



Knox Advanced Engineering Pty Ltd

BOVIS LEND LEASE has wholeheartedly embraced the concept of environmentally sustainable development (esd). Throughout their major projects, they are constantly seeking to improve the environmental footprint of their developments and provide efficiencies wherever possible. Penrith Plaza was no different.

Their goal was to reduce the operating costs of the Penrith Plaza Shopping Centre by a massive 40%, as compared to their existing centre. To this aim, they engaged the services of a young, dynamic and enthusiastic engineering consultancy called Knox Advanced Engineering (KAE). In operation since 1999, KAE have rapidly established their credentials on a number of significant projects providing consultancy on HVAC, electrical, hydraulics, fire, acoustics, and structural. Their aptitude for innovation has enabled them to develop a market that is fresh and creative, where technology is utilised to its fullest potential in generating solutions for their clients.

KAE undertook the mechanical services design for Penrith Plaza. They designed all HVAC systems and associated Building Management Control Systems (BMCS). The format is unusual in that it is a mixed flow system, which intelligently seeks the optimum balance between natural ventilation and air conditioning. The air conditioning and the operable louvres and doors of the centre are able to interface with each other to open and close automatically, depending on ambient air temperature, rain, wind direction and CO2 levels. The BMCS monitors and adjusts to the amount of natural air circulating and is designed to shut down the air handling plant (AHP) whenever possible. This variable and flexible design of the AHP and the primary only, variable flow chilled water circuit allows degrees of precision and economy rarely possible with standard enclosed shopping centres. The benefits in efficiency and cost savings are significant, but there is also a huge benefit in the creation of an open-air environment for the visitors to the centre. This was part of the original vision of BLL & the delivery architect Daryl Jackson Robin Dyke, which was "To create a street-like atmosphere that was open, airy and light".

The Central plant consists of three central chillers and 2 towers. The low load chiller running on frictionless magnetic bearings (One of the few developments in Australia to employ this technology). KAE also concentrated on the small details & designed all systems to have low resistance to flow, which meant that all systems have even greater efficiencies.

In addition to their design for the HVAC, Knox undertook a Computational Fluid Dynamics (CFD) study of the underground car park and as a result engineered a solution that negated the need for conventional ductwork and

expensive centre underground plenums, which were present in early concept designs. Fans within the car park constantly monitor CO levels and adjust the flow accordingly, forcing fresh air in one side and exhausting it from the other. This means that the car park provides the appropriate amount of clean air for the number of vehicles using it at any one time.

Throughout their work on the Penrith Plaza Development, KAE utilised the most advanced computer aided design tools available. Prior to any work being undertaken, they were able to look at the system in its entirety and make adjustments, as required, to improve its overall efficiency. As Jorgen Knox from KAE explained, "There was no guess work involved at all, every aspect of the design was run and tested using the modelling of the system."

This 'virtual' image of the design enabled KAE to 'play' with the system, removing or adding features in the ductwork and assessing their overall impact until they arrived at the optimum design. Significantly, for the developer, this meant they were also able to cost and budget well in advance, knowing exactly what was required prior to the commencement of construction.

KAE are different from many other companies within their field. They have an energy and enthusiasm that sets them apart, a willingness to embrace new technology and use it to its full extent. The results of this refreshing approach have been well demonstrated on the Penrith Plaza Redevelopment and Knox Advanced Engineering's innovative approach to ESD has assisted Bovis Lend Lease to once again, create an industry benchmark for others to follow.

Sydney Office
Suite 101, 4 Clarke St
Crows Nest NSW 2065

t. 02 9436 1244
f. 02 9436 0944

Melbourne Office
Suite 401, 9 Eades Street
East Melbourne VIC 3002

t. 03 9415 9778
f. 03 9415 9779
www.knoxadv.com.au