Bridging the Divide:
Towards a united approach to design

Graduate Profile: Gary Zamel

School snapshots
From the Dean

This issue highlights our activities in design. We welcome to UNSW and the Faculty Richard Hough and Davina Jackson who are supported by the New South Global Interdisciplinary design initiative. Skills in design, in its broadest sense, characterise professional engineers and we have recently increased the design content in all our engineering programs as we develop new curricula for the engineers of the 21st Century. Design is the solution of problems and the meeting of needs through the application of known science, mathematics and engineering science and so it differs from research which is the discovery of new knowledge. UNSW staff are strongly involved in research and this can conflict with the need to have staff able to impart skills in design to our students.

We look forward to the New South Global team developing scholarship in design so that it becomes an increasingly strong part of the outstanding engineering that we do in the Faculty.

Best wishes,

Professor Brendon Parker
Dean, Faculty of Engineering

Thumbs up for UNSW Engineers

Informative. Great. Proud, Interesting and Inspiring. They are just some of the descriptions of UNSW Engineers from readers who responded to a survey published in the last issue of the magazine.

The overwhelming majority of readers rated the quality of UNSW Engineers as good (56-60 percent), or very good (35-40 percent). More than half those surveyed were happy with the current system of UNSW Engineers coming out biannually. And the overwhelming majority of readers preferred to receive UNSW Engineers in a hard-copy printed edition. We will continue with that format but it will also be available in PDF form online at www.eng.unsw.edu.au. Readers mainly appreciated being informed on the latest news and developments in the Faculty of Engineering and in the industry, although some readers feel the magazine needs more of an alumni focus instead of a faculty focus. In response to that, new sections such as Where in the world are you? have been introduced in this issue and there are plans to broaden the ways in which alumni can be featured in the magazine. This may include more stories ‘from the field’. Some readers requested more stories on practical applications of engineering as well as articles on the status of engineers internationally. Many readers felt colour photographs would enhance the look of the magazine and that is certainly under consideration for future issues.

Two bottles of Faculty of Engineering 50th Anniversary Petersen’s Shiraz have been won by Kristian Brockmann (BE Environmental 1996) who was part of a lucky draw of survey respondents.

The team at UNSW Engineers is keen to hear of any ideas you have for new new sections or any suggestions on people we should feature in upcoming issues. We thank you for responding so generously to the survey. Your feedback is always appreciated.
As the law class of 2005 lined up for photographs of their graduation back in April, another very special group of graduates assembled before the cameras to mark their own occasion. The class of 1955—the first undergraduates to receive their degrees from the newly formed University of New South Wales at Kensington—had returned.

The event was the 50th anniversary of their graduation and the opening of Main Building, the first permanent structure on the campus. Alumni from the faculties of Engineering, Science and the Built Environment—130 in total—came from all over Australia to dine with the Vice-Chancellor and President, Professor Mark Wainwright, the Deans of the three faculties and many special guests including former Vice-Chancellor Sir Rupert Myers and Lady Myers and former Dean Al Willis.

Returning to a campus alive with students from all over the world was a particularly poignant moment for Robert Morgan, who graduated as a civil engineer in 1955. He happened to be the first undergraduate to receive his testamur at Kensington, heading a very long line of successors. Robert attended with his son, David, who received his commerce degree from UNSW in 1982 and an MBA in 1994.

Few groups can rival the class of 1955 for lasting friendship. Present were a group of 15 electrical engineers who have remained firm friends since university, meeting up once a month with their wives for social occasions. Some of the group have dubbed themselves the Wobbly Walkers for their rambling expeditions in different parts of the country.

Though a few years separate brothers Harry and Alan Wallace, both managed to graduate on the same day in 1955. Three of Harry’s children have since graduated from UNSW and now have successful careers in medicine, arts and commerce.

Of the five mining engineers graduating in 1955, three attended the Golden Jubilee—Des Hay, Des Saunders and Donald McCallum.

“All of you here today are the pioneers,” said Professor Wainwright. And though few realised that back then, they certainly did as the tributes flowed for the class of 1955.

Among the 1975 alumni contingent was current head of school, Professor Chris Rizos, a man his former classmates say they relied on to get them through their undergraduate degrees.

“Chris would go home every night and work and we would go out drinking,” joked Bill Hirst, who delivered one of the night’s most amusing speeches. “He worked hard to save us. If he went down we all went down.”

Fifteen surveyors and one lecturer, Tony Robinson, attended the event, which also attracted a strong cohort of electrical engineers from 1985, the second largest group to attend an alumni dinner.

“The night was a great success…from a class of about 200 we had about 20 people and there were many familiar faces,” said Darren Burrowes, electrical engineering graduate of 1985 and now engineering manager with ATSA Defence Services.

“The diversity in career paths was really interesting. We talked a lot about the past and there were some very funny stories that we remembered.”

Professor Parker said it was encouraging to see the Class of 1955 have maintained a lasting friendship.

Class act at Alumni dinner
The surveyors of 1975 did their year proud at an engineering alumni dinner in September to celebrate the classes of 1955, 1965, 1975, 1985 and 1995. The surveyors represented the largest proportion of graduates to attend any alumni dinner.

“Almost a complete class,” noted the Dean of Engineering Professor Brendon Parker.

The Electrical Engineers of 1955 have maintained a lasting friendship.
such large groups of alumni attending, as well as so many younger engineers among the contingent. The civil engineers of the various decades were also well represented.

Guests of honour included UNSW Vice-Chancellor and President, Professor Mark Wainwright, Professors Chris Fell and Al Willis, all former Deans of Engineering, Professor Robert King, Deputy Vice-Chancellor (academic) and Registrar, Dr Sitthichai Pookaiyudom, President, Mahanakorn University of Technology, Bangkok, and Jimmy Koh and Ben Chng of the Singapore Alumni Association.

Next year an alumni dinner will be held to celebrate the succeeding cohort of graduates (1956–1996). The contact will be Mr Luciano Ferracin on +61 2 9385 5364, l.ferracin@unsw.edu.au

Ben’s history-making graduation
Ben Lange has graduated as Australia’s first Indigenous electrical engineer. A graduate and mentor of the Indigenous Australian Engineering Summer School, Ben has taken up a building construction management position with Bovis Lend Lease in Canberra. It’s a role he hopes will lead eventually to his dream of reshaping Indigenous communities. “Redeveloping Indigenous communities is more than electrical engineering. It’s the whole infrastructure,” Ben says. “This job could foster my abilities in a range of engineering areas.”

