



Power system studies to help you plan, manage and modernize your grid

Eaton's power system engineers are heavily involved in industry activities through conducting seminars and workshops for utilities and industrial groups worldwide. They participate in technical societies such as IEEE, CIGRÉ and International Standards Committees in addition to Transmission Authority User's Groups by presenting technical papers and taking part in their working groups and task forces. This global involvement in the electrical industry is an important component of Eaton's complete solution as it allows us to stay up-to-date with the most relevant challenges and the means to deal with them to provide the best asset management to you.

Power systems engineering studies

All changes to the utility system should start with an investigation and a system study. This includes whether you're looking to increase your generation capacity, ensure NERC compliance, incorporate alternative energy resources, protect personnel or increase efficiency, a study offers the peace of mind that your system's performance is optimized, ensures your employees and customers are safe during fault conditions and you are meeting the latest industry standards and requirements. Each study includes evaluation of performance as well as recommendations for improvements by professional and experienced engineers. In addition, Eaton can review your existing safety plan, electrical safety audits and electrical safety training program to ensure your programs are at maximum efficiency to protect your resources.

Switching transient analysis

When a transformer failure occurs it is critical to understand if a switching induced transient was the root cause. Through state of the art modeling, Eaton simulates large power distribution apparatus (e.g. large transformers and/or autotransformers) to identify existing system problems or areas of concern. The analysis includes both a component analysis that simulates the cause and effect of the failure and engineering recommendations to suppress problematic switching transients. Eaton also provides engineering recommendations to eliminate this system issue in the future.



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Insulation coordination

Evaluates the degree of surge protection provided for the existing and new bus tie breakers, existing and potential transformers and associated disconnect switches and switchgear. Plots of surge arrester protective characteristics and equipment basic impulse insulations levels (BIL) are provided to illustrate the degree of surge protection that is provided by the arresters under consideration. Eaton provides engineering recommendations to resolve identified system protection concerns.

NERC compliance

Relay evaluation is required to comply with NERC Generator Frequency and Voltage Protective Guidelines. This study evaluates the generator frequency and voltage protective relay performance for one or more generators. It determines if a relay will trip the generator during certain frequency versus time conditions due to power system anomalies. Eaton confirms if your system performs as designed and provides engineering recommendations for identified issues.

System impact/transient stability study

Before large scale changes can be implemented for either increased generation or load expansion, this study is required by the network's transmission authority. The study is required to determine the impact to machine stability and major transmission line and substation limits, as well as studying the steady-state and dynamic behavior associated with the increased generator output to a wide area network and the impact of load expansion.

Included in the study are possible remediation that includes (but not limited to) protective relaying in the transmission system. The study is conducted under many operating scenarios to understand the impact of operating during the most stressed system conditions at the point of interconnection.

Ground grid analysis

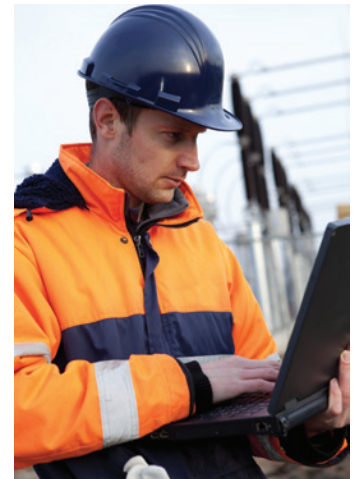
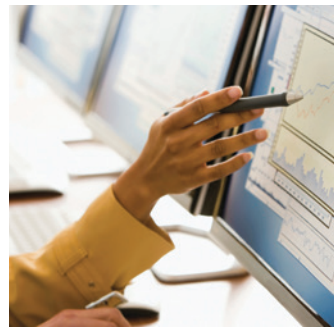
A ground grid analysis study is required for new substations to ensure substations are designed to adequately ground during fault conditions. The study calculates the zone of influence, the area around a station where ground potential is raised during ground fault conditions. It is imperative to understand and design your ground grid effectively to ensure the safety of your employees as well as protection for the expensive substation equipment.

Additional studies include:

- Insulation coordination
- Microgrid feasibility
- Integration capacity analysis (DER impact)
- Techno-economic analysis
- Network disturbance assessment D-A-CH-CZ
- GIS based CYME modeling
- Unbalanced load flow analysis/capacitor placement
- Motor starting studies (Load flow based and dynamic)
- Harmonic analysis and filter design
- Long-term load flow analysis
- Volt-Var network optimization
- Optimum capacitor placement
- Optimum regulator placement
- Optimum recloser placement
- Power quality site survey
- Effective grounding studies
- Unbalanced short circuit
- Protective device evaluation
- Enhanced protective device coordination
- Arc flash risk analysis

Eaton's experience

We offer a wide range of power system engineering services combining utility experience with state of the art technologies to assist you in addressing new and emerging system problems. These services include, but are not limited to, power system studies for transmission, distribution and industrial power systems. Our engineering staff offers a high degree of skill and their knowledge covers almost every area of power system analysis. Backed by extensive field experience in system planning, design and operation, they provide a range of options in terms of specialization, experience, and know-how. Their knowledge of the industry best practices allows them to provide innovative solutions to current challenges. Our professional team of dedicated experts continues with the commitment to work closely with your engineers throughout the entire project to achieve its successful completion.



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