



Faculty of Engineering Newsletter



Message from the Dean

The Government has recently announced another major success for the Faculty of Engineering at the University of Wollongong. In the latest round of competitive



applications for the award of national research centres, the Pipelines Cooperative Research Centre was funded for the purpose of undertaking collaborative long term research and training in the pipeline industry. This Centre will receive approximately 2 million dollars per annum for an initial period of 10 years. The Pipelines CRC will focus initially on pipeline infrastructure in the energy industry, especially natural gas transmission pipelines, and pipelines for the transport of CO₂ for sequestration purposes to reduce greenhouse gas emissions. Natural gas pipelines deliver more than 20% of Australia's energy, and this share is increasing because of Australia's abundant reserves of gas. Gas is a clean fuel that is critical to the transition to renewable energy supplies. Much of the Australian pipeline infrastructure is at or near the end of its design life and needs to have its life extended. Complete replacement would place an intolerable economic burden on our economy. At the same time the industry suffers from a serious skills shortage, which is limiting our ability to operate these pipelines safely and to extend their lives. The Pipelines CRC will develop and implement the skills and knowledge needed to enhance the safety and extend the life of energy pipelines and to build the new generation of CO₂ pipe-

UOW's key role in successful abrasive technology symposium

Abrasive technologies are central to modern manufacturing for a large variety of products across many disciplines including nanoscale elements to large equipment and from biomedical devices to aerospace structures.

Over the past decades, significant worldwide research efforts have been to develop sophisticated abrasive technology and to achieve their cost-effective implementations for environmentally conscious productions.

The 12th International Symposium on Advances in Abrasive Technology (ISAAT2009) was held recently at the Gold Coast, Australia.

A total of 134 participants from around the world attended with UOW as one of the joint organisers along with the University of Queensland and the University of New South Wales.

As a Co-Chair of the Executive Committee of the ISAAT2009, Associate Professor Zhenyi Jiang from the School of Mechanical Materials and Mechatronics said the conference was very successful with all participants giving positive comments.

Professor Jiang joined two others from UOW (Professor Xingzhong Zhang and Haibo Xie) to present five papers. Papers will be published in the international journal of *Advanced Materials Research*.

Professor Jiang, co-editor of the book 'Advances in Abrasive Technology XII', said that the text covers a broad range of research topics including design, fabrication and dressing of grinding wheels, precision grinding, abrasive jet processing, polishing and non-conventional finishing, semiconductor processing, micro/nano-machining, fabrication and forming, tribology* in manufacturing, process monitoring and measurement, and other novel techniques and advanced studies related to abrasive technologies. [* Tribology refers to interacting surfaces in relative motion.]

In the Executive Committee meeting of the International Committee for Abrasive Technology (ICAT), Professor Jiang was elected as a member of ICAT.

lines. It will be led by the Australian Pipeline Industry Association Research and Standards Committee (APIA RSC) and will involve the University of Adelaide as well as 43 Australian companies, including major corporations plus several small to medium enterprises.

This CRC will provide additional staff, PhD scholarships, and equipment to support the Faculty's already strong research areas in fluid dynamics, manufacturing automation and robotics for the building of pipelines, the processing of the steel and pipe for

P.T.O

Inside . . .

Guest editors for special issue	2
Inaugural SMART Workshop	2
Diary Dates	2
Rail Infrastructure Research	3
Student Profile	4
Conference News	4
Student News	4
Bulk Materials Review	4

From Page 1...

reduced cost and improved strength, and non destructive testing. Research outcomes will be implemented by direct technical transfer to the industry, and by the training of research students and undergraduates through their involvement in research projects, 4th year projects, and work experience.

The Pipelines CRC will deliver large benefits to the community. It will play a vital role in assuring the safety and security of supply of the infrastructure that delivers over 20% of Australia's energy supplies and which has a replacement cost of \$40 billion. It will provide the Faculty with assured and comprehensive Industry support for internationally competitive research in building and protecting pipelines, the vital 'arteries' which support our society and community.

Guest Editors for Special Issue on 'Advances in Tribology in Metal Manufacturing' of the International Journal of Surface Science and Engineering (IJSurfSE)

Metal manufacturing, such as metal rolling, micro-forming and machining, is an essential process to producing a mass of products. All the processes involve surface contact mechanics, which is relevant to the tribology. Compared with many relatively old and well established basic engineering subjects, e.g. thermodynamics, mechanics and plasticity, tribology is still in an imperfect state and subject to some controversy which has impeded the diffusion of information to technologists in general. In particular, the development of tribology in metal manufacturing is still ongoing, and new knowledge, fundamental principles, and experimental and simulation skills are continuously generated in this field.