$500,000 boost for mining engineering
To help combat the national shortage of mining engineers, Mitsubishi Development Pty Ltd has donated $500,000 to fund education programs in mining engineering at the University of New South Wales.

The fund will support a range of educational activities at UNSW. They include:
- The upgrading and replacement of computing facilities provided for mine planning and design in the Mitsubishi Computing Laboratory.
- Rural scholarships for undergraduate students studying or proposing to study in UNSW’s School of Mining Engineering.
- Postgraduate Research Scholarships
This is the second large donation from Mitsubishi Development. In 2003, the company donated $150,000 to UNSW to fund education and research activities in surface mining.

National Mining School to address skills shortage
A new national mining school involving the University of New South Wales is to be established to help combat the chronic skills shortage restricting the growth of Australia’s biggest export earner.

To be called Mining Education Australia (MEA), the proposed national school of mining engineering will be a formal partnership between the Minerals Council of Australia’s Minerals

Tertiary Education Council, UNSW, Curtin University of Technology and the University of Queensland.

Professor Bruce Hebblewhite, Head of UNSW’s School of Mining Engineering, says the vision is for one program and one school delivering a world-class program of undergraduate education in mining engineering by integrating and coordinating the resources of Australia’s premier mining universities.

Individual universities will teach years one and two, with the new school delivering a single teaching program for years three and four through a “multi-delivery” system to the respective campuses.

Announcing the Painton Prize and Scholarship
Engineering alumnus Mr Graham Painton has provided a four-year scholarship and annual prize with a value of $40,000 to the School of Manufacturing and Mechanical Engineering.

Mr Painton, who graduated from UNSW in 1964, signed an agreement last week for the Graham Painton Rural Scholarship in
Manufacturing Engineering and the Graham Painton Prize.

The scholarship, worth $8500 annually over four years, is intended to encourage and assist students interested in studying manufacturing engineering.

The $1000 annual cash prize and textbook donation recognises the best undergraduate thesis project in the field of cost-effective manufacturing in Australia.

Thai students to study at UNSW

Engineering students from Thammasat University (TU) will be able to complete their degrees at the University of New South Wales under a new international agreement.

Eligible students will undertake the first part of their studies at TU before transferring to UNSW to enter the third year of a Bachelor of Engineering (Honours) degree program. Students who successfully complete the program will be awarded a UNSW degree.

Photovoltaics book may top world sales

The new edition of the Centre for Photovoltaic Engineering’s popular Applied Photovoltaics textbook could be destined to be one of the world’s biggest selling solar energy books. The book, by Centre academics Stuart Wenham, Martin Green, Muriel Watt and Richard Corkish, was released in September 2005. It is in demand around the world and is already being translated into Spanish and Chinese.

The photovoltaics industry is booming, particularly in Japan and Europe, but also in the developing world.

Global growth in solar cell manufacture last year was 67 percent. The book serves as a textbook for the undergraduate students at UNSW and it has been published directly by the Centre to keep costs low for the students.

Wheelchair with a mind of its own

The School of Mechanical and Manufacturing Engineering has developed a wheelchair that takes the hard work out of steering for the disabled occupant.

Able to function in manual and autonomous mode, the chair has a completely unstructured user interface for the disabled occupant.

In manual mode, the occupant does not have to position his/her hand in a specific location to achieve control. Just four broad gestures of a bare or gloved hand will allow the user to steer, control speed and brake.

In autonomous mode the wheelchair can be navigated from one indoor area to another. The user points to the destination zone in a map of the indoor area. The system recognises the destination and carries out path planning. Current work is directed at implementing obstacle avoidance and navigation routines to achieve fully autonomous operation.

Class of 62 meet in Malaysia

Fourteen full-time civil engineers and four full-time surveyors, accompanied by seven of their wives, attended the 43rd reunion since their graduation. Members travelled from Singapore, Brisbane, Gold Coast, Canberra, Perth and Sydney to attend the event, organised by S.K. and Jane Wong and K.C. and Lily Wong, who live in Kota Kinabalu.

Festivities included a seafood dinner, a visit to Sandakan for the 60th anniversary of the end of the war in the Pacific and attendance at the Anzac Day memorial service, a visit to the Sepilok Orang Utan Rehabilitation Centre, a trip to Mount Kinabalu National Park and Poring Hot Spring and the Kundasang War Memorial in Ranau, an island picnic, a steam-boat dinner, a fellowship dinner at SK’s home and a farewell dinner on the Thursday evening.

The team say the hospitality of the people was outstanding and the reunion was enjoyed by all. The next reunion is planned for Perth in 2007.

NEWS
achievements

More than US$2 million for photovoltaics
Professor Martin Green and Dr Gavin Conibeer have won a Stanford University Global Climate and Energy Project (GCEP) grant estimated at US$2.37 million.

Professor Green and Dr Conibeer, of the Centre for Photovoltaic Engineering, will lead a team of 10 researchers investigating nanostructured silicon-based tandem solar cells.

To reach its most competitive long-term position, photovoltaics must push towards ever-increasing energy conversion efficiency while retaining low production costs. The most developed approach for improving efficiency beyond that of a standard cell is to use a tandem stack of cells, with each cell in the stack having a different bandgap.

This project will explore the use of nanostructural engineering to control silicon’s bandgap in quantum-confined structures to develop tandem stacks based entirely on crystalline silicon and its compounds with oxygen, nitrogen and carbon.

For he’s a Federation Fellow
Professor Tom Davis from the Faculty of Engineering has won a prestigious Federation Fellowship.

The Commonwealth Government’s Federation Fellowships are the richest, publicly funded research fellowships to be offered in Australia. They are designed to attract world-class research talent to Australia, and provide opportunities for leading Australian researchers to continue to work in this country.

Scientia Professor Tom Davis, Director of UNSW’s Centre for Macromolecular Design in the School of Chemical Engineering and Industrial Chemistry, will lead research into tailor-made synthetic macromolecules that can be used to store and convey information. The project will see the creation of a unique research team within Australia possessing world-class strength in hybrid macromolecular design and construction.

Churchill fellowship to study wetlands
Dr William Glamore of the Water Research Laboratory in the School of Civil and Environmental Engineering has won a Churchill Fellowship to study international practices for restoring coastal wetlands.

