

New Milling Machine for Engineering Workshop

The Engineering workshop has just taken delivery of a new CNC Toolroom Milling Machine. The new computerised mill was jointly purchased by the school of MMM, the Faculty and the Workshop and will give both staff and students the opportunity to programme and manufacture intricate components on a state of the art machine tool.



The Engineering Department's new Milling Machine

The HAAS TM-2 Toolroom Mill is an American-made vertical machining centre that combines innovative design principles, unique control features and quality construction to make it simple and versatile. The mill operates in three modes – full CNC in

which it is programmed through the HAAS control using G-codes, manual mode using hand wheels, and combined manual/CNC mode. It comes complete with a 10 pocket automatic tool changer for quick and hassle free

tool changes and is fully upgradeable to include its own hard disk drive, ethernet interface and 2 more axis for future manufacturing research activities.

A number of workshop staff will be trained to operate the new mill and it will be used for Formulae SAE component manufacture, manufacturing research and teaching, and general workshop jobbing work. It should be fully operational and ready for its first machining task by the end of the month.

Dean's Spot

At this time of the year every Australian university is planning for its January 2007 intake of students. Most students come to University after 12 years of primary and secondary schooling. In NSW the final exam is called the Higher School Certificate (HSC), and this results in each student being given a single mark, or ranking, which is commonly used to decide the course, and so the lifetime career, that a University will offer to an incoming student.



However, we know that people are very complex, and there are many vital human qualities which cannot be recognised or acknowledged by any attempt to summarise all academic and personal characteristics of each student into a single mark. Hence our Faculty was the pioneer in Australia in offering an 'early entry' program in which every student considering an engineering degree is given an opportunity to individually discuss engineering careers with practising professional engineers from our staff. We still run

the most comprehensive 'early entry' program available to assist incoming students.

In this program we encourage potential students to interview us as much as the other way around. Our staff are interested in far more

than a single mark. For example, motivation, initiative, ability to lead and to work in teams, a lively interest in human affairs, perhaps shown by involvement in community groups, and in sporting, musical, debating or other achievements, all throw light on a person's ability to graduate and become an excellent professional engineer. Potential students are interested to know exactly what an engineer does (and what career prospects will be like after graduation), what will happen to them when they come here and why, and to take the opportunity while they are here to speak to existing students and to visit our laboratories and the rest of the campus to see for themselves what our University is like.

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Alternative Skin Reinforcement Materials

The days of wooden pit-props in underground coal mines are fortunately long-gone, although evidence of this bygone era is still around, particularly at mine entrances. These days, underground “roadways” are held up and stabilised by rock-bolts (driven into the rock strata in the roof and sidewalls), and steel mesh known as “skin reinforcement”. Installation of this “surface support” is a slow and labour-intensive business, with typical roadway advancement rates of around 3m/hr. The steel mesh is positioned by hand against newly-cut rock, and then temporarily held in place using a hydraulic jack. The bolts are then driven into the rock through the mesh to hold it in place permanently. Automatic bolting technology is slowly being implemented, but it is still necessary to position the mesh by hand – a dangerous occupation!

A research collaboration between the School of Civil, Mining and Environmental Engineering, the School of Mechanical, Materials and Mechatronic Engineering, six coal mining companies and a mining consultant has recently been established to investigate



From left: Geoff Spinks, Chris Lukey (in mining gear), Ernest Baafi, Ian Porter

alternative polymeric skin reinforcement materials for coal mine roadways, with the potential for full automation of the surface support process. The project commenced in July with a six month feasibility study, funded under the URC Research Partnerships Scheme. An ap-

plication for a longer-term industry-funded program has also been submitted. The project is led by Associate Professors Ernest Baafi and Ian Porter from the School of CME, and Professor Geoff Spinks from the School of MMM. Dr Chris Lukey (Engineering Materials Institute and School of MMM) is conducting the investigation. A newcomer to the coal industry, Chris has already spent some time underground, observing current practices first hand, and getting a “feel” for the conditions under which the new technology will operate. Armed with this information, he is now finding out about the required material properties and looking at possible candidate materials.

Professorial Lecture

The fifth in the University of Wollongong's series of Professorial Lectures for 2006 examined artificial muscles, how they work and their many applications.

Professor Geoff Spinks from the Faculty of Engineering delivered the lecture and spoke about smart materials that respond by changing in size when stimulated. He also discussed how nanotechnology is improving their performance.

“Most commonly the stimulus is by an



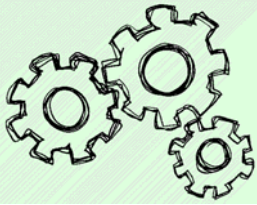
The first students to complete the new course Bachelor of Science (Photonics) graduated on Thursday, July 13. Pictured are John Russell (left) and Dennis Antiohos.

electrical voltage,” he said. “These materials have applications in many areas including robotics, medical devices and micro-machines.”

Professor Spinks explained to his audience how his research has been dedicated to making artificial muscles work better and how he hopes to one day

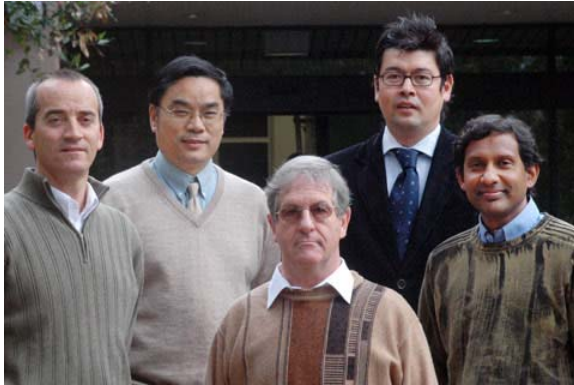
produce an artificial muscle that works as well as natural muscle.

