet the harmonic distortion level objective is determined, among them we can mention: detuned harmonic filters, tuned filters, active filters, hybrid filters and Static VARS compensators.

## FREQUENCY RESPONSE

In this part of the study, it is verified that there are no resonance conditions of the equipment with the electrical system. Resonance is a natural effect of dangerous amplification of currents in equipments, for which physical location changes have to be made or the kind of filters have to be changed.



Fig. 2 Graph of the frequency response.

## DETERMINATION OF THE WORKING CONDITIONS OF THE COMPENSATION EQUIPMENT

In this section of the study, it is verified that the harmonic filters will work safely, that is, that none of their nominal design values are exceeded.

## FINAL TOTAL HARMONIC DISTORTION

At the end of the study, the harmonic distortion is evaluated with the filters already included in the computational model, using the methodology of the IEEE-519 standard.

## ANALYSIS SOFTWARE

- ETAP.
- Reference Standards IEEE, ANSI, IEC.

## ETAP SOLUTION PROVIDER

**RADTHINK** is recognized as an **ETAP Solution Provider**. It is awarded by the ETAP brand to engineering firms that have staff with the skills, knowledge and resources to develop electrical engineering solutions using ETAP analysis software.





 81 3849 1587

 [ventas@radthink.com.mx](mailto:ventas@radthink.com.mx)

 Av. Topo Chico 570-Interior 4A, Anáhuac, 66450  
San Nicolás de los Garza, N.L., Mexico

 [radthink.com.mx](http://radthink.com.mx)