NB
News Bulletin
Australian Branch

NUMBER 183 DECEMBER 2018

Institution of MECHANICAL ENGINEERS

PRODUCED FOR INSTITUTION OF MECHANICAL ENGINEERS MEMBERS LOCATED IN AUSTRALIA
PRINT POST APPROVED 100020771
PRICE $4.00

SOFE 2018 HIGHLIGHTS

Speak out for Engineering (SOFE) is one of the major events in the IMechE events calendar and continues to enjoy widespread support in the Oceania region. Unsurprisingly, reports on SOFE have dominated correspondence to the newsroom over the last three months.

SOFE isn't just a chance for our members to compete; it also provides an opportunity to learn about various engineering projects and help judge competitions. Information on the SOFE competition and how to take part is available on the official website: www.imeche.org/get-involved/young-members-network/speak-out-for-engineering

SOFE in PNG

The organisation of a SOFE competition is always taken as an opportunity to introduce, meet and invite new members in to the Institution. This is more so when the SOFE is being organised in Papua New Guinea.

In September 2018, SOFE was organised at the Papua New Guinea (PNG) University of Technology (UniTech) in Lae. As usual, the turnout was good with 18 members participating in the event. At many SOFEs around the world, students usually made their presentations based on the final year projects. These projects were usually theoretical and explored novel engineering concepts. Herein lay a difference in the projects presented in PNG. Almost all of the presentations by the students were based on practical solutions to current issues faced by a large number of the population of PNG who live in rural areas.

SOFE at UniTech in Lae, Papua New Guinea

ON THE INSIDE

Chair and Panels Updates
Designing for Humans
Notice of AUS & NZ Elections
Software vs. Hardware
e2e Final Report
Wombat Mystery Solved

Examples of such projects were: the design of a solar powered oven, adapting wind turbine technology to power an irrigation pump and a solar powered desalination plant. In one case, a prototype of a working model was produced to highlight the student's findings. Most if not all of the presentations ended with the students asking how their projects could benefit the people of PNG. This was one of the joys of organising a simple competition like SOFE in a University with limited resources. Students were able to use basic concepts in engineering to produce practical solutions to immediate local issues.

The presence of the IMechE at UniTech introduced a respected learned society and encouraged the students to explore beyond the boundaries of their country. Although physical resources may have been limited at the University, they have reasonable access to the internet. This allowed students to access information from a variety of sources around the world. The collaboration between the University and the IMechE also allowed for international recognition of the efforts of the students and the work of the department as a whole.

The winner for the PNG heat was Mr Ryan Rombuk who provided a presentation on an autonomous robotic system. He provided a working prototype to demonstrate his project findings. The runner up was Mr Simon Muliap who provided a presentation on using wind turbine technology to power an irrigation pump. Our congratulations go to all the students for providing good competition and to both winners for their success at the SOFE heat in PNG. We look forward to the next SOFE at UniTech in 2019 and inviting the winner to compete at the World SOFE Finals. We would like to acknowledge the assistance provided by Dr Syed Wahid, Prof John Pumwa and the Department of Mechanical Engineering at UniTech for their organisation of the SOFE and their continuing support of the IMechE.

Student Chapter Presentation

While attending and judging the SOFE competition at UniTech in PNG in September 2018, I was happy to present a certificate to Dr Syed Wahid in recognition of the formation of a Student Chapter at the University.

Dr Wahid is the Academic Liaison Officer (ALO) and has worked hard in forming and maintaining the Student Chapter for 2018. The University has an enthusiastic group of Mechanical Engineering students who are keen to learn and to apply their knowledge to solving immediate issues facing their population who generally live in rural areas. They learn to be resourceful as access to physical resources is very limited.

We look forward to supporting Dr Wahid and the student's organisation and participation in events well into the future.

