Case Study

Overview

Typical of the temperature controlled logistics industry, the energy costs at ACS&T are significant. ACS&T has three sites, each of which has a number of cold stores that operate from +7 down to -27 DegC.

The cold stores are of various ages and consist of a variety of plant technologies and, due to the diversity of the estate, its management has been complex and somewhat expensive to resource. This suggested a technology-based solution to improve efficiency and performance.

Steve Pratt, Chief Engineer

"With the Next Controls 24/7 monitoring response team I get a call from a real person if any of my plant looks like failing. This allows me to take steps to protect our clients' inventory and saves us money."

Controls Implementation Process

Together with Next Controls, ACS&T originally identified the opportunity to control evaporators remotely, and implemented this at the Tewkesbury site. This step was revolutionary at the time and it allowed the engineering team to dial into the site remotely, interrogate the data and make adjustments on the fly, in order to optimise temperature within the cold stores. This was achieved by 'overlaying' the Next Controls management system onto the plant to record temperatures and then to use the control system to switch the evaporators on and off.

The subsequent addition of a blast freezer facility at Tewkesbury offered the opportunity to implement full control of the compressors, condensers and evaporators. The control strategy was enhanced to add multiple modes of operation using product temperature probes as well as the air temperature.

The chilled space was temperature-mapped by sensor-probing individual products stored within the blast freezer. This detailed mapping enabled a control algorithm to be set up so that the plant was controlled to reduce the core temperature of the stock to -18 DegC and then change the mode of operation to maintain air temperature -18 DegC once the target product core temperature was reached. This change in plant control allowed ACS&T to maintain significantly better product quality for its client base for a smaller energy outlay.

Estate Rollout

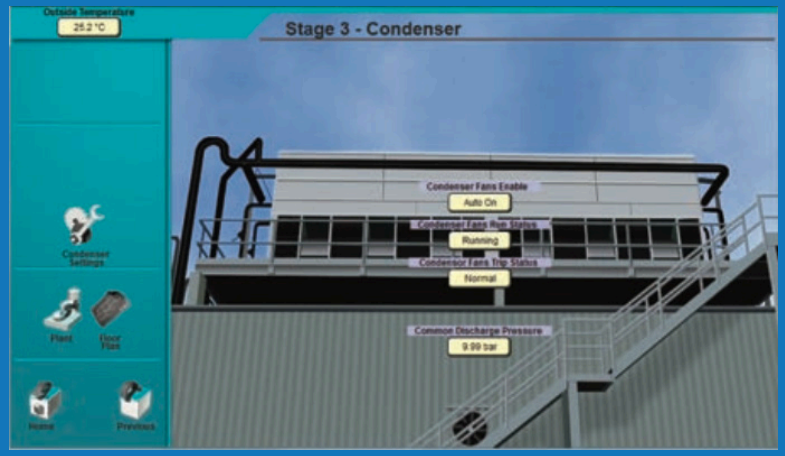
Such was the success of these two programmes at the Tewkesbury site, the Next Controls management system was chosen for implementation in a new build project at Wolverhampton. Several older cold stores at Wolverhampton were also upgraded to allow temperature control using the same methodology.

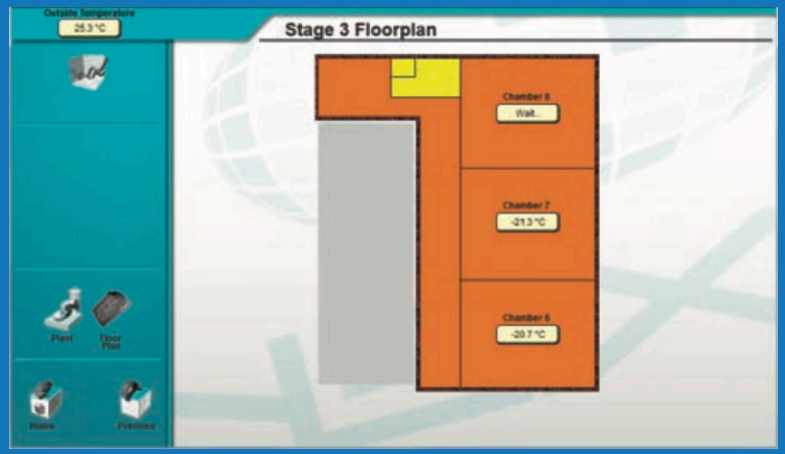
The wealth of data now available to ACS&T from the Next Controls system allowed unit by unit comparisons to be made and therefore enable better strategic decision making as to managing the whole cold estate.

