

# SWINBURNE UNIVERSITY

MAIN CONSTRUCTION COMPANY : Kane Constructions  
PROJECT END VALUE : \$75 Million  
COMPLETION : January 2011  
ARCHITECTS : H2O Architects  
ENGINEER (STRUCTURAL / CIVIL) : WATERMAN A.H.W  
SURVEYOR : Wilsmore Nelson

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With a number of technical and logistical challenges to overcome on the unique Swinburne University Advanced Technology Centre (ATC), client and superintendant knew they needed a construction company that had the experience and industry excellence to do the job.

Kane Constructions has more than 35 years' experience in the building and construction industry and is a privately owned commercial construction company active in all sectors. With more than 270 employees it also had the depth of knowledge required to complete the intricacies of this particular job.

The \$75 million project was a test of ingenuity and is one of the first buildings at an Australian University designed to achieve a 5-star Greenstar rating under the GBCA Education Tool. It includes many sustainable features such as on site power generation, energy efficient air conditioning and the use of rain harvest water. The ATC will be home to some of Swinburne's key research facilities including a world class PC3 laboratory.

"This has been a very technical project but it was the hidden challenges that made the job one of the most interesting Kane Constructions has undertaken in recent years" said Kane Project Manager Paul Christian.

"There were three interesting structural challenges during construction, overcoming them has been collaborative effort, with contributions from the architect, consultants, sub contractors and the whole Kane team" Mr Christian said.

The first of the major challenge was the re-design, planning and construction of the Level 3 transfer beams located in the North West tower. Providing structural support for the eight floors above, four beams, 2.4m wide and 3.2m deep, spanning an impressive 30m were conventionally formed, contained 1070 cubic meters of in-situ concrete and were then post tensioned.

"The size of the beams and the intricacies required during placement of the concrete were difficult. We poured 1070 cubic meters of concrete, approximately 135 truckloads, during a 16 hour continuous pour, this required the development of a detailed pour plan which included heat monitoring, close supervision and a dedicated team of workers on rotating shifts to ensure we could accommodate engineering requirements and local authorities," Mr. Christian said.

The second challenge was the design and implementation of the formwork to support the cantilever of the Level 5 structure in the North East tower.

"From lower ground to level four, the North East tower was incorporated around an existing university building, then at Level 5 the structure extended north and was suspended over the existing building which was unable to take additional load. To make it work we had to install temporary steel needles which were specifically engineered to support structural loads and to ensure we could remove them after our curing period. This process involved the use of twin 610UB temporary steel beams which cantilevered 3.6m and supported approximately 750Kn of dead load during concrete placement."

The Strong Cell Laboratory is the centre piece of the new ATC and also the third major challenge. Kane Constructions had to initiate and implement a number of strategies to ensure the requirements of the client are met. The Strong Cell Laboratory tolerances of +/- 1mm, meant that construction of steel and concrete in the strong floor had to be built to world standards and that anything outside was unacceptable. This area of the project creates a three way fixing and testing facility for deforming and destructive testing of products from the construction, aerospace, automobile and manufacturing industries.

"We have worked very closely with the client, consultants and outside industry experts to ensure that all requirements are met and although there were intricacies that proved to be problematic, the contributions of all involved has helped to overcome them, ultimately we learned that our tradesmen are the key to its success" Mr. Christian said.

"There is a total of 18,000 square meters of floor space in all four buildings and with Swinburne University at the centre of technology based learning, it was always going to be a very complex yet rewarding project."





# ADVANCED PRECAST

## Advanced Precast (Aust) Company Profile

Advanced Precast (Aust) was established in Melbourne Australia in 1982 and since those early years the company has grown to become one of Australia's market leaders in the field of precast concrete within the building sector. In 1999 the company expanded its base of operations into NSW and in 2005 into the QLD markets to service Sydney, Canberra, Brisbane, Gold Coast and the surrounding areas. The company currently employs 160 people across all three states comprising administrative staff, Engineers, Draftspersons and Construction workers. With over 25 years experience, our manufacturing, in house engineering and construction expertise has enabled the company to promote and lead by example in delivering innovative and cost effective precast design solutions for building structures. In more recent times the Victorian division of the group has seen a change of emphasis toward Architectural Precast.