SOFE Region Final – Adelaide 2018

In October 2018, Adelaide hosted the Oceania Region SOFE Final for 2018. 6 competitors representing New South Wales, Tasmania, Victoria, Western Australia and New Zealand competed to represent Oceania in the World SOFE Final to be held in New Delhi in April 2019. As usual, the presentation standards were high which made judging very difficult. However, a decision was made and Duncan Henderson of New Zealand won with his presentation on a redefined approach to designs for underwater spear guns. He will now be invited to compete in the World SOFE Final in New Delhi in April 2019.

by Leslie Yeow

Institution of MECHANICAL ENGINEERS

Rowena (L) from Tasmania and Duncan (R) from New Zealand present at the SOFE Region FInal

POWER TO THE RAILWAY PEOPLE

Metro Trains Melbourne delivers uninterruptible power supply for its legacy signalling network

Metro Trains Melbourne has developed a customised Uninterruptible Power Supply (UPS), delivering seamless emergency power backup to the inner city's railway signalling system.

Melbourne is a booming city, with the population projected to reach eight million by 2050. Rail patronage has soared from 150 million to 236 million trips per annum over the last twelve years. The CBD handles over 15,000 services every week, with a train departing every 30 seconds in the peak, so the reliability of signalling is critical. UPS technology is traditionally used within the IT industry, however this new customised UPS is a world first for the railway industry, successfully integrating industrial scale continuous power supply technology with a legacy phase-reliant railway signalling network.

Following a severe storm that impacted signal systems, Metro brought together the brightest minds from Projects, Infrastructure and Engineering divisions to deliver a fully integrated Uninterruptible Power Supply (UPS). Specifications were drawn up and funding was successfully sought from Public Transport Victoria. Going into production, agreements were formed with AEG Germany, global designer and provider of electronic systems, together with Thycon Melbourne, leading manufacturer of power and conversion solutions.

Metro's customised UPS provides critical signal power backup during network faults, giving the electrical control centre an important window in which to route alternative feeds without disrupting signal power. The system uses complex algorithms to synchronise with adjacent substations. This is vital, as the small variance between 50.0Hz vs 50.1Hz takes just 32 degrees (or 4 milliseconds) to trigger a wrong-side signal failure, which must be avoided at all costs. Another great feature of the system is its ability to maintain a perfect power supply. Grid power can become 'dirty' after a lighting strike or power surge, but the UPS can generate good harmonics that reduce the risk of signal failure.

What's more, the UPS has been incorporated into Metro's Essential Services Power Distribution Network, increasing the resilience of CCTV cameras, passenger information displays, security systems and pumps that provide protection against flooding.

The UPS meets dozens of user requirements and regulations, including the safe interfacing with electrical networks housed within traction substations and tie stations. It also complies with a long list of industry standards including AS 1042-1973 (direct-acting indicating electrical measuring instruments), AS 60529 (degrees of protection provided by enclosures for electrical equipment), AS 2374.1.2-2003 (minimum energy performance standard for distribution transformers) and many more. The UPS also complies with intruder monitoring standards and Signalling CBI Data Software Requirements.

The UPS is located within the Southern Cross Tie Station and supplies signal power to the busy inner city network between North Melbourne and East Melbourne substations. The UPS will extend its reach over time, with new substations coming online as the network expands through major capital works across Greater Melbourne.

The UPS is the right kind of engineering solution delivered at the right time, with public transport set to do the heavy lifting into the future as the population soars and pressure mounts on major road arterials connecting suburban hubs with the CBD.

Chris Fletcher, Metro Trains

Signals and power lines - critical to the operation of Melbourne's Rail Network

CHAIRMAN'S UPDATE

As we look forward to the festive season and the last few months of work for the 2018, we review a very eventful year for the IMechE both locally and at HQ.

During May 2018, the Institution convened its first ever Special General Meeting to coincide with the Annual General Meeting. Consequently, both the incoming President and the Chief Executive stood down during 2018. Since then, an interim Chief Executive was appointed and a new President elected in August. It was also decided that a review of the finances and governance were required to take the Institution forward. So far, the Terms of Reference have been drafted and agreed, resources appointed and the review of both will be underway soon.

The enforcement of rules surrounding the Global Data Protection Rules (GDPR) has resulted in the Region and many other areas being unable to contact the membership due to constraints being imposed by the rules. As we are no longer allowed to contact the membership to ask if they wish to be kept informed of local news and events, we believe that a significant number of the membership will unfortunately be unable to contribute or participate in local events. Please inform your colleagues who are not receiving this Bulletin (or any other communications) to change their profile on the IMechE website to enable them to receive ''Regional Material''.