The process of rollout across the ACS&T estate is ongoing with a continued focus on efficiency to reduce energy usage and costs even further. A continuous programme of integrated maintenance is also supplied by Next Controls to ensure that these efficiencies are realised.

Leveraging Thermal Inertia to Reduce Costs

The familiar upward trend in energy prices has become punitive, especially in the temperature controlled storage sector, and ACS&T introduced shutoff periods in the cooling cycle to enable them to benefit from the variable pricing in the energy tariff. By running





the plant hard during the lower-priced periods, it means that significant financial savings can be made by 'pre-cooling' coldstores prior to periods when a higher tariff applied.

The control system software was changed to implement a set of rules so that the store would run at a low setpoint -24 DegC at night when the electricity was cheap, and a higher setpoint -18 DegC in the day when electricity was more expensive. At times when the cost of electricity is very high (peak times, several times including 5-7 in the evening) the cold store would not run at all unless the internal temperature exceeded -18 DegC.

The Next Controls system controlling compressor pressure was then further enhanced; daytime suction pressures were increased and the sequencing of the compressors altered to ensure that only the minimum required number of compressors were running at any one time. The compressor discharge pressure was also held as low as possible.

This accrued further savings as evidenced from Carbon Trust research.

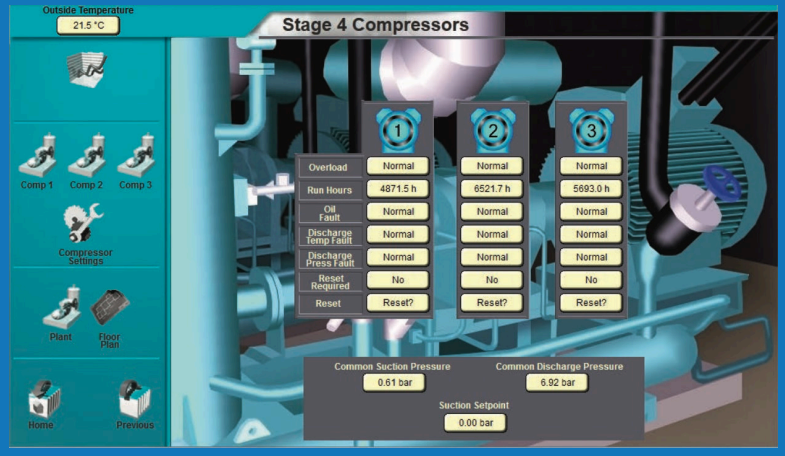
A decrease in 1 DegC in the condensing temperature saves between 2- 4 % of the power consumed by the compressor which directly relates to cost savings. (*Source:http://www.carbontrust.com/media/1305 5/ctg046_ refrigeration_systems.pdf)*

The success and innovative nature of the programme developed by ACS&T and Next Controls lead to the BCIA award finals.

Demand Response Systems

There is a programme of financial incentives that reward participants for creating a 'virtual power plant'. By shedding load on the demand side, the grid is able to claw back power it would need to supply by starting up additional power-plants. Starting up power plants is costly, and this programme helps minimise these costs.

At ACS&T, the Next Controls systems feed data continuously into the chosen demand response supplier to signal availability of potential load. The system of load shedding at ACS&T is automated via the Next Controls system but subject to temperature set point overrides at plant level. Next Controls are able to interface with all providers of demand response systems.



Web-based Energy Management for Expandability

Being web-based, the energy management system offers unlimited expansion as no third party software needs to be installed or maintained on local servers, the capacity of which would eventually limit flexibility.

This flexibility is enhanced by the brand and technology agnostic nature of the Next Controls system which can acquire data from any BeMS or metering technology using industry standard protocols without the need for additional hardware or 'black box' interfaces.

Key Points

- Demand response program reduces consumption and provides additional revenue stream
- Innovative energy reduction solutions are implemented due to technology-agnostic approach
- Continuous remote monitoring mitigates operational and energy risks
- Remote access via Next Controls graphical user interfaces and dashboards improves operational efficiency
- Web-based systems allow unlimited expandability and secure 24/7 access from any internet-capable device