

The background of the entire page is a dark blue gradient with a complex, glowing white circuit board pattern. The pattern consists of various electrical symbols, lines, and components, creating a technical and futuristic aesthetic.

# ***POWER SYSTEM ENGINEERING***

*SE Engineering, PC strives to be a leader in the power system engineering field by providing our customers with the highest level of quality, integrity, and innovation. Our mission is to offer the safest, most reliable power system solutions for you, our customer and client, and to ensure your workplace meets or exceeds all applicable NFPA 70E, NEC, and OSHA requirements.*

## COMPLIANCE SOLUTIONS

Electrical hazards account for more than 250 fatalities and 3,500 injuries in the workplace each year.\*

Electrical accidents rank 7<sup>th</sup> among all causes of work-related deaths in the U.S.\*



\* *Electrical Safety Foundation International*

NFPA 70E requires companies to employ safe work practices to protect personnel by reducing exposure to major electrical hazards. Originally developed at OSHA's request, NFPA 70E helps companies and employees avoid workplace injuries and fatalities due to shock, electrocution, arc flash, and arc blast, and assists in complying with OSHA 1910 Subpart S and OSHA 1926 Subpart K requirements.

While basic compliance to NFPA 70E requirements is established with a five-step process, a sixth step assists the facility owner with fine tuning the electrical power system, both for safety and operability.

### **Step 1: Develop and Audit Electrical Safe Work Practices Policy**

We can help you develop a written document that covers all areas of your company's electrical safety practices. It will include such things as lockout/tagout procedures, methods of qualifying workers, selection and application of personal protective equipment (PPE), methods of establishing safe work areas, arc flash and shock protection calculations, equipment labeling, and worker audit procedures.

### **Step 2: Conduct an Arc Flash Risk Assessment using the Incident Energy Analysis Method and Apply Associated Equipment Labels**

Our engineers can conduct a power system engineering study that is specific to the power distribution and control equipment at your facility and properly label such equipment.

### **Step 3: Ensure Adequate Supplies of Personal Protective Equipment (PPE) and Proper Tools**

We can help you determine the appropriate PPE that is necessary for employees working in areas where potential electrical hazards exist.

### **Step 4: Conduct Regularly-Scheduled Safety Training and Audits for All Electrical Workers**

NFPA 70E defines a qualified person as "one who has skills and knowledge related to the construction and operation of the electrical equipment and systems, and has received safety training to recognize and avoid the hazards involved." We can help you satisfy this requirement by providing safety training specific to the hazards of arc flash, arc blast, shock and electrocution in your facility.

### **Step 5: Maintain All Electrical Distribution System Components**

We can work with qualified field services personnel to perform on-site preventive and predictive maintenance services for any manufacturer's electrical equipment. Upon completion, a detailed report will be provided that identifies potential issues along with corrective recommendations.

### **Step 6: Follow Strategies to Mitigate and Control Arc Flash Hazards**

This often overlooked step is one of the most crucial in optimizing the safety and performance of the power system. The goal of arc flash mitigation is to reduce the arc flash energy, and thus the PPE, to a level that permits normal tasks to be performed on equipment.

SE Engineering, PC is focused on helping companies comply with NFPA 70E, NEC, and OSHA requirements and offers a variety of arc flash mitigation solutions to optimize the safety and reliability of your facility's power system.



Contact Us: [info@seengr.com](mailto:info@seengr.com)

## DESIGN SERVICES



SE Engineering, PC provides power system engineering and electrical design services to support a wide range of needs, including utility, industrial, data center, healthcare, university, and government facilities. Projects can be customized to include everything from basic design consultations to feasibility studies. We even partner with industry-leading electrical manufacturers to provide complete turnkey solutions.

### **Power Distribution Equipment Modernization and Upgrades**

Our engineers will perform an onsite inspection of your electrical equipment, and based on its condition and your present and future power requirements, help you select equipment and upgrade options that will improve reliability and extend the life of your system while minimizing equipment downtime. We will even help facilitate the procurement and installation of new equipment as well as test and commission it.

### **Distribution System Design**

We have the expertise and resources to complete all aspects of substation construction, remodeling, and/or expansion needs for utilities and industrial facilities. Our design experts utilize state of the art software to assure the fit, form and function of our physical designs of the electrical infrastructure.

### **Active and Passive Filtering Design for Power Quality Improvements**

Our engineers will evaluate the harmonic and transient environment in your facility and recommend the appropriate corrective equipment to maintain an optimum power factor.

### **Backup Power Design and Integration**

We can design and work with electrical manufacturers to install the necessary power system equipment to connect both temporary and permanent generators to your facility to minimize electrical downtime in the event of a power outage.

### **High Resistance Grounding Design and Integration**

Our engineers will assess, design, and apply power system conversions to help your facility retain continuous operability during a ground fault and prevent the damage to equipment typically caused by ground faults.

