



## FSAE & MONASH MOTORSPORT

Formula SAE is the world's largest student engineering design competition whereby university students design, manufacture, test and compete with a single seat race car.

With its origins dating back to 1978 as a humble SAE Mini-Indy competition at the University of Houston, this highly prestigious engineering competition has seen the last 34 years filled with innovative and award winning designs from universities and colleges across the globe. Now, the competition encompasses 511 registered teams worldwide with 12 official competitions held in 11 different countries in 5 different continents across the globe.

The hard work and dedication shown by each team comes to a climax through a number of annual competitions based in different regions around the world. It is through these competitions, such as FSAE Australasia, that each team may see just how well their cars stack up against their peers. Each

car is judged in a number of events which are separated into two types – static and dynamic. Static events consist of Design, Cost, as well as Business Presentation. These static events allow teams to showcase their financial acumen, marketing strategies and overall design philosophies. The dynamic events consist of Acceleration, Skidpad, Autocross,



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Fuel Economy and Endurance. In these events, teams may directly compare their designs on track, where each team has the opportunity to demonstrate the capabilities of their vehicles.

### **Monash Motorsport is one such team from Monash University, Melbourne**

The team started with humble beginnings in 2000, where the current Academic Advisor, Dr Scott Wordley, helped organise the first Australasian competition. With approximately 25 senior members, and 25 recruits every year, the team comprises of business, industrial design, science and engineering students across a multitude of majors and disciplines.

The team is structured starting with top level management comprising of senior members, leading onto four technical sections: Aerodynamics, Chassis/Driver Controls, Suspension and Powertrain. Technical leads are responsible for each section, though the Chief Engineer is responsible for the bigger picture integration of each section. That said, the project is more than the technical aspect it may first seem; the business team is a vital part of the team, responsible for the team's finances, sponsorship, public relations and marketing. At the end of the day, it's all one big demanding exercise in teamwork, leadership and project management.

### **Monash Motorsports last year – local & international competition highlights**

The last 12 months has seen an incredibly busy and exciting period for Monash Motorsport. In December 2011 the team was placed ahead of

24 other universities from the Asia-Pacific region and were declared FSAE-Australasia Champions for the third year running. From here, the team set its sights for Europe in 2012 with the first four months of 2012 allocated to further developing M11 (the 2011 car) reaching a refined and improved version to be shipped to Germany in April 2012. These months of manufacture, driver training, testing, as well as design work for M12, were to culminate in the highlight of the year, Formula Student UK (organised by IMechE) and Formula Student Germany, held at the Silverstone Circuit and the Hockenheimring respectively.

FSUK saw Monash Motorsport placed third overall, taking first place in static events, and receiving the Jaguar Simulation Award. FSG resulted in Monash being placed fourth overall and third in the Design event. Consistency over the past few years on top of Monash's achievements in Europe has resulted in a current world ranking of second.

### **What the future holds – events, developments**

Throughout the European campaign, some of the team remained in Melbourne to continue with the manufacture of M12. Once the entire team was back in Melbourne, the team was in the full swing of M12 manufacture in preparation for FSAE Australasia 2012 in December.

Next year will incorporate many exciting design changes for M13 as the team will hit the drawing boards and computer labs at Monash University throughout the summer.

One of the aspects Monash Motorsport prides itself on is its continual commitment to vehicle aerodynamics research and development. The conceptual design phase leads into Computational Fluid Dynamics (CFD) simulations using the National Computational Infrastructure (Australia's largest supercomputer situated in Canberra) for simulations of 40 million meshing elements. From here, designs are manufactured and taken into the Monash Wind Tunnel for full scale wind tunnel testing, with further validation and analysis being conducted on track using techniques

such as pressure tapping the undertray; thus gaining a better understanding of the airflow in ground effect.

Recent developments include a Drag Reduction System (DRS) for the front and rear wing whereby servos actuate the flaps from high downforce to low drag positions, as well as further CFD analysis with research into rotating reference frames to more accurately represent airflow whilst cornering (with meshes of 100+ million elements). These studies, paired with rotating wheels, radiator porosity modeling and complex geometry, make for some very intricate, though interesting, problems!

