Macquarie University Building C3 Library - Facilitating future learners
Solar control systems contribute to a better learning environment
**Client** - Macquarie Property on behalf of Macquarie University

**Architects** - Francis-Jones Morehen Thorp (FJMT)

**Planning** - JBA Urban Planning

**Builder** - AW Edwards

**Facade Contractor** - Facade Innovations

**Project Management** - Executive Project Management

**Structural & Civil Engineer** - Taylor Thomson Whitting

**Landscape Architect** - Francis-Jones Morehen Thorp

**Acoustic Engineer** - Acoustic Studio

**Awards** - 5 Star Green Star Building Award

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**A Welcome landmark education building.**

The 6 storey building was according to the architects, inspired by the “native parklands of beautiful forest of eucalptus trees” on the Macquarie University campus site.

The building is positioned on Macquarie Drive a main bus transport thoroughfare and University entrance for students. Reflecting it’s position and orientation, the main exterior design features two massive multi-coloured wings opening the library entrance, welcoming those who come toward it.

The building encompasses around 18,000 square metres of space, with a footprint of 6,770 square metres and housing the first library collection with a fully automated book retrieval system. The library can seat 3000 students, with wireless network to digital learning platforms. The library has minimal built-in furniture to accommodate special needs students and flexible floor usage.

““The solution lay in building a library that was people centred rather than collection-centred.”” Maxine Brodie, University Librarian - Macquarie University
Macquarie University is located north west of Sydney's CBD and is a second-generation Australian University founded in 1967. Its primary focus at inception was to further the research and teaching in sciences, social sciences and humanities.

The original library was constructed centrally within the University's campus and designed to be built in 5 stages. The last stage an extension comprising of 5,000 square metres of space was not completed. The economic climate at the time and the need to update the core electrical and mechanical systems of the library halted the construction while an overall review of the library's functionality began.

**Fundamental changes**
Over the last forty years the library services, resources and the number of students using the library have significantly changed. In 1964 no personal computers and few online journals existed.

Within ten years, 55,000 electronic subscription journals and over 1.8 million physical items were available. Today, the library is open 82 hours a week during semester with approximately 5,500 students regularly using the facilities.

Advanced library developments overseas, in particular the new Information Services Building at the University of Otago and the new Library at Christchurch Polytechnic prompted the Vice Chancellor, Penny Caraby and the Chair of Library Committee in 2002 to conduct a study tour in New Zealand. Between 2002 and 2004, two library building concepts were rigorously investigated, however these design concepts were additions to the existing library buildings for storing the library's physical items and not addressing the now urgent electronic and mechanical issues.

Early 2006, the incoming Chancellor Steven Swartz decided to overview the University's projects and plans including the library extension dilemma. He initiated a strategic focus with a challenging goal for the university, to be “among the top eight research universities in Australia and the top 200 in the world.” After much research and discussion, the University had identified two key principles - to focus effort to improve performance and achieve excellence in teaching. The library strategies were then established to meet these goals with a further objective to be a world leader in the delivery of information services - an innovative library dictum, “Client-centric rather than Library-centric.” This philosophy entails moving the emphasis onto an effective learning environments rather than the housing of the libraries growing collections.

**Moving ahead**
In line with supporting the new focus and goals, a university delegation viewed several sites in the USA where an automated storage retrieval system (ASRS) was operating. This advanced storage system substantiated the university's new direction and after examining the forecast costings on the proposed addition, it was decided money would be more wisely spent constructing an entirely new library complex. Moving forward without the contraints of the previous concepts, a stand alone complex could resolve all the functionality issues the current library buildings had, as well as supply the ongoing future needs of the university; working space for students and staff, and the housing of the library's enormous collection. The fresh start also had other underlying creative advantages.

The placement, design, construction and interiors of the new complex had even greater opportunities to enhance the state-of-the-art library envisaged by the university. With renewed enthusiasm the university began a pathway of consultation with the library team as well as other consultants experienced with library design to optimise the building's potential.
Thumbs up

The University Council approved a $70 million budget in August 2006 and agreed on a site for this innovative research and learning centre. The final brief was submitted to the six participating architectural companies.

The design criteria involved three important considerations. Firstly, the library and its environment (urban design and sustainability). Secondly, the library and people (light, connection, a range of learning spaces), and thirdly, the library and technology (collection storage with access and electronic resources and services).

In May 2007, FMJT won with their presentation that demonstrated an outstanding response to the design brief criteria and with a concept that symbolised the desired goals of the University.

The construction company, AW Edwards was commissioned by the architects to build the complex which began in January 2009 with a agreed completion deadline of January 2011.