## The Project

The Swinburne University Advanced Technologies Centre ("SATC") is set to be a state of the art research centre comprising two 11 storey towers connected via pedestrian precast bridge elements set behind two three storey structures. The building designed by Architects H20 proved to be one of the most challenging projects ever undertaken by Advanced Precast ("AP"). The theme of the external façade to the building is that of frothing bubbles emanating from the base of the building with decreasing circle diameters travelling up its height eventually becoming uniform. The theme of circles comprised 60mm concrete projections of 950 diameter and similar size circular concrete recesses of 30mm. Windows and viewing ports were incorporated in the Architectural façade and coincided with circular projections and recesses.

The main challenge for AP was to deliver a precast product both consistent in quality and colour. The Architectural specification called for an off form off white coloured concrete enhanced with the addition of white coloured oxide. The moulds utilised for the project were designed by AP in house engineers and assembled using several different fabricators in collaboration with AP tradesmen. The primary material used for the moulds was steel but due to the non-uniformity of the lower levels of the building other materials were required such as foam, timber and rubber selected for their ease of workability and adaptability in areas not easily formed in steel. It is not easy to deliver a uniform finish when dealing with such a diverse set of materials and that is where AP's experience was required to bridge the gap. By working closely with their concrete supplier the supply of concrete was closely scrutinised in order to produce the most uniform colour possible, not an easy task given the manufacture of precast was delivered over a 12 month period across four seasonal changes.

A well co-ordinated effort between Kane Constructions (The Builder) and Advanced Precast (The Precaster & Erector) ensured that Swinburne University (The Client) received a world class building in terms of the standard of finish. "This project was particularly challenging in that the precast walls were of an off form finish which meant that the precast erection had to be carefully planned and co-ordinated to avoid undue marring of the precast product which would detract from the quality of the completed building," said Victorian State Manager George Cosmos.

**For more information, please telephone Advanced Precast, Melbourne office on (03) 9706 5111 or log onto - [www.advprecast.com.au](http://www.advprecast.com.au)**



**ADVANCED PRECAST (AUST.)**

Trading Names of FRESHMORE (VIC) PTY. LTD. ACN 083 198 547 ABN 84 083 198 547





## HIGH QUALITY SERVICES

The PC3 laboratory inside the Advanced Technology Centre at Swinburne University required the highly specialized construction and finishing techniques for which Wilkore Pty Ltd is renowned. Wilkore Pty Ltd is a design and construction company with expertise in building distribution centres, offices and laboratories for the logistics, pharmaceuticals and hi-tech manufacturing industries. Wilkore utilised a sandwich panel material for the walls and ceiling of this PC3 facility. A PC3 facility is used where materials that are toxic, highly infectious or a quarantine risk need to be exposed.

“The sandwich panel is a standard one of two sheets of colorbond steel with a special fire resistant foam core. Sandwich panel is ideal for this type of facility as it is self supporting, flexible and able to withstand the high pressures experienced during certification and regular operation. It is also smooth and easily cleanable,” said Andrew Watson, business development manager for Wilkore Pty Ltd.

“The room was quite large for a PC3 lab, over 70m<sup>2</sup>, – with about 200m<sup>2</sup> of surface area. The certification criteria for a PC3 lab is for no more than two litres of air per second leakage with the room pressurized at 200 pascals. This means that the total gaps, cracks and pinholes must total less than one square centimeter.”

Using a specialised device, Wilkore tests the integrity of the room in a minimum of three discrete stages; at the completion of the building envelope, completion of services installation and final certification. This allows Wilkore to monitor progress of the building and identify problem areas early, rather than at the end of the process.

“Our training and quality assurance system ensures that every finish within the facility is of the highest quality. The challenge is to ensure that all trades are aware of the importance that every finish is perfectly sealed. Every sealing point must be signed off by the tradesman who installs it. This gives us traceability and accountability when we find a leak using testing.”