### **Why young engineers should get involved**

Young engineers should get involved in this extremely rewarding and prestigious competition as it is one of the few real industry experiences and exposures available to engineering students within university life. Not only do the practical skills developed strongly complement the more theoretical aspects taught in lectures and textbooks, but team members enrich their education with further leadership, communication and project management experience. These are vital skills in industry which so many employers seek, especially from recent engineering graduates. Apart from the obvious career benefits with the skills that are nurtured, the competition allows participants to create strong friendships for life from around the world, not to mention advantageous networking. ■

### **Australian Universities with teams at FSAE-Australasia 2012**

University of Western Australia  
University of Newcastle  
Edith Cowan University  
University of Adelaide  
University of Wollongong  
RMIT University  
Curtin University  
University of South Australia  
Swinburne University of Technology  
University of Sydney  
University of Queensland  
Queensland University of Technology  
University of Technology Sydney  
University of New South Wales  
Monash University  
University of Melbourne



## EDITORIAL

This edition is dedicated to the Young Members of the Australian Branch. All the volunteers within the Oceania Region work hard to provide technical lectures, social events and value for your membership fee. However, recently there has been a particularly large wave of young volunteers acting above and beyond what is expected of them. In NSW the new committee is dominated by Young Members, Queensland will be hosting a Young Members "Engravaganza" and Belinda and I have flown the flag for Australia by each winning, IMechE Young Member of the Year Awards.

The Australian Young Members section is also paving the way in social media with a distinct presence on Facebook and Twitter.

I hope you enjoy this issue and I look forward to comments, feedback and any articles you would like to see published.

**Matthew Springer**

[australiaweb2@imechenetwork.org](mailto:australiaweb2@imechenetwork.org)

**Check out the *nearyou* pages on [imeche.org](http://imeche.org) for contact details and events. ■**

## THE SUPPORT NETWORK AND YOU

**Support Network is a charity for IMechE members and their family. We provide advice, practical support and finance to help with day-to-day problems and the unexpected circumstances that life brings along the way.**

We are co-located with the Institution at Birdcage Walk in London, but operate on an international basis – as our services follow the member, wherever they are in the world. All Support Network Trustees are IMechE members, as are all of our volunteers. We are grateful for the annual donations that members make to the fund and we very much feel that we are part of the wider IMechE community.

Until recently however, the fund largely supported the widows of former members and did not adequately address other needs. Things have changed, and whilst we still assist widows and older people, (and will always do so), our priority focus now is much more on the needs of undergraduates and/or members of a working age, as they form the majority group of IMechE membership.

Additionally, we are simultaneously trying to increase our international reach, as we want to ensure that we are in a position to help all members and, whilst 20% of IMechE members reside outside of the UK, this is not currently represented in our current enquiry and/or assisted profile.

We very much welcome feedback from international members to help us with shaping our service offerings, so even if you do not need our help, we would love to hear from you.

Our current services include:

### EMPLOYMENT COACHING:

We can help to give you a head start and/or refresher with job seeking skills including CV preparation, making applications and interview technique. We have a permanent partner agency in Australia and New Zealand, and we would endeavour to find equivalent partners in Papua New Guinea and other areas as required. We can provide a single session and/or a longer, more intensive programme, depending on your situation.

**FINANCIAL SUPPORT:** Short-term 'breathing space' payments can be provided during times of need to help you keep on top of things. We use volunteers near to you to ensure that currency and/or cost of living issues are appropriate, and we use online banking to transfer funds direct to your bank account. If you are regularly finding it hard to make ends meet, and are getting behind, we can

also help with debt advice – to reduce and/or avoid indebtedness.

**FAMILY SUPPORT:** We can try and ease the costs and/or demands of specific situations which might otherwise stretch your pocket or your emotions. For example through providing new baby grants, access to specialist support such as autism, dyslexia, caring for elders and/or meeting the needs of disabled children.

