Risk prevention through design, process and people.

Many organisations have safety or business critical systems and/or equipment that require a constant supply of electrical power. Failure or fluctuations in this power supply can have significant impacts including the potential for harm to building occupiers, the loss of data and business interruption. The provision of UPSs and batteries is commonplace as a critical organisational asset.

While the deployment of UPS and battery systems mitigate the impact of power loss for organisations, the ongoing maintenance and operation of these systems can introduce less obvious risks to the workforce. The uninterruptable nature of the UPS system can require repair and maintenance procedures be undertaken, and often while the unit is energised.

Considering these factors can easily minimise the risk to employees, equipment and the service engineer performing the maintenance work on the system. This article answers common questions about UPS design, installation, maintenance and outlines how to identify and reduce these risks.

Identifying hazards

Some of the most critical business systems rely on UPS and battery systems to protect and power the equipment such as industrial and medical processes, communication networks and airport flight controls. Unplanned outages can quickly add up to thousands of dollars in lost revenue – or even lost lives. Generally, if a UPS protects the equipment, it's because downtime or interruption is not an option.

Regular maintenance is a crucial part of managing any UPS system with battery performance being one of the primary factors of any robust maintenance plan. According to the Institute of Electrical and Electronics Engineers (IEEE): "Proper maintenance will prolong the life of a battery and will help enable the battery to satisfy its design requirements."

Because large UPS systems carry dangerous electrical voltages, all types of installation and service work introduces the potential for personal harm or property damage:

Shock or arc risk: UPS and battery systems and the associated electrical infrastructure are designed to prevent the power going off, so even if the main power source is switched off, the connected load could still be getting power from other sources such as battery, generator or secondary mains feed. This means that there is constant risk of power arcs which can cause electric shocks or fires.

Battery venting risk: Batteries store the electrical energy used to support the connected load in the event of a mains power outage. Typically, UPS batteries are valve regulated lead acid (VRLA) and often described as "maintenance free" whereby any gasses produced do not escape. It is important to understand that VRLA batteries when being charged or discharged have the potential to vent gas if the pressure relief valves open. Overcharging batteries presents the greatest risks of gas venting.

Mechanical and seismic risk: UPS and battery systems are extremely heavy, and this is frequently overlooked as a hazard. Installation work presents a manual handling risk to service engineers due to the weight of both the UPS units and battery blocks. Once installed, the seismic risk of heavy equipment must be considered to avoid movement in seismic events.

UPS POWER SOLUTIONS

UPS Power Solutions Ltd
0800 877 769
sales@upspower.co.nz
upspower.co.nz

Find us on LinkedIn

Minimising or eliminating hazards

Once risks are identified, acknowledged and understood, there are clear pathways to managing them or preventing them altogether:

Safety by design: The design of the UPS and battery system along with the associated electrical infrastructure can play a significant role in managing risks before they have a chance to occur. The inclusion of an external maintenance bypass switch provides an alternate power path that bypasses the UPS equipment altogether. This enables the UPS to be serviced or replaced without interruption to the critical load and without danger of electric shock. UPS and battery systems should be seismically restrained with larger battery installations being housed in seismically rated racks that are appropriately fixed to prevent movement in the event of an earthquake or similar disaster.

Planned Preventative Maintenance (PPM): Preventative maintenance dramatically improves performance, availability and service life of this critical equipment. UPS systems that receive no preventative maintenance have a 400% greater chance of load loss when compared to properly maintained UPSs. Analysis of millions of operating hours for thousands of UPSs has shown that the mean time between failures (MTBF) for UPSs that receive preventative maintenance twice per year is more than 20 times better than for UPSs that receive no preventative maintenance. Prevention pays off.

PPM services address the reality that even the best made components will eventually wear out and need to be replaced. Capacitors, circuit boards, fans, batteries and power supplies are all consumable parts that you can expect to replace in a UPS. The benefit of a proper maintenance program is that replacement can occur as a proactive task rather than a reactive repair.

Smart system monitoring: Monitoring UPS and battery health is important in providing you with early indications of potential issues that can be addressed proactively. This extra visibility will ensure that risks are identified and addressed before they have a chance to impact electrical systems.

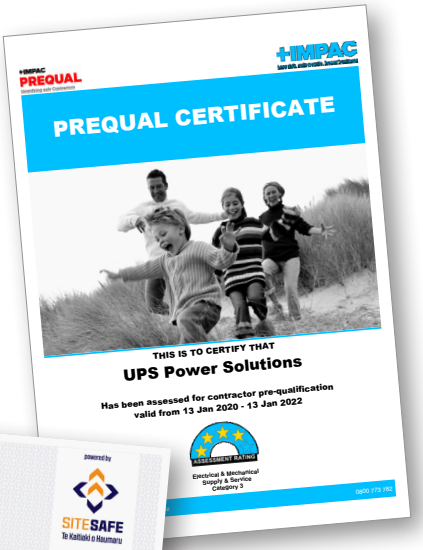
Qualified expert UPS engineers: The more complicated the equipment becomes, the more important it is to have trained experts performing the maintenance required to ensure smooth operation. Without the right safety training and without proprietary diagnostic analysis and connectivity tools, UPS owners can perform only very limited service themselves. Partner with a capable and proven service provider.

NZ Electrical regulations require that works on hard wired single and three phase UPS systems be undertaken by electrically registered people. Manufactures train service engineers in the risk reduction strategies which include documented procedures designed to minimise risk to both service engineer and equipment.

Health and safety processes: A through site risk assessment and job safety analysis should be undertaken ahead of any works to identify and minimise risks associated with the work planned. This should also acknowledge any risks posed by the location or site. Typically, a site induction would ensure that the service engineer is aware of any existing site risks and is able to identify any new risks that may arise as a consequence of any work undertaken.

The service engineers should wear personal protective equipment (PPE) appropriate to the task being performed which may include, arc flash gloves, safety boots, eye and ear protection and protective (non-synthetic) clothing.

The risks associated with high energy voltages and heavy equipment are serious, but there are many ways to prevent incidents or reduce their consequences. Prevention is foremost; mitigation is the second line of defence. To put it in other terms, if your car's airbag has activated, you are already having a bad day. It's much better to have good visibility, tires and brakes so you can avoid the incident in the first place and be assured that your well-maintained airbag will function when its required to do so.



UPS Power Solutions has undergone external audits of its health and safety systems and practises which is recognised by a SITESAFE Green status and 4 star Impac Prequal rating

UPS POWER SOLUTIONS

UPS Power Solutions Ltd
0800 877 769
sales@upspower.co.nz
upspower.co.nz
Find us on LinkedIn