

POWER QUALITY PROBLEMS AND SOLUTIONS IN INDUSTRY

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ROOT CAUSE OF PQ ISSUES

The widespread use of electronic equipment, such as information technology equipment, power electronics such as Adjustable speed drives (ASD), programmable logic controllers (PLC), energy-efficient lighting etc. led to a complete change of electric loads nature. Due to their non-linearity, all these loads cause disturbances in the voltage waveform.

These loads are simultaneously the major causers and the major victims of power quality problems

POWER QUALITY

It is the Quality of the voltage, rather than power or electric current.

The term is used to describe electric power that drives an electrical load and the load's ability to function properly. The performance of electronic devices is directly linked to the power quality level in a facility

IMPACT OF POWER QUALITY PROBLEMS

Without proper power, an electrical device may malfunction, fail prematurely or not operate at all. There are many ways in which electric power can be of poor quality and many more causes of such poor quality power

MOST COMMON POWER SUPPLY PROBLEMS

- 1.Voltage surge/Spike
- 2.Voltage Dips
- 3.Under voltages
- 4.High voltage spikes
- 5.Frequency variations
- 6.Power sag
- 7.Electrical line noise
- 8.Brown outs

MOST COMMON POWER SUPPLY PROBLEMS

- 9. Black outs
- 10. Very short interruptions
- 11. Long interruptions
- 12. Voltage swell
- 13. Harmonic distortion
- 14. Voltage fluctuations
- 15. Noise
- 16. Voltage unbalance

Improving power quality

1. Grounding and bonding integrity
2. Proper wiring
3. Use of power conditioning equipment
4. Use of energy storage systems

Power conditioning equipment

1. Transient voltage surge suppressor (TVSS)

2. Filters

- Noise filters
- Harmonic filters

3. Isolation Transformers

4. Voltage regulators

- Tap changers
- Buck/Boost
- Constant voltage Transformers

Power conditioning equipment

5. Dynamic voltage restorer

6. Uninterruptable power supply

- Offline UPS

- Online UPS

- Line interactive UPS

7. Motor Generator set

8. Thyristor based static switch

9. Static VAR compensator (SVCS)

10. Unified power quality conditioner (UPQC)

Energy storage systems

1. Fly wheels
2. Super capacitors
3. Super conducting magnetic energy storage (SMES)

In a nutshell

- The availability of electric power with high quality is crucial for running the sophisticated industrial/medical equipment
- To avoid huge losses related to PQ problems, the most demanding consumers must take action to prevent the problems.
- Among the various measures, selection of less sensitive equipment can play an important role.
- When even the robust equipment is affected, then other measures must be taken, such as installation of restoring technologies, distributed generation or an interface device to prevent PQ problems