**UNDERGRADUATES:** We provide grants to members on IMechE accredited degrees. We also help student members on other mechanical engineering first degrees and/or higher level related courses, depending on their financial circumstances.

All of our services are free for you and your family to use as a benefit of your membership of the Institution. Members, partners and dependants are all eligible to contact the Support Network directly.

Further details can be found from our website at [www.supportnetwork.org.uk](http://www.supportnetwork.org.uk) or via the About Us link on the IMechE homepage, but please do get in touch with us if you think we might be able to help; as we only help members and their family, we try and be as flexible as possible – which might include doing something we have not done before, so it's best to ask! If we cannot provide a solution ourselves, we will endeavour to work with others who can. We would therefore encourage all members and dependants to think of us as a 'first point of contact' to help ease you through these difficult times. ■

**Anni Broadhead, CEO**

[a\\_broadhead@supportnetwork.org.uk](mailto:a_broadhead@supportnetwork.org.uk)



### Members supported 2010 – 2012

Service	2010	2011	2012 (at end Oct)
Employment coaching	14	25	49
Financial support	154	148	139
Debt advice	196	224	240 (at end Sept)
Undergraduates	11	21	28

## ESCAPE TRAIN

Amy Lezala of Bombardier Transportation, delivered a presentation on evacuation time modelling within the railway industry as part of the Victorian Speak Out for Engineering (SOfe) competition. Below is a summary for *News Bulletin*.

Evacuation time is an important measure of a railway vehicle design for both station dwell time optimisation as well as passenger survival in the event of a fire. A design is deemed safe for life safety if the Available Safe Evacuation Time [ASET] is greater than the Required Safe Evacuation Time [RSET].

The assessment of railway vehicle evacuation is based on general fire engineering principles. The current methods are practical live trials or theoretical engineering assessments. Live trials are costly and impractical as they require a full vehicle to conduct the assessment. The trial cannot be conducted prior to manufacture but the results give a true assessment of the specific design. Engineering assessments are cost effective and can be conducted prior to manufacturing, allowing for design improvements to be identified at an early stage. This method, however, is based on assumptions and theory. An alternative method is required to minimise the number of assumptions and to address the railways industry's move towards a reduction in product delivery time.

Advancement in technology provides the opportunity to use Computational Fluid Dynamics [CFD] for determining railway vehicle evacuation time. This method is less expensive than live trials and assesses the specific design. CFD programmes have the ability to assess computer models of the design, allowing for design improvements to be identified prior to manufacture. Validation of this method is required as the CFD technology available introduces assumptions for ease of modelling.

The research project presented at the Victoria heat of the IMechE SOfe 2012



competition aimed to establish which of the three methods is recommended for use in the railway industry going forward. This has been achieved by assessing a generic Bombardier Transportation rail vehicle using each of the three methods. The results of the assessments have been compared to typical contractual and legal requirements of the design to verify the methods. The three methods have also been compared to each other based on the validity of results and process.

The results show that a live trial, an engineering assessment and a CFD simulation deliver a similar evacuation time; however the CFD assumptions are not reflective of the in-service performance. Live trials and engineering assessments are therefore reliable methods for determining evacuation time of railway vehicles whereas CFD is currently only suitable for supporting the other methods. Although it is reliable, a live trial assessment is not practical for use in the railway industry. Engineering assessments are therefore the most ideal method, particularly when supported with CFD simulations.

Engineering assessments are theoretical and are currently based on dated live trials. To improve the validity of this method the railway industry needs to develop a database of evacuation times to support these assessments, either through a research project or through knowledge sharing. The open-source CFD software used

in throughout the research project assessed the impact of the fire on occupant behaviour but could not simulate evacuation along the narrow aisles of the railway vehicle. There is an opportunity for the development of an economic CFD software programme which analyses the impact of fire on evacuation and is capable of modelling to the detail of the narrow architecture seen in the transportation industries.

