WBPS POWER YOU CAN TRUST

PROJECTS

WB Power Services (WBPS) was first established in 1983 and since then we have grown significantly in size and service capability. Today, we provide critical power services to some of the UK's most important businesses and organisations, ensuring essential services are protected. We proud to retain our family values on a national scale as we strive to be the biggest and the best power generation company in the UK.

CASE STUDY

HYPERSCALE DATA CENTRE GROUP – PHASE 2

Over a number of years, we have worked very closely with this global Data Centre operator to support in the design, supply installation and commissioning of a range of high quality and cost-effective generator packages of various ratings and configurations. To date we have designed, supplied, installed and commissioned nearly 120 generating sets of various ratings and configurations. All packages being designed to meet the power requirements of a particular data hall, the space envelope available for the generator package, scalability of the requirement as well as electrical distribution and level of operation redundancy required, all delivered to a very tight client driven programme.

To fully explore the innovative packages that WB Power Services have been able to offer this client, the power range, flexibility offered by Kohler generating sets, control system flexibility and acoustic packaging option and fuel system options: this is the second of three different case studies we have prepared based on the work completed at this site and for this client.

The early design brief issued by the client sought for

- Scalability of standby power capacity to cater for a range of data hall footprints / capacities
- Utilisation of the same generator building blocks for ease of maintainability and user familiarity
- Control system adaptability with high levels of site wide connectivity
- Good product adaptability but with short production times for shortest possible site build times

To cater for the ever increasing size of data halls and growing power densities it was necessary to select a larger generator rating whilst maintain a competitive / kW price & short lead time, all of which was accompanied by a move to power distribution at 11kV.

DETAIL OF WORKS

GENERATOR SELECTION

Working closely with the client we identified that a 1650kVA 1320kW DCC rated generating set offered the optimum capacity and flexibility to meet their current and foreseeable needs. WB matched this requirement to our partner Kohler's KD1650. When married to an appropriately rated alternator the compact and highly reliable Kohler 20 cylinder, 45 litre KD45V20-5DES engine can deliver full DCC power at it standby rating.

The generating sets were designed to be housed in a standard Kohler factory assembled container and day tank with inlet and discharge attenuation. Discharge air turning ducts were added to ensure there was no mixing of inlet and outlet air within the confines of the sound reduced high security generator enclosure. The total solution was designed to ensure that all equipment was available on the shortest possible delivery period. The total solution was focused on ensuring the shortest possible delivery periods.

The key adaptation for these sets was the addition of a dual output circuit breaker package which was designed to facilitate local LV load bank testing of each individual set without the need for an attendant HV AP.

A further adaptation for this project included the provision of a dual starting battery, dual battery charge and dual starter motor package which when combined with the dual output permitted the client to achieve compliance. The generating sets were deployed in groups of five (N+1)

CONTROL PANEL SYSTEMS

All of the generating sets utilise the sophisticated Kohler AMP802 control panel and are configured for set-to-set synchronising. The AMP802 is the control system of choice for many of our clients across multiple industries, as it offers a very fast multi set to set "deadbus synchronising" facility. When configured for this client we were able synchronise all five sets of one data hall package from start signal to accept load within ten seconds. By utilising this method of synchronising the design effectively permitted the "soft starting of the output step-up transformers (avoiding any transformer magnetisation issues) and the load.

A key function for this client was the ability of the APM802 to "load match" which enables generators to drop out when not required (whilst retain N+1 redundancy), and start again when called upon, this reduces optimises fuel consumption, emissions and general operating costs associated with the maintenance of the equipment.

The Kohler AMP802 control system also offers a comprehensive range of remote monitoring / status interface options which include RS485 and Modbus etc which are available via volt free connections, ethernet or fibre optic connections. In this application the generating sets are connected to both the onsite BMS and EMS systems. By way of an example of the level of flexibility offered by the APM802 the fuel level of each generator day tank can be remotely identified, auto minimum fill level adjusted, or an auto tank replenishment initiated from the central control location.

The client specified the provision of an A and B system output and to have the ability to transfer loads between each outgoing network. To ensure safe transition is was essential to provide comprehensive monitoring of all breakers on both the 11kV ring and outward LV distribution network. Fitted with the prerequisite levels of I/O and using The APM802's in-built programmable logic capabilities, this requirement was readily managed whilst at the same time offered for remote display to both the clients independent BMS and EMS systems.

The APM802 control system manages all aspects of the mains failure, synchronising process (LV and MV), controls the neutral earthing transformers and interfaces with the BMS and EMS. The in-depth management and programmable functionality of the system means that the 11kV ring can be opened at any point, offering maximum operational flexibility to the client without impacting system operation.The allows for all sets to feed side A or side B of both in any combination of sets. This offers total system operation flexibility.

SWITCHGEAR CONTAINERS

To ensure delivery times were as short as possible, the decision was taken to use a standard set configuration with a LV alternator coupled with a step-up transformer arrangement rather than using the longer lead time 11kV alternator solution. A containerised transformer and switchgear solution was developed using a match low loss 400V/11kV step up transformer, switchgear and Neutral Earthing transformers. With the customer deploying an A and B distribution arrangement for compliance.

The step-up transformers, MV breakers and associated controls were installed within a 20ft containerised package. The package was extended to a 30ft container when a Neutral Earthing Transformer and additional breaker was required.

All containers were fitted with internal and external lighting, heating and ventilation to ensure all operation requirements of the installed equipment were covered. Additional safeguards were also put in place with the use of internal bulkheads assess to which were controlled by key interlock systems.

FUEL SYSTEM

Each generator is complete with a suitably sized bunded; each of the sets within the group are fed via a pressurised fuel distribution system from a 65,000l bunded bulk fuel tank. The bulk tanks are a split tank design with valved balance pipe, offering additional system resilience to the fuel distribution system. The fuel distribution system is completed with the deployment of duty standby pumps (with bypass) and a high-performance fuel polishing system installed within the bunded are of each bulk tanks. All of these elements are in place to enhance reliability, facilitate ease of maintenance and potential replacements of components without taking the fuel distribution system offline.