The purpose of this special issue on 'Advances in Tribology in Metal Manufacturing' of the International Journal of Surface Science and Engineering (IJSurfSE) is to collect research experiences and innovations in the field of tribology in metal manufacturing, and to provide a forum for developing new methodology and modelling skills in identifying the advances in tribology in metal manufacturing processes. After calling papers, the peer-review processes, eight papers were finally selected for inclusion in the special issue, in which all are original contributions. Associate Professor Zhengyi Jiang, a Guest Editor of the Special Issue and member of the Editorial Board of IJSurfSE has made the special issue available in IJSurfSE, Vol. 3, No. 5/6, 2009.

Inaugural SMART Workshop held

At the inaugural SMART Infrastructure Facility Workshop, held on campus in September, the NSW Department of Transport and Infrastructure tasked SMART to work on a transport modelling project for a new urban renewal area in Sydney.

Attending the workshop were international experts in computer modelling and simulation from the USA and Europe who also gave guest lectures which were well attended.

The willingness of these academics to travel to Wollongong and participate in the workshop demonstrates that a multi-disciplinary approach to infrastructure development based on computer modelling and simulation is the way to address the future infrastructure needs of the nation.

Representatives of the NSW Department of Transport and Infrastructure and the Department of Planning provided the policy framework for participants and actively engaged with over 50 UOW academics in addressing the workshop challenge.

The workshop ended on a high note with all parties, ranging from the Department, the overseas guest and UOW academics, determined to continue the collaboration and interaction between the agencies and institutions present.

All were excited by the opportunities that SMART presents to tackle problems in a new way. Firstly by bringing together experts from a range of fields to break down a problem and workshop solution scenarios; then using technology and agent-based computer modelling and simulation to visualise the scenarios and show the 'what-if' possibilities that any course of action presents.

The SMART Infrastructure Facility will continue to facilitate this engagement and find ongoing opportunities for SMART to participate in future transport planning and urban renewal initiatives.



Richard Dwight, Dr Priscilla Nelson from NJIT and Kirk Bendall from the Transport Data Centre working on a SMART solution

Diary Dates	
3rd Nov	Faculty Committee
17th, 18th & 25th Nov	Phys Assess Committee
18th & 25th Nov	CME Assess Committee
18th & 24th Nov	MMM Assess Faculty
24th Nov	PG Res. Committee
25th Nov	Committee
Study Recess Lab Follow-up Inspections	

Wollongong Rail Infrastructure Research proven the National Best

Sakdirat Kaewunruen, a PhD alumnus from the School of Civil, Mining, and Environmental Engineering, has won the '2009 National Engineering Bursary Award' from the Concrete Institute of Australia. He is the first from UoW to receive this prestigious award, which is highly competitive.

The Concrete Institute of Australia National Bursaries are biennial awards made to the best PhD graduates studying engineering, chemistry, materials science, building science and other relevant subjects which contribute to the research knowledge base in Australia. For the 2009 award, eligible theses are those completed in 2007 and 2008, the years prior to the Biennial Conference of the Concrete Institute of Australia.

The engineering award of \$5,000 in total will be made for excellence in thesis work on concrete and cement-based products and processes.

Eligible topics could be related to cement, cementitious materials, concrete, concrete admixtures, reinforcement, related design and construction procedures and the like.

Based on his outstanding research outcome and its significant impact to industry, Sakdirat has been nominated for the prestigious award by Head of School of Civil Mining and Environmental Engineering Professor Buddhima Indraratna, who is also the Director of the Railway Research Centre at UoW.

At UoW, Sakdirat had been working to develop a new design concept for railway concrete sleepers, under the supervision of A/Prof Alex Remennikov. The research was part of a larger project under the CRC for Rail Innovation (RailCRC). At present, concrete sleepers have become the most common choice of track owners worldwide. Many superior advantages of concrete sleepers in comparison with plastic and timber sleepers include the increased track stability (e.g. reducing track buckling), improved track conditions (e.g. for faster and heavier trains), higher durability, and more environmentally friendly. It is noteworthy that through the life cycle cost analysis, concrete sleepers are the most sustainable option for rail tracks and is the smallest contributor of carbon emission.

"The discovery has helped rail track owners make more cost-effective use of their assets through improved knowledge of track behaviors under static and impact loading, and in particular through more realistic and reliable processes of analysis and design of concrete sleepers" said Prof Remennikov. "Addressing these issues has the potential for substantial savings for track owners. As well as helping the track owners, the beneficial repercussions also inevitably involve passengers and environments at large. For instance, the more reliable tracks comfort travelers, save materials, and reduce the insurance fees of merchandise."

Dr Kaewunruen also added that "a recent finding shows that the production process of cement produces large amounts of CO₂, as much as 10% of the world's total CO₂ emission, and our new design concept for concrete sleepers would lead to more optimal use of cement and concrete, which indirectly reduces the CO₂ that is the main contributor towards climate change". "This all adds up to human, environmental and cost savings. This research outcome will dramatically boost Australia's economic and social growth in the near future."

