A LIVING MACHINE

DEVELOPER : University of New South Wales
MAIN CONSTRUCTION COMPANY : Brookfield Multiplex
ARCHITECT : Grimshaw Architects Pty Ltd
STRUCTURAL ENGINEER : Taylor Thomson Whitting Pty Ltd
CONSTRUCTION VALUE : $ 126 million

The Materials Science and Engineering Project (MSEP), is the new building in the Physical Sciences precinct of UNSW that provides not only teaching and laboratory space for Materials Science and Engineering, but also workshops, administrative offices, display spaces and more.

The Materials Science and Engineering Project (MSEP), is the new building in the Physical Sciences precinct of UNSW that provides not only teaching and laboratory space for Materials Science and Engineering, but also workshops, administrative offices, display spaces and more.

The new 9 storey building was designed by a US based consultant with Grimshaw architects through a competitive design process. The building's 23,500m2 has been designed to cater for 140 staff and up to 160 students, with capacity for a further 144 individuals in future.

The focus of the building was on providing excellent research spaces and the innovative design allowed for flexibility of laboratory spaces to be modified and removed in future years if required.

A central 'spine' of the building contains building services that laboratories can 'plug in' to with services wrapped by perimeter modules that can be changed or deleted as research demands or alter in future years with technological advances.

The unique design is particularly appropriate given the building's core function to serve materials engineering faculty and students, however only floors one to four will be occupied by Materials Sciences. The three floors above are available as cold shell lab space to house researchers in other disciplines.

Teaching spaces are located on the ground and first floors to facilitate quick entrance and egression. While funding from philanthropist Michael Crouch (inventor of the zip water heater) allowed for the inclusion of a Student Innovation Centre on the ground floor.

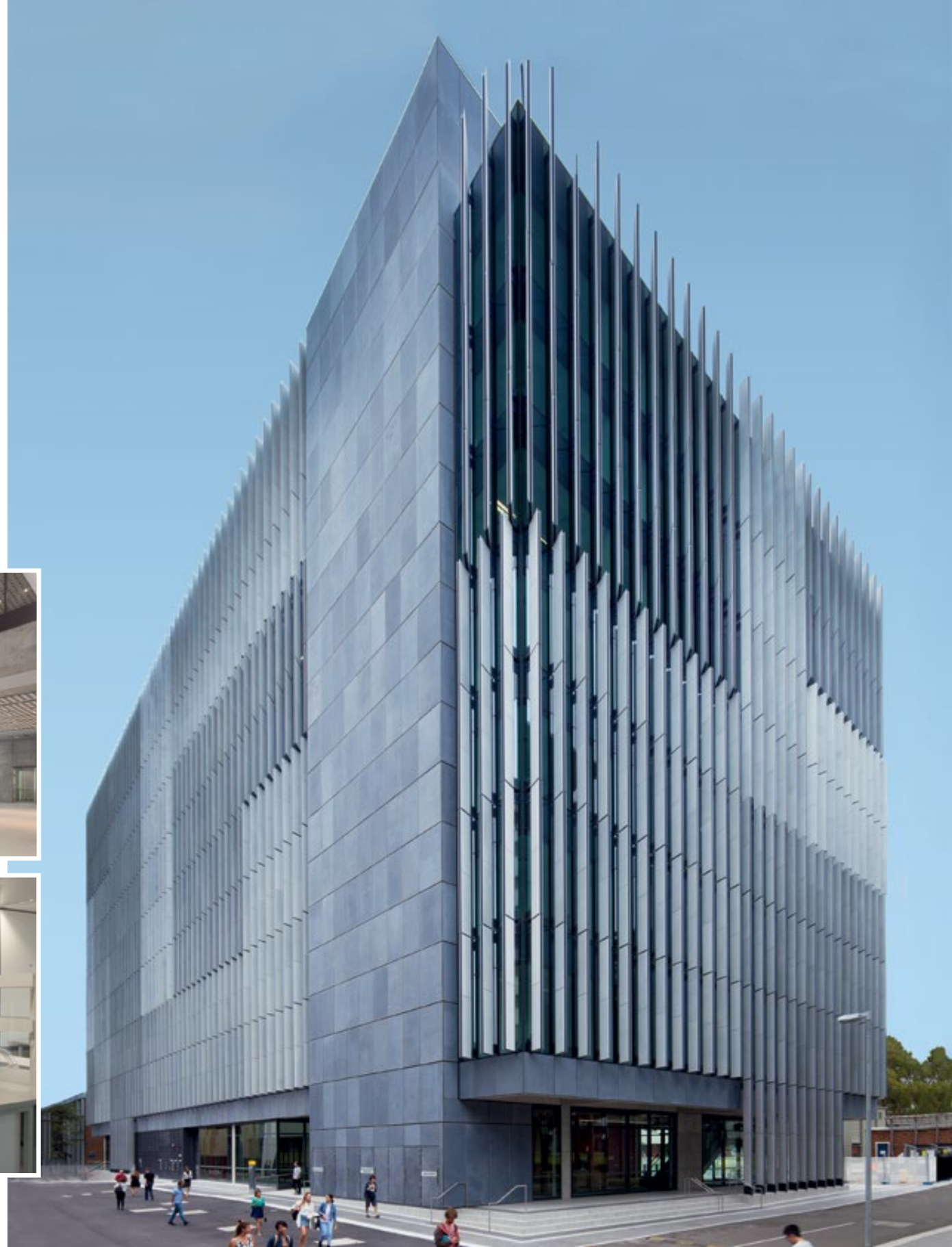
The Innovation Centre provides a forum for nurturing innovation, promoting commercialisation and enhancing connections between the student body and businesses and professional bodies. The physical space allows for lectures, workshops hosting and specialist laboratories. The area can be reconfigured into a single large space to host events and pop-up retail functions.

