

Glazing a trail for energy efficiency



Freeman's Quay, a new energy-efficient leisure centre in Durham, is blazing a trail when it comes to both water and energy consumption – Durham Building Control provided the building control service on the project

Leisure centres have an inherently high demand for energy and water due to the exacting requirements for the internal conditions and the high number of visitors. As such it is imperative that design strategies focus on reducing both water and energy consumption to ensure the long term success of the building.

Although the world heritage site location of this new wet and dry leisure centre in Durham limited the scope for introducing renewable technologies, the innovative design has nevertheless delivered one of the lowest energy leisure centres in the UK. The EPC rating for the building indicates a CO₂ footprint which is over 30% lower than a current 'good practice' and 60% lower than a 'typical' UK leisure centre.

From the outset strong

emphasis was placed on close communication with the client to develop the brief and allow them to make informed decisions throughout the design development process by clearly explaining the various options open to them and help them achieve their high sustainability aspirations for the building. The client has expressed their satisfaction with both the completed building, and with the project successfully reducing energy consumption and costs and making the building a pleasure to occupy by staff and the public alike.

MECHANICAL AND ELECTRICAL

The exacting requirements for the internal environment for the different sporting activities taking place in swimming pools and leisure centres present some demanding mechanical and electrical challenges. At Freeman's Quay design challenges have

"EXTENSIVE COMPUTER MODELING WAS USED TO OPTIMISE THE GLAZING DESIGN AND DELIVER THE REQUIRED UNIFORMITY AND GLARE INDICES"

been successfully met and these deliver appropriate temperatures, air quality, water quality and lighting with the minimum energy consumption and CO₂ footprint.

LIGHTING

The orientation and arrangement of the building and its glazing were designed to provide excellent quality daylighting throughout. As well as enhancing the look and feel of the internal spaces, this natural lighting significantly reduces energy consumption by allowing the artificial lighting to remain switched off for most of the day, and provides beneficial solar gains to the pool hall.

Extensive computer modeling was used to optimise the glazing design and deliver the required uniformity and glare indices. The teaching pool receives daylight via a 4m diameter daylight funnel passing through the fitness suite above. Automatic controls ensure that artificial lights are switched off when rooms are unoccupied or daylight is adequate.

HEATING

The building is heated with high efficiency (109%), low NO_x (<40 mg/kWh) condensing gas boilers. The compact, super-insulated and airtight building envelope minimises heat loss through the building fabric. The pool hall ventilation is optimised by controlling on the basis of a continually adjusted internal humidity set point, which is calculated on the basis of the external air temperature and hence the internal dew point. The fitness suite ventilation





utilises a unique control strategy which uses an automatic people counter to calculate the optimum ventilation rates to produce excellent air quality with minimum energy consumption. Heat recovery is incorporated into all the mechanical ventilation systems to provide further significant energy reductions.

COOLING

Natural ventilation has been used wherever possible to provide fresh air and prevent overheating in the summer. Where mechanical cooling is required, waste heat from the chiller plant is used to provide free heat to the swimming pools.

WATER

Excellent pool water quality is ensured through enhanced pool water filtration rates and good circulation provided by bottom inlets and surface skim via the level deck channel.

Meanwhile, a pioneering technique utilises waste pool water to flush WCs throughout the building, significantly reducing the overall water consumption and enhancing the pool water quality by increasing the dilution rate of the pool.

MATERIALS SELECTION

The pool water filters utilise recycled glass as the filter media. Nanogel rooflights in the pool hall, sports hall and entrance area have an enhanced thermal performance – reducing heat loss and risk of condensation – and allow large quantities of diffuse daylight into the spaces with minimal glare.

PERFORMANCE MONITORING

The building's water, gas and power consumption are continually monitored by the building management system to allow the staff to monitor and control the environmental performance of this low

“THE POOL WATER FILTERS UTILISE RECYCLED GLASS AS THE FILTER MEDIA”

energy building. Following completion of the building, work has continued with the client to monitor energy consumption, optimise control strategies and highlight areas for future improvement in energy consumption. In this way we can ensure that the building remains as sustainable in practice as it is in theory.

