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Institution of MECHANICAL ENGINEERS

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MICROFLUIDICS AND MEDICAL DIAGNOSTICS

Microfluidics can be seen as a subdivision of the mechanical engineering staple fluid dynamics; however, it really is a multidisciplinary field covering areas of engineering, physics, chemistry, microtechnology, nanotechnology and bio-technology.

Microfluidics concentrates on specific phenomena of fluids at a nano-, pico- and femto-litre level, constrained within defined channels on a micron level. General design rules for macro systems are inappropriate for scaling. Different factors need to be taken into consideration of microfluidic design and manufacturing, as surface tension, fluidic resistance and energy dissipation take more dominant roles.

Microtechnology is used for a variety of different purposes from ink-jet printers to fuel cells and CD-ROMs to medical diagnostics. The emergence of medical and bioscience based microfluidic devices have brought about a huge change in point-of-care and biological testing, as well as pushing design principles.

I work at MiniFAB which is a locally based company in Scoresby, Victoria, which has become an international supplier of product development services and manufacturing of micro, nano and biotechnology. Focussing on polymer based solutions, MiniFAB has several different technologies at its disposal to meet client needs.

Such technologies include; micro-moulding, surface coating, micro-machining and electro-forming. These abilities allow a rapid turn around on first principle development and proof-of-principle design and evaluation.

Projects are often diverse, and utilise the technologies and capacities of experience in increasingly wider areas. A dominating focal point though is continuous-flow microfluidics which is predominately found in point-of-care devices. A lot of these devices replace biomedical assays or procedures carried out previously in clinical laboratories.

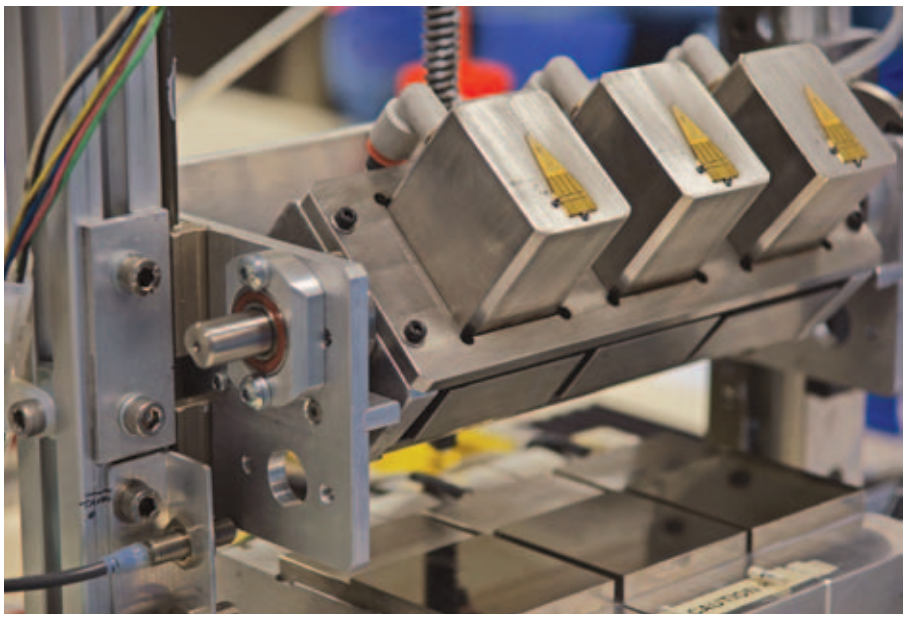
Immunoassay

An assay is any molecular biology procedure which measures or monitors characteristics of a biological sample or chemical. This can include testing biological samples for drugs, disease or presence of proteins. A common example of an assay is the immunoassay.

The immunoassay specifically tests biological samples, such as urine or blood for the presence of proteins using the molecular specificity of antibodies and their associated antigens. A key goal of the immunoassay is to give a measurable indicator of the substance being tested for, which most commonly is a colour change or visual cue.

On a basic level a lateral flow immunoassay, such as a pregnancy test, provides a simple visual

ON THE INSIDE



feedback. The tested substance mixes with a reagent and flows along a dipstick or path, using capillary action, to a set point that contains a antibody or antigen. The reaction of the test fluid and antigen causes a visual feedback, such as a colour change.

These simple components, fluid flow, mixing with a reagent and feedback are the core of microfluidics. However, devices which perform more complicated tests, for HIV, infectious diseases or DNA identification require more complicated biochemistry. As such a complicated assay requires a microfluidic device of higher complexity if it is to substitute for a laboratory procedure.

Manufacturing

Key goals of the medical diagnostic are to lower cost, perform repeatably, reliably and accurately. As such, the devices must be designed with tight tolerances and understanding of the chemical, biological and engineering requirements but longer term be highly reproducible at low cost.

To develop a microfluidic device, a fluidic system on micro and nano scale can be created by machining channels using techniques such as chemical etching, laser ablation and micro-machining. Features for mixing, pumping, containment and imaging can be created and built upon depending on the cartridge's requirements. Using surface texture and surface treatments channels can take on different characteristics such as hydrophilicity or hydrophobicity.

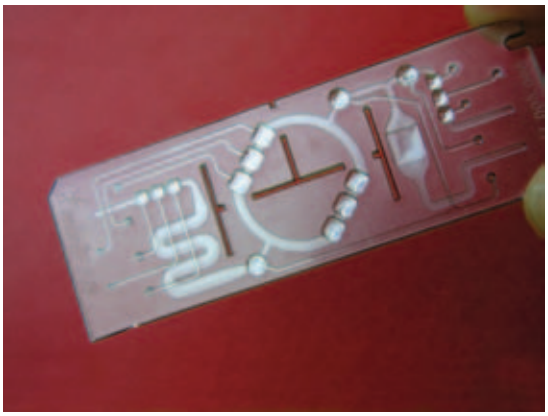
These different components allow complex fluidic systems to be created. These incorporate fluidic manipulation, mixing, separation, reagent introduction and storage, and optical imaging of results.