Below the building, the basement area has been specifically designed to house highly-sensitive research equipment, requiring very high tolerance specifications. For example temperatures must not fluctuate more than 0.2°C. Shielded with an aluminium cell in order to stop fields affecting the electronic micro-environment, the basement has been designed particularly to isolate elements that create electronic fields such as moving vehicles, lifts, substations and also lasers. The most sensitive microscope is currently being procured by UNSW for installation in the basement.

The building's integrated laboratory and office areas are designed and built to increase collaboration between research parties. Comprising a number of interconnecting voids, researchers will be able to walk easily between levels, facilitating communication of ideas between disciplines. Unusually for a research facility, open office floor plans are included and there is a lot of interior glass, allowing eye contact.

External glass is also a feature of the build, with a high performance glass façade allowing floor to ceiling penetration of daylight. A sense of space in laboratories is further enhanced with high floor to ceiling provision. Louvres surround the building, positioned and modelled to allow the internal sense of **space without heat loading.**

For more information contact UNSW Facilities Management, Level 2 (Pavilions Level) Mathews Building F23, Gate 11, Botany Street, Kensington NSW 2033, phone 02 9385 5111, email fmassist@unsw.edu.au, website www.facilities.unsw.edu.au



Below Fredon Air installed mechanical services and specialised tempreture control equipment in the MSEP.

Below Sharvain Projects completed the design and fabrication of the façade elements.

Operating for nearly 50 years, Fredon Air are a leader in installation of air conditioning, electrical, data and communications systems. Fredon have Designed and Installed the mechanical services and equipment in the new Material Science and Engineering Project (MSEP). Original concept documentation was provided by Steensen Varming (offices) and HDR (labs) and Fredon undertook further design and construct services.