Sustainability and the people factors

The University’s commitment to attaining a Green Star rating objective and the second element in the design brief involved shading the massive double skin glazed section of the facades. This important feature would contribute to the environmental sustainability outcome and the people factor; light and comfort internally for the library’s users. Shading concepts for the two double skin facades included roller shades, however due to the design complexity of the facades a more efficient solar control system was being considered.

Horiso was commissioned by the architectural firm FJMT to design a solution for the exterior shading of the glazed areas as well as their internal areas that contained the main study areas for the students.

Judging Panel - University Council.

"An elegant and timeless design concept that responded to a 'new beginning' at Macquarie."

Top: An artists impression of successful design proposal.
Above top: Construction underway. Courtesy of AW Edwards ©
Above: Natural light through the interiors. Courtesy of Vanessa Berry.
Horiso had a proven record with FJMT for designing custom made solutions for innovative facades and was at the time completing the solar shading and control systems for Darling Quarters' twin building complex and beginning 161 Castlreagh Street single skin projects. The time frame in which to complete this component of the library was also tight, eight weeks only for design, manufacture and installation. Horiso, a Sydney based company was the favored choice to deliver within the architectural design guidelines.

The design brief had its challenges. The facades were designed with a limited space between the double skins to maximise the internal space. The architect's design choice was the installation of roller blinds in the double skin. One facade faced west, the other north, humidity build up while the blinds were down and lack of light control was not deemed to be the desired result.

The product choice was reconsidered, and Horiso Specialty Venetian Blinds were decided as the best option for the double skin facades. A motorised control system could be integrated to maximise sun with daylight control while allowing natural ventilation within the double skin. However, the problem to house and install both the motor and the blinds in this limited space surfaced. AW Edwards voiced Horiso's concerns to FMJT and together with Horiso's team of solar shading engineers and Turner Bros' installation experts collaborated to find the solution.

The solution had two elements. To solve the space restraints for the installation of both the blinds and the motors. The conclusion involved the building company supplying rounded pelmets to house both the blinds and motors suitably and engineers from Horiso designing and manufacturing special brackets for their installation.

Meanwhile, Turner Bros. negotiated with AW Edwards to gain access for the blind installations before the outer skin of glass needed to be fitted within the four week time slot.

The other component of Horiso's manufacturing contract were the roller blinds with PVC free fabric for the internal areas. The neutral colour of the fabric chosen contrasts with the external vertical louvres emphasising their strong colours externally while internally creating a soft light, conducive to a more beneficial learning environment.

Other 5 Star Green Star building features

Energy savings

The building’s energy systems were designed to achieve significant savings for the main power requirements. Mixed mode ventilation, bio-filtration and night purge systems contributed to the overall energy savings.

“"It's not only a place of light and learning, it's also the most stunning building on campus.""

Professor Schwartz - Vice Chancellor, Macquarie University.

Above left: The western facade featuring the Specialty Venetian Blinds, externally and internally. Courtesy of FJMT.

Above right: The natural light filled relaxed seating area.
Other green attributes
The natural light and ventilation achieved in the floors below by the green roof feature, boost the comfort level for the students and creates a small oasis with plantings of drought resistant natives. Any water collected from the green roof is recycled through the toilet system.

www.horiso.com.au

Macquarie University Library Environmentally Sustainable Design achievements

- ASRS system reduced the size of the building footprint by 11,000 square metres.
- Green roof with drought resistant native plants.
- Rainwater collection and storage - saves over 50% of the required water from Sydney Water.
- Forty year durability status of building and interior components.
- Use of recycled materials where possible.
- Integrated energy system including the use energy generation, mixed mode ventilation, biofiltration, response system to primary power draws of airconditioning and lighting night purge systems.
- Natural light wells for lower floors.
- Zoned lighting.

Key building facts
- Building footprint - 6,770 square metres.
- Gross floor area - 17,997 square metres.
- One of the largest green roofs on an education building.
- Australia’s first automated book storage and retrieval system.
- Ground floor exhibition space.
- Lachlan Macquarie room - complete reconstruction of his drawing room from his home on the Isle of Mull.
- Seating capacity for 3000 students.

Images above show differing views of the green roof and it’s impact on the areas below. Courtesy of AW Edwards.

Images and content references:
Maxime Brodie, University Librarian
Macquarie University website
AW Edwards June 2011 Newsletter
Vanessa Berry
Melbourne Design Awards Newsletter.
Goethe Institut website.

The content of this case study was derived from sources which Horiso believes to be true at time of publication.