MiniFAB has over ten years experience in creating and developing microfluidics for the purpose of making disposable assays and medical devices. As such the devices they have developed and manufactured cover a vast variety of biological tests and procedures.

Market and End-User

A large focus for medical diagnostics, microfluidics and point-of-care device producers are the developing world markets. Costly laboratories and a very serious lack of skilled laboratory personnel and national health budget prevent accurate and early detection and monitoring of diseases. Microfluidic devices which miniaturise previously laboratory bound and expensive techniques, can now become low cost disposable items reducing the need for human analysis. Devices need also to provide bio-containment preventing clinic workers extended exposure to contagious pathogens.

Conversion from development devices and validation tools to manufacturing high volumes is sometimes a



complicated step, especially with very new technologies and techniques. MiniFAB has had success in crossing this boundary, manufacturing products for worldwide distribution.

The award winning Tearlab® product measures nano-litres of human tear fluid for the osmolarity (a signal for the amount of soluble salts and proteins within the sample tear fluid). Development of the product was carried out at MiniFAB and further development and manufacturing of high volumes continues under ISO 13485 certified quality system.

Microfluidics is a continuously developing technology, and its further reach allows medical diagnostics and point-of-care devices to bring otherwise un-obtainable treatments to both the developed and the developing world. ■

Matt Springer

WOMEN IN ENGINEERING, SCIENCE & TECHNOLOGY

Earlier this year Monika Sud, NSW panel chair, was invited by the Smith Institute with association from the IET, IMechE and the Institute of Physics, as a well regarded expert to contribute towards a document for UK Parliament highlighting the severe lack of women in science engineering and technology.

Below is Monika's submission which formed part of the document presented in front of parliament.

Despite the advances that engineering has brought to the world, engineering is still not seen as an attractive career for women. It is still stereotyped as a male industry and there are few females visible in the industry to encourage and inspire other women to join. That has to change, not only because we simply need more young engineers – both men and women - to help find sustainable solutions to the energy, transport and environmental challenges that we face. But also because there is no real reason why women and men cannot find and develop successful careers within the engineering field.

Part of the problem is perception, and the rather narrow way people think about engineering as something that happens in muddy construction sites with lots of guys in hard hats. There are of course a wide variety of engineering roles that are just as suitable to women as men, but they do not receive sufficient airtime. The awareness gap can be narrowed and there is a strong business case to do so, but the industry is going to have to work harder at it to achieve results.

Money is also an issue. Overall the engineering sector is not as highly paid as some other sectors like finance, although this is changing due to globalization and the demand for skilled labour. Engineers are in short supply and employers are having to offer financial incentives to attract people from elsewhere. As the recruitment process is opened-up, there are more opportunities for women like myself who are upwardly mobile and willing to move for a career.

Being an engineer is of course not something you do at the drop of a hat. You have to make a long term commitment, which can be costly in terms of university fees. However, unlike many other professions engineering has a long history of apprenticeships and sponsorships. Some of the big engineering firms are now offering young people a career path with paid apprenticeships and the prospect of covering the costs of tuition fees. This should attract more young people.

Unfortunately though, for women the apprenticeship route seems to be the exception rather than the norm. I was the only person, for example, out of 240 on my mechanical engineering degree course who left the traditional schooling pathway of A-levels and took an apprenticeship linked to technical qualifications (the Engineering Construction Industry Training Board and Higher National certificates).

Working alongside a number of multi-disciplined engineers, designers and managers actually inspired me to continue with my studies. My employer at the time, Foster Wheeler (which took me on as an enthusiastic 16 year old), sponsored me through university, where I became a Whitworth Scholar.

Going back even further in perception development, I think children in schools are not encouraged enough by parents and teachers to take alternate career paths and the majority follow the standard route to gaining a degree. There is nothing wrong with this approach, but people may not realize that there are alternative options to the same end point. Perhaps we need to provide more information and educate parents, teachers and career officers, and promote role models and mentoring?

The engineering industry has to take the lead in raising awareness and do more to promote the benefits of the profession to females in all walks of life. In particular, this needs to be done at different stages of education and development so that possibilities are considered from an early age.

The industry also has a lead role to play in helping promote women into managerial and board roles. Companies should target to have a certain percentage of women in these

roles. This issue, of course, is not particular to engineering alone, but the record so far is hardly impressive – especially in the in the petrochemical environment which is renowned for being a predominantly male workforce.

When I moved to Australia I decided I wanted to move out of petrochemicals into a new area to gain new industry experience so I started working at Kellogg Brown and Root (KBR) within the water area. I was very surprised to find myself amongst a large number of female engineers, which was a big change for me having worked in male dominated workforces my entire engineering education and career.

I have found working in Australia has brought me great working experience and opportunities that I may not have received as readily back in the very male dominated petrochemical environment.

Ensuring the workforce is continually receiving training, mentoring and professional development is critical to attracting and retaining women. I have been lucky to receive all of the above throughout my career, which has been one of the main reasons I have stayed within engineering. At my current employer (KBR) I have been mentored by a number of senior staff, undertaken several training courses as well as being chosen to take part in the KBR Future Leaders Program.

Encourage working mums back into the engineering industry by offering flexi time, job sharing, working from home opportunities and good paid maternity leave is also important. Many women leave the industry to start a family and never return. Anecdotal evidence suggests that women often start work in engineering, have children, and then find work in other industries (notably finance and business services). Survey work by Engineers Australia shows that many organisations are putting policies into place to assist all engineers in balancing work and family commitments. The largest change, as reported by women in the 2007 survey, was the availability of carer's leave, paid maternity leave, part time work, flexible work hours and job sharing.