Given the sensitive scientific equipment and highly specialised environment required in the MSEP, installing mechanical systems was no simple task. HVAC services had to be designed, co-ordinated and built and commissioned in a tight program period. This included the challenge of building a large, main, central energy plant room within 8 weeks. With 9 Fredon staff and 125 subcontractor workforce present at that stage in all floors of the building, this was a challenging task in terms of logistics planning for labour and materials.

Other challenges included the high acoustic specification of the wall construction for the labs and offices, installing high accuracy control equipment, and the substantial amounts of equipment that required procurement. This included 360 fan coil unit ducted systems, 4 chillers, 24 pumps, 3 heating generators, 4 humidifiers, 11 air handling units, 62 snorkel extraction arms and 30 fume cupboards each with dedicated exhaust fans and 319 Air Valves. The current installation allows the UNSW to increase the final number of fume cupboard systems to 120 total, this is achieved via low airflow technology which in turn reduces extracted air volumes by 60% compared to conventional fume cupboard extraction.

Fredon Air were also tasked with installing the systems to maintain temperature control in the Transmission Electron Microscope Suite. High accuracy control was required from an air handling unit, maintaining a 20°C temperature with maximum drift of +/- 0.2°C per hour and maximum fluctuations of +/- 0.05°C per minute. Fredon's extensive expertise in technical and management fields have been essential in achieving very specialised outcomes for UNSW's MSEP.

As project manager Geoff Skelton stated, "The team delivered an exceptional product, stood up to the many challenges faced and delivered on time. Everyone involved should take great pride in what was accomplished whilst working well as a team from concept to delivery".

For more information contact Fredon Air, 123 Wetherill Street North, Silverwater NSW 2128, phone 02 9475 9400, fax 02 9748 0040, email nsw@fredon.com.au, website www.fredon.com.au

A key design element of the new Materials Science and Engineering building at UNSW is light. The building is intended to illuminate the minds of students and researchers and this is certainly reflected in the architectural design, which allows for plenty of sunlight penetration into the central laboratory spaces and surrounding office areas.

The external curtain wall system, spanning nine floors, has been installed by Sharvain Projects. Sharvain were contracted to complete detailed design work for the curtain wall and also fabrication of the façade elements. They commenced on site with the installion of the curtain wall glazing panels and glass reinforced concrete (GRC) feature blades.

Extensive glass façade areas were incorporated into the design to meet the client's requirements. The large quantities of glass used on the project required the inclusion of external shading devices to reduce heat gains through the façade. The vertically aligned, parallel blades have been manufactured in two colour extrusions and arranged in a high density pattern that gives the building a striking and modern external appearance, as well as offering functionality.

Originally, these GRC blades were supported off the perimeter beams from all around the building. However, after redesign, they are now fixed directly on to the façade panels through a series of sophisticated cleats and bracket arrangements. The blades are very heavy, some weighing up to 400kg each. They comprise a high strength, alloy structural body and are designed to take the load of the GRC cladding as well to safely transfer wind loads from the blades into the building connections. Using GRC in this way is quite a unique application, but has led to an extraordinary final effect.

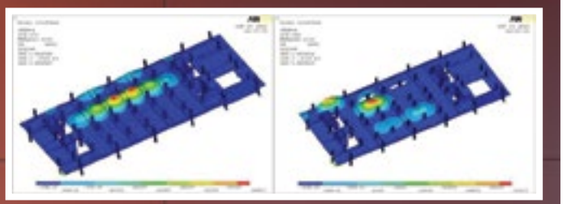
"The clients are pleased with the outcome. Our challenge lay in getting the colours and GRC mix right for this special application," says Sharvain's Boris Kostura.