There is great potential in applying CFD practices to evacuation assessments but the technology is not currently available. With more investment the possibility could become a reality. The use of CFD would allow for design specific evacuation assessments which provide the opportunity to identify passenger flow improvements prior to manufacture. Improving passenger flow through layout design will optimise safe evacuation in an emergency as well as reduce station dwell times. With the application of science we can deliver improved vehicle designs. ■

**Amy Lezala**  
RAMS Engineer  
Bombardier Transportation

## FROM THE CHAIR

### Greetings all.

Ever had one of those conversations where you understood each of the words individually, but had absolutely no idea what they meant when they were placed in a sentence together?

Well that happened recently in Auckland. Whilst participating in the IMechE Regional Meeting, poor Matt Springer had the painful pleasure of trying to explain to me what the IMechE Facebook and Twitter presence was. Now, I am a self-confessed luddite, and obviously middle aged, because as Matt explained how many likes we had, and that he had re-tweeted a tweet from somewhere else, I had absolutely no idea what he meant. Oh well, thank god for Generation Y.

### Our Facebook and Twitter presence is fantastic.

For any of you more conversant with social media than I am, you too can like us at: <http://www.facebook.com/pages/IMechE-Australian-Young-Members-Panel>

or follow the tweets at [@IMechE\\_OzYM](https://twitter.com/IMechE_OzYM).

The Auckland Meeting did provide an interesting insight into the level of cooperation in New Zealand

between our institution, and IPENZ – the Institution of Professional Engineers in New Zealand. Much as we do here in Australia with IEAUst, it was informative to see joint learned society activities, and a steely determination to provide something back to the membership. Also, the challenges seemed similar across the ditch too. How to engage younger members (maybe they could try that face-tweet thing too?), and how to keep the few active volunteers from suffering burn out. This is a challenge here in Australia too, and so it is always heartening when new volunteers pop up to support the running of the branch.

NSW has seen a bolstering of the local committee to a level not seen for many years. Queensland continues to set the benchmark for a vigorous and healthy panel membership too. So much so in fact, that in addition to everything else on the go, the Queensland Panel has also taken on the challenge of organising the AGM for March 2013.

The change of venue from Adelaide is unfortunate but necessary. Owing to the pressures of time, work and family, it has meant that the local SA panel has entered a rebuilding phase. This cycle is not uncommon, and I am certain SA will re-emerge as a healthy panel in the near future. If you happen to be SA based and wish to assist, I'd be happy to hear from you.

The volunteer base is also busy conducting an unprecedented number of professional interviews. I cannot recall a busier period – and believe metrics of interviews conducted in Australia in that last 12 months exceeds everywhere except London. I have heard it said that some incorrectly believe you cannot become chartered, or achieve fellowship, through the IMechE here in Australia. Wrong – wrong – wrong. The same process applies as if you were in London, the same forms are completed and sent to HQ, only the interview will require a little travel (especially if you live in Cairns!). I hope the current bow wave of applications continues.

As I type this the festive season is approaching fast. However, by the time you read this, those festivities will be a fading image in the rear view mirror. I therefore hope you had a pleasant festive break, and hope to see as many of you as possible for the AGM in Brisbane.

Anyway, off now to enjoy that fact that whilst I failed to comprehend or embrace either twitter or Facebook, I did find the word 'fart' in the word search last issue. Come on, admit it. I cannot be the only one who chuckled (am I?). Who said that expensive engineering education was lost on me!

Cheers all. ■

Ian Mash

## THE CHAIRMANS TOUR

Over the past twelve months Ian Mash, the Australian Branch Chairman, has been visiting all of the panels and delivering a presentation on risk assessment and motorsport.

Making technical presentations to your peers remains a source of fear for many. Hours spent in front of the bathroom mirror rehearsing and rehearsing. I have spent quite a few hours whilst mentoring coaching and guiding on some of the do's and don'ts of making such presentations. Somehow this year, I found myself having to follow my own advice when I was encouraged (because press ganged is such a vulgar word!) into presenting my paper on Superkarting around the Panels.