It is also well known that women engineering graduates, with a background in maths and science, switch professions after graduating more than men. We need to do more to understand why that is and take action to keep more women in the sector.

Retaining women engineers is a challenge, but there needs to be more willing candidates in the first instance – especially among the smaller more boutique firms that cannot afford to offer training or apprenticeships. Financial incentives from government for women willing to take on apprenticeships should help, but public funds are limited and politicians look to the industry to make the changes needed.

Government can work more with engineering institutions to come up with ideas on how to promote and increase awareness of engineering in society. The government could also enforce equal opportunities legislation, which would motivate engineering companies to keep hold of their current female workforce and recruit more women into roles. Firms should be monitored on this and possibly rewarded.

I am currently performing the role of Chairman of the IMechE New South Wales branch and am the first female to take that position in Australia.

Engineers Australia has established a sub-group called 'Women in Engineering', which seeks to make engineering an inclusive profession which values, supports and celebrates the contributions of women in engineering teams. I believe such organisations should be replicated within other engineering institutions and across engineering related professions.

In Australia women make up less than 10% of the professional engineering workforce. That number (and retention rate) is rising, due to the engineering skill shortages and changing public and corporate attitudes towards women in work. More women are in fact moving to Australia to work in the sector, which shows that where the need dictates, cultures can change.

However, females in the profession remain overwhelmingly at low levels of responsibility and a lot more needs to be done to attract young women into engineering in the first instance. We need to create a bigger pool of skilled women engineering graduates and increase the percentage of women in senior management roles. Women are good for engineering and organisations, like Women in Engineering, are working hard to make the profession more inclusive and more attractive to tomorrow's young people. But the sector also has to do more to assist all engineers in balancing work and family commitments. ■

Monika Sud

EDITORIAL

As a young member of IMechE, my local panel and the Branch committee I would like to pass my thanks to all those who have helped me settle into this position and take on much greater responsibilities. Without Roshan's help, the *News Bulletin* wouldn't be where it is now, nor look as professional.

I hope to stand up to the high standards that Roshan and previous editors have set, and live up to the promises I made in my nomination form.

I always welcome more correspondence from readers. Please feel free to submit any articles, letters, notes from an interesting seminar or site visit that you would like to share. Length of the article is unimportant and photos or images are appreciated.

And on behalf of the Branch Executive and all of our membership we pass our condolences to past Branch Chair Clive Waters for the passing away of his Wife, Judy. ■

Matthew Springer

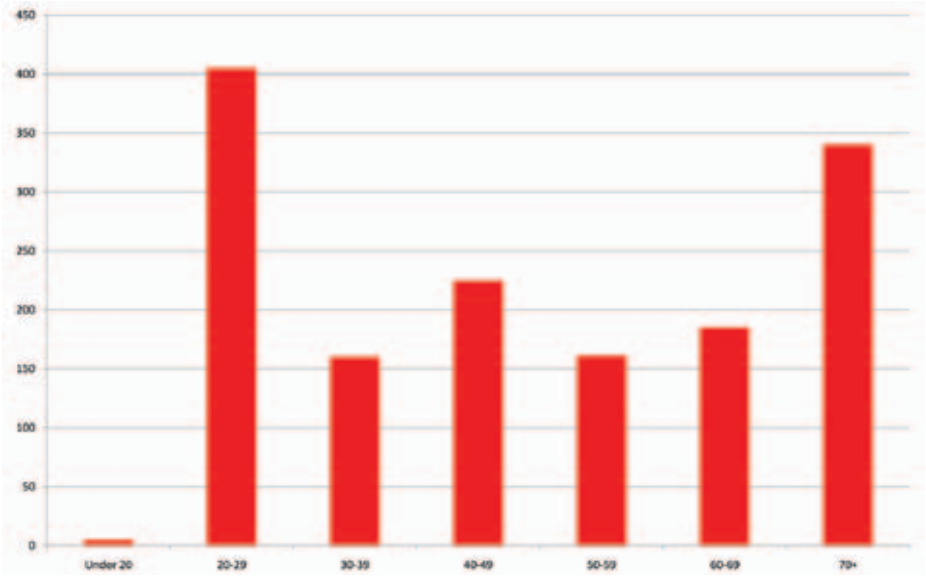
FROM THE CHAIR

Firstly, may I convey my sincere thanks to my predecessor as Chairman, and to those who actively supported and worked with Clive at both the Branch and in the State Panels to take our institution forwards in the last two years. When one reflects on the IMechE here in Australia, whilst it is robust and healthy, we do have a few issues to wrestle with. I thought I would start by discussing the largest two: funding and membership demographics.

I wrote in the previous bulletin about our funding situation. Well, I am pleased to be able to report to the membership that our views and concerns were well received in HQ, and we have since received additional funding allocated to enable us to continue our activities as planned. Ken continues to watch our expenditure and income closely – it would be a bad headline if the IMechE went bust!

In terms of our membership, the overall numbers here in Australia 1572 members. We do however have a skewed demographic as shown above. This is not surprising, nor news, but does lead one to consider the subject of the longevity of our Institution. New members are undoubtedly required. Though that leads to another dilemma – and one in which will exploit the Chairman's right to encourage debate. The Institution has, for a few years now, attempted to encourage those at University to become members of our Institution by providing memberships for free to students. Whilst the motivator is one I can understand: filling the development pipeline with potential future fee paying members. Further, it is a policy which is certainly supportive of the strategic goal to increase membership. But at what cost?

Most businesses would not consider it to be a good strategy to effectively give away their core product for a while, and then at some arbitrary deadline when the person's attention is doubtless deflected into activities such as 'getting a real job', choose that moment to suggest they pay a significant amount (in both real and proportional terms) for exactly the same product. Yet that is a deliberately provocative description of the membership approach adopted hitherto. Some Branches (though not our own) have taken this to an extreme: significantly more than half their quoted membership numbers pay no subscriptions whatsoever! Such free affiliates must have a unit cost – someone at least processes their application – which is not done for free. So I ask you, the Australian membership, to respond to a simple question: is it the right approach to have free membership for students? I'd be interested in your views – both in favor and against.