Within Oceania, 2018 was the second year that we operated as a Region rather than as the Australian Branch. The improved regional structure is working well with good contributions being made by all members of the region without the added layer of the Australian Branch. However, the Branch has continued to exist in the background as it is still a formal entity and can only be dissolved through a formal vote by the membership. As there were many distractions occurring at HQ in London this year, we decided that it was a good idea to continue as we are and to postpone the vote till 2019 when the issues at HQ are resolved. Briefings have been made to the membership through earlier News Bulletins by the previous Regional Chair on the merits of dissolving the Australian Branch.

In May, I took over from Ian Mash as the Regional Chair and Elliot Powell took over from Amy Lezala as the Regional Young Member representative. Our thanks go to both Ian and Amy for their efforts over the past three years. Ian was elected as Fellow on Council in May. The region continues to be as lively as ever with good initiatives being progressed in all the Panels. One of the initiatives in progress is the formation of the New Zealand Panel. This formation will align their operations with the Panels which are already in existence in Australia. 6 SOFE heats were completed during 2018 including PNG and the Oceania Region Final was held in Adelaide in October. We wish the Oceania Region SOFE winner, Duncan Henderson of New Zealand, well in the World SOFE Final to be held in New Delhi in April 2019. The UK will be represented for the first time in an international final, making the winner of the competition in New Delhi the first World SOFE Champion.

An increasing number of Professional Review Interviews (PRI) continue to be completed around the Region which is encouraging. This shows that an increasing number of engineers are seeing value in being assessed for and qualifying as Chartered Engineers. If you are a Chartered Engineer and wish to be involved in PRIs, why not contact your local Panels to see if you could assist by being an Assessor?

Application has been made to the Board of Professional Engineers Queensland (BPEQ) to enable the IMechE to be an Assessor for RPEQ certification. The application is currently being considered by the Minister for Housing and Public Works and BPEQ. An update will be provided when this has been approved. This will be an added benefit for those candidates presenting themselves for Professional Review Interviews in Queensland for election as Corporate Members.

My thanks go to all the hard working panels and representatives throughout the Region. Without your efforts, the Region would be a very dull place. Please enjoy the festive season and be safe in your pursuit of festive activities. The Region always welcomes new volunteers to assist with the organisation of activities. Why not include volunteering your expertise to a Panel for 2019 in your New Year's resolution? My best wishes to all the membership for the festive season and I look forward to bringing you more interesting news in 2019.

Leslie Yeow, Chair Oceania Region

Institution of MECHANICAL ENGINEERS

Calling all Budding Editors

The editor of this News Bulletin is looking for someone to take over the role in the new year.

The commitment involves working with various panels around the region to source interesting material and news, then working with publishers to design the layout and arrange distribution to our members.

This is a great way for any member interested in creative writing and design to get more involved with the institution and influence the strategic direction of the Oceania region.

Please see the last page of this bulletin for more details on how to apply for this and other vacancies.

SOFTWARE VS HARDWARE

As an area where technology and creativity intersect, the modern music studio is an environment where software and hardware can co-exist.

Upon the release of the movie Blade Runner 2049 last year, I came across an article that discussed the technical challenges faced by pioneers of electronic music. The score for the original film, released in 1982, was produced by the Greek composer Vangelis at his custom built Nemo Studios in London. Nemo housed an extensive range of acoustic equipment- from pianos to timpani- and an array of cutting edge synthesizers. One of the most frequently used instruments was the Yamaha CS-80, a beast of a machine that weighed over 80kg and sold for £26,000 in today's money. Vangelis had eight of them!

At the time, studios were not optimised for complex electronic soundtracks. Vangelis and his team encountered problems of track hiss as multiple parts were overdubbed on to tape, difficulties synchronising music with film and had to use custom electronic circuits to make instruments run together. Even the prized CS-80 had limitations. Like many analogue synthesizers of the time, the tuning of its oscillators tended to drift. It took a technician a full day to disassemble the unit and remedy the problem by adjusting internal trim pots.

Since that time, two big technologies have made the production of electronic music a lot easier than it once was. The introduction of Musical Instrument Digital Interface (MIDI) has enabled a reliable form of communication between instruments and a host sequencer, while Virtual Studio Technology (VST) is another important development that enables realistic digital emulations of instruments and effects from a software platform.

