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An Analysis of the of Power Quality

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ABSTRACT: The power quality (PQ) improvement is important for the electrical equipment's in which voltage, frequency, phase measurements etc. are invited to utilize for the uninterrupted power with better performance of the electrical system. The power quality term is also described the better electric power equipment through load. For the better power quality, the voltage magnitude should be constant and its waveform should not be distorted. Sources of the power quality such as supply, internal distribution, internal loads etc. Power quality is the huge important in the electrical system because consumption of electrical energy in various forms such as heating, cooling and various types of the number of the applications. Power quality is the combined analysis of the voltage and current quality. Harmonics in voltage and current are the most effective parameter to decide the quality of electrical power. Power quality analysis has become an important issue now a day to minimize the losses and to obtain efficient electrical power. This will surely improve the life electrical equipment's.

KEYWORDS: Power Quality, PQ issues, Harmonics, Voltage Sag, Voltage Swell, Custom Power.

I.INTRODUCTION

The power quality problems are noticed by the various types of parameters. Power quality issue is important for the consumer demands. The most of electrical energy loads can be consumed in industry, homes, agriculture they are inductive in nature for induction motors, agriculture pumps fan etc. The inductive loads currents shown by the load sources for the lagging with respect to the voltage. The pushiness of data processing machinery of power system is quite inconsistency due to non-implementation of the smart grid in power sector characterized by the power curvatures, which award the duration and magnitude of voltage deviations that be capable of putting up with [1]-[4]. For the power quality they should have constant magnitude and frequency of sinusoidal voltage waveform. Power quality problems are usually due to the distraction between utility grids and the customer electrical devices. The micro grid power quality problems comprise of wide range of disturbances such as voltage sags/swells, flicker, harmonic distortion, impulse transients and interruptions [5]. The disturbances occurred by the serious technical and financial problems for the devices. The power quality problems issues such as voltage sag, voltage swell, voltage interruption, voltage flicker, harmonics distortion etc. Flicker is described as the change in voltage over nominal expressed as precents. Let us assumed that the voltage value is increased from 120 volts to 130 volts and decreased to 114 then the flicker value is calculated by the, f=100*(120-114)/130=4.66%. Any sinusoidal components which is of a periodic wave if has frequency as an integral multiple of the fundamental frequency then that of the sinusoidal component is said to be harmonic for that particular frequency single. Let us assumed that the value of the fundamental frequency is to be 50 Hertz, and then third harmonic will be 3 multiplied by the fundamental value as it is an integral multiple. So the third harmonic will be 150 Hertz voltage swell, is defined as an increase in RMS voltage or current for durations from 0.5 cycles to 1 minute at the power frequency. Typical magnitudes are in between 1.1and 1.8 rises [6]-[8].Swell is defined as the increased in the RMS value of the voltage at power level. Ranges from a half cycle to few seconds. The end consumers are totally in dark of the power quality sent by the utilitiesHowever, in practice, power systems, especially the distribution system has numerous non linear loads which produce power quality problems such as voltage sag/swells, flicker, harmonics, , impulse transient and interruptions [9]-[10].. The bad power quality diorites the performance of the system as well as increases the generation demand [11]. A dip or voltage sag is the conflicting condition of the power system where the RMS voltage is below the supposed voltage byb10to 90%for cycle to one minute[12]-[13].Voltage sag is defined as when suddenly change in the root mean square voltage, caused by the short circuit, starting of the large motor etc. Voltage flicker, when change in the light intensity. It broadens in instantaneous voltage entitled spikes, impulses and surges commonly caused by large inductive loads being turned off, or more

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relentlessly by lighting [14]-[15].When the system is under voltage then voltage drop take place through below 90% for more than one infinitesimal. Various problems are coming out during poor power quality problem such as overloading, during faults in the system, short circuits etc. To improvement of the power quality is most serious important because the regular usages of the power in this world.