Australian Branch age profile.

On to another topic of interest to me, and it aligns to one of the key themes of our Institution: climate change. I remain fascinated by (actually – fascinated is a little strong – more have a vague awareness of) the ongoing media reporting of the Carbon Tax and all the possible ramifications: be that the sky falling in or otherwise. Now I do not intend to offer an opinion supporting or otherwise any position. It is not that I should not, rather I have no opinion to offer. However, I do have an observation and it is this – surely there would be a bigger effect in terms of total carbon emissions to not sell hundreds of millions of tonnes of coal to China? Would that not have a bigger effect than any carbon tax? That too might just prompt the odd letter to the Editor…and he likes receiving those!

One surely cannot mention the Editor without giving praise to both Roshan and Matt for the restyling and refreshing of *News Bulletin*. The last issue was first class, and subject to Matt correcting enough of my typos, I trust the same quality of output can be maintained and even improved into the future.

Further on in this *News Bulletin* you will find reports of our Branch being represented at the Regional Meeting, in New Delhi, and also a report on the recent International Strategy Board meeting in London – held the same week as Prof Rod Smith became the 126th President of the Institution.

Finally, I must reflect that I feel honored to be able to serve you, the membership, as Chairman of our Institution. I further feel lucky to have a team of dedicated, energetic and motivated volunteers at both the National and State levels who are just as committed as I am to developing our Institution – in which ever direction is the right one. Maybe, just maybe, you know better than us which way that should be – and if so, please let us know. We do not yet have all the answers. But we are intent of having fun along the way!

Cheers all. ■

Ian Mash

REPORT FROM REGIONAL FORUM IN NEW DEHLI

The members of the Regional Forum in New Delhi.

Ian Mash attended the Regional Forum held in New Delhi in April 2011, deputizing for the then Chair, Clive Waters. This was the last such forum to occur before the change in the Regional Boundaries, and as the attached picture indicates, the region was well represented.

The meeting benefitted from Maria engaging with us all by phone (and one did not choose to calculate what time it was in the UK with the time difference – to spend your weekend at that early hour listening to us seemed well beyond the call of duty). The meeting was chaired by Ken Tushingham in his role as Regional Chair.

Key issues discussed included:

Near You website: the inadequacies of the current functionality were clearly expressed and we were assured that Maria Taylor has accountability for driving improvements, promising 'more and better functionality' in the new roll out. Timings committed to were a test site in May 2011, and a full implementation by September 2011.

Prizes: the situation remains that the key international prizes still have no monetary value attached.

Rules and Guidelines: It was noted there were new draft rules and guidelines in circulation. We were advised a draft was available for International review – but seemingly few beyond those who had worked on them had actually seen them.

Subscriptions: Much debate about how much the subscription should be, especially in areas whereby the average wage per annum was not much greater than our membership fees. The meeting benefitted from knowing that anyone with an income of less than 14,500 UKP could apply for a reduced rate of membership, and pensioners with an income of less than 6000UKp could get a further reduction.

50 year Service: Disappointingly, I learned that the free membership after 50 years as a right had been relaxed to a discretional allocation, though the 50 year medal should still be issued as a matter of course. HQ were asked to do a bottom up check of this process as several 50 year members in Australia were awaiting their medals.

International Growth Strategy: Meeting learned that significant sums were to be spent in both India and China (63K UKP and 16K UKP respectively) to establish a depth of membership in these regions with high membership potential.

Speak Out for Engineering: The regional Speak Out final was held, and Australia's Daniel Burdett winning the competition of six. All the papers were of a high standard: demonstrating the power and benefit of this competition.

Leverage: The greatest benefit taken was the cross-fertilization of ideas to assist the branches progress: be that sharing of successful ideas, and equally, sharing of frustrations. All the established Branches – Malaysia, Hong Kong, Singapore and Australia were united in our concern over the budget process and its outcomes, and the effect this would have on the 'business as usual' activities of the Branches.

The meeting concluded with our discussion of inputs and agenda items for the ISB meeting to be held in London 23-25 May 2011. ■

Ian D. Mash

REPORT OF TRIP TO LONDON – ISB - 23-25 MAY 2011

In lieu of the then Chair, Clive Waters, I travelled to the UK in May 2011, to represent the Australian Branch at the International Strategy Board (ISB). After enduring a 22 hour flight, I arrived in the middle of the afternoon on Sunday.

Both days were full, each commencing at 9am and finishing not before 5pm. The meeting was attended by the Regional Chairs, the respective Young Members from each region, and numerous Branch Chairmen. Without trying to give a verbatim account, the high and low points (as I saw them) were:

Colin Brown – Engineering Director of the Institution - asked those attending to pass on a big thank you to those in the Branches and Regions who continue to work tirelessly in a voluntary capacity for the benefit of our Institution. Colin further advised that 23% of the IMechE membership now resides outside of the UK.

Stuart Cameron – ISB chair – reiterated the thanks expressed by Colin, and went on to share his vision for the ISB: proposing actions to move away from a UK centric institution. Stuart highlighted the International Agenda publication, and described his desire to see on International 'Company Based Registration (CBR)'.

Jo Fox shared real examples of International activities, following which Ken Tushingham chaired a session during which it was proposed that the prize allocations be revisited to better reflect the Institution's increasingly international form.

Later that afternoon, I proposed the concept of a Speak Out for Engineering World Champion – whereby Regional winners could be brought together; the idea seemed well received, but I wait to see for any further development.