These are some of the most thorough internal systems to service the most demanding institutional or government project and to complement the already exacting standards of the company. Wilkore Pty Ltd is also certified to AS4801 and ISO18001, is FSC Accredited, Code Complaint to National Code of Practice for the Construction Industry and is prequalified to work in most states in Australia.



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## MONEY MANAGERS

The Advanced Technology Centre at Swinburne University is the largest capital works project undertaken by the University and a key plank of the 2005 Facilities Master Plan prepared by construction cost consultants and education specialists Wilde and Woollard.

The Wilde and Woollard Group provide an integrated fixed asset planning and management service covering all parts of the fixed asset lifecycle from creation through to disposal.

The ATC is essentially four distinctly different buildings with a lively laneway and village feel created between them at ground floor with upper levels linked by bridges at various points.

The scale and complexity of this project meant the University needed a highly skilled and experienced cost management team to oversee their \$100M investment through briefing, design, documentation and construction phases. Wilde and Woollard Director Paul Dowling noted that “although far from the largest project undertaken by the Practice, ATC at Hawthorn presented us with unique challenges from a cost management perspective. The ground floor of one of the buildings houses an open space 500 seat Auditorium requiring transfer beam elements in excess of 30m long to support 9 levels of structure above.”

“Another feature of the building is the largest mass concrete stress reaction wall built in the southern hemisphere. We travelled to UCLA in San Diego to see examples of these types of structures in operation and to get our heads around how they are constructed and how we would price them”

Mr Dowling added “just the look of that façade is enough to give any QS a headache but we enjoyed the challenge of achieving a cost effective outcome for this unique element and its circular windows which took a lot of research and consultation with specialist sub-contractors, long before the project was ever put to tender – this was of course a critical part of the thermal performance of the building too, assisting it to achieve its 5 star green star environmental rating.”

Wilde and Woollard are particularly pleased to see the success of this project as it is a good example of sensible campus master planning being implemented. It will be delivered on time and on budget and is a credit to the consultant team and the Contractor, Kane Constructions. Mr Dowling concluded by saying “by any measure this project has delivered excellent value for money for SUT – in an industry dominated by debate around procurement methodologies – the somewhat traditional full documentation, fixed lump sum tender was certainly the right choice. Good quality documentation and tight budget control has ensured that any exposure to budget risk during construction has been well contained”

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## ENSURING HIGH QUALITY FINISHES

With a quarter of a century of experience in the industry, ASK Aluminum Fabrications was the perfect choice to help complete the iconic Swinburne University Advanced Technology Centre.

The company has grown from a small concern in those 25 years to become one of Victoria's most well-respected mid-tier companies with an impressive portfolio of completed projects including The Westpac Centre, Hisense Arena, Federation Square and One East Melbourne.

Those projects have involved a vast array of styles and finishes, with differing degrees of size, scope and complexity.

The firm has extensive capabilities in the commercial window industry offering personalised service and a commitment to ensuring its clients get the highest quality finish.

ASK Aluminum Fabrications was responsible at the Swinburne University project, for the fabrication and installation of the many differing window and façade combinations, all of which were manufactured to the design specifications on site at the company's Epping base.

The Advanced Technology Centre building required ASK Aluminum Fabrications to manufacture and install not just standard window frames for the glass fronted streetscape but also a number of circular feature windows.

Conventional materials were used to achieve the desired effect required by the architect's intricate design and installation was done on time and on budget.

ASK won the tender for the project based on its outstanding previous performance and its ability to successfully liaise with Kane Construction and the architects of the project.

Recently completed projects include the Watsonia Barracks Living In Accommodation, in Watsonia for Grocon and 109 Clarendon Street, South Melbourne, a 33 level apartment tower, for Built.

Currently the company is working on several other major construction projects including the prestigious Laureate apartments for Mirvac in Albert Park and the Old Country Courthouse for Hansen Yuncken in William Street, Melbourne.

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Aluminium Fabrications Pty Ltd

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