



Outstanding!

Keeping the world's largest fully demountable building cool requires a carefully considered solution. Ecolibrium takes a look inside the pavilion that was packed for Adelaide's V8 Supercar event.

In March each year, fans of V8 Supercar racing flock to Adelaide's Victoria Park Street Racing circuit for the Clipsal 500. The four-day event marks the beginning of the V8 Supercar Championship Series in Australia.

This year, more than 3,000 of those fans, officials, corporate VIPs, media, pit crews and drivers enjoyed the comfort of a new air conditioned pavilion. Measuring 200m by 21m and three storeys in height, it is the largest and most technologically advanced fully demountable building in the world. It replaced an aging demountable structure that had been erected and dismantled on the site for more than 17 years.

Commissioned by the South Australian Government and assembled at a cost of more than \$20 million, the new pavilion

provides 30 world-class pit garages and workshop space for racing teams at ground level. Above are two floors of race control, administration, media and community facilities, corporate hospitality suites and two levels of open decks and verandahs for use as viewing platforms.

A permanent, multi-purpose pavilion would have meant considerable design compromises, and would have been three times as expensive.

Consulting engineers Kellogg Brown & Root (KBR) of Adelaide, designed and project-managed this challenging project from concept to delivery.

Constructed in 5m modules, the versatile demountable structure needed to be fully air conditioned to provide a comfortable

refuge from Adelaide's summer heat, when temperatures often reach 40°C. This created special problems requiring a technologically advanced solution.

The design engineers found this solution with a lightweight air-to-air heat exchanger.

"The key to better air conditioning quality is the use of large amounts of outdoor air," says Paul Higley, KBR's building services engineer – mechanical. "Rather than re-circulating stale or polluted air, the heat exchangers used provide an economical method of efficiently delivering very high levels – up to 100 per cent – of fresh, filtered, outside air into enclosed buildings."

Higley says a good system will also eliminate stale air and air-borne

contaminants such as bacteria, smoke, fungal spores and dust without the danger of cross-contamination of air paths through the heat exchanger.

He says the biggest challenge was to design an efficient air conditioning system that could be installed and dismantled within a very tight timeframe.

“The design philosophy was to provide an innovative, single-pass, multi-modular air-conditioning system and minimise the distribution ductwork,” Higley says. “The fabric internal ducts can be fitted in less than a third of the time needed for rigid ductwork and need minimal storage once deflated.”

Higley says special brackets were designed to make installation flexible and to eliminate the need to drill additional penetrations within the structure.

“This project – the world’s largest demountable temporary building – was delivered on time, which is a credit to all involved,” he says.

“Measuring 200m by 21m and three storeys in height, it is the largest and most technologically advanced fully demountable building in the world”

The South Australian Government’s over-riding requirement was that every component of the temporary pavilion’s construction represented the best solution available, was energy-efficient and technologically superior.

“It was certainly challenging, but by coupling seven units to evaporative coolers that pre-conditioned outside air we were able to achieve the quality of air required in the two floors above the garages,” says Steve Cook, a director of Air Change’s South Australian distributors, Industrial Air SA. “Normally, we would have used return air to provide pre-cooling but there was no way of recovering air from inside the building and getting it back to the heat exchangers.”

Industrial Air SA recommended using two 96kW and five 112kW units mounted on skids with evaporative pre-coolers.



Outdoor units.

Once in place, these close-coupled units can be connected by short metal ducts to textile air distribution tubes suspended on wires below the ceilings on each floor.

“Climate studies indicated we would need to meet fairly wide temperature and humidity contingencies and an ever-changing air flow,” Cook says. “On a typical hot and dry day with 40°C dry bulb and 23.5°C wet bulb, and a hot and wet day with 35°C dry bulb and 23.5°C wet bulb, we had settled on providing 16.5°C of air to match a worst-case scenario in a cost-effective way.”

He says the heat exchangers offered full outside air economically at 95 per cent efficiency.

Air Change Manufacturing CEO Steve Atherton says that a key element in the selection of the combined heat exchanger and air conditioning system for the Adelaide project was the ease of installation and connection to the pavilion. The units, he says, can be moved without the need for special equipment.

The design and construction of the seven skid-mounted units was carried out by Westside Mechanical Contracting.

Westside director Wayne Irvine says the demountable pavilion was one of the most exciting projects in which the group had been involved. His company designed, manufactured, installed and then commissioned the removable air conditioning system.

The seven sets of evaporative coolers, heat exchangers, controllers and connecting

ductwork are on steel skid bases that are 6m by 3m. Each unit is more than 2m high and weighs just under four tonnes.

When the demountables are in place, a crane lifts the units onto a 4m high support frame at the rear of the building, enabling them to be easily connected to the pre-installed delivery system.

The textile tubing that delivers the conditioned air into the two upper floors inflates when the system is turned on. These tubes have mesh slots designed to regulate the flow and distribute air evenly.

“Inside temperatures are monitored by wireless sensors that automatically provide information to the controllers fitted to the units outside,” Irvine says. “Our role when the pavilion is required for an event is to lift the air conditioning units into place, connect the power, water and drainage and then test and adjust the whole system – this takes only a few days once the main internal systems are installed.” ■

At a glance

Consulting engineers:
Kellogg Brown & Root (KBR)

Contractor:
Westside Mechanical Contracting

The equipment:
96kW and 112kW Air Change sensible and enthalpy heat exchangers

Supplier: Industrial Air SA