Tuesday began with a presentation by Stephen Tetlow, the CEO of the Institution. Stephen expressed his gratitude again for the efforts of our Branches, and reflected on the successes of the Institution. These included a 32% increase in the number of C.Eng registrations in 2010 compared to 2009. Stephen talked openly and frankly about the discussions ongoing and the Institution's view on the subject of Licensing and Recognition: assuring the meeting that work was ongoing, but accepting it is a controversial subject.

What proved a revelation to me was that of the 20,000 or so international membership in 2010, over 12,000 were affiliates who paid no fee. I will let you draw your own conclusions but suffice to say, I do not think that a good business strategy.

During a workshop, the participants spent a little time developing the value proposition for an international member: the idea being to have a standard internationally applicable answer to the question: "What do I get for my membership fee". The following is the results of the workshop:

International acceptance of CEng (IMechE preferred route)

- Alternative routes to registration based on background.
- Mutual recognition of standards across country borders (e.g.: Washington Accord)
- Network of contacts (experts)

Recognition of competence (status)

- Availability of e-CPD.
- Access to virtual library
- Access to mentors for younger engineers.

Increase in earnings potential/career prospects

- Giving back to the profession

Independent verification of skills

- Member support (e.g. Support Network)
- Technical programme

Tuesday afternoon was the low point of the meeting for me and many others. We were presented to by Stephen Mullarkey – the Finance Director of the Institution. It is fair to say that the tone of the presentation given was not well judged. Regrettably, his message was lost in the midst of the angst in the room. A key action was agreed to produce, region by region, a profit and loss account – to enable the various Chairmen to answer the question – Where does the rest of the money go? The section relevant to Australia is reproduced below. ■

Ian D. Mash

COUNTRY	NO. OF MEMBERS	ACTIVITY	2010 INCOME	2010 EXPENDITURE (PLANNED)	EXPENDITURE PER MEMBER	INCOME PER MEMBER	COST/INCOME PER MEMBER
AUSTRALIA	1572	Branch	142,753.00	17716	11.27	90.81	79.54
NEW ZEALAND	294	CM	32,611.00	2500	8.50	110.92	102.42
PAPUA NEW GUINEA	54	CM	452		0.00	8.37	8.37
Total	**1920**		**175,816.00**	**20216**	**10.53**	**91.57**	**81.04**

PANEL NEWS

SA PANEL

Although the schedule of the South Australian Panel has somewhat slowed down, a number of events have still taken place. Firstly, the South Australian Panel would like to express their condolences to former Branch Chairman and SA Committee member Clive Waters on the passing away of his wife Judy. She will be missed by all at future functions. Secondly, it is my sad duty to announce the retirement of Derek Marley from the SA committee. Derek has been a long time member of the committee and we hope that his involvement with Institution with continue into the future.

Thirdly, after preparing a detailed application to headquarters, SA Panel member Robin Firth made a successful application for the only surviving Humphrey Pump located in Cobdogla, SA to be included in the IMechE Heritage Awards. An official unveiling of the plague is schedule for the neat future.

On the more regular front, the SA Joint Technical Program has been holding its monthly events with lectures and site visits (see separate on Intercast & Forge visit). Lectures were held on topics such as robotics, mechatronics and the new Adelaide trams.

As usual at this time of year, around 20 of the panel members and supporters met to hold the Antipodean Christmas. A new location was chosen for this year's event and all participants thoroughly enjoyed the occasion.

Michael Riese
SA Panel Chair

Members and supporters of the SA Panel congregating for the annual Antipodean Christmas lunch in July 2011.

NSW PANEL NEWS

Firstly this quarter has marked the implementation of new Young Members to the NSW committee. Having served the Panel as treasurer for the past 18 months Jason Groombridge will be stepping down and relocating to Melbourne to take up a great job opportunity with Interfleet, managing the Melbourne office. Thank you to Jason for all your input over the past 18 months.

We have two new members to the NSW committee whom also form our new Young Members group. Carl Ingleton will be taking on the role as Treasurer and Chris Hoskins (2010 SOFE winner) will be taking the role as Hon Secretary replacing Ian Mash who has now taken on the role as IMechE Branch Chairman but will still be heavily involved in the NSW committee. Welcome to the team Carl and Chris, we look forward to an active promising year ahead.

In June a professional interview was undertaken and the recommendation was forwarded to UK HQ for the next membership committee meeting.

A special ceremony was held at the University of Wollongong on May 14th where the Frederic Barnes Waldron "Best student prize" and IMechE project prize was awarded to Mark Pensini and Alexander Wysocki. The awards were presented by Professor Gursel Alici on behalf of the IMechE.

Mark Pensini, Federic Barnes Waldron prize winner & Professor Gursel Alici.

Alexander Wysocki IMechE project prize winner & Professor Gursel Alici.

The NSW Mechanical Chapter have had some recent popular technical presentations of late in conjunction with EA and ASME.

In May Ian Mash presented "Motorsport and the mountain - an application of risk management". This presentation detailed the application of a risk assessment process to establish whether it safe to race a Superkart

around Mount Panorama, Bathurst at speeds of up to 240km/h.

In June Con Sikalos & Dennis Cho from SKM presented on "Design of Desalination Plants" Design of a major seawater reverse osmosis (SWRO) desalination plant poses many challenges to engineers of various disciplines particularly those of process and mechanical backgrounds.

These challenges include; meeting or exceeding the contracted energy efficiency targets, addressing durability of materials in a seawater environment, ensuring safety of piping and equipment operating at high fluid pressures and design to meet sometime conflicting constructability, operability and maintainability requirements. This presentation briefly outlined the design aspects of pressure driven membranes, energy recovery, material selection for protection against corrosion and piping.

