

## REVIEW ON A POWER QUALITY ISSUES

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**Abstract** -In earlier time the consumer wants the continuity of supply but now in present era the scenario is changed they need quality of supply as well as the continuity. To make life easier new innovative ideas application in power system is necessary in terms of power quality. This paper present the information regarding power quality issue, power quality problems, effect and various method of clearing power quality problem.

### Key words

Power quality, THD, Harmonics, Power System, Non-Linear Load

## 1. INTRODUCTION

Simply the power quality is measurement of ideal power supply; maintaining the supply at its rated value is called as power quality. As per IEEE dictionary the power quality is defined as "The concept of powering and grounding electronic equipment in such a manner that it is suitable for the operation of equipment and fit with wiring system and remaining connected equipment". Power quality is an important issue among the today's electric world, day by day problem related to power quality is increases and it is essential to limit this problem using suitable remedies over it.

## 2. POWER QUALITY PROBLEM

Modern industrial power electronic equipment's offer higher compact size, reliability, efficiency and best controllability. In spite of all this things due to switching actions the devices behave just like a non-linear loads. This give rise to power quality problems such as harmonics, voltage Swell, voltage sag, flickers, interruption in supply, impulse transient, asymmetric voltage waveform serious issue. On another side, modern industrial equipment's are more sensitive to the power quality problems. Failures due to such disturbances responsible for increasing production cost. So now in present continuity and high quality electrical power has become basic needs of industrial, agriculture and domestic sector. The problems related to power quality can

be classified mainly into two types,

- i) Instantaneous effects
- ii) Long-term effects.

The instantaneous effects problems are associated with interferences, malfunction or performance degradation of equipment's and devices. Long-term effects are of thermal nature and are related, to additional losses and overheating, causing a reduction of the mean lifetime of capacitors, rotating machines and transformers.

## 3. HARMONICS

Harmonic is defined as "a sinusoidal component of a periodic wave having a frequency is an integral multiple of the main (fundamental) frequency. Power system operate under the sinusoidal voltage supply and a linear, non-linear load. The current of the nonlinear load contains harmonics. The harmonics in the line-current produce a non-linear voltage drop in the line impedance, which distorts the load voltage. Since load voltage is distorted, even the current at the linear load becomes non-sinusoidal. Another problem caused by harmonics in the line current is to overload the circuit wiring.

Harmonics are the by-products of modern electronics. They occur frequently when there are large numbers of personal computers (single phase loads), uninterruptible power supplies (UPSs). Non-linear loads create harmonics by drawing current in abrupt short pulses, rather than in a smooth sinusoidal manner.

The existence of harmonics, when power lines are considered leads to even greater power losses in distributing, causing noise troubles in the communication systems, causing breakdown of functioning of electronic apparatus. Variable frequency drives (AC and DC) or any electronic device using solid state power switching supplies to convert incoming AC to DC responsible for generation of harmonics.

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manner. These become the reasons that put together the power quality issue as one of the most focusing issues as far as the final user is concerned.

#### 4. PROBLEM CAUSED BY HARMONICS

There are several problems which are given below that are caused by the harmonics in the power system. Waveform gets distorted due to harmonics which is shown in figure. Distortion of sinusoidal voltage and current waveforms caused by harmonics is one of the major problems of power quality concerns in electric power industry. But such clean waveforms typically only exist in a laboratory.

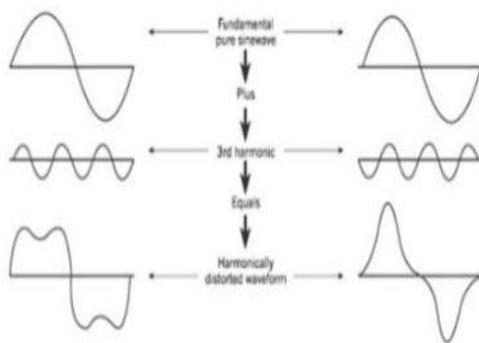


Fig-1 : Distortion in current waveform due to harmonics

##### 1) Effect on Power System Itself

The major effect of power system harmonics is to increase the current in the system. This is particularly case for the third harmonics, which caused a sharp increase in the zero sequence current, and therefore increase the current in the neutral conductor.

