

CASE STUDY

CONTROL OF EPIC PROPORTIONS

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Nuneaton's recently completed Eliot Park Innovation Centre (EPIC) is expected to consume just half the energy of a typical office development, but without sacrificing occupant comfort. Energy efficiency has been maximised through clever design of the HVAC services – which are based on a TermoDeck thermal storage/ventilation system – and the use of complex control routines implemented by an Ethernet-based Trend BMS. The latter incorporates IQ3xcite controllers, whose flexible firmware structure was much appreciated by Robell Control Systems, the Trend channel partner who supplied the BMS and designed its control strategies.

Built by Bluestone for Warwickshire County Council, the 4000m², 3-storey EPIC building will initially provide office space for start up businesses. Business support to the tenants is provided by Coventry University Enterprises Ltd, who also manage the centre. A BREEAM (BRE's Environmental Assessment Method) rating of 'excellent' and a Sustainability Award from the Institution of Civil Engineers, give a measure of the building's green credentials. Among its most distinctive features is a wall and roof-mounted, solar photovoltaic panel installation – one of the largest in Britain.

EPIC's building services were designed by consultants Couch, Perry & Wilkes (CP&W), their brief being to achieve low energy usage while still providing a stable and comfortable environment. This led them to opt for a TermoDeck

system, in which hot or cool air is supplied to the space via hollow-core concrete ceilings/floor slabs that act as a thermal store. There are two air handlers, each serving half of the building and each fitted with fully condensing low NOx gas burners, four stages of DX cooling and two total energy reclaim wheels that are 85-90% efficient. During hot weather, the TermoDeck slabs are pre-cooled at night – using outside air whenever the temperature is low enough.

The plant is controlled by the Trend BMS to make maximum use of free energy and thus limit the operation of the mechanical heating and cooling. Moreover, CP&W have designed the in-line burners and DX cooling units in such a way that even when they do run they operate in a highly efficient manner. The AHU fans are fitted with

inverter drives, as are the transfer fans that distribute the air, allowing the BMS to reduce their speed (and thus their power consumption) in accordance with demand. Specific fan power at maximum duty is below 2 w/l/s.

Robell has programmed the Trend system's controllers to allow 30 different 'modes' of plant operation. How the plant is controlled depends on such factors as building occupancy, heating/cooling demand, external temperature levels and air enthalpy values. A particular set of conditions will need to apply for, say, the thermal wheels to be operated or an AHU's second burner to be brought on. During office hours, the space is supplied with full fresh air, thus enhancing occupant comfort. If there is demand for heating, and the building is unoccupied, the dampers are positioned to full recirculation.



Three Ethernet-linked IQ3xcite controllers perform all the system's control and monitoring functions. One advantage of the IQ3xcite is that its flexible firmware structure gives the system engineer an unrivalled degree of freedom. This was particularly important on the EPIC system owing to its very extensive monitoring role and the consequent need for an unusually large number of logging modules, which the IQ3xcites could easily be configured to accommodate.

The system maintains space conditions within their desired limits by controlling the supply air setpoint using a formula based on the return air temperature – a strategy that has proved very successful. However, it would be very easy to reconfigure the IQ3xcites to provide a different control regime, one based say on slab temperatures. Whether this or other changes are made will depend on what CP&W and TermoDeck discover from monitoring the building over the next two to three years. Crucial to this exercise will be the temperature trend logs and other information recorded by the BMS.

CP&W and TermoDeck will be able to access this data via the Internet, using client Trend 963 supervisors. Remote access to information could in fact be made available to anyone who might benefit from seeing it, such as Warwickshire County Council (who has Trend systems in many of its other buildings). An on-site '963' supervisor allows the building manager to view conditions and adjust occupancy time settings.

Variables monitored by the BMS include the electricity generated by the solar panels. This data is transmitted to a plasma screen display in the building's reception area, which can express the amount of energy produced in a variety of novel ways – such as the number of kettles it would boil.

Consultants Couch, Perry & Wilkes have developed considerable expertise in the design of TermoDeck based systems and believe that the solution they have devised for EPIC is particularly energy efficient. CP&W Associate Partner, Simon Seaton-Smith, acknowledges the vital contribution made by Robell: "They were very quick to understand the

system's complicated control requirements, which helped to ensure that it performed exactly as intended. What was also important was their pro-active attitude, their willingness to become involved in the project at a very early stage of the design. We were impressed too by their thorough knowledge of Trend's latest control technology."

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