AN ENGINEERING TRIUMPH

AROUND 200,000 DATA POINTS WERE COLLATED TO CREATE AN AUTOMATED SUNSHADE SYSTEM THAT WOULD BE EFFECTIVE FOR AN ELLIPTICAL-SHAPED BUILDING IN SYDNEY WITH 64 FAÇADE ANGLES. DAWN ADAMS REPORTS.

Horiso views its automated shade solution for No 1 Bligh Street in Sydney as an engineering triumph of astronomy and mathematics. Unlike most buildings in the city, this high-rise was constructed with an elliptical shape rather than a traditional flat frontage. The result is that each office represents an individual façade with a different geographical location. The building has 64 façade angles, the equivalent of 64 controllable windows per floor each of which faces in a different direction.

The solution had to be vastly different from a standard shading control system which is able to control one, two or three facades in one section. In this instance, each façade required an individual program to take into account the surrounding parameters for their particular orientation.

Driving demand for a dynamic, intelligent integrated shading system was the use of clear untinted glass with a Visual Light Transmission (VLT) of 62 per cent to maximise the views of Sydney Harbour. With most of this glass dominating the eastern and western facades, the shading system would need to eliminate glare and reduce energy consumption as the use of VLT raised the potential for excessive heat load into the mechanical systems.

STRATEGIES

Horiso general manager Bruno Seguin highlights some of the strategies used to overcome the challenges this task presented. "We produced 3D modelling and then had to work out the position of the sun at different times of the year," he says. "The first priority was sun tracking."

The project would take months of intensive work from pre-commissioning to final delivery, as well as fine tuning. A team of engineers collated the data required to program a fully automated shading control system. The entire building surrounds had to be considered as well as overshading and indirect glare from neighbouring offices and the harbour.

About 200,000 data points were programmed into 897 decentralised controller units, networked over 28 floors. Each of the 64 separate controllable windows facing 64 different directions were programmed to receive information that combined the sun's angle of incidence, absolute position within the building and relative position to adjacent buildings.

Some 897 individually programmed controllers and 1780 SpecialtyVenetian Blinds featured in the fully automated shading system that was integrated within the elliptical glass cavity of the curved double skin ventilated façade, which ran the full height of the building's 29-floor atrium. Automated SpecialtyVenetian Blinds, with a 7.5 metre drop, were installed on an exposed area on the building's roof.

CLEAR GLASS DOUBLE SKIN FACADE

For the first time on a project of this scale in Australia, a double-skin glass façade was used on a high-rise tower to reduce the significant heat load. The entire façade is cantilevered out from the ring beam. Horiso explains that the outer glass skin protects the sun shades while allowing natural light into the building.

Designed to keep the building cool, air enters the cavity on the bottom of the building, allowing cool air to circulate within the cavity and exiting at the top of the building. As a result, the design also protects the mechanised blinds from being disturbed by wind.

OUTCOMES

With intelligent controllers permitting highly complex mathematical and astrophysical calculations to take place within each controller device, the energy consumption in the building has been kept to a minimum. These strategies enable it to operate at 5Star NABERS Energy levels. A 42 per cent CO_2 reduction was achieved compared to a similar sized conventional office tower.

Intelligent control of the façade's venetian blinds is integrated into the building management system, with micro processors ensuring each set of venetian blinds is individually adjusted according to the angle of the sun. Horiso cites this ability as ensuring the exact position required is secured to achieve maximum heat and light control.

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HARDWARE

Ensuring easy integration with most building management systems and remote control access from any location worldwide, the native BACnet protocol was used by Horiso.

Only three major hardware components feature in the entire shading control network. Horiso explains the intelligent distributive network enabled two motor controllers, a Control Point to connect sensors and to provide contact to the building management system as well as a network router for each floor to enable communication with the server. All mathematical processing of specific astronomical parameters is compiled and executed within the shading controller.

ON TIME DELIVERY

To complete the task, more than 145,000lm aluminium alloy coil material, 125,000lm PVC free coated stainless steel cable and about 6800lm, or the equivalent of six tonnes, of structural aluminium was used for Australian manufacturing of the 1790 SpecialtyVenetian Blinds. And the original design specifications and installation details of the Specialty Venetian Blinds were amended to accommodate the building's curvature.

The project was managed by Turner Bros, credited with ensuring installation was achieved in the exact time allocated to avoid extensive delays.

PROJECT
No 1 Bligh St

OWNERS
Co-owned by DEXUS Property Group, DEXUS Wholesale Property Fund and Cbus Property

ARCHITECTS
Australia's Architectus and Germany's Ingenhoven

BUILDERS
Grocon

SHADE SOLUTION
Horiso

MOTORS
1780 Elero motors (changed order)

SHADE AUTOMATION
Horiso Solarai

PROJECT MANAGED BY
Turner Bros.