



The  
Electrical  
Power  
Engineers

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## QUAL-TECH SERVICES

### Power Systems Analysis & Measurements

- *Short Circuit & Coordination,*
- *Arc Flash & Labeling*
- *Power Factor & Harmonics*
- *Load Flow & Stability*
- *Motor Starting, Transients, Flicker*
- *Problem Solving/Power Quality*
- *One-Line Diagrams*

*Commercially available software systems are used for most analyses. For the convenience of our clients, it is possible to transfer the data files to the client if he has the same software.*

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### Problem Solving

- *Equipment Failures*
- *Unexplained Equipment Operations*
- *Excessive Power Outages*
- *Inefficient Operations*
- *Need for New Solutions*

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### Specialized Applications

- *Harmonic Filters*
- *Static Var Systems*
- *Arc Furnaces*
- *Cogeneration*

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### Specialized Turnkey Projects

- *Harmonic Filters*
- *Power Quality Solutions*

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### Power Systems Workshops

- *System Application Considerations*
- *Power Quality*

# TOTAL POWER FACTOR & HARMONIC SOLUTIONS

## 1. POWER FACTOR ANALYSIS

- *Determine Savings & Kvar Required*
- *Evaluate Power Factor Control Methods*
  - ◆ *Adjust Transformer Taps*
  - ◆ *Adjust Field of Synchronous Machines*
  - ◆ *Do Not Oversize Motors or SCR Drives*
  - ◆ *Add Synchronous Condenser(s)*
  - ◆ *Add Capacitor Bank(s)*
  - ◆ *Add Harmonic Filter(s)*

## 2. HARMONIC AUDIT

- *Document Harmonic Producing Loads*
- *Review System Operating Conditions*
- *Document Future System Changes*
- *Review Harmonic Related Problems*
- *Measure Harmonic Distortion*
  - ◆ *Average, Maximum, & Statistical Data*
  - ◆ *Background Distortion Levels*

## 3. SYSTEM ANALYSIS & RECOMMENDATIONS

- *Simulate the System*
- *Evaluate Possible Alternatives*
- *Design Filters if Required*
- *Finalize Designs to Meet the Criteria*
- *Make Solution Recommendations*

## 4. EQUIPMENT & INSTALLATION SPECIFICATIONS

- *Equipment Specifications*
  - ◆ *Complies with ANSI/IEEE Standards*
  - ◆ *Enclosure/Structure Suitable for Location*
  - ◆ *Self-Protecting Design Features*
  - ◆ *Enhanced Safety & Maintenance*
  - ◆ *Can Incorporate Customer Desired Features*
- *Installation Specifications*
  - ◆ *Sets High Standard of Workmanship*

## 5. EQUIPMENT PURCHASE OR LEASE

- *Capital Purchase*
- *Financing Available*
  - ◆ *Immediate Positive Cash Flow*

## 6. INSTALLATION

- *Continuous Supervision of Contractors*
- *Coordination with Plant Activities*
- *Provide Foundations and/or Structures*
- *Equipment Delivery and Placement*
- *Connections to Electrical System*
- *Changes to Existing Electrical System*
- *Drawings (As Built)*

## 7. COMMISSIONING

- *Detailed Factory Equipment Checkout*
- *Detailed Field Equipment Checkout*
- *Harmonic Audit*
- *Power Factor Evaluation*
- *Operation & Maintenance Manual*

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## QUAL-TECH TURNKEY ADVANTAGES

- ◆ *One Point of Responsibility*
- ◆ *Reliable & Complete System Solutions*
- ◆ *Flexible Design for Future Changes*
- ◆ *Self-Protecting Equipment Package*
- ◆ *Positive Cash Flow With Lease*
- ◆ *The Total Solution*

# POWER QUALITY SOLUTIONS

**Qual-Tech Engineers, Inc.** can supply all of the services involved in assuring that your power quality issues are solved. Within the last five to ten years a large amount of equipment has been added to electrical power systems which is controlled by electronics. Some of the control is directly through power conversion electronics, such as ac-drives, dc-drives, power controlled heating, and switch mode power supplies, while some of the other electronic equipment includes computers and PLC's. System disturbances, which we have considered to be normal for many years, now cause disruption to the industrial power system with a resulting loss of production. In addition, new considerations must be taken into account for developing a reliable power system which were not previously considered significant.

Power quality is actually an issue of power compatibility. The operating characteristics of each piece of equipment must be compatible with the characteristics of all the other pieces of equipment connected to the system under normal operating conditions as well as abnormal operating conditions. The condition of the system voltage is generally a key factor in the compatibility issue. This includes harmonic distortion, momentary voltage dips, transient overvoltages, etc. It is essential that the entire electrical system be sufficiently compatible so that the plant can safely produce a quality product at the minimum cost. This includes the entire electrical system, not just one side of the utility meter or the other.

**Qual-Tech Engineers, Inc.** can address your power quality concerns:

\_\_\_ **Field Measurements** - Determine existing system conditions.

- Harmonics
- System Disturbances
- Power Factor

\_\_\_ **System Analysis** - Evaluate possible solutions and other system operating conditions.

- Harmonics
- Transients
- One-Line Diagrams
- Short Circuit, Coordination, and Arc Flash
- Load Flow
- Transient Stability

\_\_\_ **Education** - Educate personnel on industrial power system application considerations.

- Industrial Power Systems Workshops
- Power Compatibility Workshops
- Workshops for Customer Specific Problems

\_\_\_ **Solutions** - Recommend detailed solutions.

- Detailed Recommendations
- Turnkey Solutions

# SYSTEM AUDIT AND ANALYSIS

## SYSTEM AUDIT AND ANALYSIS INCLUDES...

1. *Equipment and Substation Audit*
2. *Documentation of Equipment and System Operating Conditions*
3. *Updating One Line Diagrams*
4. *Load and Harmonic Audit*
5. *Power Factor and Harmonic Analysis*
6. *Short Circuit, Coordination, and Arc Flash Analysis*
7. *Development of a Plan With Specific Recommendations*

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## FOR INDUSTRIAL PLANTS OVER 20 YEARS OLD, OFTEN...

- The system was designed to standards and codes that may be out of date.
- There are many different types of equipment.
- There is equipment from many different manufacturers.
- System and equipment documentation is either incomplete or nonexistent.
- One-line diagrams are either badly out-of-date or nonexistent.
- Less reliable analog trip devices are in use instead of modern static trip devices.
- Consideration is given to replacing aging switchgear.
- Equipment short circuit ratings may be inadequate.
- Equipment maintenance is lacking.
- When a breaker trips or a process misoperates, it is difficult to identify the source of the problem.

Develop a **“PLAN”** so that steps can be taken to improve system efficiency and reliability. Begin with a **“SYSTEM AUDIT AND ANALYSIS”** done by the experienced staff at *Qual-Tech Engineers, Inc.*

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## OLDER PLANTS ARE A CHALLENGE....

....THEY ARE OUR **“SPECIALTY”** AT QUAL-TECH !!!