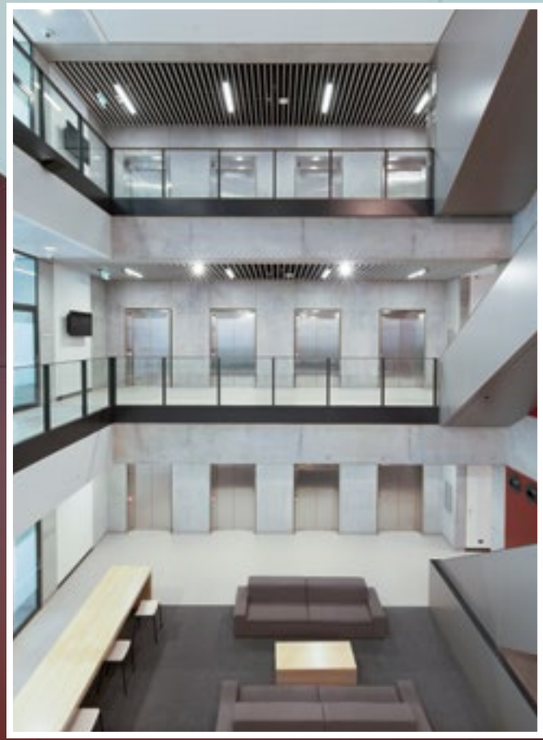
Sharvain completed work on the project in February 2015 after deploying up to 40 workers on site at peak installation. Based in Sydney, the company offers design, manufacturing and construction for specialised glazing and façade projects as well as a wide range of façade components and architectural hardware.

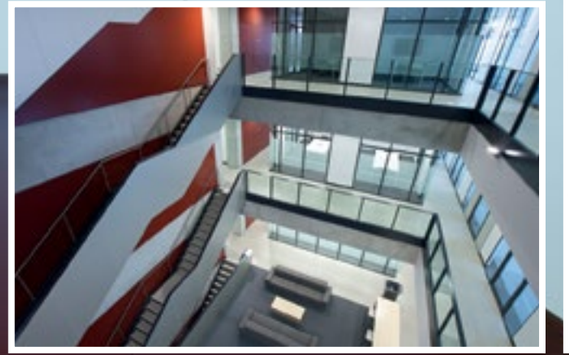
For more information contact Sharvain Projects, Unit 7, 119–133 McEvoy Street, Alexandria NSW 2015, phone 02 9698 3411, fax 02 9690 1006, website www.sharvainprojects.com

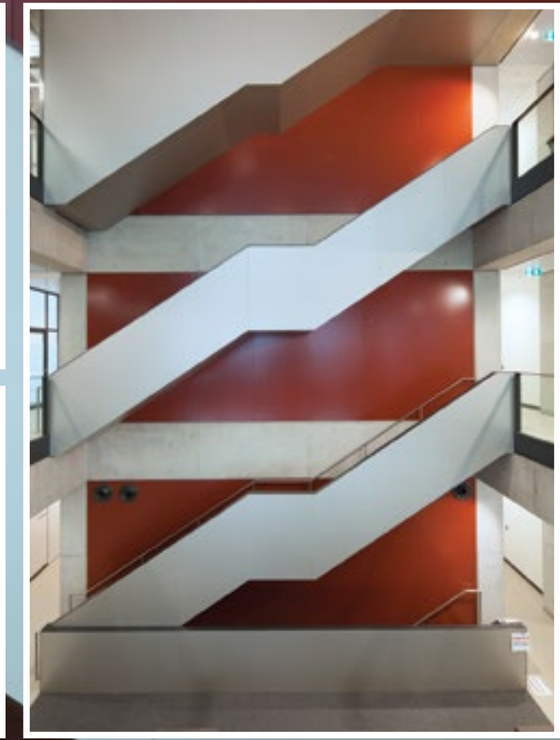
Below SLR Consulting Australia was responsible for the acoustic and vibration design on the MSEP.

Below Cubic undertook a vast range of works for the interior fitout of the Material Science and Engineering Project.