In general, two methods can be used within software to create sounds. The first is a 'top down' method where a player triggers a pre-recorded sample. Thanks to fast computer memory and large hard drive speeds, modern sample packs, several Gigabytes in size, contain thousands of samples per instrument and various articulations – such as whether a string instrument is plucked, bowed, damped or sustained. The second technique of 'bottom up' sound generation, employed by software synthesizers, builds sound from raw sound waves. Advances in processor power mean that the latest plug-ins are actually simulations of the circuit boards found in classic hardware.

With a home computer and a fairly modest budget, it is now possible for aspiring musicians to assemble a comprehensive virtual studio that would have been out of reach to amateurs just 20 years ago. Software offers a pretty convincing emulation of hardware units, but with

A modern home studio

very low distribution costs and few physical components prone to mechanical deterioration. Yet, any trip to a music store tells us that traditional instruments are still in high demand for production as well as performance. So what is driving this persistent interest in physical devices?

The answer lies is no small part because of human factors, an area that generates surprising reliance in the face of technological advancement. For a start, hardware is immediately accessible when inspiration strikes, rather than being hidden inside a computer that must be switched on and loaded up. Also, hardware provides a hands-on approach to the process of sound making, rather than requiring interaction with menus and icons on a screen. There are emotive reasons too. A physical instrument has a unique appeal when being played, and who can argue against the joy and admiration that its aesthetics and feel can bring?

The complimentary advantages of hardware and software have led to a thriving market for hybrids. One of the best known hybrid instruments is the digital piano- an electronic simulation of an acoustic piano inside a decorative cabinet. Whether switched on or off, a good digital piano is capable of mimicking the sound, touch and style of its acoustic cousin.

You might think the resilience of musical hardware in a digital world is simply a reflection of the creative aspects of music. But we notice similar pattern emerge elsewhere, such as in offices, where technology has not quite succeeded- at least not yet- in removing the need for conventional tools. Word processors have replaced typewriters and electronic tablets are becoming increasingly popular as a way to work and organise one's day. But for reasons that are difficult to explain, there are times when a pen and paper are just more convenient and materials are more easily examined and digested in print than on a screen.

Although the number of professionals who make a living from adjusting internal trim pots of musical instruments may be limited, Mechanical Engineers involved in building, maintaining and repairing physical devices can breathe a sigh of relief, as their skills will almost certainly be in demand for a long time to come.

In a book called The Myth of the Paperless Office, hardware and software are recognised as complimentary rather than opposing tools. The summary describes a future where both work 'in concert' – a phrase that is as relevant to the office as it is in the music studio.

Nic Coulthard - Editor

Institution of MECHANICAL ENGINEERS

DESIGNING FOR HUMANS: ADMIRAL ACKBAR AND AN ITALIAN MICROWAVE

Human Machine Interface (HMI) specialist Ronan McInerney discusses the importance of considering human factors during your project and offers some practical tips to improve the usability of your solutions.

I once met a software engineer during a beta test with some end users.

He expressed his surprise and frustration that the end users didn't seem to 'get' how to navigate the software he had designed. They clicked back and forth, fumbling through various menus and sometimes taking minutes to find the target information. Maybe next time, the engineer mused, they could just find some smarter users for his software.

I'm not an engineer but I have spent my career working closely with all manner of engineers. And I have seen this story repeated over and over again: A problem presents itself. Designs are proposed. Risks are assessed. Calculations are performed. The word 'analysis' is uttered, often many times a day. A solution is finally engineered and deployed to much fanfare… and the end users complain the solution doesn't really meet their needs.

So why does this keep happening?

It's easy to believe that if your design works for you, then the design will work for everyone else too. If you find yourself thinking like this, just remember the wise words of Star Wars' Admiral Ackbar: 'It's A Trap!' This belief is a trap because our personal experiences, upbringing, education and personality shape how we interpret the world, so we are unconsciously inclined towards designing solutions that we understand - and naturally assume our solutions work for others too.

However, we humans are complicated creatures. If we could all predict the thoughts and behaviour of other people with ease, then fields such as human factors, psychology and cognitive science wouldn't need to exist. And yet they do exist, and every day these fields reveal new insights about human thought and behaviour that are contrary to our common intuitions. So blindly trusting intuition alone that your design will work for everyone else is a significant risk to the usability of your solution.