Dr Glamore will spend time in the US, Holland and Vietnam, meeting with experts at the USA Coastal Conservancy, the US Army Corp of Engineers, the Wetland Advisory Centre in Holland and the Centre for Natural Resource and Environment at the National University of Vietnam among many other institutions.

“Based on my experience, I plan on composing Australian methods to effectively restore coastal wetlands,” said Dr Glamore, who is one of 87 fellowship recipients, many of whom are researching drought solutions.

Feitz’s ‘fresh’ approach to toxic spills
Dr Andrew Feitz won a 2005 Fresh Innovator award for his work on decontamination using iron nanoparticles.

Dr Feitz and fellow researchers from the Centre of Water and Waste Technology in the School of Civil and Environmental Engineering, and the University of California, Berkeley, have found rusting iron could offer an environmentally friendly way to stop toxic chemical spills and make subsequent clean-up safer.

Molecular-sized nanoparticles of iron rust extremely quickly. In the process they produce powerful compounds, called oxidants, capable of breaking down almost all pesticides, industrial waste chemicals and other toxic organic compounds normally resistant to clean-up.

“Normally these incredibly powerful oxidants can only be produced using hazardous chemicals or high energy UV light. But we’ve discovered how to make nanoparticles or iron that are so small they rust almost instantly in air,” says Dr Fietz.

Dr Feitz is developing an iron nanoparticle spray that can be used on spills in the workplace, on farms and at emergency scenes.

His work is being promoted through Fresh Innovators, a national initiative to bring the work of 16 early career inventors to public attention.
**Bush Telegraph**

Our Blast from the Past photo in the last issue inspired a few readers to write in.

**Groundbreaking mining engineers**

Dear Ed, you found us alive and well and a good 15 years younger than thought. The late 80's also had a return to the hairdos of the 70's. We started Mining Engineering in 1989 at UNSW and were photographed by Uniken (in those stylish hard hats) during our first week. Our intake was the first to include more than 1 woman and coincided with the lifting of a legislative ban on women working underground in NSW – the university felt that was newsworthy.

Although we all graduated with the same degree it has taken each of us in very different, exciting and rewarding directions. Two of us are still working on mine sites – Jo in NSW as Senior Mining Engineer (Northparkes Underground) and Alex in the arctic conditions of Northwest Canada as Assistant Manager – Dike Construction (Diavik Diamonds). Jane is directly associated with the mining industry as a Marketing Product Manager with an explosives company and Rebecca is a management consultant specialising in operational improvement with clients in the mining and other industries. Two of us work fulltime while managing young families and between the four of us we've worked on every continent (bar Antarctica) in technical, managing and consulting roles.

Over the past 16 years we have achieved many things including a Rhodes Scholarship, a Churchill Fellowship, a successful business in Mining Consultancy, the first woman to work as a shift supervisor in South Australia, first female Open Cut Examiner (NSW) and first female with a NSW Underground Metaliferous Mine Manager's certificate. Two of us work fulltime while managing young families and between the four of us we’ve worked on every continent (bar Antarctica) in technical, managing and consulting roles.

Even though we all graduated with the same degree it has taken each of us in very different, exciting and rewarding directions. Two of us are still working on mine sites – Jo in NSW as Senior Mining Engineer (Northparkes Underground) and Alex in the arctic conditions of Northwest Canada as Assistant Manager – Dike Construction (Diavik Diamonds). Jane is directly associated with the mining industry as a Marketing Product Manager with an explosives company and Rebecca is a management consultant specialising in operational improvement with clients in the mining and other industries. Two of us work fulltime while managing young families and between the four of us we’ve worked on every continent (bar Antarctica) in technical, managing and consulting roles.

Over the past 16 years we have achieved many things including a Rhodes Scholarship, a Churchill Fellowship, a successful business in Mining Consultancy, the first woman to work as a shift supervisor in South Australia, first female Open Cut Examiner (NSW) and first female with a NSW Underground Metaliferous Mine Manager’s certificate.

Even though we all graduated with the same degree it has taken each of us in very different, exciting and rewarding directions. Two of us are still working on mine sites – Jo in NSW as Senior Mining Engineer (Northparkes Underground) and Alex in the arctic conditions of Northwest Canada as Assistant Manager – Dike Construction (Diavik Diamonds). Jane is directly associated with the mining industry as a Marketing Product Manager with an explosives company and Rebecca is a management consultant specialising in operational improvement with clients in the mining and other industries. Two of us work fulltime while managing young families and between the four of us we’ve worked on every continent (bar Antarctica) in technical, managing and consulting roles.

(Clockwise from top left in that photograph) Jo Dudley, Alex Blake, Jane Slack-Smith and Rebecca Scott.

Regards,

Jo Dudley, BE (Mining)

The Blast From The Past photo in the UNSW Engineers Feb 2005 issue, contrary to the jibe about hairdos re the 70’s, is actually from the late 80s or early 90s. I’m pretty sure the woman in the lower left corner is Rebecca Scott, who was one of the 1989 intake of Co-op scholars and studied mining engineering (thus the hardhats with lights). I’m pretty sure she was awarded a Rhodes scholar and did some post grad study at Oxford UK. The other three ladies’ faces are familiar from the same year of Mining engineering but I don’t recall their names.

Regards,

Russell Vonthien BE (Aerospace) Hons

There was a query in the letter regarding the photo of the four young ladies in hard-hats. If you haven’t been informed already, they are mining engineers, and probably finished around 93 or 94, but I can’t remember their names. My final year was 1990 and I’m pretty sure that they were in 1st year at that time.

Paul Newcombe
Senior Mining Engineer/Alternate Underground Manager
Nustar Mining, Paulsens Gold Operation

**Story behind acidic soil research**

I read with interest the story in the latest UNSW Engineers on ‘Farmers unite to back acidic soil research’, page 13, Feb 2005.

There is another story behind that one. Environment Information Technology PL has been designing and manufacturing environmental monitoring equipment for over 20 years. Based in the Northern Rivers Area of NSW, I started the original company back in 1982. Since then we have supplied equipment to many Australian universities, CSIRO, Departments of Agriculture and other private companies. The work which you have reported relies heavily on equipment manufactured and installed by EIT some three years back. The equipment measures ph, temperature, depth of water in drains and other meteorological parameters and communicates it back to UNSW in Sydney via the GSM mobile phone network.

I completed my PhD at UNSW in 1975, and always have good memories of the time spent at Kensington. I thought you may be interested in the information that there is another UNSW engineer out there participating in some world standard design and manufacture.

