

BAE Systems

Case study



Background

Through an extensive programme of capacity control upgrades at one of its major Military Air & Information sites in North West England, global defence, aerospace and security company, BAE Systems, has achieved annual savings of 70-80% on its computer room air conditioning energy costs, equivalent to £350,000. The business expects to recoup the costs of the project within just 15 months.

The UK's largest supplier to the UK Ministry of Defence (MoD), BAE Systems employs more than 34,000 people across 50 UK locations. BAE Systems required a cost-effective upgrade solution for its Warton site that would increase cooling performance and deliver significant energy efficiencies without disrupting critical testing and production of combat and training aircraft such as the Typhoon and Hawk Advanced Jet Trainer.

“ With the help of Joule Consultants, BAE Systems identified an opportunity to reduce energy consumption of the Computer Room Air Conditioning units at our site by up to 80%. Airedale was selected as the most competent company with the best product to meet our needs. The project involved retrofitting new EC fans, chilled water valves and controls to over 70 CRAC units over a 12-month period. The savings have been measured and amortised to give an annual saving of around £350,000.

Jon Farmer, CEM
Energy Manager, BAE Systems, Military Air & Information

Airedale solution

- Retrofit EC fans, EEVs and other energy-efficient components
- Upgrade refrigerant in line with current legislation
- Upgrade control system, implement control strategies and integrate with BMS
- Re-commission units

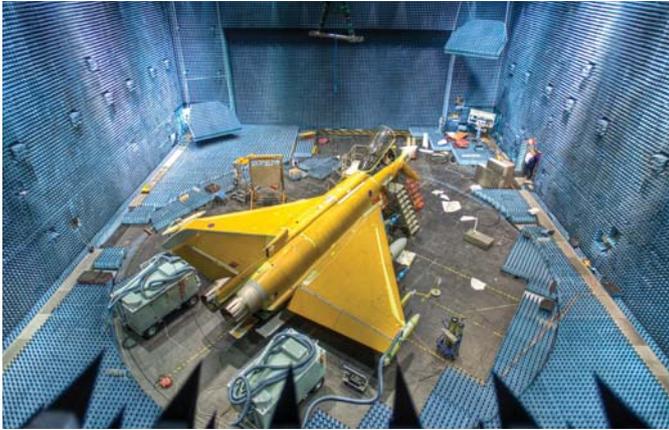
“ The flexibility of Airedale's products and services allowed us to customise the best control solution for each computer room so that room cooling was maintained whilst minimising energy consumption. ”

Paul Wainwright
Joule Consultants



In more detail

BAE Systems



Refurbishment solution

Airedale's multi-disciplinary team of engineers and controls experts worked closely with the BAE Systems sustainability team, project team and external engineering and energy advisors, Joule Consultants, to upgrade more than 70 Denco and Airedale precision air conditioning (PAC) units in more than 30 computer rooms. The British manufacturer has significant experience of project-managing complex retrofit projects, often involving hot work, in critical environments.

To provide robust predictions of energy savings, a trial was conducted in two separate environments allowing a comprehensive business case for budget sign-off. Following additional system refinements and re-commissioning the final savings were more than 27% higher than original predictions.

The 12-month project at the high security site involved consultancy and works across a variety of system specifications and was closely project-managed throughout. This included replacing all necessary controllers and interface cards, re-wiring panels, installing 42 new electricity meters and replacing air filters and water detection probes on all units.

More than 50 EC fans were also installed. EC fans are up to 70% more efficient at part-load in comparison with equivalent AC fans and offer extremely precise variable speed control matched to load and low air flow resistance, reducing fan power input, energy consumption and noise. Power usage was also reduced by retrofitting electronic expansion valves (EEVs) to 16 units. EEVs improve EER (Energy Efficiency Ratio) by up to 30% compared with standard thermostatic expansion valves and deliver very accurate refrigeration control at part-load and lower ambient conditions with a reduced condensing pressure. To bring the units in line with current legislation, refrigerant was also reclaimed and the system pressure-tested for leaks and recharged.

Controls integration

Airedale's controls division also developed bespoke chilled water (CW) and mechanical expansion (DX) control strategies to maximise the part-load efficiencies of the Airedale chillers. CW valves maintain cooling with the fan set at 40% of full capacity minimising unnecessary power consumption. As load increases, the valves open to reject heat load from the room until they reach 100% at which point the fans ramp up to precisely match capacity needs. As the need for cooling diminishes the fan will ramp down to 40% and then, if required, the valve will start to close.



The PAC units were also networked and integrated with the existing Building Management System (BMS) providing remote temperature and humidity management.

To minimise power consumption and provide redundancy the PAC units are programmed to operate in run/standby mode alternating after a set number of hours. This ensures even wear of components and provides back-up in the case of maintenance downtime.

The flexibility of the new Airedale controllers also meant that Joule Consultants could tailor controls strategy and air balance to individual room conditions, minimising energy consumption whilst maintaining close temperature and humidity control.

Benefits

- Annual energy savings of £350,000 (3,300,00 kWh)
- Payback under 15 months
- Improved system resilience, reducing risk and maintenance downtime
- Full control and visibility of system performance