

Power For The Tower - Uninterruptible power supply design for the Heathrow Airport Control Tower



The Client

NATS, the UK's leading air traffic service provider, controls the flights that carry millions of passengers safely through UK air space each year. One of the most challenging environments it controls is London Heathrow Airport, the world's busiest international airport.

The development of a fifth terminal at Heathrow required a new control tower to ensure controllers had a complete view of the airfield's operations, something that would no longer have been possible from the position of the existing 50-year-old tower.

To minimise disruption to flights and the Terminal Five construction project, the new tower's 32m-high top section was constructed and fitted out on a remote part of the Heathrow site then transported 2km to the installation site where its 900 tonnes were gradually lifted into place to complete the 87m high structure.

With Heathrow's air traffic controllers responsible for the movement of up to 100 arriving or departing flights per hour throughout the day, 365 days a year, the smooth operation of its control tower is vital. A totally reliable power supply for the controller's systems underpins the whole operation.

The Challenge

Each of the four main ATC systems: surveillance, communications, navigational aids and data, requires secure power to enable continuous normal operation and

a smooth transition to contingency facilities in case of an external power failure. Each of these systems is duplicated by a hot standby redundant system which requires identical power protection. The NATS project team developed a detailed specification based on the demands of each of these systems and took it to competitive tender.

"Best practice and experience of our working environment has refined the way we specify the system. For example we have moved away from the old approach of having large UPS to power all systems, to having a pair of redundant UPS sized for each equipment bay, as this reduces common mode failure risks," said Richard Moon, NATS Project Manager.

As well as delivering a system that provided the required level of power security the UPS selected supplier had to design the system for long-term maintenance, and provide ongoing training and support.

"We are working towards increased standardisation across the 17 different ATC sites we manage, so that we can reduce the maintenance overhead of spares holding and training," Richard Moon explained. "So we specified that all UPS be of the same family and looked for a major supplier. We needed a team who could not only deliver and install all the equipment but also provide 3rd line maintenance support, on-site engineers, 24 hr telephone advices and system training for our own engineers."

Founded in 1984, originally as Universal Power Systems Ltd, on365 is an independent company specialising in the implementation and operation of the complete physical infrastructure of business IT and communication systems. This covers everything from power to cooling and can ultimately be a total datacentre build.

Providing total packaged solutions from concept to after-sales service, on365 has steadily grown to the position of market leader in this field, with an established reputation for innovative power protection design, supply and application. Expansion has been achieved through a commitment to providing customers with the highest level and quality of service.

on365 has the people and the tools to understand both the technical and practical issues involved for your business, its people and its IT infrastructure requirements. This understanding extends beyond taking care of design, safety, principles of operation, future growth and after-sales services. More importantly, it looks at value and basic business principles such as 'return on investment' to ensure that the customer is furnished with a complete solution for their current business needs. Wasting expenditure worrying about the tomorrow's possible growth is practically eliminated by designing on-line expansion facilities, without the need for system downtime.

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0945 VIGO	AF	5572 KL	2194 D	ON TIME	D58
0950 VENICE	AF	1426 DL	8516 F	ON TIME	F31
0950 BUDAPEST	AF	1694 MA	6559 B	ON TIME	
0950 TUNIS	AF	2384 KL	2118 F	ON TIME	F44
0950 ST PETERSBURG	AF	2698	B	ON TIME	
0950 ZURICH	AF	5102 DL	8481 F	ON TIME	F43
0950 HANOVER	AF	5492 DL	8309 D	ON TIME	D53
0955 FLORENCE	AF	5040 AZ	7803 D	ON TIME	D55
0955 BILBAO	AF	5960 KL	2164 D	ON TIME	D72
0955 NEWARK	CO	057	A	ON TIME	A37
0955 PRAGUE	OK	759 AF	4900 B	ON TIME	
1000 NEW YORK-JFK	AA	045 UN	6515 A	ON TIME	A45
1000 LONDON HEATHROW	AF	1370 AM	8504 F	ON TIME	F55
1000 GENEVA	AF	1842 LX	4605 F	ON TIME	F36
1000 BIRMINGHAM	AF	5132	F	ON TIME	F50

The Solution

After evaluating responses from a wide range of UPS specialists, NATS selected on365 to supply the system, ongoing routine maintenance and incident response in case of a failure.

Richard Moon commented, "on365 responded with a competitive proposal and proven in-depth expertise on APC UPS systems. We had some past experience of working with on365 and received good feedback from other customers on their service and on-time delivery – which was critical for us on this project."

on365 engineered the Heathrow control tower system based on APC Symmetra UPS. These modular On-Line UPS units are not only highly efficient, they have 'hot swap' capabilities: IT personnel can now change the units towards the end of their life or if short term operational requirements demand, without undertaking the sort of complex replacement engineering work that might have been required in previous years. This added flexibility helps meet NATS' engineering team requirements for high availability with still further reduced risk of any battery performance issues.

The system's UPS units operate in an n+1 configuration.

Each UPS, fed from separate incoming power feeds, is individually capable of powering all equipment in the bay for the required time. This approach reduces common mode failure, protecting the systems from power disturbances, even if one of the UPS is having its battery changed. Phases are also distributed amongst bays to balance loads and reduce the risk of phase-specific issues.

To deliver this unusually high degree of independence between the power supplies on365 designed and engineered bespoke power distribution panels.

A PC-based system monitors the condition of each UPS, reporting on current status, battery condition and providing alerts for any faults or warnings by email to designated staff. The system consolidates alarms together to avoid unnecessary multiple alerts and provides drill-down views for fault isolation.

"We have not had a remote UPS monitoring facility before," said Richard Moon. "Having that single point for monitor interrogation results in a lower workload for our engineers – who previously had to plug in a laptop and interrogate each UPS to get the same data."

The Outcome

The on365 Heathrow control tower UPS system has been operating successfully since 2007. The company has since been selected to equip Heathrow's ATC training and contingency facility with a similar system.

"on365 co-ordinated well with our team, listened to our requirements, and delivered what they promised," said Moon. "For our training and contingency facility project, on365 were able to deliver in just eight weeks from our order and to extend the system's lifetime on UPS by adding additional batteries to the second installation."