##### 2) Effect on Consumer Itself

Non linear load also caused harmonics in utility supplied voltages due to which even the linear load draw non linear current. Harmonics can also cause thyristor firing errors in convertor. The performance of consumer equipment, such as a motor drives and computer power supplies, can be adversely affected by harmonics. At consumer side distorted wave will find due to harmonics which is shown in figure.

##### 3) Effect on Communication System

Harmonic current flowing on the utility distribution system or within an end user facility can create interference in communication circuit sharing a common path. Voltages included in parallel conductor by the common harmonics current often fall within the bandwidth of neutral voice communications. Harmonics current on the power system are coupled into communication system by induction or direct conduction.

#### 5. CAUSES OF POWER QUALITY PROBLEMS

##### a) Faults on Transmission or Distribution Network:

Due to sever harmonics there is fault occurs in transmission line and ultimately it affects the power quality.

##### b) Non-Linear Load:

Nonlinear loads are widely used in industries. These loads mainly generate the harmonic into the power system. These harmonics cause a lot of disadvantages such as the erroneous measurement of electric meters, protective device failures, loss in transmission lines and electric devices.

##### c) Various Digital Controllers:

No of power electronics devices are generally used in power system. It creates the harmonics damage the power quality.

##### d) Lightning:

Lightning is the natural phenomenon and it generally happened in rainy season. Lightning also affects the power quality of system. High voltage transmission line gets affected due to the lightning.

##### e) Switching ON-OFF Highly Inductive Devices:

While turning ON highly inductive devices, there may be chances of voltage sag. On another side due to turning OFF inductive devices, voltage swell produced in power system.

#### 6. IMPACTS OF POOR POWER QUALITY

**a) Reduced Production Speed:** Due to large harmonics occurs in the power system the speed of components get reduced. Due to reduction in speed the efficiency will also reduce.

**b) Increased Energy Consumption:** There is large no of power electronics equipment's are used in the power system. It creates both even and odd harmonics. Odd harmonics are very effective and danger for operation. Hence due to this energy or heating effect is increased in the equipment. Hence large energy will consume by the devices and hence at output side efficiency will low.

**c) Lost production:** Due to low quality of power production getting lost in number of cases. After improving quality definitely production will save.

**d) Equipment Damage:** Harmonics are generally produced due to electronics equipment. Sometimes large heat is absorbed by the devices and hence the efficiency will reduce and equipment will damage.

**e) Data Loss:** Due to damaging of devices the data which is stored in the equipment will loss. This data may be very important for the operation purpose. If this data is already recover from the devices then this is helpful for the reoperation of equipment in power system.

#### 7. SOLUTION TO POWER QUALITY PROBLEMS

The power electronics based equipment's have become key components in today's modern power distribution system. There are the vast advantages offered by utilizing the power electronics based devices for power processing, the operation of these equipment gives rise to some serious problems in terms of power quality. These devices generate harmonics polluting the power distribution system, and demand reactive power. In order to provide technical solutions to the new challenges imposed on the power systems, the concept of flexible AC transmission systems

(FACTS) was introduced in the late 1980s. The active power filter (APF) is the most promising solution to mitigate some of the major power quality problems at the distribution level. They can be classified as shunt APFs, series APFs, hybrid APFs, and unified power quality conditioner (UPQC). The UPQC is one of the most versatile power quality enhancement devices which offer advantages of both the shunt and series APFs, simultaneously. The series APF is connected in series with the ac line and shunt APF is connected in shunt with the same ac line. These two are connected back to back with each other through a DC link.

## 8. RESULT AND DISCUSSION

We discussed about power quality problems, issues, effect on various equipment and remedies over it. as a result we can minimize the problem cannot completely vanishes and compared with the standard value and get a result. We can use various filter, power electronic devices for increasing power quality. In today's world the FACTS devices used is increasing day by day.

## 9. CONCLUSION

This paper presents the innovative idea for management of power quality issues, related information and solution over it.

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