Over 80 people attended, questions were firing, most were answered but questions had to stop to get out by 8pm. Dennis and Con commented "Truly a gratifying experience"

In July Ben McInnes & Keiran Lewis from ACCIONA Windpower presented on Wind Farms. Over the past 30 years the wind power industry has evolved significantly. Generating technology has improved, the supply chain is now commercialised, and project risks and returns are well understood by investors. For these reasons, wind energy is likely to form the bulk of Australia's 20% renewable energy target. By referencing a traditional project lifecycle, this presentation focused on the issues that are critical to developing a successful wind energy project. These include understanding the wind conditions, choosing the right technology, constructing safely, and connecting to the electricity grid.

Monika Sud
NSW Panel Chair

QLD PANEL

The last quarter has been one of recognising achievements from our future Professional Engineers.

On 13th April, I was fortunate to have attended and listened to a number of participants competing in the Speak out for Engineering event held at the University of Queensland. The presentations were of a very high standard and were difficult to separate. Twenty four Affiliate Members from a total of 140 participants presented and competed in five different venues around the Engineering Faculty for the SoFE Prize. At the end, Yassmin Abdel Magied won with her lively presentation on the "Design and Analysis of Space Frame Chassis for the University of Queensland Formula SAE-A Race Car". The runner up was Liam Irvine who presented "The Modelling and Enhancement of Air Cooled Condenser Performance". The Queensland Panel is appreciative of the efforts of Dr Bo Feng and Professor Mee of the University of Queensland for their continuing support of the SoFE and the IMechE.

Two days later, I was invited to the University of Southern Queensland's Annual Awards presentation. As the representative of the Queensland Panel, I was invited by the Faculty to present the Frederic Barnes Waldron Award to the best student and the IMechE Institution Project Prize to the student who had the best project. I was pleased to meet Jason Clarke who won the FBW Award and Owen Flemming who won the Institution Project Prize. I found both to be obviously very able students and already employed by local engineering firms. They both expressed appreciation for their awards and were keen to apply for and continue their Membership of the IMechE when advised of the benefits of membership and that they would receive their first year's Associate Membership as part of their prize. The Queensland Panel is appreciative of Dr Selvan Pather of the University of Southern Queensland for their continuing support of the IMechE.

The Queensland Panel Secretary has also been busy organising technical presentations and site visits. For example, in June, Hillary Mercer, one of our Panel Committee Members, was invited to make a presentation introducing "The Arrow LNG Project". A site visit was also organised for the Airport Link Project.

Leslie Yeow
QLD Panel Chair

VIC PANEL

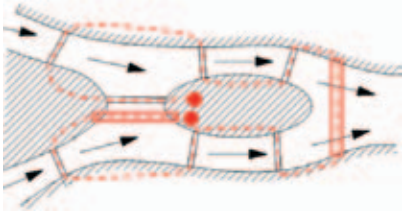
A technical presentation was organized at the Ian Wark Theatre at the CSIRO research Labs in Clayton to correspond with Engineers week by Principle research Scientist Dr Robert Lumley. His topic was "High performance Aluminium for Transport applications". The lecture attracted considerable interest and was well attended. Retired members were invited to attend a site visit to the Australian Synchrotron also in Clayton in for a conducted site visit. The Synchrotron, commissioned in 2007, provides a source of highly intensive light beams ranging from infrared to hard X rays and is used for a wide variety of research purposes. It is one of fewer than 40 similar facilities around the world and is the largest stand-alone research infrastructure in the southern hemisphere.

The panel is currently seeking young members willing to take part in the 2011 Victorian "Speak out for Engineering" competition which it is planned to be held on Friday 21st October 2011. If members are aware of any recently qualified Mechanical Engineers or students in Mechanical Engineering Degree courses it would be a great help if they could encourage them to send the Panel Chairman a synopsis of a technical Presentation and enter the completion. Contestants must be at least Affiliate Members of the IMechE, but this can easily be arranged if they are students for no cost to them.

J.W.Burt
VIC Panel Chair

SOMETHING TO THINK ABOUT...

SOLUTION TO NB161



From NB 161...

The problem is to define a walk such that it crosses every bridge once and only once, and returns to its start point. Clearly, this is not possible. However, it could be possible if one or more additional bridges were built. Where would this (or they) be built?

NEW INDUSTRIAL-SCALE WIND TUNNEL

Following five years of development, the University of Adelaide has launched the Adelaide Wind Tunnel as its newest research facility. The facility is the only industrial-scale wind tunnel in South Australia and the second largest in Australia. It was financed by the University of Adelaide together with the SA Government through the Premier's Science and Research Fund (PSRF) and the Sir Ross and Sir Keith Smith Fund.

Wind turbine set-up for testing during the first commercial tests.

The wind tunnel was designed and constructed with a number of key industry sectors in mind. Since the relocation of the DSTO wind tunnel facilities from the Edinburgh site to Fishermen's Bend, Victoria, the South Australian defence industry and governmental organisations have been lacking a local facility for wind tunnel testing that is easily available for Primes, SMEs and Defence research. This need can now been met by the new Adelaide Wind Tunnel.

In the past, aerodynamic tests to determine wind loadings and pressures, which are required for major construction projects such as the Adelaide Oval Redevelopment, had to be undertaken interstate or overseas. With the dedicated wind engineering section of the tunnel, the University of Adelaide is able offer a local testing facility to the construction sector in South Australia and as a result can deliver significant cost savings for South Australian taxpayers and construction companies.

