

Data centre design - achieving maximum availability



All too often people wrongly assume that simply installing an UPS is the end of their problems. However, if the design and installation is handled badly, it could be the beginning. Nowhere is this more important than with the design of data centres.

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Data centres, like most businesses that are totally dependent upon electricity for their critical operation, will be aware of the need for power protection and have probably installed standby power equipment. Unfortunately, if the design and installation of the uninterruptible power supply (UPS) is not handled correctly and ongoing maintenance performed they may be operating with a false sense of security. Simply installing the UPS and turning it on is unlikely to be sufficient to safeguard against future power problems. A UPS, like any type of electronic equipment can fail if not properly specified, installed and maintained.

To achieve the aim of maximum availability the quality of installation is a vital consideration. Surprisingly often in critical applications this does not get sufficient attention - commonly as a direct result of a "lowest price tender". Where systems have been installed down to a price rather than up to a required quality, risks are ever-present.

UPS system design must be fault tolerant and maintainable, while the critical load must remain supported and fully operational. The objective should be for a system that allows any single part to fail, be repaired and tested, without affecting the operation of the critical load. The following key design principles should be adhered to:

Reliability

- Keep it simple and understandable to operators. Multiple bypasses and alternative power paths can complicate the system design
- 'What if' fault analysis on all parts of the system should be carried out during the design stage, with suppliers and maintenance staff involved, before orders are placed and the design is set in stone

Maintainability

- System design should have sections of the supply which can be isolated, maintained and tested, without affecting UPS support to the load
- Operators should have a sound understanding of the system's principles with standard operating procedures prepared and frequently rehearsed

Redundancy

- In a typical 'dual bus', the A and B distribution buses must be kept fully independent and not interconnected, to eliminate any 'single points of failure'
- Static switches should be included in the final distribution to allow a seamless transfer from one source to another

Use of static switches

The static switch provides instant load switching from one power source to another and, when combined with a UPS, offers two fold redundancies. When the power supply feeding the load begins to operate outside accepted limits it immediately switches the load to an alternative supply implementing automatic source switching to provide additional power protection downstream from the UPS. This is the final link in the distribution system and is achieved by using at least two completely independent power sources. The static switch supplies the critical load using one of the two completely independent power sources and if the active source develops a fault or its electrical features are no longer suitable, will transfer the load to the alternative sources. Switching is controlled in such a way as to guarantee transfer times are completely compatible with the load tolerance and in accordance with the technical standards in force.

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Achieving the goal...

Vodafone has the largest data centre of its type in Europe and can boast eight nine's availability. Power protection is provided by over 24 MVA of Chloride UPS, together with the company's CROSS static switches and battery-monitoring system for 14,000 battery blocks.



During the latest 'engineered' Integrated Systems Test, an independent advisor confirmed an availability factor of 99.999999% (theoretic down time of only 0.0053 minutes per annum) proving the quality and dependability of the power protection infrastructure and the effectiveness of quality installation and regular maintenance provided by Chloride.

Regular maintenance

Even correctly sized and installed equipment cannot be regarded as a 'fit-and-forget' solution. It needs regular maintenance to perform at its best and this should be considered a must, not an option, even though there is usually some reluctance to commit spending beyond the initial cost of the hardware. In standby mode the equipment will be very quiet and may not display any outward signs of motion or activity so it is easy to ignore once installed. To overlook maintenance is likely to be a serious mistake. The UPS is there to protect and support the business in an emergency, so it has to be ready and efficient. Maintenance is an integral part of the UPS system, and should not be marketed as an extra level of insurance.

In **summary**, to achieve maximum availability in a data centre - back up should be obtained from companies which keep abreast of the latest developments in technology and product application and who can plan for the changing nature of the computer loads their product will support. These days data centres find it difficult to provide adequate resources, partly due to the increasing deployment of high density and blade servers which can draw power from the supply in a leading rather than a lagging form. Power protection products should be compatible with all types of load and designs should be fully optimised for the actual loads encountered in the IT environment.

About the author

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Rob Tanzer is Technical Support Manager for Chloride Power Protection. He has worked in the UPS industry for over 30 years and has experience and knowledge of most of the different types of static and rotary UPS systems currently in service today.

Rob is the author of several published technical papers covering UPS systems, thyristor power switching devices and different aspects of UPS systems applications.



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