II. VARRIOUS CAUSES OF THE POOR POWER QUALITY PROBLEM

In according to the various causes are occurred during the poor power quality problem. The following fig.1 shows the various problem of the poor power quality. In electricity rules and regulation the above figure shows the acceptable limits for good quality of the power. Good power quality needs are more important due to considerable exploit as interrupted source.

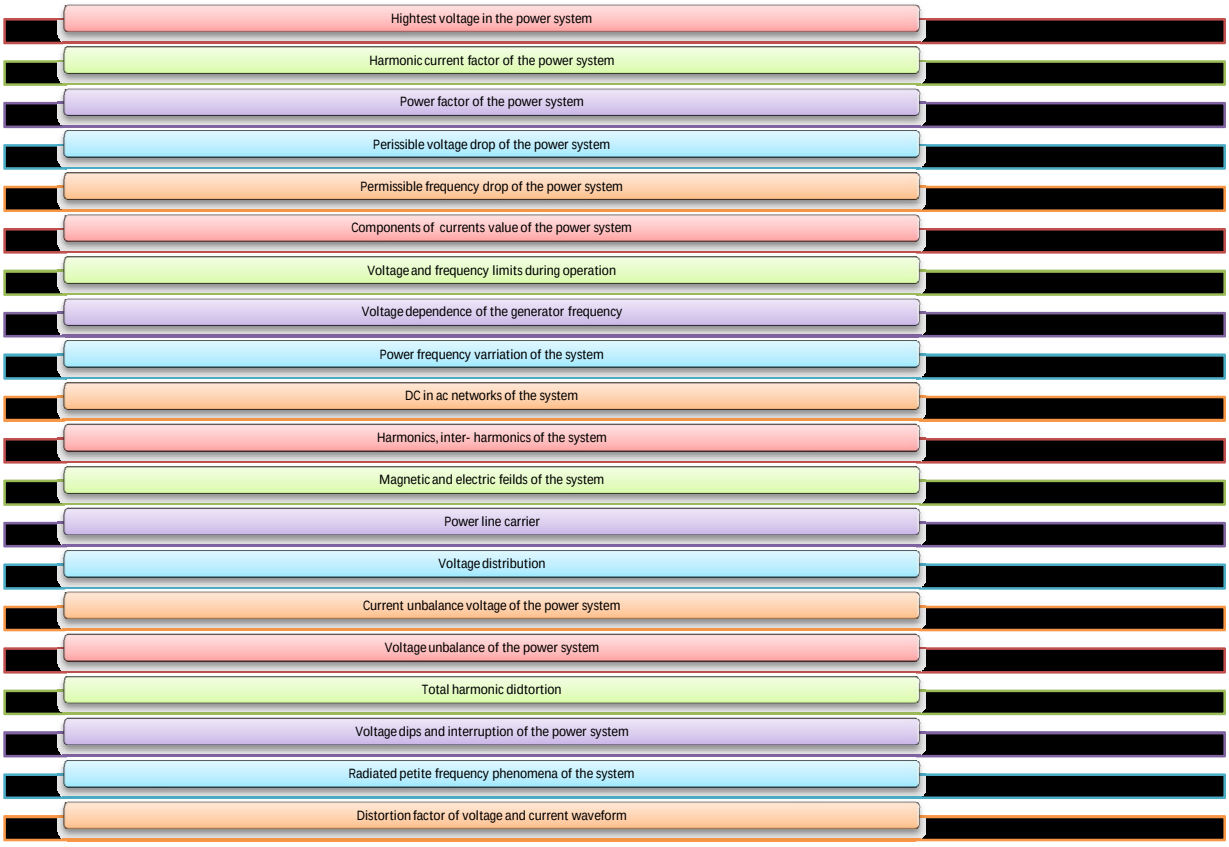

Fig.1 Poor power quality problem

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III.HARMONICS EFFECTS IN THE POWER SYSTEM EQUIPMENTS

Harmonic are the disturbance created in the every first cycle. The results in the harmonic include, increased the losses and equipment's life loss. Many utilities are employed in the substations and various protection switching are located in the switching yard. Various causes due to harmonic such as abnormal voltage spikes, increased load, drop in voltage etc. Fluctuation in the light due to the disturbance created in the voltage power supply. The following fig.2 shows the fluctuation in voltage in the power supply.