My kitchen at work provides a regular reminder of the consequences of designing for oneself, rather than for end users. Our kitchen is stocked with a particular Italian microwave. No doubt this device is feat of clever engineering with high quality construction, and the

microwave's four-figure price tag is further justified by its sleek black aesthetic. Yet I often observe staff struggle to heat their meals (you might recognise this as, "The Primary Function of a Microwave"), as they attempt to decipher the panel of glowing, minimalist hieroglyphic buttons. To the engineers of this microwave, an exclamation symbol inside a diamond obviously denotes 'Start' and of course the 'W' stands for 'Wattage', which is used to set the power level. Maybe next time they could just find some smarter users for their microwave?

So, what can you do to avoid the Italian microwave problem?

First, spend time collecting and understanding the project's requirements. Just like the slab of a house, the requirements are the foundation that everything else is subsequently built on. Speak with end users early and regularly to gain a deep understanding of the operational concepts and the actual problems the users need solved. Recognise that all solutions to the requirements are unlikely to be elicited by sitting around a room and talking; unexpected insights are often had whilst drawing on a whiteboard or playing with a toy model.

Second, involve Human Factors specialists in your project: the earlier the better. I believe the best solutions arise from exposure to a diverse range of opinions and considerations. Technical considerations for calculating sheer forces, operating temperatures and failure thresholds are absolutely necessary for an effective design. But human considerations are important too, because ultimately every product should improve the lives of its users in some way, and Human Factors specialists are trained to consider the implications of a design from the end users' perspective. Will this handrail be reachable by the majority of members of the public? Could a person with poor eyesight understand this sign from this distance? What is the risk that this alarm will be missed due to distraction by other elements on the screen?

Third, follow the User Centered Design (UCD) process as closely as possible. The exact steps in the UCD process may differ slightly depending on who you speak to and which direction the wind happens to be blowing on the day, but at its core the process advocates interacting with end users throughout every phase of the project, iterating through mock-ups and prototypes early to test out theories, and collecting objective data to make evidence-based design decisions. Discovering a design failure on a whiteboard, wireframe or virtual reality model is a thousand times cheaper and faster to fix compared to discovering the failure after you've built the solution.

Finally, and perhaps most importantly, allow for all of this in the project schedule. The logistics of sourcing, meeting with and training end users isn't always straightforward, and collecting and analysing data to arrive at justifiable design conclusions isn't instant either. Even the best Human Factors specialists are likely to produce sub-optimal advice if they aren't given enough time (search YouTube for "Spiderman Speed Drawing Challenge" to see this principle in action). In the end, the users of your product will thank you for taking the time to understand, design, build and test something that enriches their lives. Good solutions meet the functional specifications, but great solutions meet the user's needs.

Ronan McInerney

Institution of MECHANICAL ENGINEERS

Does this microwave look easy to use?

PANEL UPDATES

Western Australia

In summary, things are ticking along in the West with 3 professional interviews conducted this period. Industry seems pretty buoyant with potential of another subsea project boom in the next 3 years. This boom is driven by expansion of gas supplies to existing onshore facilities. Engineer supply is currently OK, but a skills gap has been identified and is likely to force rates up and work overseas in order to support this next phase of projects.

Ben Wooten

Victoria

In September the Victorian Panel conducted the Victorian Speak out for Engineering Competition and the Tasmania Speak out for Engineering Competition. The Victorian Competition was held at the University of Melbourne and the Tasmanian competition was held at the University of Tasmania, Sandy Bay Campus.

In October the Victorian Panel Young Members organised an informal mentoring event at the Clyde Hotel in Carlton. The location was chosen due to its close proximity to the University of Melbourne. These events provide an opportunity for undergraduates to meet senior engineers and discuss matters relating to their study or careers. The events are really refreshing as they are a two way learning process. While senior engineers bring in a wealth of life and career experience, the younger engineers bring a fresh perspective on engineering and are enthusiastic about new and emerging technologies such as Artificial Intelligence. The Victorian Panel runs a mixture of formal and informal mentoring events spread out through the year.