Dr Rob Hannah BE (Electrical), PhD
Head, Design & Engineering
Environment Information Technology Pty. Ltd

**Out of solitary**

Dr Iain Macgill is right when he says that “getting engineers out of their solitary labs is essential in the drive towards sustainability.”

Bertram Carter, BE (Chemical), MBA
Bridging the Divide: Towards a united approach to design

Engineers have tended to approach design from a solitary perspective. But now moves are afoot to work more closely with artists and architects – with some interesting results for Australia’s export industry.

By Mary O’Malley.
How many Australian-designed engineering artefacts can you name quickly? The Hills Hoist and the Holden certainly. What about the Victa mower, the ring pull can and the wine cask? While these are good examples of our capabilities, Australia does not spring to mind where engineering design is concerned.

As one of the organisers of the International Conference on Engineering Design (ICED2005) held in Melbourne in August, Professor Andrew Samuel of the University of Melbourne is keenly aware of this fact.

Typically, he says, we know about Scandinavian artefacts such as Volvo, Saab, ABB tools and turbo-generators, Swiss watches and machine tools, German AEG and Bosch and French Aerospeciale for its Airbus.

“We used to be very good designers,” says Professor Samuel. “But for eons most Australian companies have manufactured engineering design from their corporate headquarters. This makes for lower overheads but we do not have the control of ownership of this precious intellectual property; property that defines 90 percent of the behaviour of a product.”

Adjunct Associate Professor Alex Churches is a former head of design in UNSW’s School of Mechanical and Manufacturing Engineering and is currently Chairman of the Engineers’ Australia’s National Committee on Engineering Design. He says that Australians have always been inventive – take, for example, the stump-jump plough and wheat harvesting machinery – but have not been nearly as successful in getting products to market.

There were reasons for this – small local market, lack of suitable manufacturing skills, distance from overseas markets and lack of understanding of what was needed to adapt the product to a wider market to suit other countries and cultures. “Almost exclusively, engineers designed working machines (not always well-styled or thought out ergonomically) and industrial designers designed household appliances (not always well engineered),” says Churches.

“Too often, the only return to the Australian economy was by way of royalties, with the real profits going overseas.”

It is a scenario set to change. As manufacturing moves offshore to countries such as China and India, many Australian companies are responding to the shift by carving a niche in creative services – the design capabilities that determine not only how a product looks but how well it works.

“Engineering design defines the intrinsic quality of a product,” says Professor Samuel. “What the user sees is a final packaging and this is often attributed to ‘industrial design’.

“The inherent difficulty in defining the nature of engineering design is that it is almost invariably the agent for the absence of certain features in an artefact, rather than the presence. I mean the absence of bumps and grinds in machinery. The absence of maintenance and service difficulties.”

Over the past decade, Alex Churches has been a judge with the Australian Design Awards, run under the sponsorship of Standards Australia. The awards cater for ‘Australian product design’. He says he has been delighted to see a gradual increase in collaboration between industrial designers and engineering designers, with rivalry or worse changing to synergy. “I believe I have also seen an emerging Australian design ethos, at least in product design, complete with its engineering-design content, which will have a well deserved place in the global design arena,” he says.

“The inherent difficulty in defining the nature of engineering design is that it is almost invariably the agent for the absence of certain features in an artefact, rather than the presence. I mean the absence of bumps and grinds in machinery. The absence of maintenance and service difficulties.”

“On a related front, as we saw over and over again in the ICED 2005 conference, research groups in many countries are working to develop more effective methods for
collaborative design by electronic means and, as a result, the tyranny of distance is being ‘virtually’ eliminated.

Indeed, that is precisely what is happening with organisations such as GKN Aerospace Engineering Services. GKN is working for both Lockheed Martin and Northrop Grumman as an integral part of the Joint Strike Fighter (JSF) design team. GKN has specific responsibility for a number of parts which are designed in Australia. Other elements of the design process come from the US, with the majority of the work undertaken in Melbourne, Sydney and Brisbane by some 150 Australian design engineers.

The value of GKN’s work with Northrop Grumman has tripled over the past 12 months. In June 2003, GKN started with 30 engineers working on JSF. The company now employs some 150 engineers on the program, with the majority working in Melbourne and Sydney. A small number of the engineers are based in Brisbane as well as Northrop Grumman’s El Segundo plant in California and Lockheed’s facility in Fort Worth Texas, and the overall number is growing.

Earlier this year Minister for Industry, Ian Macfarlane, noted that it was pleasing to hear that GKN had reported a ‘reverse brain drain’ whereby Australian engineers have been returning to Australia in pursuit of work on the JSF Program.

Design consultancy Blue Sky Creative has found a similarly rewarding experience in its relationship with motorcycle manufacturer QJ in Wenling, China. Recognising its lack of creative ability, QJ asked Blue Sky Creative to run its design studio. Designers have been travelling to China on rotation for almost two years now.

Richard Hough, a leading structural engineer with the Arup Group, also cites Australia’s growing reputation in the built environment. “We export a lot of design skills in engineers and architects whose skills are highly valued overseas,” he says. “European developers come to Australia to understand the efficiency and effectiveness of our property development, building design and construction industries.”

He lists automotive, aerospace and rail rolling stock as other areas in which Australia participates very much in world design and production markets. But he still believes the value of design in many industries is not well understood in Australia.

It is partly this fact that inspires him in his new part-time role as UNSW’s Professor of Multi-Disciplinary Design. Working closely with Associate Professor Davina Jackson, a prominent architecture writer and curator, he aims to alter that awareness.

In looking for cross connections between the faculties of Engineering, the Built Environment and the College of Fine Arts, the pair are working towards an integrated approach to design – more closely aligning the roles of engineer, architect and creative artist. One overarching goal of the Multi-Disciplinary Design Initiative (MDDI) is to seek opportunities to help build a credible export industry for Australia through boosting its design profile.

UNSW is encouraging the NSW government to explore the design contribution to the economy more. Workshops have been conducted with Polyteknico di Milano, a key design centre in Italy, to build a collaboration which will form the basis of a design initiative in NSW.

UNSW is encouraging the NSW government to explore the design contribution to the economy more. Workshops have been conducted with Polyteknico di Milano, a key design centre in Italy, to build a collaboration which will form the basis of a design initiative in NSW.