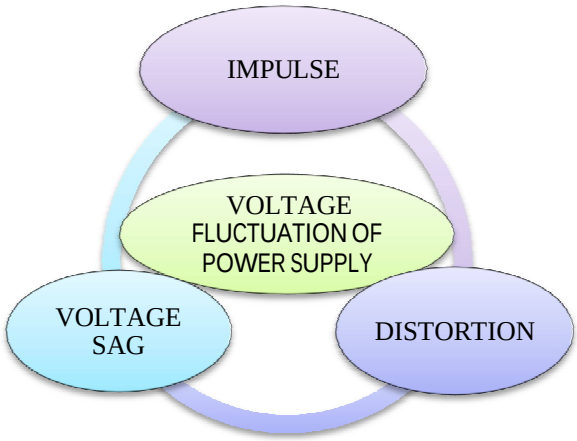

Fig.2 Voltage fluctuation of the power supply

Harmonic protection equipment's are used within the limit otherwise they are not able to work. Equipment's are not able to care for this situation. Voltage limits 220V to 250V are planned in the Indian equipment's system. This is standard voltage when the electric equipment's are working condition.

IV. SOURCES OF HARMONICS IN A POWER SYSTEM

The various kinds of the sources are used in the reduction of the harmonics in the power system. The following fig.3 shows power devices which include unit power supply.

Fig. 3 Power devices

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V. HARMFUL EFFECTS DUE TO THE HARMONIC

- Distorted voltage
- Capacitor bank overloaded problem are shown in the following fig.4

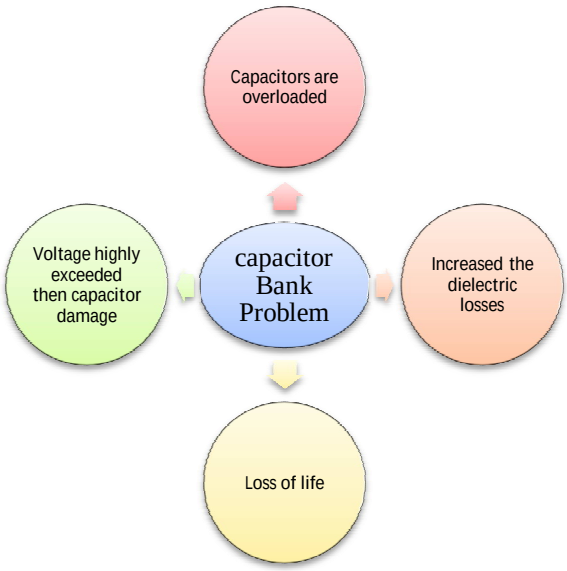

Fig.4 Capacitors bank problem

- Consumer load at low voltage
- Magnetic trip circuit breaker
- At emergency generator control of the speed
- Computer data loss
- Unwanted noise problem/ communication problem
- Eddy current losses in the core steel of the metallic strip
- Tripping the circuit
- Distorted problem
- Suddenly fuses problem
- Effected the power supplies
- Electronic equipment's problem
- Overheated transformer and motor problem
- Skin effect produced due to overheating conductor
- Circuit breaker and relay problem
- Peak current sensing is greater than RMS value ,overprotection occurs
- Miss operation in the electronic equipment
- Fluctuations problem

VI.VOLTAGE SWELL

The voltage swell causes are; start/stop heavy loads, imperfectly power sources, imperfectly regulated transformer etc. Here the following fig.5 shows the generated simulation results of the voltage swell with waveform. During voltage swell, increase of the voltage, at the power frequency, time interval more than one cycle etc.