The paper focuses on the subject of risk assessment, and the application of this often inadequately completed process to a very entertaining subject, that of racing Superkarts around Mt Panorama at Bathurst. These little race machines are incredible in terms of their performance and handling. The paper recounts the application of the risk assessment process in a bid to change the track license to allow Superkarts to join Formula Vee and Formula 3 as open wheel race cars permitted to run around the Bathurst race track.







**ALARP – As Low As Reasonably Possible**  
**SFAIRP – So Far As Is Reasonably Practicable**

Motorsport is considered by some, and somewhat emotionally, to be a dangerous activity. However, that speaks to the issue; what is safety? Safety is a relative concept, therefore any engineer should be considering 'how safe is safe enough?' Whether the term ALARP or SFAIRP (see *box inset*) is used (and they are different), clarity of thought can be achieved by considering what and who defines risk tolerability and risk acceptability in any situation.

In the example chosen, the risk assessment has so far been unsuccessful in achieving the change to the track license. The paper was intended to demystify the risk assessment process, and show how a good risk assessment should affect the decision making process, where the emotion and politics do not dominate.

Starting in NSW, the paper was well

received by an audience of 70 or so. The questions and answer session proved most enjoyable, with a mix of questions from engineers and other race drivers alike. Then on a business trip to WA, the opportunity presented itself to make the presentation to the WA Panel. Again audience numbers were excellent, with around 50 in attendance. What struck me in WA was how vibrant the Panel was, and how well IEAust and IMechE are cooperating to bring together a robust service offering to their respective members.

Audience numbers were regrettably much lower when I presented the paper in South Australia, but those who attended seemed to take something from the presentation. The lower numbers did allow a much deeper level of questioning – which was fun.

In late August I was invited to attend

the Queensland Annual Dinner, and gave an abridged version of my paper after a lovely 2 course meal. Audience numbers were about 30, and in this case, I did feel a little pressure as the audience had paid to be there!

Most recently, I enjoyed the opportunity to present in Victoria. It is always a refreshing problem to see committee members scurrying round bringing more and more chairs into the auditorium. What a lovely problem for any panel to have! I believe the audience numbered 60 or so in the end, but irrespective, the room was full.

Through this tour the Australian Branch achieved another of our objectives: to make the Chairman accessible to the Panels and their members. I was fortunate enough to share conversations with a great many of our members around this vast country, and share my passion for engineering and motorsport with around 250 fellow engineers. That alone, made the few nights away from the family almost tolerable. ■

**Ian Mash**



**Editor's Note** – Ian also presented his paper at New Zealand's Mechanical Engineering Group AGM, to another full room, whilst attending the Oceania Region committee meeting in Auckland in November.



## QUEENSLAND PANEL AWARD BEST PROJECT WINNING SYNOPSES

The following articles are the executive summaries of the Best Project Prize winners for University of Southern Queensland – Jock Farrington, and the University of Queensland – Liam Irvine.

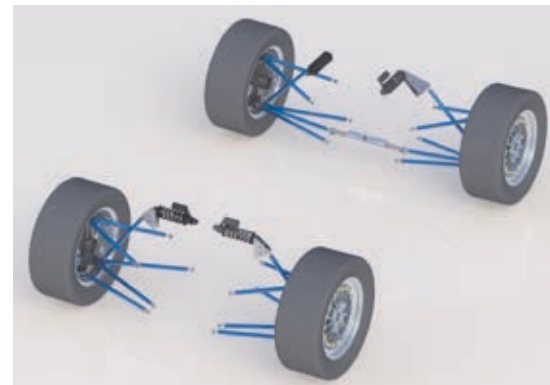
### Redesign of an FSAE Race Car's Steering and Suspension System

In 2008 USQ's FSAE (Formula Society of Automotive Engineering) team was forced to abandon the competition due to a crash which was thought to have been caused by the car's suspension and steering system. If USQ planned to enter a car into future FSAE competitions it seemed appropriate that a revision be made to the current suspension and steering system, along with the design processes employed to create these components.

