



A home away from home

Originally from Suchuan province in China, giant pandas Funi and Wang Wang have settled in nicely into their new home at Adelaide Zoo, where they are the star attractions. Careful consideration has been given to replicate as closely as possible the pandas' natural living conditions.

Some facts about giant pandas are quite well known. Native to certain parts (the hilly central-western and south-western) regions of China, the bear is distinguished by its distinctive black and white colour, by its penchant for bamboo (although it will indulge in other foods, including meat), and by being irresistibly cute.

It's this last point that doubtless explains the popularity, especially among young children, of the slow-moving creatures.

Estimates of panda numbers vary greatly, but there is consensus among experts about one thing: panda numbers in the wild are lower than they should be – possibly as low as 1,600.

There are even less in captivity, especially outside of their homeland. Estimates put giant panda numbers in zoos outside China at about 30. Only two of those, however, can be found in the southern hemisphere: four-year-old female Funi, and five-year-old male Wang Wang.

Adelaide Zoo will be home to the pandas for the next 10 years. And if everything goes to plan, a breeding program some time in the future will see the pair produce some “made in Australia” cubs.

SO LONG TO WOLONG

After the Wolong Giant Panda Research Centre where they were born and raised was destroyed by the Wenchuan earthquake that struck China in 2008, Wang Wang and Funi were transferred to the Baixiongpin Yaan Research Centre for intensive care.

The pandas were carefully chosen for Adelaide because they are healthy, friendly, easy to handle and genetically important.

The facilities for the giant pandas have been designed to emulate their native conditions, and feature naturally landscaped indoor and outdoor areas incorporating chilled rocks, air conditioning, waterfalls and an abundance of their natural food source: bamboo.

“Every effort has been made to ensure the pandas are content in their new home during South Australia's hot summer months,” says Adelaide's Zoo CEO, Professor Chris West.

The project consists of the Giant Panda Day Enclosure, the Sanctuary Function Centre, the Santos Conservation Centre and an entrance area.

Consulting engineering firm Bestec was contracted to provide the ecologically sustainable mechanical design, and Haden Engineering won the tender to install the mechanical services for the project.

Air Con Serve designed and installed the building management systems to monitor and control the mechanical, electrical and hydraulic systems.

Air handling units and energy recovery ventilators (ERVs) were specified by Bestec.

Specified in late 2008, work commenced on the enclosure in March last year, and was completed in readiness for the Pandas' arrival in December. The centre was opened to the public from February.

THE DAY ENCLOSURE

The Giant Panda Day Enclosure is used to house the pandas during those daylight hours when they are not outside. These times are determined by the zoo keepers responsible for the pandas, and depend on weather conditions and other factors.

The original brief for the Day Enclosure was a design maximum of 17.5°C DB with a tolerance of +1.0°C DB, with no requirement for heating.

Wade McKinlay of Bestec chose to use two 2,000 l/s energy recovery units supplying 50 per cent outdoor air, with enthalpy heat exchangers for energy efficiency and to provide lower relative moisture content in the internal space.

Four individual circuit-chilled water coils were chosen to provide excellent part-load control and temperature stability.

“This provides a high level of redundancy for cooling, so that should a control valve fail, there are still three valves and three circuits to handle the design temperature load for the vast majority of the year,” McKinlay explains.

A 0-10V input from the BMS was used to control the airflows of the units. Individual fan/motor VSDs were factory fitted.

The heat-recovery and economy-cycle dampers are digital-input-controlled for either of the two main types of operating modes from air side: heat recovery, or economy cycle.

In the heat-recovery mode there is 50 per cent outside air and 50 per cent return air bypass, with the exhaust fan only operating at 50 per cent.

In the economy cycle, with no relief air via the space, the exhaust air is taken out 100 per cent via the units' mounted exhaust air fans.

“Exceptional temperature control results have been achieved with the inherent design of the energy recovery units and the addition of the specially designed four-circuit chilled-water coils,” McKinlay says.

Air filters with deep beds were used for the outside air, and panel filters used for return air to the units.

“The challenge for us was to make sure the end users had controls that were functional and reliable,” says Air Con Serve's Mark Wood, Ass.AIRAH.



“We are able to confirm that in the major Adelaide heat waves of around 40°C, the temperatures in the panda enclosure held extremely well at around 0.1°C of the set point.”

THE SANCTUARY FUNCTION CENTRE

Recently opened, and boasting a capacity of up to 400 people, the Sanctuary Function Centre has already hosted more than a few events. The centre overlooks both Botanic Park and Adelaide Zoo.

The centre had 100 per cent outdoor air supply specified. ESD initiatives determined that heat recovery was necessary, combined with the use of chilled-water and hot-

water coils. Bestec selected two air handling units in combination with sensible recovery heat exchangers and water cooling/heating coils.

A 0-10V input from the BMS is used to control the airflows of the units' individual fan/motor VSDs, which are factory fitted. The heat-recovery and economy-cycle dampers are digital-input-controlled for either of the two main types of operating modes from air side: heat recovery and economy cycle.

“In heat recovery, all air passes through heat exchangers, cooling or heating air as required on demand,” McKinlay says. “The unit has been provided with in-built VSD-driven supply and exhaust air fans matched to projects requirements.”



“In the economy cycle, 100 per cent outside air is supplied, bypassing the heat recovery exchanger, and the exhaust air fan is shut down. The relief of air from the space is via BMS-controlled motorised openable windows.

“A night purge is also used on economy cycle, integrated with the site calendar and only used if facilities are booked for use the next day. Both of these initiatives provide additional energy ESD benefits.”

COLOURFUL CLIENTS

Mark Stevenson of Haden Engineering’s Adelaide operation described the giant panda project as one of the most unusual the firm has worked on in its 40 years of Australian operations, with some rather unusual clients inhabiting the air conditioned area.

“The South Australian climate is hotter than the pandas’ natural environment, so great effort has gone into ensuring they will be comfortable in the hot, dry conditions,” explains Stevenson.

“To accommodate this, we have cooled the enclosure with an air-handling unit that services the day rooms, while the

outdoor enclosure has five large, chilled rocks naturally embedded around the periphery of the area.”

Though the chilled rocks may look like they’re natural, they are actually moulded from glass-reinforced concrete. Inside each rock is a poly-coil supplied with water chilled at 6°C and a temperature sensor that is used to maintain the temperature to approximately 12°C.

“This provides enrichment for the pandas when outside, and allows them to move freely from the air conditioned enclosed space of the day rooms to the outdoors enclosure in relative comfort,” Stevenson says.

Industrial Air’s Frank Johann says it is fulfilling to think his company, which supplied the air handling units, may have played a small role in the survival of an endangered species.

“Hopefully the Down Under giant pandas will be happy in their conditioned enclosure, and Adelaide may eventually add to the world population of this species,” Johann says. “To think that our products are making an important contribution really puts a smile on your face.” ■

PROJECT AT A GLANCE

The Professionals

Architect: **Hassell**

Consulting engineers (mechanical and ESD): **Bestec**

Managing contractor: **Hindmarsh**

Mechanical contractor: **Haden**

The Equipment

Air handling units (Panda Enclosure): **2 x Air Change 50% Outdoor Air NEXT-AHU 2,000 l/s**

BMS: **Air Con Serve**

Energy recovery ventilators (Sanctuary Function Centre): **2x Air Change 100% Outdoor Air Green Building AHUs 3000 l/s**

Variable speed drives: **Danfoss**

Chillers: **Carrier 30RA**

Fans: **Fantech**

Pumps: **Grundfos**

Water treatment: **Hydrochem**