### **Power System Automation and Transfer Schemes**

An important requirement of mission-critical electric power distribution systems is the need for automatic operation. In particular, the rapid and reliable transfer of the system from one power source to another during certain system events is crucial to achieving the reliability goals for such system and the facility it serves. We can work with you to design power system solutions that ensure uninterrupted service to your mission-critical equipment.

### **Construction Project Management**

Our engineers are also experienced project managers, and can manage costs, plan resources, and schedule multiple vendors to deliver a complete turnkey solution.

### **Commissioning Services**

We will verify your equipment has been properly installed and is safe to energize. Proper commissioning ensures the main power path as well as the controls, monitoring and protection systems are functioning to deliver the overall level of reliability stipulated in the system design. Our services also include operator training and operation manuals.

**SE Engineering**

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## ASSESSMENT SERVICES



Our power system assessments are performed by experienced, licensed professional engineers. They can be customized to meet your needs and can help your company address reliability issues, process disruptions, code violations, outdated safety requirements, and more.

### **Disturbance Monitoring and Power Quality Analysis**

Power quality issues can be caused by a variety of problems, including over-voltage, under-voltage, outages, electric noise, and harmonic distortion, and can cost hundreds of thousands of dollars in equipment damage and lost work time. Our engineers will document the symptoms, examine damaged equipment, assess the power and grounding in the area, collect data using temporary monitors, and develop a report of findings that identifies the most probable cause. We will also recommend cost-effective mitigation solutions to prevent future occurrences of the problem.

### **Power System Grounding Evaluation**

Components of a grounding system are subject to deterioration over time and can lead to an increased chance of fire, data and equipment losses, process anomalies, plant shutdowns, and workplace safety hazards. Our engineers will develop a scope of work to address your areas of concern, which will include documenting the baseline condition of your grounding and surge protection system, and recommending corrective actions to ensure your facility remains in compliance with current electrical codes and standards.

### **Equipment Condition/Maintenance Evaluation**

Our engineers can provide a basic equipment condition evaluation by visually inspecting the equipment during a walk-through of the facility. They will present an overall assessment of the structural, mechanical, and electrical integrity of the equipment and document any observed safety, operational, or maintenance concerns. This information can be used to inform decisions about repairing, replacing, and reconfiguring equipment to optimize your power system.

### **Risk Assessment**

A risk assessment is used to evaluate the condition of the electrical system as well as the vulnerability of a facility or process to the adverse effects of an unexpected electrical event. Four key factors are used to determine the overall risk to a facility or process: personnel safety, critical-function impact, likelihood of occurrence, and facility vulnerability.

### **Contingency Planning**

Our engineers will identify a power system's key components and evaluate available alternatives, in case of a major asset loss. They will then produce an action plan to be implemented in the event of a major loss.

## ANALYTICAL STUDIES



Our analytical studies will help identify potential issues with your power system and determine solutions to eliminate or mitigate their effects. Each study will include a detailed report of findings along with corrective recommendations to help maximize the reliability and operational efficiency of your system.

### **Protective Device Time-Current Coordination Analysis**

Our engineers will evaluate your electrical system's protective devices, including relays, fuses and circuit breakers, and the equipment to which they are applied to ensure they are providing your power equipment with the appropriate protection. The final report will include suggested settings for all adjustable devices that will isolate faulty circuits, maximize system protection, and reduce possible equipment damage.

### **Short Circuit Analysis**

We will calculate the fault current levels throughout the power system and compare the interrupting duties of the devices being analyzed with the available fault currents. If underrated equipment is identified we will provide recommendations to help you comply with industry codes and standards as well as improve workplace safety.

### **Load Flow Analysis**

A load flow analysis can be used to address present electrical system deficiencies or identify system requirements to meet future demands. Our engineers will use design data or field measurements to calculate various scenarios to stabilize system voltages, evenly distribute plant load, and improve power factor.

### **Harmonic Analysis**

We will identify sources of power quality issues that can reduce system efficiency and increase operating costs.

### **Motor Starting Analysis**

Our engineers will use this analysis to calculate the voltage, current, and the accelerating torque of motors during the starting process. This data can be used to prevent damage to equipment due to voltage sags, and extend motor life by reducing thermal and mechanical stress during startup.

### **Switching Transient Modeling and Analysis**

Our engineers will determine stresses that system components are exposed to and recommends corrective measures, including alternative switching schemes, adding additional components, and modifying the power system configuration.

### **Reliability Analysis**

A reliability analysis can be used to quantify the probability that a system or component will operate as intended. This will allow our engineers to identify potential modes of failure and recommend solutions to improve power system reliability.

### **Substation Ground Grid Analysis**

Our engineers will evaluate high-risk areas of the switchyard and provide suggestions to optimize grid geometry and reduce potential risks during ground faults.

### **Stability Analysis**

Our engineers will evaluate various power system scenarios corresponding to switching actions or the initiation of a fault. This will provide you with a better understanding of your system's response to unfavorable conditions and allow for better contingency planning.