We are keen to foster greater engagement of our membership in Panel activities and the Victorian Panel sent out a letter inviting members who are experts in their fields to get in touch with us. We can provide our members with advice and assistance in organising a technical presentation or a site visit. Our assistance includes organising a venue, designing a flyer, advertising the event, managing registrations and assistance with tweaking the presentation. Also, IMechE provides refreshments for the event. Such events provide a great opportunity to network with other Engineers and participation counts towards your CPD. If you would like to present, please get in touch with your local Panel via the IMechE Near-You website.

Finally we look forward to celebrating a successful year with a Christmas luncheon on Sunday 9th December, again at the Clyde Hotel. I would like to take this opportunity to thank all the Panel members who have worked hard during the year and also to their partners and families who have supported IMechE activities and to our members who have supported us. I wish everyone a Happy Christmas and all the best for 2019

Roshan Dodanwela

New Zealand

In the second half of the year, activities have remained fairly stable with two events per month, one in Auckland and one in Wellington. In the PRI (Professional Review Interview) stakes, NZ has remained reasonably quiet in comparison to 2017-18, when we had a flurry of candidates coming through, and our final PRI for the year is due to be held on 29th November. NZ is about to have a member issuing an application for transfer from Member to Fellow, but interestingly the NZ International Committee Volunteers are not automatically informed of these requests, meaning that valuable sources of peer review and support are not always made available for the candidates to lean on.

The IMechE members resident in NZ are automatically entitled to be member of MEG (Mechanical Engineering Group), which is a Technical Interest group of Engineering New Zealand (ENZ), so bringing together a larger group of Mechanical Engineers instead of two smaller entities.

The ENZ Spring Forum was held on 23rd November with more than 70 delegates from the local branches, Young Member sections and Technical Interest groups. Of specific interest to MEG members were the proposal for changes to the ENZ groups Charter, and the theme that is now common across most regions and professional institutions – how to attract and retain young engineers into membership and committees.

The ENZ management team made a whistle stop visit to Birdcage Walk whilst on the International Engineering Forum update.

Finally, at the Adelaide Oceania Meeting, a proposal was tabled to create a New Zealand panel, which would line up NZ membership in a manner similar to the current representation of the members in the larger Australian states. This allows us to create and manage our own budgets within the Oceania framework, and in light of the recent shenanigans in HQ, provides better transparency and oversight of activities. Given that this is the final issue before Christmas, the Committee here in NZ wish you all a Very Merry Christmas and Prosperous Year, and look forward to updating you on progress early next year

Darren Sharpe

New South Wales

The NSW Panel has continued to meet regularly over the past few months, with a focus on continuing engagement with our members, recruiting new panel members and planning for 2019.

We held our Spring Social at a venue in Circular Quay, Sydney in October with an excellent turnout which was a mixture of regulars and some new attendees. In October we also said farewell to our Treasurer, Neal Fleming, who relocated back to the UK. We are very grateful for Neal's support over the last couple of years and are now looking for a new Treasurer to support the team.

The remainder of 2018 will be focused on planning events for next year, which will kick off with the NSW Panel's Annual Industry Night. We have a number of interesting speakers lined up from industry and are looking forward to engaging with our student members to provide some ideas and advice for making the transition from engineering degree to that first job in industry.

Neil Moriarty

Institution of MECHANICAL ENGINEERS

NOTICE OF ELECTIONS IN NEW ZEALAND

Nominations are being sought for the following Panel Volunteer positions to operate and manage the soon to be formed NZ Panel:

- Panel Chair
- Panel Treasurer
- Panel Secretary
- Ordinary Member

Volunteers must be paid up members (not student or affiliates) at the time of election and remain members during the period of office. Nominations are to be emailed to the current NZ Country representative – Darren Sharpe, at Darchemdaz@hotmail.com, stating nominee, and if appropriate, name of nominating person. Individuals may nominate themselves for any position, and may nominate for each position, but may only be elected to hold one position in any one operational year.

A list of nominees will be published in e-Torque magazine and/ or International News, along with details of how to register a vote for each position. An exceptional meeting of NZ members will then be called, chaired by the Oceania Regional Chair, who will declare the results and facilitate creation of the Panel. Thereafter, Panel officers will serve in accordance with rules of the International Volunteers handbook.