Sakdirat is currently working with RailCorp in Sydney - one of the busiest rail networks in the world. He is a Chartered Professional Engineer and has extensive experience in structural designs of concrete and steel structures, dynamic and impact analyses, railway track structures, wheel/rail interaction, structural risk and safety, ocean engineering, forensic engineering, and sustainable urban development. He has served as the international expert referee for many engineering societies e.g. American Society of Civil Engineers and both Institutions of the Civil and Mechanical Engineers in UK. In addition to the contribution to many current RailCRC projects, he has been involved in many rail transport infrastructure projects. He will attend the Concrete Institute Gala Dinner in September this year to receive the award. Sakdirat was awarded the Peter Schmidh memorial scholarship for Best Performance in Engineering Research in 2006. He was also a first prize-winner at Wollongong HDR Conference in 2007 in the theme "New Materials and Methods." Also, he was named '2008 Young Railway Engineer of the Year' by Railway Technical Society of Australasia.



Student Profile

J. Humberto Dominguez Davila began his PhD studies within the Faculty of Engineering in 2007 after successfully being awarded the fiercely competitive National Council for Science and Technology (CONACYT) scholarship from the Government of Mexico. Although now part of the Centre for Bulk Solids & Particulate Technologies, under the supervision of Assoc. Prof. Peter Wypych, Humberto is a Civil Engineer with a Masters degree in Geotechnical Engineering from the highly regarded Autonomic National University of Mexico (UNAM), in Mexico City. Before beginning his PhD studies Humberto worked as a Geotechnical and Environmental/Civil Engineer in Mexico City whilst juggling his academic teaching and research position at the UNAM. Awarded several PhD positions from noted Universities in North America, Humberto chose to study his PhD at UOW because of the fantastic studying, career and lifestyle opportunities both UOW and Australia presented. Since joining UOW, Humberto has become a strong voice for postgraduate students within the Faculty of Engineering. Humberto is the postgraduate student representative for the Faculty of Engineering and also a member of the Workplace Advisory Committee.



When asked about some of the highlights from his PhD studies Humberto said that it was the opportunity to present one of his PhD publications (co-written with Peter Wypych) titled "Scale-Up Effects in Bulk Characterisation - a Review" at the 6th International Conference for Conveying and Handling of Particulate Solids (CHoPS 2009) held in Brisbane in last August 2009 (see photo). 'I thoroughly enjoyed participating both in the research and social programs held during CHoPS 2009 in Brisbane. I especially enjoyed the opportunity to speak with influential international researchers in the field of Bulk Materials and Powder Handling. Speaking with experienced researchers helped me view my own research in a more innovative way and as such I was able to gain new ideas making me even more enthusiastic about my current research'.

Conference News

Muhammad Hadi attended two conferences in September 2009. The first conference was the 24th Biannual Conference of the Concrete Institute of Australia, which was held during 17 - 19 September 2009 at Luna Park, Sydney. Muhammad presented one paper in this conference which was coauthored by Mrs. Yuliarti Kusumawardaningsih who completed her masters in July 2009. The second conference was The Fifth International Structural Engineering and Construction Conference which was held during September 21-27, 2009 at Las Vegas, NV, USA. Two papers were presented, one coauthored by Mr. Veysel Yazici (PhD candidate) and the second coauthored by Mrs. Yuliarti Kusumawardaningsih.

Student News

In January 2009 I submitted a paper on "Improving Sustainability of Concrete" to the Concrete Institute of Australia. This paper was accepted to be presented and published at the biannual Australasian Concrete conference held in Sydney. The opportunity of presenting this paper has allowed me to make a valuable contribution to the concrete industry. In addition I have been able to associate with notable industry colleagues and make many friends. All the university academic staff have been very supportive and without their guidance and technical knowledge this journey would not have been possible. The skills I have learned from this experience and friendships made are greatly cherished. Bruce Standen

Australian Bulk Materials Handling Review

The 'Australian Bulk Materials Handling Review' has published its list of the top 20 people in Bulk Materials Handling in Australia. 10% of these are at the University of Wollongong: Peter Arnold and Peter Wypych.

It further adds that the two people who 'sit atop the hierarchy of bulk materials handling academics' are Alan Roberts and Peter Arnold. They, by virtue of a lifetime of talented effort, have in many ways defined the field, brought rigorous research tools to bear on a technically difficult area and defined many of the standards and techniques the industry now commonly uses, not only in Australia but worldwide. Alan is also, of course, really a UOW person, having started out life at Wollongong, making UOW's share of the top 20 really 15%.

The Review refers to Professor Arnold as a "prolific researcher, teacher, author and consultant for 45 years who has made major advances in bulk solids flow properties."

The Review also discusses Peter Wypych's achievements and refers to him as "the most ubiquitous academic and consultant today" and says he is a "prolific conference speaker, researcher, author and consultant." Peter Wypych is the founder and general manager of Bulk Materials Engineering Australia, the bulk solids consulting arm of the University of Wollongong.

Congratulations to both Peters.