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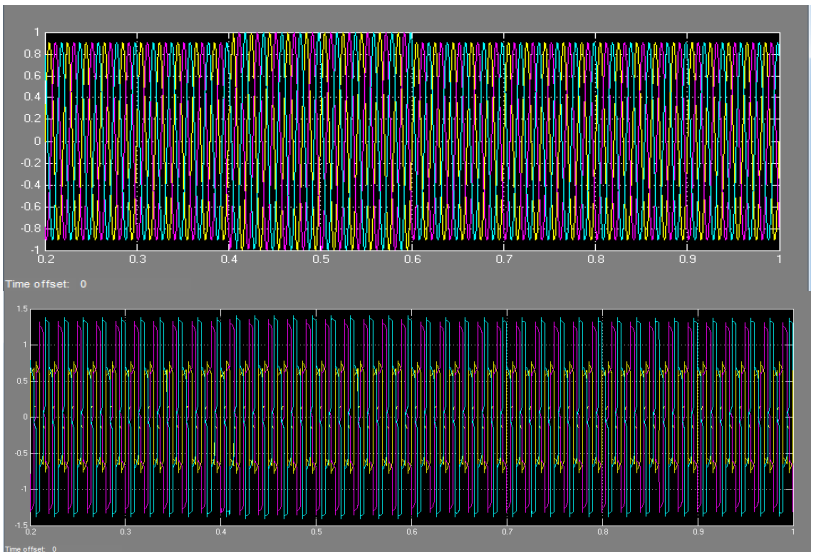

Fig.5 Simulation results for swell

VII.VOLTAGE SAG

Three phase voltage sag is simulated and the results are shown in the following fig.6. According to the IEEE Std. 1159 (1995), sag magnitude range from 10% to 90% of nominal voltage and sag durations from half- cycle to 1 minute voltage sags are the most common power disturbance whose effect is quite serve especially in industrial and large commercial customers such as the damage of the sensitive equipments and loss of the daily productions.

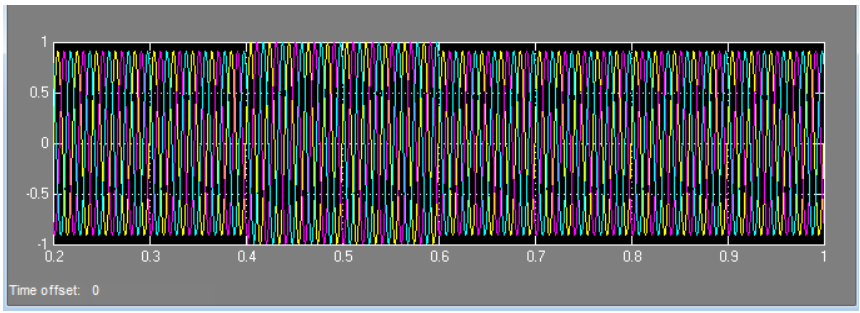

Fig.6 Simulation results for sag

VIII.CONCLUSION

In this paper, overview of the power quality has been discussed. Various problems occurred in the poor power quality situations. In the power quality factor is unity then wave form are pure sinusoidal. For the better power quality there are two things supposed that voltage magnitude should be constant and waveform should not be distorted. We supposed the situation; power can be irregular, and then what happen the building can be bad quality. There are about 80% problem of poor power quality are caused by insufficient building wiring, large loads sharing the same circuit. These problems are caused by the starting, running and stopping large machinery and other critical system problem. If the consumer building is more than 18 years old, it was not designed in the today best power equipment's. Then the system will be overloading and poor power quality problem created. Solution of improvement of the power quality problem is

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approaches the custom power devices, and active filters. Various types of the custom power devices are such as D-STATCOM (Distributed static compensator), DVR (Dynamic voltage restorer), UPQC (Unified power quality conditioner).In surrounding of the restoring technologies, distributed generation or an interface application to turn away power quality problem.

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