As ever, we need you to stand up and volunteer, or if this is not of interest then please do vote, to register your opinion, and to ensure you have a say in the future direction that the NZ Panel takes. The election is likely to be confirmed early next year, and will probably coincide with the Mechanical Engineering Group AGM, which for reasons of cost, and to facilitate attendance, is likely to be a virtual AGM, held though group and individual site video media, much like those of the larger corporates – to ensure as many people as possible have a say.

NSW Panel Spring Social

E2E REPORTS PROGRESS WITH ADDRESSING ENGINEER SHORTAGES

The Steering Group of New Zealand's e2e programme has concluded its four year long programme of work by releasing a final report to the country's Tertiary Education Commission.

Set up in 2014 in response to what is described as a 'critical shortage of engineers', Engineering e2e (Education to Employment) seeks innovative ways to draw more students into tertiary study in engineering –particularly in the NZDE (New Zealand Diploma in Engineering) and BEngTech programmes.

Over the past four years, e2e's Steering Group has collaborated with various stakeholders to gain a greater understanding of the nation's engineering industry. One of their important stakeholders is the IMechE, with whom it has signed a Memorandum of Understanding as reported in a previous edition of this News Bulletin.

Some of the ground breaking initiatives developed by e2e include diversifying the ways in which engineers can reach professional standards. For example, New Zealand now has its first degree apprenticeship, a broader system of learning called 'micro-credentials', a good practice guide for engineering educators and a range of pathways to bridge the gap between secondary and tertiary education.

In its final report to the Tertiary Education Commission, e2e's Steering Group makes five main recommendations, broadly summarised as follows:

1. Maintaining established connections between employers and educators via funding of grants.

2. Continued oversight and support to ensure success of new and ongoing initiatives, such as a pilot of regional engineering education hubs.

3. Sustained feedback and participation by sharing the outcomes of work with engineering employers and educators.

4. Educating employers about the three main engineering qualifications, so that the value of hiring NZDE or BEngTech graduates is understood.

5. Further evaluation of the work done by Engineering e2e in order to guide longer term initiatives by the TEC.

It is clear that the Steering Group believes that a number of effective solutions have been devised and momentum must be maintained in order to ensure continued progress. The importance of ongoing stakeholder communication has also been underlined.

The Steering Group's evaluation has focused e2e's plans for the programme over the next two years. One of the main challenges will be to increase the number of Level 6 and Level 7 graduates, which the Government has identified as an area of high demand. Students often aim for Level 8 qualifications which facilitates a pathway to professional engineer status, but many employers, especially small-to medium sized ones, have demand for engineers with Levels 6 and 7 qualifications. Matching candidates with roles at an appropriate level is important for both sides as it ensures candidates will perform as expected and enjoy continued job satisfaction.

E2e's efforts to broaden the industry seems to reflect the IMechE's own system, where different grades of engineer are described as being 'different, but equally valuable' and the route to professional recognition can take many forms according to a candidate's own experience and aptitude.

In an email to the IMechE's New Zealand panel chairs, Engineering New Zealand made the following comments:

'The Steering Group's formal role ends this month and on their behalf I would like to take this opportunity to thank you for your contribution to our work. With your help the Steering Group has set in motion a comprehensive programme which the TEC will manage through to completion over the coming 18-20 months. TEC staff are aware of the MoU Engineering e2e has with IMechE and are interested in maintaining a connection to ensure industry needs are well understood.'

For more information on e2e, visit their website at engineeringe2e.org.nz.

Nic Coulthard - Editor

Institution of MECHANICAL ENGINEERS

SOLVED: THE MYSTERY OF WOMBAT CUBES

Wombats are the only creatures in the animal kingdom that produce cube shaped droppings. Their method for doing so was one of the strangest biological mysteries in the animal kingdom. But now, thanks to dedicated investigation by a mechanical engineer, the answer could inform a new manufacturing process.

Led by Patricia Yang, a postdoctoral fellow in mechanical engineering who studies hydrodynamics within the bodies of animals at the Georgia Institute of Technology in the US, the research group looked at how the chubby, short-legged marsupial's digestive processes and soft tissue structures create the regularly shaped stools.

Yang and her co-authors studied the digestive tracts of wombats that had been euthanised following motor vehicle collisions in Tasmania. Near the end of the intestine, they found that faeces changed from liquid-like states to solid states made up of small, separated cubes. The group concluded that the varying elastic properties of wombats' intestinal walls allowed for the cube formation.

