CASE STUDY

# TREND GIVES CONTROLLED PERFORMANCE AT HOME OF ENGLAND RUGBY

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The new South Stand at Twickenham Stadium, Home of England Rugby, provides more than just an excellent vantage point to watch the game played at its highest level. It is also a top-class venue for business and leisure, perfect for events such as conferences and exhibitions, functions and live performances – and even incorporates the 4-star London Marriott Hotel Twickenham. Its extensive HVAC services are closely regulated by Trend building controls supplied and engineered by AES Control Systems Ltd.

The redeveloped South Stand has increased Twickenham's capacity from 75,000 to 82,000, making it the largest dedicated rugby stadium in the world – and doubled its conference and events capacity. Spread across five levels, it boasts 5000m2 of conference and exhibition space, a 400-seat performing arts centre and a banqueting hall for up to 800 people. Other facilities include meeting rooms, bars and a Virgin Active Classic health and fitness club (due to open this autumn) – plus the 156-room Marriott hotel. It will also accommodate the main Rugby Football Union (RFU) offices.

AES has put in two separate Trend systems within the South Stand. One is for the hotel, where it provides room-by-room control, while the other controls environmental conditions in most other areas. The latter has been integrated with networked Trend controls that had previously been installed in the stadium's other three stands, thus allowing centralised management and monitoring of the entire ground. Each system has a Trend '963' graphics-based supervisor as its main operator interface.

*Photo: RFU/Leo Wilkinson*

The main system in the South Stand incorporates 13 Trend IQ3xcite Ethernet-linked controllers. It closely controls 34 air handling units, each of which serves a different area. Other control functions include sequencing the stand's three boilers and enabling its seven chillers in accordance with demand. It also has a major monitoring role, which includes logging the readings from hot and chilled water meters and a large number of gas and electricity sub-meters, enabling the RFU to monitor usage across its various commercial operations and maximize energy efficiency. Another of the system's duties is to monitor the air conditioning units and temperature levels in IT server rooms.

In most areas, the IQs generally use return air sensor measurements to maintain the space temperature at the desired level – though the meeting rooms have re-heater coils that are controlled from space sensor readings. About half of the air handlers have air to air heat exchangers for energy recovery and here the IQs modulate a face/by-pass damper to make maximum use of the 'free' heating or cooling that is available from the return air. They only open

the AHUs' heating or cooling valves if the temperature setpoint cannot be satisfied using just recovered energy.

Most of the AHU fans have variable speed drives. If required, these can be controlled by the IQs on the basis of room air quality, as measured by CO2 sensors. This should allow the fans to be regularly run at lower speeds – thus saving energy – without jeopardising room conditions.

Each AHU and the area of the stand that it serves can be controlled as an individual time zone. This means that the operation of the plant can be closely matched to an area's occupancy. The RFU plans to use the 963 supervisor's calendars function to preset the times that the air conditioning needs to operate, ensuring that it is automatically brought on prior to a room or other space being used, and switched off again when no longer required, optimizing conditions and energy efficiency.

The 963 supervisor is used both by the RFU's facilities team and its maintenance contractor. It is currently accessible through just one computer, but this will change when it is moved onto the stadium's IT network – which will make it available to authorised users from any PC in the ground. One benefit will be to enable event staff to adjust temperature levels in response to client requests. Remote access will also be possible, allowing plant faults to be investigated out-of-hours.

The RFU's Head of Technical and Facilities, Neil Theuma is keen to make full use of the Trend system: "We want to automate the stadium as much as possible and will also be looking to do far more recording and analysis of data." Though Mr Theuma only joined the RFU last summer, he has long experience of Trend building control technology, which he describes as "reliable, easy to use and a powerful energy saving tool."

Though the hotel is an integral part of the South Stand – it is owned by the RFU – its Trend system is completely separate and is managed by Marriott's own maintenance staff. Fan coil units provide air conditioning in all of the bedrooms and VIP suites, each of them controlled by an IQ212. Each room also has a Trend RDU (room display unit), via which guests can alter the temperature setpoint and adjust the fan speed. The guest room areas are served by three AHUs, which like those elsewhere in the stand have IQ3xcite controllers and air-to-air heat exchangers. These units also have humidity control and duty/standby fans, which the IQs rotate weekly. Other air handlers serve the rest of the hotel, including front-of-house areas, kitchens and offices. Here there are further fan coil units – and in some places variable air volume boxes. Both are controlled by IQ212s. Most of the hotel AHUs have variable fan speed control.

In Twickenham's other three stands there are 38 IQ1 and 2 series outstations controlling the HVAC plant. The first of these were installed in the West Stand in the mid 1990s. All are linked on a single local area network that runs around the ground. This connects to the Ethernet network that supports the South Stand's IQ3xcite controllers. Thus all three generations of IQ controller have been integrated within a single system, all parts of which can be accessed through the 963 supervisor. This has been possible because of Trend's policy of backward compatibility when developing new products.

One important feature of the IQxcite controller is its use of modular input/output units, which was an advantage on the South Stand project because of the variety of i/o configurations that were needed. Its flexible firmware structure, which allows its strategy function modules to serve in any role, was also very useful because of the number of time schedule modules that were called for.

Like Trend, AES Control Systems has a long association with Twickenham Stadium, having maintained the building management system for a number of years. It is currently contracted to provide quarterly service visits and have an engineer on site during match days and other major events.

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