

Case Study



> TRW Automotive

TRW Automotive is among the world's ten largest automotive suppliers, with 200 facilities in 24 countries. The company supplies more than 40 major vehicle manufacturers and is global leader in automotive safety, producing one of the largest arrays of active and passive safety technologies. In a brand new TRW electronics assembly plant in Peterlee, Co. Durham, Airedale's air conditioning products are playing a major role in the precise control of temperature and humidity as part of an integrated environmental solution.

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TRW Requirements

As world leader in automotive safety, TRW is at the forefront of developments in vehicle dynamics, driver assist systems, foundation brakes, inflatable restraints, seatbelt technologies and the electronics and software advancements that will enhance the safety, convenience and comfort of tomorrow's vehicles.

The brand new 3,240 m² electronics assembly plant is part of a 13,400 m² TRW facility in Peterlee, Co.Durham, and manufactures automotive occupant safety systems such as air bag sensors, electrical component units and occupant restraints. Precision of the end-product is crucial and the intricate, detailed processes demand accurately-controlled temperature and humidity. Air quality is also a major priority as all components and equipment must be free from dust and debris from the air.

The high heat load produced by the process equipment, particularly during the assembly of printed circuit boards, requires substantial cooling. Being a continuous system process operation, the cooling requirement is 24/7, calling for 100% efficiency and total reliability.

Continuous system operation gives TRW the opportunity to significantly reduce energy costs by taking advantage of low ambient night-time temperatures and free-cooling technology available from Airedale.



Design Criteria

Two Ultima FreeCool chillers supply 1,000 kW of cooling to twelve AlphaCool Close Control units located inside the electronics assembly space. The free-cooling chillers make use of reduced ambient temperatures, cutting back the need for mechanical cooling and thereby reducing energy consumption. The AlphaCool Close Control units provide precisely-controlled air conditioning. Their unitary configuration made possible the phased installation of the new plant and the ergonomic design of both chillers and the close control units facilitates low level maintenance.



Unit Specification

- > Two Ultima FreeCool 500kW Chillers
- > Twelve 90kW AlphaCool Upflow chilled water units for close control
- > Sophisticated AireTronix controls using BMS/Trend interface cards for remote monitoring

For Key Technical Data, see page 4



Phased Installation

Main contractor Russells Construction carried out the building conversion from a warehouse to a hi-tech factory, including anti-static flooring, clean surfaces and the relocation of production facilities to the new site. Turnkey providers Heatworks, appointed by Russells, fitted out the new plant and designed and installed all HVAC work including chilled water piping and air handling units, as well as the boiler house and the local exhaust ventilation system.

Says Heatworks director Craig Ayrton: "The stand-alone AlphaCool units enabled TRW to meet exacting production deadlines through phased installation. The new facility started out as just a shell and as we moved through the factory installing the close control units, TRW brought in the production machinery behind us. It worked well for us and for TRW."



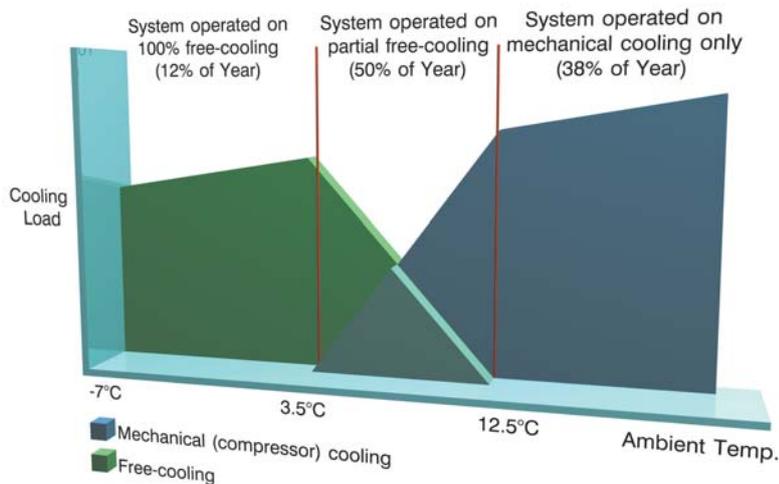
Free-cooling

The free-cooling cycle is designed to give priority to free-cooling whenever the external ambient is below the return water temperature. Having a precise, continuous cooling requirement, TRW can take maximum advantage of free-cooling for substantial proportions of the year particularly during night-time operation. During the coldest parts of the year, free-cooling can totally satisfy the cooling load. The Ultima FreeCool Chiller can also operate on partial free-cooling for up to 50% of the year and only needs to operate completely on mechanical cooling for about 38% of the year, typically saving 35% of the energy consumed by a conventional air-cooled liquid chiller.*

* Based on Met. Office figures for London, UK



Free-cooling Vs Mechanical cooling



Energy Efficiency Ratios (EER's)

Contributing to the free-cooling, energy-saving benefits of Ultima Chillers, individual components are designed to maximise EER's and in turn minimise power consumption, lower running costs and reduce carbon emissions. Electronic expansion valves (EEV's) and modulating head pressure control offer even more enhanced EER's in part load and low ambient conditions. EEV's can operate at much lower condensing temperatures, reducing the need for unnecessarily high head pressures, and resulting in significant compressor energy savings whenever the ambient temperature and/or cooling requirement are below design conditions.