Biologist and co-author Scott Carver said: "There is much general interest from the public, both in Australia and internationally, about how and why wombats create cube-shaped faeces. Many ideas, some more entertaining than others, have been put forward to explain this, but until this study nobody had ever investigated the cause. This has been a fantastic collaboration which shows the value of interdisciplinary research for making new scientific discoveries."

After cleaning out the intestines of any remaining waste, the team pushed long, inflatable balloons through them to figure out the flow of faeces. Yang and her team inflated almost 30 meters of intestine per creature, each of which had a body about 1 meter long (for comparison, human intestines are about 8 meters long.) The intestines of most animals have uniform stretching capacities. The scientists found that near the end of the wombat's large intestine, the walls varied in their stretchiness. "Wombat intestines have periodic stiffness, meaning stiff-soft-stiff-soft, along the circumference to form cubical faeces," Yang said. In other words, as waste is pushed through the intestines, encountering a firm portion of tissue creates unique flat faces.

To produce a poo with a square cross-section, the circumference of the intestine would need four stretchy regions interspersed with four stiff regions. That way, the stiff regions form the flat faces, while the stretchier parts allow corners to form. The balloon tests revealed only three stretchy parts and two stiffer ones. In a technical paper, the scientists suggest that the other stiff and stretchy bits may only become apparent when they can inflate the intestines to a larger size. In other words, strain a little harder.

This work could have interesting implications for the engineering industry. In the built world, cubic structures are produced by injection moulding or extrusion. In theory, the wombat method of making cube-shaped objects could be applied to manufacturing. You could push material through a tube with both form and forgiving walls to give it a unique shape by the time it emerges.

"We currently have only two methods to manufacture cubes: we mould it, or we cut it. Now we have this third method," Yang said. "It would be a cool method to apply to the manufacturing process – how to make a cube with soft tissue instead of just moulding it."

As reported by IMechE/ Professional Engineering

Institution of MECHANICAL ENGINEERS

Wombat looking pleased with itself

2019/2020 AUSTRALIAN BRANCH OFFICE BEARERS

We are pleased to announce details of next year's AGM and election.

There is a requirement for each branch or region to hold an Annual General Meeting (AGM) each year, prior to the Institution's AGM in London in May. The next Australian Branch AGM is expected to take place in Melbourne in March 2019.

At the Australian Branch AGM, the Office Bearers for the 2019/2020 year will be announced and take up their positions in May for a 12-month long period, or until the planned dissolution of the Australian branch has occurred.

Below is a nomination form for the 2019/2020 Office Bearers. All positions listed are vacant. The first stage is for members to nominate a person of their choice for a specific position using this nomination form. The form must be countersigned by the nominee to ensure their acceptance. Please email the nomination form to Leslie Yeow at the address below, to arrive no later than **31 December 2018.**

A list of nominations and a ballot paper will be sent to all members in early February 2019. The closing date to submit ballot papers is 28 February 2019. Results of the ballot will be announced at the branch AGM. Please note that there will be no voting at the AGM.

IMechE Australian Branch Nomination Form (2019/2020 Office Bearers)

Please sign, scan and email this completed form to Leslie Yeow at WLY8NZ@GMAIL.COM

Dear Sir,

I, ……..nominate……..for the position of (tick one box below):

Position on Australian Branch Committee	
Oceania Region Chair	
Oceania Region Honorary Secretary	
Oceania Region Assistant Honorary Secretary and News Bulletin Editor	
Oceania Region Young Member Section Chair	

Yours Faithfully

(Signature of nominator) (Date) (Membership Number)

I, ……. accept this nomination

(Signature of nominee) (Date) (Membership Number)

Nominee: Please include with this form a short statement (~100 words) giving details of your education, career, date of joining IMechE, involvement with panel, branch or region and your vision for the nominated position.

Exec Committee:
Andrew Lezala, Leslie Yeow,
Ken Tushingham, Nic Coulthard,
Ibrahim Shahin.

Websites:
IMechE
www.imeche.org

Young Members on Social Media
Twitter: @IMechE_OzYM
Facebook: IMechEAustraliaYM

Enquiries & article submission

Please address all News Bulletin correspondence to the editor:

australianews@imechenearyou.org