

# Power Systems Analysis

Complete system optimization

## APPLICATIONS

- Electrical power systems
- Oil and gas mining, petrochemical, industrial, and utility sectors
- Power system optimization

## BENEFITS

- Improves safety for personnel and equipment
- Enables efficient, economic use of power
- Reduces losses and operating costs
- Mitigates penalty charges due to poor power factors and harmonics

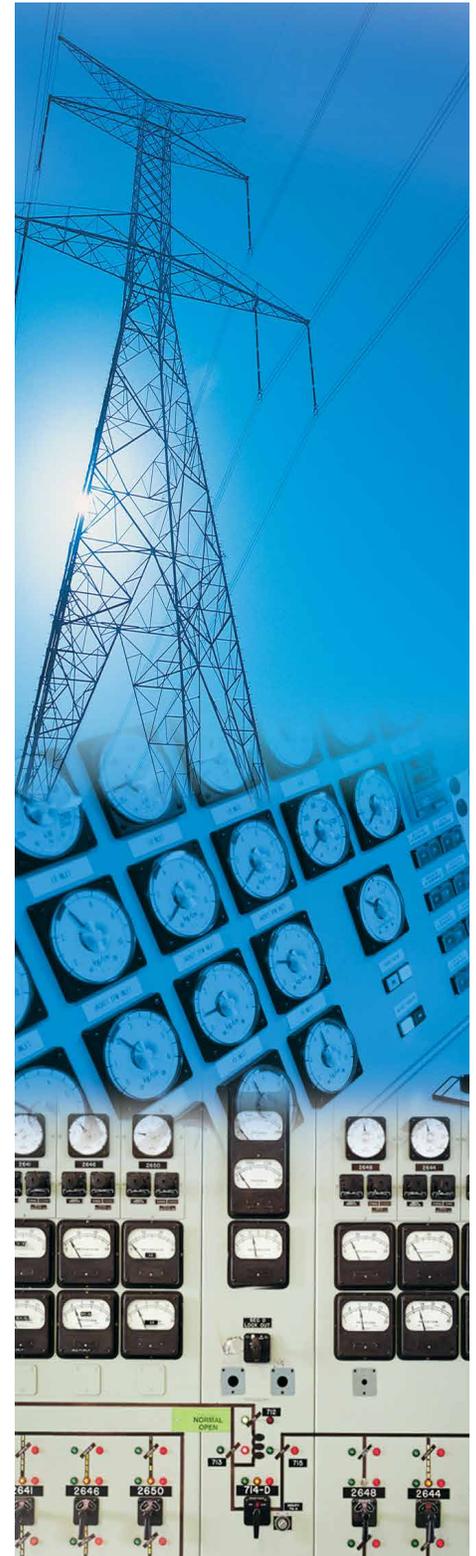
## FEATURES

- Load flow studies
- Short circuit analysis
- Harmonic analysis
- Evaluation of system expansion on existing network
- Protective device coordination
- Arc-flash hazard analysis
- Motor starting studies
- Power factor correction
- Load filter for ESP systems

Schlumberger power systems analysis uses field measurements and computer modeling to analyze power systems, make recommendations, and deliver custom products such as filters and power factor correction capacitor banks, enabling the efficient and economic use of electric power. Projects have been performed in petroleum, mining, petrochemical, industrial, and utility sectors throughout the world.

The power systems analysis database serves as the basis for improving system performance and power quality, reducing operating costs, and providing a reliable supply of power during system operation. Using the latest software tools, Schlumberger engineers can deliver complete system optimization.

Final reports detail the voltage, current, and power factor at various locations in the system. Typically, this type of study is used to optimize transformer, switchgear, and cable loadings. A mathematical model optimizes the electrical power consumption in a system by determining if loading can be redistributed or aided by power factor correction or if a new load can be added.



# Power Systems Analysis

## Power systems analysis processes

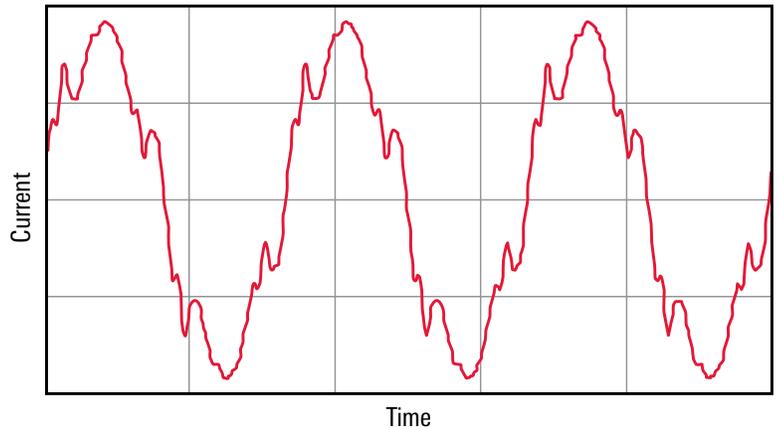
Schlumberger specialists study all parameters when performing power systems analysis. The total system approach provides a complete and thorough evaluation. The following steps ensure that all information and conditions are understood and considered:

- Field trips are made to gather data
- Close coordination with the power supply utility is necessary to obtain information about the power system in remote locations
- Proper coordination with the variable-frequency drive manufacturer is needed to obtain accurate harmonic characteristics for the specific drives
- Accurate modeling of the power system is used in the design of the filters and coordination of the protection devices.

## Typical power system analysis

- Load flow — A base study is performed to determine the steady-state operating characteristics of the electrical system.
- Transient motor starting — This study examines how the electrical system will react when individual motors are started or when groups of motors are started simultaneously.
- Short circuit — The calculations of fault current levels at all buses in the system are studied to minimize the consequences of a potential short circuit in the system.
- Protective device coordination — Protective devices, such as circuit breakers, fuses, and relays, are studied and their usage properly coordinated to protect personnel and equipment.
- Harmonics — This study is recommended on systems that have 20% or more nonlinear loading produced by equipment such as variable-speed drives, arc welders, and fluorescent ballasts.

Unfiltered Current Waveform



Filtered Current Waveform

