CASE STUDY

POOL LETS SWIMMERS EXPEND THE ENERGY

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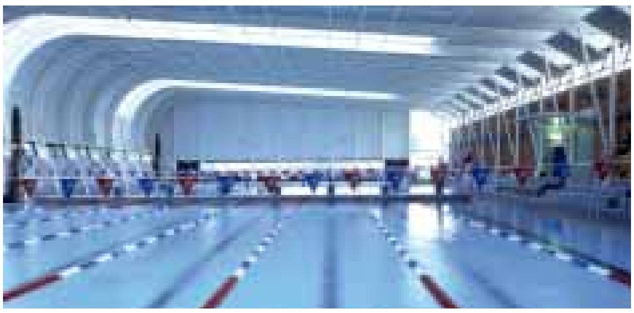
Prior to last year's Commonwealth Games, England's successful swimming squad honed their performances in a new £7million, 50m pool at Loughborough University. As well as being among the best facilities in the world for training top swimmers, it is also one of the most energy efficient pools around – the main reason for which is its high reliance on natural ventilation. Its building services were designed by Max Fordham and are largely controlled and monitored by a Trend BMS supplied and engineered by AES Control Systems. Constraints on control panel size, coupled with a heavy monitoring requirement, led AES to choose IQ246 outstations to perform many of the system's functions.

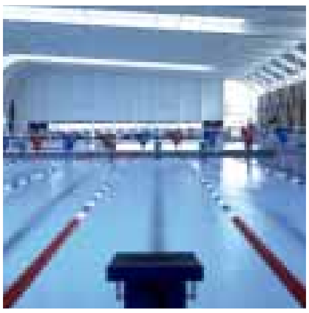
The building of Loughborough University's state-of-the-art Olympic-sized pool was made possible by £6million of Sport England funding. It is part of a growing network of English Institute of Sport elite training facilities that are dedicated to producing sporting champions. A movable floor and movable central boom allow the pool to be adapted to meet different needs, including training for people with disabilities and recreational swimming.

The large pool hall area is served by just a single air handling unit, rather than the two or three that might be expected. This is because it depends heavily on natural ventilation to provide dehumidification and a pleasant environment, as well as cooling when required. Dehumidification is vital to prevent condensation and protect the building fabric. Though the services that maintain pool hall conditions are impressively simple, their various modes of operation have called for a relatively complex control strategy. This is implemented by the Trend building management system.

The control setpoint for relative humidity varies according to the outside air temperature, ranging from 50% (at –4ºC) to 65% (at 10ºC). When there is a requirement for dehumidification and the outside temperature is above 10ºC, the system first opens a set of high-level windows that run the entire length of one side of the pool. If this fails to reduce RH sufficiently a set of low-level windows on the opposite side are opened. Should this not achieve the desired effect (which generally it does), or if the outside air temperature is below 10ºC, the AHU's recirculation dampers are moved to increase fresh air intake. Finally, the speed of the supply fan would be increased, via its inverter drive. A plate heat exchanger in the AHU allows heat recovery from the exhaust air. The BMS prevents windows opening when it is raining or if the wind speed is too high.

When there is demand for heating, the AHU heating coil valve is modulated open and fan speed increased. When the space temperature approaches setpoint (29ºC), fan speed is reduced to a minimum and then the fan switched off. If the temperature in the





pool hall is too high, the system's first action is to open the windows. Should additional cooling be required, the AHU fan is brought on and dampers positioned for full fresh air. (The air handler has no cooling coil.)

Other energy saving measures include the use of condensing boilers and variable speed drives on the main heating pumps. The changing areas have underfloor heating circuits, which are supplied via 2-port valves, as are all the other LTHW circuits. The valves are modulated by the BMS to achieve required room conditions. It also sequences the boilers, as well as controlling the pool water temperature. The pool's office areas are air conditioned by a VRV heat pump with room-mounted cassette units, which the system enables. Heat recovered from their water-cooled condensers helps to heat the pool water.

Further savings have come from the use of rainwater as pool make-up. The role of the BMS is to maximise its use through pump control based on tank level measurements. A utilisation rate of over 90% is expected. The rainwater tank has a storage capacity of 35m3, which is equivalent to the volume of water lost during the weekly backwash of the pool filters. Among its various other duties, the Trend system also controls sewage pumps.

The BMS's control and monitoring functions are performed by four, network-linked IQ intelligent outstations. Two of them are IQ246 models, a 72pt controller with a very small footprint. This was an important feature as the size of the control panel was constrained by it having to be installed in an area of the plantroom where wall space was limited and there was also a lack of headroom due to overhead ductwork. Moreover, the 246's high number of inputs (52pt) is well suited to the large amount of monitoring carried out. This is higher than usual partly because the position of every panel switch is monitored to make it easy to see if plant controls have been manually overridden.

The main point of access to monitored data and system settings is a Trend 962 PC-based supervisor in the plantroom. A modem link allows the performance of the building services to be remotely monitored from a 962 in the offices of Max Fordham. Soon the pool system will also be accessible from a supervisor that is part of a larger Trend BMS on the main university site.

The pool building was designed by Faulkner Browns and the building contractor was Shepherd Construction.

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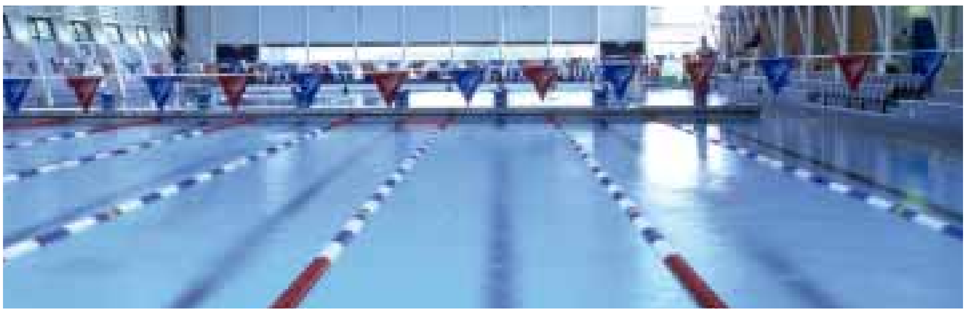

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