The initiative, which is being assessed by the NSW State Government, would lend support to small to medium enterprises for more effective use of design in their own processes and product manufacturing. This plan is to research industries needs in design terms and then to find ways for the three design faculties at UNSW to help.
“UNSW will maximise its opportunity if we all choose to think of design as much more broadly based than just adding aesthetics to engineering or ergonomics to products,” says Professor Hough. “Design has a vast range of criteria, from safety and usability and economy to environmental footprint and lifecycle performance. Of course, aesthetics and attractiveness of use often are crucial. But there is much more to it than that alone.

“It is by that wider definition that engineering will evolve and become a more attractive profession – more socially useful and not constrained by traditional views of design as a secondary activity. It’s a fundamental endeavour.”

In fact, Dr Carl Reidsema, a senior lecturer in engineering design at UNSW, believes design thinking has a critical bearing on the ability of engineering education to meet industry’s needs generally.

“With the growth of information we are less able to know it all,” he says. “There are more computers in cars nowadays than there were available for the the NASA space shuttle at one time. That’s an enormous amount of information to get your head around.

“There has got to be a shift away from content to relationship and enabling skills. You have to understand the problem that you need to solve and to learn the process of designing a solution.

“My approach is de-emphasising technical content and teaching students how to derive that. Instead of 20 litres of content give them 10 litres and the skills to find the other 10.

“Industry wants graduates to be creative and innovative, comfortable with open-ended problems, to work well in a group and have good communication skills...they want people to be autonomous problem solving units. That’s what design skills can give you.”

Professor Hough calls it heralding in the era of the ‘transdisciplinarian’ – young people working in design practice be it architecture, engineering or a related area, who are using new tools to integrate designs much more quickly and efficiently, albeit under the guidance of more experienced people.

“As far as UNSW graduates in design disciplines are concerned, the opportunities are wide open to integrate skills and tools and methods to make the construction and manufacturing industries more efficient and competitive in global terms.”

Tony Quick, director and general manager of GKN, believes Australia’s future in the global market has to lie in this direction. “We have some very talented engineers, particularly very talented young engineers,” he says. “Other countries might be lower cost so we should move up the value-added chain.”

But the expectation that manufacturing automatically will go to cheaper nations worries Alex Churches. He recalls the Vice-President of Engineers Australia presenting figures showing the huge advantage to the Australian economy of local manufacture, compared with importing the same item from a low-cost country.

“It would be unrealistic to expect labour costs in developing countries to remain as low, even in relative terms, as they are today,” he says. “However, by the time some sort of cost parity is achieved, the developing countries may well have a monopoly of plant, equipment and skilled labour, as well as design and manufacturing know-how.

“Some very clear thinking is needed to ensure Australia’s future in engineering design. I suspect the solution will be to identify niches, where a high order of design and manufacturing skill and stringent quality control are of overriding importance. The immediate task will be to identify existing and emerging areas and consolidate them as part of our engineering activity.”

Professor Samuel maintains there is another compelling reason to boost our stature in engineering design. “For a country such as ours to produce poor quality design for the sake of saving money shows poverty of ambition. Intellect without ambition is the deadliest sin I know,” he says.
Growing replacement tissues in the laboratory offers a potential solution to the chronic shortage of organs for transplantation. Yet this technology is currently unable to generate thick tissues.

This is due in part to the fact that the organisms living in the middle parts of these tissues are not surviving, because they are not being perfused adequately to allow nutrients in and transport wastes out of the system.

In nature, tissues are connected to a blood supply which keeps the tissues alive and adequately perfused, yet to date no artificial tissue contains an inbuilt vascular system.

Clinically, the current technologies allow only simple skin replacements and avascular cartilage grafts to be employed. The field of growing and recreating thick tissues, which is known as tissue engineering or regenerative medicine, is embracing a new strategy in which vascularisation is of central importance to creating viable tissues.

This project at the Graduate School of Biomedical Engineering aims to focus on this central vascularisation theme in the pursuit of functional bioengineering replacement tissues and organs. This project analyses natural vascular structures and then manufactures synthetic templates that mimic them. These templates will be used to culture vascular structures capable of supporting tissue growth on implantation.

School of Chemical Engineering and Industrial Chemistry

Hazardous waste test found to be ‘inadequate’

The standard classification test and techniques used to dispose of solid waste are inadequate for Australian conditions, a researcher from the University of New South Wales has found.

Dr Jason Scott of UNSW’s Centre for Functional Nanomaterials in the School of Chemical and Industrial Engineering has been funded by the NSW Environmental Trust to examine the standard Toxicity Characteristic Leaching Procedure (TCLP) used to classify wastes containing heavy metals.

TCLP was developed in the United States in the early 1990s and is designed to mimic conditions found in municipal landfills in which putrescible and non-putrescible materials are disposed together.

Household waste contains a substantial amount of organics that can leach out harmful metals so the test is somewhat strict in determining how certain solid waste needs to be treated before it can be dumped.

But the practice in Australia is not to co-dispose. Applying a standard test in a situation where conditions differ can result in disposal measures being too severe in some cases – and not tough enough in others.

“The leaching of toxic constituents of waste – for example, heavy metals – beyond the boundaries of the landfill and into the environment can have serious implications for both the local ecosystem and nearby communities,” says Dr Scott.

“The TCLP is a laboratory batch test with a result that is obtained within...
A single test is inadequate for dealing with hazardous waste.

24 hours. The test does not provide information on the rate of release of pollutants and is therefore not useful in assessing the environmental impact the waste will have over time.

“The TCLP is limited in considering the nature of the substrates in which contaminants are immobilised and does not account for the changing properties of leachate over time. It can also underestimate the potential hazards of wastes of high alkalinity such as cement wastes, municipal incinerator ashes and lime kiln dusts. More importantly, it does not consider potential disposal scenarios such as the reuse of stabilised waste in building materials or as road base.”

Dr Scott says the research team set out to find a test to replace the TCLP. But it found that a more diverse strategy is needed. “The results confirm the concern of the Environmental Trust that more study is needed on overall solid waste management,” he said.

School of Civil and Environmental Engineering
Ian Gilbert takes up Australian Professorial Fellowship

After more than nine years as Head of the School of Civil and Environmental Engineering, Professor Ian Gilbert is stepping down to take up a prestigious Australian Professorial Fellowship. Ian has been awarded an ARC Discovery Grant for the next five years to work full-time on a project titled ‘The implications of low-ductility reinforcement and strain localisation on the strength and ductility of reinforced concrete two-way slabs’.