The project aimed to uncover any problems with the 2008 vehicle and then use these findings, coupled with appropriate research, to create a new steering and suspension system that possessed improved performance.

Although there was no USQ team for the competition in 2011, it was intended that all work completed would be able to be utilised by future groups in years to come.

Completion of the project saw the design of geometry for the wheelbase and tracks, suspension arms, suspension actuation mechanisms, uprights, as well as the steering rack and steering arms. Additionally, concepts in the way of 3d models were established for the suspension and steering systems. Because these components were unable to be physically created, a lot of time was placed on researching and documenting a logical design process. For this reason the author believes the thesis will become a valuable



reference tool for upcoming FSAE teams at USQ and that the design presented could be feasibly integrated with a future USQ vehicle to yield a car that provided improved safety and handling characteristics.

The following 3d render represents the final geometry design along with the concept component models that were established during the project. ■

**Jock Farrington**

**Winner of Best Project Prize at the University of Southern Queensland**

## THE MODELLING AND ENHANCEMENT OF AIR COOLED CONDENSER PERFORMANCE

The supercritical, coal-fired Millmerran Power plant in Queensland produces electricity at a rate of 850MW, across two separate units. Forced Draught Air Cooled Condensers (ACC) are used to cool turbine exhaust, one in each unit. The two ACCs have a performance which is affected by local cross wind conditions. The project is primarily concerned with reducing the performance decrease of the ACCs at the Millmerran Power plant.

Crosswinds can cause recirculation of hot exhaust plumes, intake of air heated by the rest of the plant and reduced fan performance – all of which act to reduce the performance of the ACCs as a whole. This reduction in ACC performance leads to a decrease in plant efficiency and an increase in turbine back pressure. The Computational Fluid Dynamic (CFD) package Ansys CFD solver was used to model the behaviour of the airflows around the two ACCs at Millmerran and were employed to quantify exactly

how much recirculation, hot intake and fan performance reduction is occurring. The CFD model was then used to evaluate a number of retrofittable solutions. The main outcome of the thesis was a practical and effective solution which when implemented will improve ACC performance at the Millmerran Power plant.

Historically, CFD software has been used to model ACC performance. The biggest factors influencing ACC performance are local wind direction and speed, the amount of heat rejected from the ACCs themselves and the plant building layout. These quantities all differ greatly between plants and as such results from previous CFD work cannot be directly applied as a general solution to this case. However, the methods of CFD modelling used by Duvenhage & Kröger (1996) and Rooyen & Kröger (2008) and others have been studied and taken into consideration for this work.

A simple model of the two ACCs has



been built and results indicate a definite recirculation of hot exhaust plume both between and within the two units.

Missing from the model at this stage is an accurate pressure drop across the finned tube banks, accurate heat transfer, the swirling effect of the fans on the cooling air and local geometry.

The results of the ANSYS CFD model will be used to design a retrofittable solution which when implemented will reduce the negative effect that crosswinds have on the Millmerran Power plant ACC's performance. ■

**Liam Irvine**

**Winner of Best Project Prize at the University of Queensland**



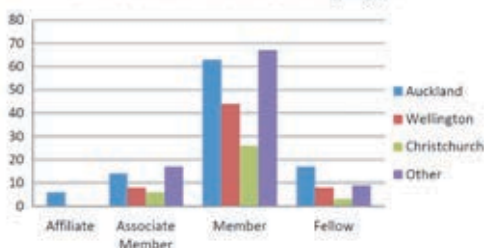
## OCEANIA UPDATE

It gives me pleasure to report back to all our members in New Zealand that the tour and meetings, recently conducted, were a great success.

First, I would like to record my thanks and appreciation to Win Miskelly, our New Zealand Country Representative. This is for all the tour arrangements he made, particularly for accompanying me on the tour, and for his support and contribution during it. Everything went off without a hitch and we were not late once, despite a drive of over 2,250 km.