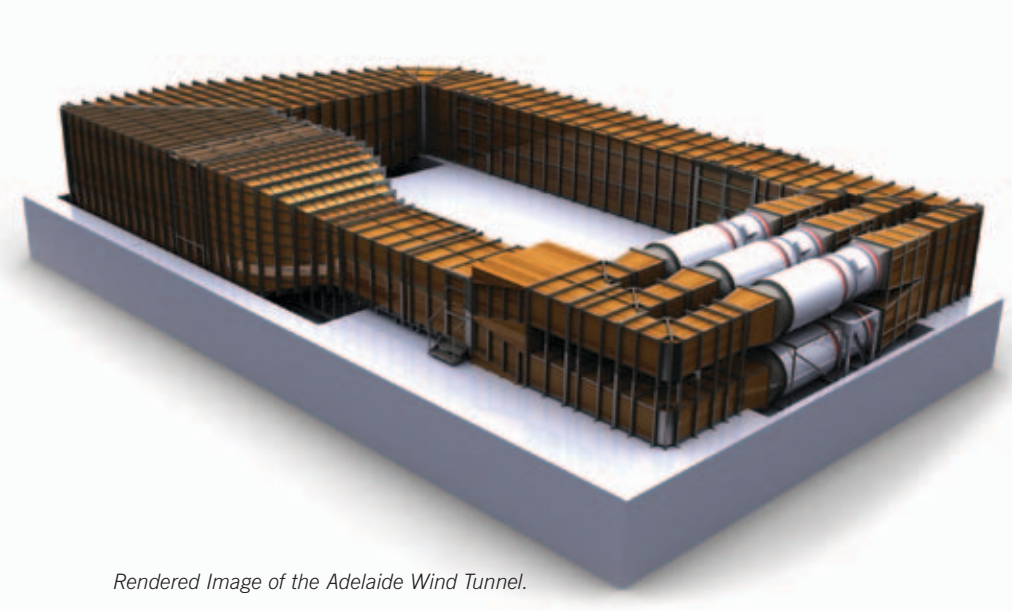
The new facility is designed to undertake testing and research in a range of fields directly relevant to the defence, building, energy and sports sectors. These include projects such as flight vehicle component testing, maritime vehicle research, the modelling of dust mitigation strategies, wind turbine and wave energy generator testing, and sports equipment optimisation.

The development of the facility benefited from the University's teaming arrangement and existing relationship with local small-medium enterprises. The detailed design was developed utilizing the fluid dynamics and aerodynamics expertise of University of Adelaide personnel, drawing on their previous experience in the design and construction of a number of wind and water tunnel facilities in Australia and overseas.

During the time of major construction work, the contracted drafting company and personnel from the University undertook concurrent detail design work and reviews to ensure that essentially no rework was necessary on any of the wind tunnel structure and time delays between fabrication, installation and carpentry could be held to an absolute minimum.

The University of Adelaide is proud to have launched an important facility to local and interstate customers in the private and research sectors. The Adelaide Wind Tunnel is the largest facility of its kind outside Victoria and the second largest facility in Australia overall. Through financial support from the SA State Government and the Sir Ross & Sir Keith Smith Fund, the School of Mechanical Engineering is in the position to offer a low cost alternative to clients when compared on a like-for-like basis with other facilities.

Through collaboration between University experts and external organisations it is expected that South Australia has an exceptional opportunity to become a prime research centre for aerodynamics, defence, wind power, energy, building and sports engineering. ■



Rendered Image of the Adelaide Wind Tunnel.

Michael Riese & Richard Kelso

TRAIN TOPICS

Suburban trains tend to be rather prosaic – their clientele being only really interested in reliable transport to and from home and work. Long-distance trains, on the other hand, are quite a different matter. They exude an atmosphere of romance and adventure, and have corresponding names – The Flying Scotsman, The Orient Express, and for Australia the Erstwhile Spirit of Progress and The Ghan.

Since their journey times exceed the usual inter-meal hours, they always have one or even two dining cars, with appropriate kitchen facilities. Unlike the airlines, which only offer a no-choice three-course pre-processed tray affair, the railways usually rise to at least two choices of freshly cooked desiderata. The best class of train might even provide an elegant menu card, to be retained as a precious souvenir.

Really long-distance trains must of course furnish some sort of sleeping arrangements. They vary enormously. At the lowest end we have the so-called "reclining" seats. Not one of engineering's better efforts, alas. Problems abound … one is entitled to wonder if their designers personally test them for a whole night. If the next seat in-front is also "reclined", nocturnal excursions of need are next to impossible. As regards comfort, one can recommend the judicious location of a couple of inflatable pillows – always have them handy. At the very least they will convert the appalling to the bearable.

For the impoverished young at heart (and body), compartmented rolling stock sometimes offer the possibility of stretching out, either on the under-seat floor or an overhead luggage rack. Surprisingly, and no doubt illegally, it has in fact been done, with moderate success, but hardly in the same class as single-bed compartments with en-suite facilities. These can occasionally be found – at a price. Business travellers should always demand them on principle, if they ever exist. ■

VULCAN

SOUTH AUSTRALIA JOINT TECHNICAL PROGRAMME VISIT TO INTERCAST AND FORGE

In July 2011, a group of engineers from the South Australian Joint Technical Program (JTP) visited Intercast and Forge located in the Adelaide suburb of Wingfield.

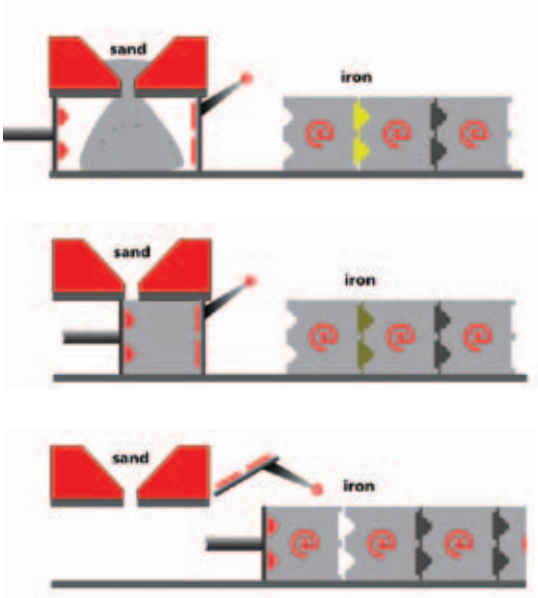
The foundry was built as a greenfield site in 1998 and is the most technically advanced iron foundry in Australia. The site sells approximately 45,000 MT of iron castings to domestic and export markets per year and as such is the largest iron founder in Australia. Intercast & Forge operates up to three Disamatic vertical moulding machines simultaneously. These moulding machines allow for production line set-ups applied to casting processes significantly increasing the throughput of the factory.