“Since natural muscle works as a system of billions of co-ordinated nano-scale machines, we are looking to nano-scale materials to produce better artificial muscles,” said Professor Spinks.



ARC Linkage Grants

Prof Rian Dippenaar, Dr ZhiXin Chen and Dr David Nolan from the Faculty of Engineering, in partnership with their industrial partners from BlueScope Steel, Mr Jim Williams, Dr Frank Barbaro and Mr Chris Killmore were awarded ARC-linkage funding of \$896,584 over five years.



ARC Linkage Project recipients who achieved substantial funding for their engineering-based projects. From left are Dr David Nolan, Dr Zhixin Chen, Professor Rian Dippenaar, Professor Brian Uy and Professor Buddhima Indraratna

By radically departing from the mainstream steel design philosophy, the team intends to develop a new family of steels by exploiting the attributes of new alloy designs. This business initiative provides an exciting intellectual challenge to augment the design concepts by an improved understanding of the metallurgical principles underpinning this largely unresearched technological innovation. A rare opportunity is also provided for the university researchers to work closely with their industrial partners to identify the critical processing route constraints, to participate in the technical and economic analysis of the proposed new process route and to weigh up the potential benefits of the new approach against the possible impact on properties.

If successful, the progressive reformulation of the alloy design of a new family of steels would enhance their properties, greatly reduce the complexity of manufacture, ensure more efficient steelmaking production practices and enable the full capacity of the domestic pipe mills and plate manufacturing facilities to be realised. This innovative and new approach opens up opportunities for market growth and export potential in areas of fundamental importance to Australia's infrastructure and mining industries and defence capability. Implementation of this newly developed technology would, for the first time, create export market opportunities for Australian pipe manufacturers.

Dean's Spot cont'd...

We will interview over 200 students before the end of this year, and many of them will impress us so much that we will make them a guaranteed offer of a place in our courses even before they have the results from their final examinations. This helps reduce some of the stress inevitably associated with any exam. Anyone interested in this program will shortly be able to apply on the net at <http://www.uow.edu.au/eng/prospective/undergraduate/earlyentry.html>

Who's Who

The editors of the Marquis Who's Who have selected Weihua Li, from UoW's Faculty of Engineering, for inclusion in the forthcoming edition of the 2006-2007 Edition of Who's Who in Science and Engineering. This compilation will chronicle the lives and careers of the world's most accomplished scientists and engineers.



Weihua Li

Staff News

Muhammad Hadi

Muhammad Hadi presented a paper about using fibre reinforced polymers in reinforced concrete in the Second International Conference of Concrete Solutions. The conference was held in St Malo, France. Muhammad also visited Jordan University of Science & Technology (JUST) in Irbid, Jordan where presented one seminar and gave a brief presentation about UoW and his own research. The labs at JUST, especially the structures lab are enviable. During his visit, Muhammad met the head of the Civil Engineering Department and the Dean of Engineering who at one stage of his life was a lecturer in UoW Dubai.



Prof. Hua Kun Liu

Prof. H.K. Liu delivered an invited talk "*Nanocomposite materials for use in lithium rechargeable batteries*" (30 min) at "the 7th China International Battery Technical Conference, June 28-30 2006" and acted as a co-chairperson of a session "Lithium-ion batteries". Beijing, China.



She also delivered an invited plenary talk "*The impact of Nanomaterials on lithium rechargeable batteries*" (45 min) at "the 6th International symposium on new materials for electrochemical systems, July 9-12 2006" and acted as a chairperson of a session of "Elaboration and characterisation". Montreal, Canada.

AISC Spring Meetings



Photos: John Hancock Tower, Chicago (left), and Sears Towers, Chicago (right).

Professor Brian Uy attended the American Institute of Steel Construction (AISC) spring meetings in Chicago in June. Brian was recently elected to Task Committee 5 on Composite Construction which has direct responsibility for formulating guidelines on composite design for the AISC specification for structural steel buildings. His role on this committee will provide a direct conduit between Australian and American practices in composite design. Currently the Australian Composite Structures Committee BD32 is carefully considering overseas specifications in developing their own local standards and Brian's involvement in Task Committee 5 and BD32 will help to assist these developments. These meetings are held twice annually in Chicago, the city directly responsible for the birth of the modern skyscraper. Two fine examples include the John Hancock Tower and Sears Towers, both world's tallest upon their completion.



UIC Visit to INSA de Rennes

Professor Brian Uy recently spent two weeks at INSA de Rennes in France as part of a University Internationalisation Committee (UIC) funded grant. The grant was established to promote collaboration in the area of composite steel-concrete structures between the University of Wollongong (UoW) and INSA de Rennes (INSA). Professors Uy and Hjjaj from UoW and INSA have already through this UIC established the inaugural co-tutelle PhD

agreement at UoW. This scheme supported by the French Embassy allows for French PhD students to spend one year of their PhD working on research at an Australian university. The first student Mr Quang Huy Nguyen (pictured below) will commence the Australian component of his PhD studies at UoW in October 2006 with Professor Uy.

During Brian's visit to INSA, he and Professor Hjjaj also co-chaired a special retirement symposium for Professor Aribert of INSA. Professor Aribert was the major French expert involved in the development of Eurocode 4: Design of composite steel and



Symposium attendees were treated to a special tour of Mont. St Michel

Diary Dates

11 August	Faculty Education Committee
15 August	Faculty Research Committee
22 August	Faculty Postgrad Research Student Committee
29 August	WAC
5 Sept	Faculty Committee

concrete structures. A total of twenty invited papers from worldwide experts on composite construction were delivered at the symposium and these will be published in special issues of *Journal of Constructional Steel Research* and *Steel and Composite Structures* with Professors Hjjaj and Uy as guest editors.