



SPE ELECTRICAL – DESIGN



Power system design is the process of developing a robust system design, before placing contracts for equipment and construction. This may sound obvious, but some initial investment in developing a correct design can save significant costs and delays later. The design process for a power system can vary enormously depending on the complexity of the system and the site configuration. At one end of the spectrum, SPE can provide guidance for a simple LV connection to the utility company, while at the other extreme SPE can design a tie-in to a complex EHV Brownfield site that has limited space and outage windows.

System Concept Design

As part of the design approach SPE will typically begin by estimating the total power demand, selecting appropriate voltage levels, transformer rating, earthing approach, circuit breaker ratings and fault levels. On more complex sites, our team can also then help to establish the required reliability and maintenance requirements of the system. This analysis helps with considerations on whether to use single radial feeders, ring feeders, or dual radial feeders and different busbar configurations and the need for emergency power supplies.

Substation Design

SPE has the capability to undertake a wide range of detailed substation designs, and our engineers have worked on everything from small pad-mounted LV feeder pillars, up to much larger 400kV open terminal (air insulated) substations and complex GIS substations. As part of our design we will typically prepare full layout and elevation drawings of the site to optimise the location of all equipment, taking into careful consideration the working and operational areas, safety isolation, safety clearances, access for maintainability and also operator access and egress. When considering GIS substation design, we will liaise directly with GIS manufacturers to ensure the layouts and design reflects manufacturers' requirements.

Cable Sizing Calculations

An important part of any electrical design process is choosing the correct cable sizes for feeders and motors. This process can be relatively simple for LV circuits following the BS 7671 requirements but becomes significantly more complex for HV and EHV cables. SPE are familiar with the BS 7671 design practices as well as IEC 60364 and IEC 60287 and can carry out full sizing calculations for HV and EHV systems considering circulating sheath currents, adjacent heat sources using the Digsilent Power Factory cable sizing module.

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Protection & Control Design

Our approach to protection design is to consider what will be the most appropriate protection scheme for any given item of plant or system and select the most cost-effective scheme. As part of the protection design we would consider whether the use of differential protection at 33kV and 11kV is justified, and identify the protection devices required for transformers, generators and large motors. Part of this design process also considers the type of control system required.

Detail Design Deliverables

As well as concept and general design development, SPE can undertake a wide range of electrical design activities and prepare key design deliverables necessary to define how the system operates and should be built by switchgear manufacturers and site construction teams. Typical activities can include preparation of system operating philosophies and specifications, cables schedules, wiring / schematic diagrams, data sheets, control logic and load schedules,

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