Fine-Tuning with AireTronix

The Ultima FreeCool Chillers and AlphaCool Close Control units at TRW are equipped with sophisticated AireTronix controls specifically developed for use with Airedale air conditioning systems. AireTronix offers powerful analogue and digital control and is fully programmable to maximise product efficiency, energy savings and compatibility.

The controller's in-built display allows viewing of the unit's operating status via its multi-button keypad. By allowing the operator easy access to a menu system, operational parameters can be customised and adjusted on site.

The ongoing partnership between Heatworks and TRW has seen the development on site of a controls strategy which is fine-tuned to TRW's needs. TRW is able to make maximum use of the environment, topping up the cooling by using either of the two chillers.



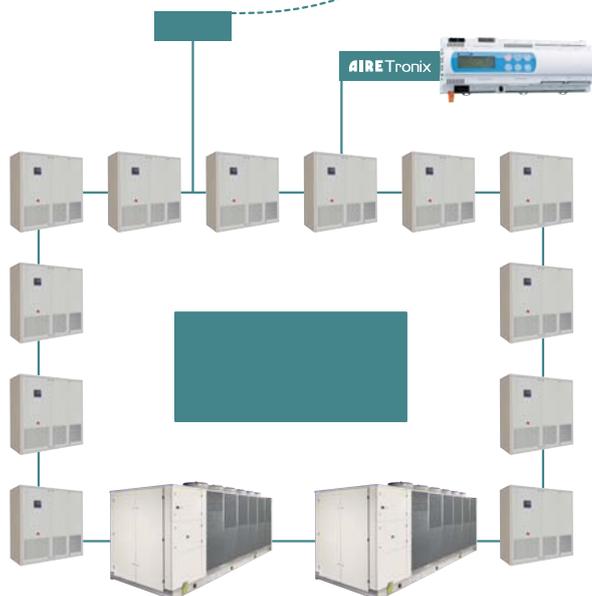
Remote Monitoring and Alarm

Using Trend interface cards, the AireTronix controllers in the Airedale chillers and close control units are connected and integrated into the site Trend Building Management System (BMS), via the Local Area Network (LAN), allowing remote monitoring and control and an efficient 24/7 remote alarm indication system.

Remote monitoring and control on and off site, means that temperature setpoints are easily changeable without the need for sending an engineer, and performance graphs are readily available. Heatworks can dial in from their offices in West Yorkshire to monitor the system and check temperatures.

“The printed circuit boards have to be manufactured in consistent conditions,” says Craig. “Trend can store and archive historical data of temperatures and humidity for quality control purposes.

“All alarms can be intelligently identified from one control office eliminating unnecessary call-outs for non-critical alarms and time spent suiting up to enter a clean room. On such a large site as this, an intelligent, user-friendly, remote alarm system is saving vast amounts of engineers’ time. Minor incidents can be dealt with on a cluster basis. Alarms would automatically repeat back to Heatworks and send an SMS text message to our engineers.”



Ultima FreeCool chillers and AlphaCool Close Control units are integrated into the site Trend BMS via a LAN



Energy Technology List

Due to their proven energy-efficient performance, Ultima FreeCool Chillers are included on the Energy Technology List. Under the Enhanced Capital Allowance scheme, this enables companies like TRW, investing in energy-saving products published in the approved list, to claim 100% first-year capital allowances on their spending.



Authorised User No. 00007

Integrated Environmental Solution

Says TRW plant manager Phil Pearce: "The various aspects of the job were prioritised so that all environmental factors were taken into account, reflecting our commitment to energy-efficiency. The ongoing, free-cooling benefits of the Airedale chillers will enable us to recoup substantial energy savings. Airedale's air conditioning equipment has made a significant contribution to the integrated environmental solution provided by Heatworks and Russells."

Product Specifications

Ultima FreeCool - Key Technical Data

- > 200 to 750kW nominal cooling capacities
- > 39 model sizes
- > Standard, Quiet or Super Quiet variants
- > AireTronix intelligent microprocessor controls
- > Single screw compressors
- > Sickle bladed fans for lower sound levels
- > Six to eight stage capacity control as standard depending upon model size
- > Electronic expansion valves
- > Dual independent refrigeration circuits
- > Modulating head pressure control
- > Free-cool & condenser coil
- > Simultaneous mechanical and free-cooling operation for maximum energy saving (free-cooling takes priority during hybrid operation)
- > Modulating fan speed control



Ultima FreeCool Chiller

AlphaCool - Key Technical Data

- > 8kW to 100kW cooling capacity
- > 72 model sizes
- > Advanced AireTronix controls technology
- > Upflow and downflow configurations
- > Front, rear and base return air options (upflow only)
- > DX, chilled water and glycol free-cooling systems
- > Single, double and triple circuit models
- > Electronic expansion valves
- > Scroll compressor technology
- > Direct drive fan technology (9-19 models only)



AlphaCool

For details contact Airedale on +44 (0)113 239 1000 or enquiries@airedale.com

- > Airedale participates in the Eurovent Certification programme as a founder member. The performance data of certified products is independently verified and identified within the relevant sales literature.

Your nearest Airedale distributor is:



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