“The fellowship is a great opportunity for me to devote myself on a full-time basis to research, to work on an exciting and important project and to make significant contributions to both the field of structural engineering, to the Australian construction industry and to the community in general,” said Professor Gilbert. “It also gives me the opportunity to pass on the Head of School’s baton to an able colleague.”

Professor Nicholas Asbholt, formerly deputy director of the Centre for Water and Waste Technology in the school, has taken up the position.

In the design of reinforced concrete structures, ductility is an important requirement, providing warning of failure, alternative load paths and justification of many of the assumptions made in the analysis and design of the structure. The recent introduction in Australia of low-ductility, deformed welded wire fabric reinforcement (Class L) has resulted in concrete floor slabs with relatively brittle failure modes (including catastrophic collapse when subjected to unexpected overloads) and its use has been the subject of much debate.

Professor Gilbert’s research will for the first time quantify the ductility of two-way slabs containing Class L welded wire fabric. It will result in an increased awareness of the problem, far more attention to the specification of high quality reinforcement, and the development of reliable and safe design procedures for reinforced concrete floor systems. The improved safety of Australian infrastructure will have significant social benefits. The reduced costs associated with repair and rehabilitation of structures and the avoidance of sudden collapse resulting from fracture of non-ductile steel will have obvious economic benefits.

Professor Ian Gilbert:
Secured a prestigious research fellowship.
UNSW has excelled in two separate categories of RoboCup 2005, an international robotics competition held this year in Osaka, Japan.

Competition was particularly fierce in the Rescue Robot league, with 26 teams from universities and research institutes around the world fielding real robots in a mockup of a disaster site.

Team CASualty consists of members from UTS Mechatronics and UNSW Computing, both of which are part of the ARC Centre of Excellence in Autonomous Systems (CAS). Team CASualty fielded two robots: CASTER, a remotely operated, heavy duty tank-like robot capable of handling rough terrain; and HOMER, a smaller, faster robot, designed for running without human intervention.

Robots explore a specially constructed disaster site about the size of a small house. The disaster site includes mannequins with various signs of life, such as waving hands, shouting noises and heat. They are hidden amongst stairs, platforms and building rubble.

The robots, some under human control, must find and approach the victims, identify their signs of life and produce a map of the site showing where the victims are located. The aim is to provide human rescuers with enough information to safely perform a rescue. Each team is scored based on the quality of its maps, the accuracy of the victim information and the number of victims found.

According to judges, Team CASualty had excellent mapping and victim identification capabilities, with a talented robot operator using a polished user interface. A highly mobile robot base, combined with numerous cameras mounted on the robot, enabled the CASTER’s operator to identify victims in very rough terrain while a state-of-the-art sensor package aboard CASTER enabled the generation of 3D virtual reality maps of the disaster site with both conventional and thermal imagery.

Team members at UNSW only started CASTER’s sensor fitout and software development in March 2005. rUNSWift, the RoboCup 4-Legged League team for UNSW, has continued its outstanding success by coming third overall. With this year’s results, they continue to be the most successful team in the history of RoboCup across all leagues. Consisting entirely of undergraduates, they have been beaten only by teams which include academics and PhD students.

School of Electrical Engineering and Telecommunications

Studies explore role of wind in the grid

The University’s recently established Centre for Energy and Environmental Markets (CEEM) has been given $660,000 by the Australian Greenhouse Office to undertake research on facilitating the integration of wind generation into the Australian electricity industry. The grant forms part of the Australian Government’s $14m Wind Energy Forecasting Capability (WEFC) initiative announced in its Energy White paper last year.

Wind energy has a vital role to play in helping us address growing climate change and energy security challenges in electricity industries around the world. Wind is, however, the first intermittent renewable energy resource that has begun to achieve significant grid penetrations. As such, it represents the frontier of managing such types of renewable energy sources in the electricity industry.

Many electricity industries, themselves, have been undergoing restructuring towards more competitive market-based arrangements over the last 20 years. Australia is no exception to these parallel developments, with increasing amounts of wind generation now entering a competitive National Electricity Market (NEM) that stretches all the way from South Australia to Queensland.

The three-year research project is headed by Associate Professor Hugh Outhred and Dr Iain MacGill of the School of Electrical Engineering and Telecommunications.

This proposed work has two strands. The first will investigate issues specifically associated with wind...
energy, including the behaviour of the atmosphere, wind forecasting, the design of wind turbines and strategies for wind farm control.

The second strand of research explores the design and performance of the Australian electricity industry to see how it might better facilitate high levels of wind generation.

UNSW has, in fact, played an important theoretical and practical role in Australian electricity industry restructuring since the 1970s through the work of researchers including Hugh Outhred and Dr John Kaye.

The design of the Australian national electricity market is more favourable than many in terms of integrating stochastic renewable energy resources. However, there is still room for improvement.

In addition to underpinning the outcomes of the first strand, the research will identify, analyse and propose remediation of features of the national electricity market design that present unnecessary barriers to renewable energy generation.

A unique approach to new product development and engineering risk management has been developed by a research team led by Dr Berman Kayis of the School of Mechanical and Manufacturing Engineering.

The software, called IRMAS (Intelligent Risk Management and Assessment System), helps users to identify, prioritise, analyse and mitigate any potential risks which can jeopardise the success of manufacturing projects.

IRMAS is the first engineering risk management software to structure and link the entire product design, development, manufacturing and delivery process.

The emergence of Concurrent Engineering (CE) or Integrated Product Development in the early 1990s removed many of the problems associated with products being developed in isolation.

However, the higher interdependency of tasks means that a failure of any one element can propagate throughout the project network, causing severe failures, cost overruns and delays. This is especially so in multi-site and multi-partner projects.

In such environments, a well-structured risk management process is required to systematically identify, assess, mitigate and monitor the potential source of project failures in a manufacturing environment.

IRMAS integrates organisational, product and process-related knowledge in CE multi-partner, multi-site projects.

Though several risk management software systems are available on the world market, this is the first to cater for the manufacturer’s needs in a CE environment.

The team behind the work included senior researchers from CSIRO, the University of Wollongong and Boeing-Hawker de Havilland. The project was funded by the Cooperative Research Centre for Intelligent Manufacturing Systems and Technologies (CRC-IMST).

The system was formally handed over to Boeing-Hawker de Havilland in March. The company since has deployed IRMAS in its two aerospace manufacturing sites in Sydney and Melbourne.

