

## Power Systems Studies

A well-designed power system is the backbone of all industrial and utility facilities. A GE power system study provides customers with the information necessary to upgrade and maintain their power delivery infrastructure. The results focus on reducing operating costs, improving efficiency, increasing reliability and improving system maintainability. Our engineering experts specialize in:

- Utility
- Automotive
- Metals
- Pulp & Paper
- Oil & Gas
- Chemical
- Cement
- Commercial

### Industry Expertise

Power systems engineering is one of the oldest and most fundamental services provided by GE. Our power system engineers have unprecedented expertise gained from over 100 years of working with a wide range of customers and utilizing pioneering techniques.

GE engineers have direct access to GE product design teams who maintain expertise in the intricate details of power system equipment.

### Delivering Value

- Increase operating reliability
- Evaluate impact of adding new equipment
- Reduce operating costs
- Optimize system upgrades
- Identify source of failures

### Systems Studies Offered

#### Short Circuit Study

Your country's electric code may require that all short circuit interrupting devices have capabilities beyond the ratings imposed by the power system. GE Energy's short circuit study can provide information to help determine if the interrupting capacities of the

power system's components provide adequate protection. The short circuit study calculates the short circuit capacity at designated locations within the power delivery infrastructure. This data may also be utilized to select equipment ratings and may serve as the basis for a protective device coordination study and an arc-flash hazard analysis.

#### Load Flow and Power Factor Study

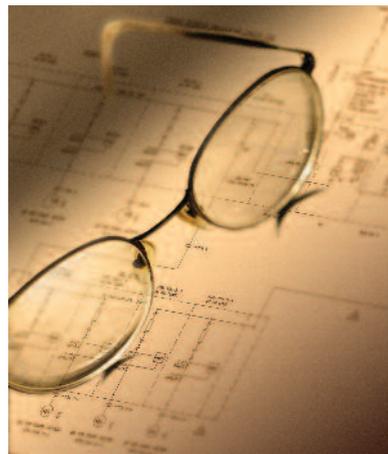
Utilizing proven mathematical models, GE's load flow study determines how the electrical system will perform during normal and emergency operating conditions, providing the information needed to:

- Optimize circuit usage
- Develop practical voltage profiles
- Minimize kW and kVar losses
- Develop equipment specification guidelines
- Identify transformer tap settings

Additionally, the power factor study calculates the reactive load compensation required to achieve and sustain a given reactive voltage level and to maintain a specific power factor.

Consider GE's load flow study for the following:

- Facilitating conceptual design
- Identifying corrective actions when components are overloaded or voltage performance is inadequate
- Determining the power factor correction to increase system capacity and lower utility bills
- Determining the operational impact of potential contingencies



## Arc-Flash Hazard Analysis

GE's comprehensive arc-flash hazard analysis is designed to help ensure employee safety against dangers associated with the release of energy caused by an electrical arc. Key elements of an arc-flash hazard analysis are:

- Determining the required level of personal protective equipment (PPE)
- Communicating PPE and safe approach distances to exposed energized equipment through an effective warning label system

## Protective Device Coordination Study

You can help ensure ongoing, reliable operation during a fault by periodically evaluating the protective devices in your power system. The goal of a protective device coordination study is to assure the system is capable of clearing a fault in the minimum amount of time possible, while minimizing the impact to the power system. A protective device coordination study also may include recommendations for revisions of the types of protective devices for improved protection.

## Harmonic Analysis

Harmonic analysis has become more important due to the application of AC & DC adjustable speed drives, converters and other equipment that produce harmonic distortions. These non-linear loads generate harmonic currents that interact with system impedances. These interactions may result in equipment malfunction and/or damage to the power system.

A GE harmonic study analyzes the system and recommends corrective measures, which include the design of filters or traps to absorb harmonic currents generated by non-linear loads.

## Conceptual Design Study

The purpose of a conceptual design study is to develop a roadmap for building and maintaining an optimum power system that serves present and future plant operating needs. Conceptual design studies often include a comprehensive review of the existing system with a clear understanding of future requirements.

A key component of a conceptual design study is the ability of the engineer to understand existing conditions, future needs and equipment and system capabilities. A combination of load flow, motor starting, short circuit, protective device coordination and stability study techniques will be employed to complete the design study.

## Motor Starting Study

The motor starting study analyzes the motor, the motor load and the connected power system through the range of operation. Recommendations on motor starting methods are provided.

## Impact Load Study

An impact load study can model the system to determine whether the impact load may be added to the existing system without causing detrimental operating effects due to voltage and frequency fluctuations.

## Power System Automation Study

As an extension of a conceptual design, protective device coordination, and load and power factor studies, the power system automation study focuses on developing solutions to operating issues in existing or planned power systems. It recommends electronic and control technologies that provide productivity enhancing solutions.

## Diagnostic Study

A diagnostic study provides an engineering review to determine the root cause of power system failure.

The power systems studies GE Energy offers are tailored to meet the needs of the individual facility and customer. Each study involves the collection of data and information. GE employs the most advanced tools, processes and procedures to obtain information. The end result is a formal, comprehensive report outlining study findings and recommended actions.

For more information, contact your local GE Energy office or call 1-888-GE4-Serv or 540-378-3280.



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