Aquatic air quality

Fresh air is a must for athletes in training. A new aquatic facility at the Sydney Academy of Sport in the city's north features AirChange's PoolPac system, which keep both the building and the people performing at their optimum ability.

When the human body is working at its peak, air quality is at its most critical. Remember the uproar over Beijing's polluted skies at last year's Olympics? At the Sydney Academy of Sport in North Narrabeen, young sportspeople come to perform at their very best. The state-run fitness facility acts as home for the Manly Sea Eagles when in training, and caters for schools, community sporting clubs and corporate groups year round. The grounds are set within verdant national parkland and can accommodate 100 guests in motel-style rooms, while dormitories have space for 260 people.

As such, the new aquatic centre facility currently under construction had to be of the same high quality. With a six-lane heated indoor pool, plunge-pools, ice baths and contrast showers helping players train to their optimal standard, it was important that the new aquatic centre not be compromised by poor air quality.

Serious de-heater

Caringbah-based enthalpy air-to-air heat exchanger manufacturer, Air Change - which has completed projects on other high-profile aquatic centres such as the Australian Institute of Sport, University of Sydney, the Shangri-La Resort in Fiji and Ryde Aquatic Centre - was called in to install its ACPB-6500 unit. The 5000-litre PoolPac unit with de-superheaters was recently put in place as the centre nears completion.

Air Change marks up a score for the environment through its enthalpy air-to-air heat exchanger units via reducing loads by pre-conditioning incoming air prior to entering the refrigeration system.

The PoolPac unit introduces 6,500 litres of 100 per cent outside air each second, which is then processed through a heat exchanger. The heat exchanger is designed to work in the cooler months of the year, where a pool complex typically requires a constant internal temperature of 28˚C.

Air Change engineer, Shane Carmichael explains how the system manages to use waste heat generated from the unit in order to heat outside air.

"Rather than introducing outside air that's cold and having to heat it up and freshen up the pool that way, we use the heat in the exhaust air, and transfer that heat in our air-to-air plate heat exchanger to the outside air," Carmichael says.

The system can also operate using a heat pump in the summer, when cooling is more of a necessity. "The outside air would typically come into our air conditioning system in a warmer state, and then it goes through a traditional reverse cycle heat pump."

Compared to a conventional system, which simply takes 100 per cent outside air even at 0˚C and introduces it into an air conditioner system to try and heat that air, the PoolPac unit features a heat recovery system. If the air temperature is 6˚C outside, while it's 28˚C, the heat exchanger will actually heat that air up to around 21.6˚C.

"What we're doing is recovering the heat from the exhausting air, and then putting that heat into the outside air that's coming in."

Efficient operation

The result is a real gain in energy efficiency by achieving a degree of free heating, which is channelled through a heat pump. That temperature difference from 6˚C to 21.6˚C is essentially free.

"Generally, what you achieve is 50 per cent reduction in required heating capacity," explains Carmichael. "This is a 96kW unit - traditionally it would a 192kW."

The process of reclaiming waste heat allows for the AC system to be sized down significantly, explains AirChange national sales manager David Gartrell.

"We're able to use much smaller systems that have a smaller footprint. We used smaller platforms on the job. Electrical demand came down from our smaller systems compared to the larger conventional systems, so they didn't need to do the electrical upgrades into that facility."

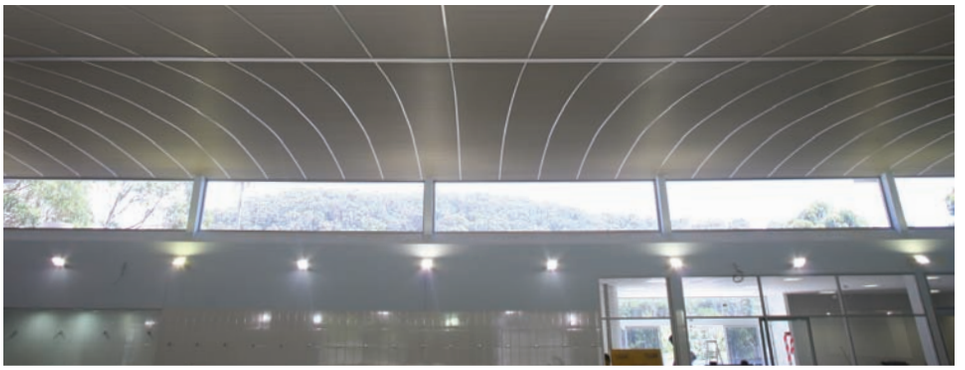
The response from the market has thus far been exceedingly positive.

"A lot of engineers have said to us: 'what more can you want from a unit? it's got heat recovery, it's got economy cycle, it can use CO_2 sensing to modulate the amount of fresh air coming in to maintain air quality," says Gartrell.

While ensuring temperature levels remain constant within the aquatic centre for the comfort of patrons is important, the quality of air in the building is perhaps even more crucial. Sanitary requirements mean that the pool must use a number of potentially harmful chemicals in order to keep it clean.

"Generally, a pool requires 100 per cent outside air, for a couple of reasons. One is to improve the indoor air quality," says Carmichael. "A big problem is that in pools it's chlorinated air, which can cause harm to swimmers and staff. Introducing 100 per cent outside air you're reducing the levels of contaminants.

"We're bringing in about three times the amount of air that Australian Standards call for. I mean, Australian standards really are the bare minimum fresh air you want in a building to maintain acceptable air quality. But a lot of these new green buildings are pushing for 150 per cent improvements on air quality."



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Pools also need large amounts of outside air to offset the amount of water in the atmosphere. The constant presence of moisture on the glass and steel structure can lead to corrosion, shortening the lifespan of the facility and ultimately becoming dangerous.

"The second reason is to reduce or eliminate condensation on glass and walls by introducing outside air, which is generally drier than the room temperature, or indoor temperature," continues Carmichael.

"We're keeping the indoor environment nice and dry, and by doing that, we're eliminating condensation on all the internal surfaces. When there's condensation on the internal surfaces it forms a harmful chloromine, and it will corrode the building's structure."

The PoolPac system works to circulate the air in the aquatic centre, greatly decreasing the concentration of chlorine and potentially harmful chemicals.

AirChange founder John Urch extolls the environmental virtues of reclaiming heat, "We're not ordinary air conditioning manufacturers, we're in a much wider scope than just that. As far as energy reclaim, and everything else, everything we do is saving energy. It's a big step just from the normal practice of making air conditioning."