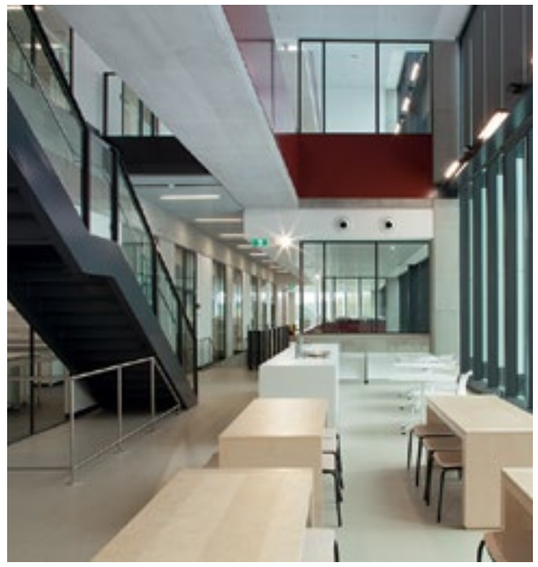




SLR Consulting Australia (SLR) was responsible for the acoustic and vibration design on the Material Science and Engineering building. SLR provided targeted construction supervision, working with the structural engineers, architects and builders to cover all stages, from the early design through to the final commissioning measurements of the building. A vibration survey was undertaken early on to evaluate the site's suitability to meet very stringent VC-E criterion for the electron microscopes and other sensitive equipment. SLR also evaluated the structural design, using FEA of the structure to predict and assess footfall vibration.

Equipment isolation was a particular challenge given that the building accommodates a host of vibration sources including fatigue rigs, rolling mills and jaw crushers (used to test materials) as well as mechanical services such as an emergency generator. A two-stage vibration isolation system was custom designed by SLR to support the generator. This achieved >99% isolation at the run-speed of 25 Hz. Ensuring the equipment was isolated at the source, as well as isolating the SEM/TEM suites, was critical for meeting the stringent VC-E criterion.

For more information, contact Matthew Harrison at SLR, phone 02 9427 8100, email mharrison@slrconsulting.com, website www.slrconsulting.com



Cubic's latest works on the UNSW's Materials and Science Engineering building, has again demonstrated why the company is a leader in the construction industry. In completing the interior fitout for the building, Cubic undertook a vast range of works. This included fitting the metal and blade ceilings, setting the ceiling and joinery ceiling in the building's Innovation Centre (where it also fitted operable walls) and installing thermal slab insulation. Additionally, Cubic fitted Hebel service risers, solid partitions (including for the labs and offices), glazed partitions and doorsets, and composite sheet panelling. It also completed heavy duty and high density works in the building's basement engineering lab.

"We provided high detailing in and achievement of acoustic throughout the project between the engineering labs and office spaces," Cubic's Project Director Rick Muang adds. "The sequencing of works also allowed a fast track of high volume services rough-in to the main service corridors and labs."

As expected with a project of this calibre there were challenges, including an intense value engineering process with the stakeholder to ensure the required design outcomes fit within the cost plan. Cubic also introduced new products and solutions during the works.

"Both the one-way ceilings systems and acoustic blade ceilings are unique to this project in their as-built configuration," Rick explains. "Acoustic sealants of penetrations into labs from the main service corridors also required specific detailing. We also successfully used Hebel PowerPanel to create fume cupboard risers and services risers."

From high quality Commercial Fitout Works, Design and Construct, and Project Management, as well as world class Raised Access Floors, Cubic provides a comprehensive and integrated service to ensure a precise service and outcome. The UNSW project is an example of this exceptional service.

"The successful outcome of this project was achieved utilising the diverse range of in-house resources and talents that Cubic has invested in to provide as part of its service offering for its clients," Rick says. "All parts of the Cubic organisation collaborated, whether on site or behind the scenes, to deliver the great result achieved."

For more information contact Cubic, Unit 4, 4 Avenue of Americas, Newington NSW 2127, phone 1300 028 242, fax 1300 056 369, email info@cubicgroup.biz, website www.cubicgroup.biz