IRMAS is also suitable for use in other manufacturing industries. The CRC-IMST is currently finalising its commercialisation with an international firm. For more information on the project contact Dr Kayis, (02)9385 4162, b.kayis@unsw.edu.au.

Dr Berman Kayis and Dr Sue Savci worked closely together on the IRMAS project.
School of Mining Engineering

$1.72 million boost for Virtual Reality

Professor Jim Galvin of the School of Mining Engineering has been awarded a $1.72 million grant from Coal Services (previously known as the Joint Coal Board) to enhance virtual reality training in the NSW coalfields over the next three years.

In 1999, Professor Galvin undertook an international scoping study for the Joint Coal Board to investigate opportunities for using virtual reality training to improve health and safety in the Australian mining industry. This led to the Joint Coal Board Health and Safety Trust and the Australian Coal Association Research Program (ACARP) funding the school to develop a virtual reality simulation capability. Having successfully demonstrated its benefits, Professor Galvin has been given this grant to take the project further.

Professor Galvin said that virtual reality simulation offers numerous benefits, many of which take on added importance in a mining environment. This includes:

- The opportunity to train for and ‘experience’ events that otherwise would only be experienced in a real emergency situation
- Development and testing of safe operating procedures
- Training in fault finding, hazard spotting and hazard awareness
- Training in an environment where trainees are not exposed to risk.

Two virtual reality theatres and three simulations have been developed to date. One theatre is located in the School of Mining Engineering at UNSW and the second is at the Newcastle Mines Rescue Station (NMRS).

The new funding is to be used to construct a second, state-of-the-art, virtual reality theatre at the NMRS, to enhance the prototype simulations and adapt them to team environments and to develop a number of new simulations. The theatre will be equipped with a surround curve screen which enables trainees to utilise their peripheral vision, an important factor in a mining environment. The research grant provides a number of flow-on benefits to the School of Mining Engineering, especially with postgraduate research and computing facilities. Professor Galvin will act as project manager while Dr Phillip Stothard will be lead researcher. Dr Stothard has played a pivotal role in developing the VR capability of the school. 

Virtual reality is transforming the way we train miners.

Centre for Photovoltaic Engineering

Solar projects to aid developing regions

A group of six second-year students of Photovoltaics and Solar Energy Engineering are spending the year on projects investigating solar-powered water purification and pumping options for developing countries.

They are honing their skills in preparation for an assignment in a couple of developing regions – one affected by the Boxing Day tsunami. The students will join forces with a group of around 10 additional students who completed preparatory project work last year.

The Centre for Photovoltaic Engineering is arranging with Perth company, Solco Pty Ltd, for students to spend their summer break working with photovoltaic (solar) powered water purification systems in tsunami-affected areas in Sri Lanka.

Water quality and sanitation in Sri Lanka was affected by the tsunamis. Drinking water shortages have resulted from loss of rainwater storage and contamination of wells and groundwater. Most people in rural Sri Lanka rely on wells for their drinking water. Seawater has seeped into the wells and has put a serious dent in local residents’ access to drinking water.

Where groundwater has become saline, solar-powered reverse-osmosis desalination technology is used to decontaminate wells and produce drinking water. In other circumstances,
source water is contaminated, but non-saline, in which case a simpler filter technology that requires less energy can be used.

The Photovoltaics and Solar Energy students will be installing new solar-powered water purification systems, maintaining existing systems and collecting data to analyse the local water supply system and the comparative performance of technologies.

Solco, provider of sustainable water and power solutions to international markets, already has donated labour and equipment to provide villages with better water facilities. An innovative user-pays community owned micro-enterprise approach has been used, in order to achieve sustainable management of the water purification technology after the NGOs are gone and the aid has run out.

Solar-powered water purification systems will aid tsunami-affected Sri Lanka.

School of Surveying & Spatial Information Systems
Investment in GPS receiver design capabilities

The School of Surveying and Spatial Information Systems now has the most comprehensive set of equipment in Australia for the design, development and testing of GPS receiver hardware and internal software (or ‘firmware’).

The first step was taken in August 1999 with the purchase of the Mitel Architect GPS Receiver Software Development Kit (SDK). The Architect SDK provided all the source code (in the C language) for the customisation of receiver firmware based on the Mitel (later Zarlink) GP2021 baseband processor chip, essentially the digital ‘heart’ of a GPS receiver.

In mid-2002 a new SDK was purchased. This SDK was based on the Zarlink GP4020 chip, and could be used to modify the firmware resident in the new Signav receiver HW. However, unlike the Architect SDK, not all the software (SW) source code was provided, but in 2003 researchers successfully ported the ‘old’ Architect SDK to the Signav receiver, permitting continued research using this relatively ‘open’ SDK with new receiver HW.

In mid-2004 UNSW researchers were funded to develop a new HW platform based on Field Programmable Gate Arrays (FPGA) reconfigurable chip architecture. The Architect-based firmware has been ported to a microprocessor core on the FPGA that mimics the operation of a GP4020 baseband chip. This new FPGA board will be the foundation for a new generation of GPS and Galileo SW-based receiver design research at UNSW. The FPGA-based receiver is currently under test, and will be made available to the research community in late-2005 as the world’s first ‘open source’ FPGA-based receiver.

In 2005 UNSW also purchased two additional SW-GPS receiver tools.

The purchase in May 2005 of a pair of Spirent 6560 RF Signal Simulators, funded by an Australian Research Council grant, was a significant milestone. This equipment allows laboratory testing of new signal tracking and navigation solution algorithms, under different receiver-satellite scenarios.

The total investment in equipment and development tools is over $300,000, ensuring UNSW has the best equipped GPS receiver research facility in Australia. Such a unique equipment facility will help UNSW build a world-class GPS/Galileo receiver design research capability over the next few years. For further information visit www.gmat.unsw.edu.au/snap/work/theme4.htm.

The new Spirent 6560 GPS signal simulator is used to test the FPGA-based GPS receiver developed by SSIS and NICTA.
Dean’s Industry Advisory Council

The Dean’s Industry Advisory Council is made up of senior executives from various industry sectors including several prominent members of industry. It reflects the breadth of the Faculty’s 10 schools. Introducing the members of the DIAC...