Intercast & Forge creates customer specific solutions for manufacturing cast iron parts. The company's engineering and metallurgical experts work with customers to optimize product design to ensure high integrity, tight tolerance and cost effective solutions.

The visitors were treated to an in-depth introduction of the company history and set-up. This was followed by an extensive tour through the factory in small groups showing the guests the shell coremaking, the casting and the cleaning area. The tour finished with a question time and a vote of thanks to the hosts. ■

Michael Reise

Participants of the JTP visit to Intercast and Forge in front of one of the induction furnaces.



Schematic representation of the casting process using the Disamatic verticle moulding machine.
(Source: Intercast & Forge)

VISIT TO A FOREFATHERS COTTAGE

Ken Tushingham makes a pilgamage to George Stephenson's cottage whilst in the UK.

Having been born and brought up in the North East of England I have been aware of where "George Stephenson's Cottage" is all my life. In fact the first time I saw it at the age of about eight, from the carriage of a train, appropriately pulled by a steam engine, as it passed about 25 feet from the front door.

That line, to Wylam and beyond, was shut down long ago and converted into a Tyne Valley walkway. The path provides a pleasant route to the cottage which is now owned and maintained by the National Trust.

Though I have lived in Australia for over 30 years the photographs record a recent pilgrimage and indicate the recognition given to the birthplace of our first President by the IMechE.

Though I have walked the path during at least three separate visits, I have never managed to pass when it has been open! Perhaps it will be next year. ■

Ken Tushingham

WARMAN DESIGN & BUILD COMPETITION

2011 NATIONAL FINAL – SUNDAY 2ND OCTOBER, 2011

Australian Technology Park, Enmore, Sydney

Rules are available at: http://seit.unsw.adfa.edu.au/static/warman.php

A strategically important Gondwanan manufacturing industry is facing a challenge in material handling. In a congested location, an overhead bridge structure to carry slurry has been introduced. However, the planning process failed to account for the spatial impact it has on moving other product in spherical containers between a processing plant and the warehousing facilities.

The challenge is to design a prototype system to meet the needs of the Gondwanan industry. The industry is important to the Gondwanans and the product is highly valuable yet volatile. Therefore, an unmanned automatic system is perceived by the Gondwanans to be most appropriate.

The objective is to design, build and prove a prototype system in a lab environment that serves to transfer a payload of game balls on the defined track in accordance with the rules. In context, can you design the best system to pick and place product in the form of spherical containers between production and storage facilities? Can you assist in Project PnP

This is a public event. All are welcome.

Contacts: Dr Warren Smith
(0407 893 594, (02) 6268 8262)

NOMINATIONS

FOR 2012/2013 OFFICE BEARERS

Included in this edition is a nomination form for 2012/2013 Office Bearers. A ballot paper along with a brief bio of the nominees will be included in the January 2012 edition of the *News Bulletin*. The closing date to submit ballot papers is 31 January 2012. Results of the ballot will be announced at the AGM on 26 February 2012. **Please note that there will be no election or voting at the AGM.** The newly elected Office Bearers will take up their duties during the third week of May 2012.

All positions are declared vacant. The positions to be filled are:

- Branch Chairman
- Branch Hon Secretary
- Branch Treasurer
- Branch Assistant Hon Secretary/ *News Bulletin* Editor

The first stage is for members to nominate a person of their choice for a specific position, using the nomination form contained in this issue of the News Bulletin. The form must be countersigned by the nominee, to ensure his/her acceptance.

Please send the nomination form to the Branch Chairman, Ian Mash, at the address on the form, to arrive no later than 30 November 2011.

A list of nominations will appear in the January 2012 issue of the *News Bulletin*.

Notes:

• In the interests of a seamless transfer of responsibility for Branch activities, it has been found that the Branch is best served by appointing the Branch Chairman from among those who have served an immediate previous term as a Branch Committee Member, most usually Honorary Secretary.

Institution of MECHANICAL ENGINEERS

Executive Committee:
Ian Mash
Clive Waters
Ken Tushingham
Dayaratne Dharmasiri
Matthew Springer

Branch I.T Co-ordinator:
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10 Carrbridge Drive
Castle Hill NSW 2154
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News Bulletin is the means by which members of IMechE and other professionals air their views. The views expressed in *News Bulletin* do not necessarily reflect the views of IMechE and/or the editor.

Please address all *News Bulletin* correspondence to:
The Editor
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1 Dalmore Drive,
Scoresby
Victoria 3179
Ph: (w) (04) 6882 9412
m.j.springer@aberdeen.ac.uk

Nomination Form (2012/2013 Office Bearers)

To: Mr Ian Mash
Chairman, IMechE Australian Branch
75 / 26 Macpherson Street, Warriewood
NSW 2102

Closing date for nominations: 30 November 2011

Dear Sir,

I, ... nominate .....

for the position of ..... on the Australian Branch Committee.

Yours faithfully,

.....
(signature of nominator) (date) (membership no.)

I, ... accept the nomination.

.....
(signature of nominee) (date) (membership no.)

Note to nominee: Please attach to this form a short statement giving details of your education, career, date of joining IMechE, involvement with Panel or Branch and your vision statement for the nominated position.

In accordance with the rules of the Institution, nominees and nominators must be Australian Branch Members. The Chairman must be a Fellow (or a Member actively pursuing upgrade to Fellow).