



POWER  
CONTROL  
ENGINEERS

# Power System Studies & Protection System Design

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PCE excels in conducting comprehensive power system studies and designing protection systems. With a profound understanding of the challenges and intricacies of power systems, we offer tailored solutions that ensure the safety, reliability, and efficiency of electrical systems. Whether it's for a new installation or an upgrade, our team of skilled engineers use cutting-edge tools and techniques to analyse and design systems that meet your specific needs. Our expertise spans a wide range of industries, ensuring your power system is optimised for peak performance.

**Count on us**

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## Power System Studies & Protection System Design

### Our services include

**Power system modelling, using ETAP, PTW and PowerCad software.**

**Protection system studies and design**, including coordination and selectivity analysis. Protection schemes include overcurrent and earth fault, directional and non-directional, motor, high and low impedance differential, distance protection, and IEC 61850 communication systems including goose messaging implemented in a large and growing number of relay makes and models. Services typically consist of:

- Protection design, including detailed analysis of fault data and customising of protection schemes to suit, developing relay setting files, or evaluating existing settings, and specifying CTs.
- Testing support including detailed Inspection & Test Plan (ITP) development, Factory (FAT), and Site Acceptance Testing (SAT).

**Arc flash studies**, including IEEE1584 incident energy calculations, hazard and risk assessments and labelling, mitigation measures and protection optimisation.

**Load flow studies**, including steady state and dynamic analysis such as motor starting studies, analysis of load diversity, equipment rating checks and sizing, voltage and tap changer position analysis, effect of power factor correction (PFC).

**Harmonic studies**, including source identification and mitigation recommendations. Analysis includes establishing resonance points, effects on Ripple Control schemes, effects of and on PFC schemes, filter analysis and specification, and Connection Point limit checks.

**Insulation coordination studies**, including equipment and system Surge Protection evaluation and specification to protect transformers, switchboards, and downstream equipment.

**Short circuit studies**, including fault current calculations and equipment rating checks typically using IEC60909 methods and checking switchboard peak ratings, CB peak and breaking ratings, cable ratings. Studies often require an analysis of supply configurations, generation combinations and motor contributions.

**Transient Stability studies** analysing effects of system disturbances such as generation changes, faults, and load addition/rejection, results typically being used for optimising of Load Shedding schemes.

**Equipment Reliability studies** allow recommendations to be made on upgrades and protection improvements, spares options and optimising switching configurations. Evaluation uses published or actual reliability figures for installed equipment and provides results such as time between failures and cost of failures per year.

**We have a proven track record of successfully delivering projects on time and within budget, and we pride ourselves on our attention to detail and commitment to safety. We strive to provide our clients with the highest level of service and support throughout the entire project lifecycle.**