Mr Barry Hill, Chief Engineering Services, ANSTO

Mr Michael Batchelor, Director, NSW, Maunsell Australia

Dr John Baxter, Joint Managing Director, Bishop Innovation

Mr Roger Buckeridge, Director, Allen & Buckeridge Pty Ltd

Ms Cheryl Marvell, Senior Manager, Sydney Water

Mr Ian Dawson, Manager, Sydney Office, GHD Pty Ltd

Mr Michael Eckert, Manager, Business Transformation, Optus

Mr Paul Harcombe, Chief Surveyor, Land & Property Information NSW

Dr Heidi Kapfenstein-Doak, Senior Chemist, Memcor Australia

Ms Cheryl Marvell, Senior Manager, Sydney Water

Mr John O’Brien, Managing Director, Whitesmiths Australia Pty Ltd

Dr Colin Sutton, Managing Director, Ventracor

Mr Peter Tyree, Chairman, Tyree Holdings Pty Ltd

Where in the world?

ALAN GROVE

Graduated: Civil Engineering, 1965, the same year I completed a MEngSc (Hydraulics).

Career Highlights: In 1966 I came to Darwin, Northern Territory as a Commonwealth Department of Works cadet – and I have never left! I spent my entire working life in the civil construction field and engineering management roles. During the 70s and 80s a partner and I owned a contracting business constructing highways, pipelines, subdivision works, quarry and marine activities throughout the northern half of the NT. The last 10 years of my career, until my retirement in 2002, was spent managing the NT Government’s Lands Department land development and capital works activities.

Current Interests: My retirement activities include travel (including visiting my three interstate children and grandchildren), golf, tennis and net-based share/derivative trading. My wife and I delight in our retirement and contentedly live abutting the Darwin Golf Course.

Address: 9 St Andrews Court, Marrara NT 0812
Tel: +61 8 8927 5720

Share your story

Alumni are invited to send in stories about their university days as well as to share career highlights.
Email us: unswengineers@eng.unsw.edu.au

The late John Lions (below, standing) was a pioneer of computing and was one of the key people responsible for the growth of expertise in operating systems design across the world. He was a member of the UNSW academic staff for almost 25 years.

Anyone know who else is in the photo?
email us: unswengineers@eng.unsw.edu.au
Graduate profile >
Gary Zamel

Business leader Gary Zamel believes Australia’s future lies in growing companies around smart technology for industries in which it has a competitive edge.

He should know. Zamel is managing director of Mine Site Technologies, a leading mining communication systems company serving an industry in which Australia has long reigned supreme.

“Mining has always been one of the most significant industries,” says Zamel, who graduated with a Bachelor of Engineering from UNSW’s School of Mining Engineering in 1974.

“Mining has emerged as a leading industry for safety and productivity and, as such, the global industry is coming to Australia to seek our expertise and technologies.

“There is a great opportunity for Australia to advance technologies in areas where it has a competitive edge – and mining is clearly one of them.”

For the past 19 years, Zamel has made it his business to prove that point. In 1986, having already run a couple of successful businesses, Zamel decided to set up a high-tech electronics business for the mining industry, developing products to be designed and manufactured in Australia.

Mine Site Technologies is now a leader in the field, supplying more than 250 mines worldwide with products that have become synonymous with best industry practice.

One of the key products is the PED Underground System, an ultra-low frequency ‘through-the-earth’ paging, control and blasting system that is used in more than 130 mines in Australia, the United States, Canada, Sweden and China.

The VDV Leaky Feeder Radio System is another product designed for voice and data communications on all channels simultaneously. There’s a personnel and vehicle electronic tagging system, often used for personnel management at blast time, and a digital underground communication infrastructure that allows LAN and IP applications to operate beneath the surface.

One of the latest products is a new concept in miners’ cap lamps. The Integrated Communications Cap Lamp (ICCL) comes with several safety and communication devices, such as a PED Pager Receiver, a tag for tracking personnel through the mine, and two-way radio.

Zamel is closely involved in development and application of the products, building on solid mining experience that began back in the tin mines of Cornwall soon after leaving UNSW.

Zamel, who had thoroughly appreciated the hands-on experience he gained during his industrial training at UNSW, wanted to capitalise on his working knowledge of mines. After a touring stint of Europe, he got a job as a miner, an experience he remembers for the tough working conditions and the excellent grounding it gave him in the industry.

Returning to Australia after 18 months, he snared a job with Mitchell Cotts Engineering, which then represented Austria’s Voest Alpine, a major supplier of mining and tunnelling equipment. Within five years, Zamel had established Voest Alpine’s business in Australia.

In 1985, he established his own consultancy firm, developing new technology and products for the industry. Some of the tunnelling products he introduced to Australia are now standard on projects such as Sydney’s Eastern Distributor and Cross-City Tunnel.

In the late 80s, he established Jellinbah, a new coal mine in central Queensland, before concentrating his efforts on Mine Site Technologies.

Through all the years of directing his company, Zamel has also guided the future of young mining engineers. He has been a member of the Head of School Advisory Council in the School of Mining Engineering, helping to ensure that students get the practical industrial training that he found so valuable.

It was during such training that he formed a lifelong friendship and business relationship with alumnus Bob Cameron, founder of Centennial Coal.

“The thing with mining engineering at UNSW is it forms relationships that last for many, many years,” says Zamel. “I have maintained relationships with many of our group of 45.”

Lately, Zamel has worked with UNSW’s Australian Graduate School of Management to cultivate the entrepreneurial skills that he considers essential to young scientists, engineers and commerce students.

“We are developing a course for teaching students – undergraduate and postgraduate – the fundamentals of commercialisation.

“This will involve the establishment of a centre for technology commercialisation innovation and entrepreneurship.

“It’s part of my long term view that we should be training young graduates about what is required to take smart ideas and make them commercial global leaders.

“Whether its medical technology devices or engineering products and services, this is where Australia can emerge as a leader.”
Please stay in touch

If you have changed your address please send your updated details to:
Faculty of Engineering Administrative Unit > The University of New South Wales, Sydney 2052 Australia
Telephone +61 2 9385 4023 > Fax + 61 2 9385 5456 > Email unswengineers@eng.unsw.edu.au

<table>
<thead>
<tr>
<th>Name</th>
<th>title &gt;</th>
<th>given name &gt;</th>
<th>family name &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>New postal address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old postal address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>(h)</td>
<td>(w)</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of Birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree + graduation date</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Privacy Statement

Provision of information requested in this form is voluntary. It is for use by UNSW and the UNSW Foundation to maintain your details for the purposes of communicating University and associated activities to you.
If you do not wish to receive any further details or you wish to check your information, please phone +61 2 9385 4023.