I would also thank our members as over 50 (of 277 in NZ) turned up for the various meetings, and 130 completed and returned the issued questionnaire. That is a response of 47%, remarkable. Consequently the indications provided by the questionnaire should be a very accurate guide to the views of the New Zealand membership.

**New Zealand Membership Type**



For the interest of members inset is an infographics on New Zealand member demographic spread detailing the location, grade of membership as it was earlier this year. This was used to establish the tour route and location of our meetings. The result was that meetings were held 'within reasonable striking distance' of 95% of all members. Access to a report on the questionnaire responses is available on nearyou.

The main lesson learned is that the IMechE has to communicate more effectively, particularly with and between members in New Zealand; but also IPENZ, and perhaps NZ universities that offer mechanical engineering courses. We also found that far too many members (27%) had no knowledge of a key benefit

their membership provides. That is membership of the Mechanical Engineering Group (MEG). MEG is a special interest group of IPENZ and the current means of IMechE delivering a technical programme in New Zealand. Membership of the MEG is 'automatic' for IMechE members and no additional payment is required. It appears that the link between IMechE HQ and IPENZ has been too infrequent, or even failed, in the past. This is something that is being corrected now. It has also been resolved to create a document that can be given to all new IMechE arrivals in New Zealand that describes the MEG, says what it is, what it does, where and when it operates, membership details, and (lack of ) cost, etc.

This problem (of 'lost or 'missing' members) was discussed during a meeting we held with IPENZ in Wellington. Both parties are keen to make more of the MEG and it was agreed to work closely to ensure all IMechE members are registered with the MEG, receive notice of events and the MEG magazine 'E-Torque'. I can add that the Oceania Region Board are committed to a cooperative approach with IPENZ and will do all we can to add to the technical programme offered each year.

Still on the subject of communication it was encouraging to find that 85% of our members in New Zealand have e-mail addresses, and 77% said e-mail is their preferred means of communication. Economics, and the speed of electronic communication, are driving us in that direction so our task now is to encourage all our members to provide a current e-mail address.

Similarly encouraging responses were received concerning the use of the IMechE website. This facility provides access to many useful and interesting areas that contain information on many aspects of membership. This is the second string to our future communication bow and I urge all members to explore what it has to offer. Access to New Zealand items is best gained through:

**[www.imeche.org/near-you/oceania/new-zealand](http://www.imeche.org/near-you/oceania/new-zealand)**

Your Board also decided to extend



the reach of the IMechE Australian Branch News Bulletin to include content from, and be distributed within, New Zealand. I look forward to detecting a New Zealand flavour in future. The editor is already looking for contributions.

The last aspect I would report is that a significant number of members thought our programme should also involve some social events each year. Perhaps combined with a technical meeting or visit, even a breakfast meeting. The main objective being to have a good time, an interesting time, and a good networking opportunity.

All these things can be done, and I hope they will happen. My thanks, above all, goes to the six members, in different locations, who gave their names at our meetings as being prepared to assist in organising/ coordinating events in their area. Win Miskelly now has contacts, 'on the ground', who have the necessary local knowledge.

I will end by saying that I enjoyed my 'tour' of New Zealand and the best part was being able to meet so many members face to face. It worked as I had hoped and provided me with an education about membership so far from London The most encouraging thing was to find how keen and committed so many members there are – and in New Plymouth, how young! (This was very encouraging)

I will continue to keep you informed as things are put in place and trust you will actually notice a difference in 2013. ■

**Ken Tushingham**  
Chairman Oceania Region



# STATE NEWS

## NSW NEWS

This has been an active period for the NSW panel, with many talks and a host of changes to the committee.

The NSW Mechanical Chapter have, as always, had some popular technical presentations in conjunction with EA and ASME. Of particular note was our very own Speak Out for Engineering (SOFE) competition which was held late in October with two excellent speakers.



Simon Cowling (left), a Senior Engineer with AVL went first. His presentation, having been cleared for publication following the release of the engine in question in three weeks previously, outlined the development of a balance shaft drive system for a 1.0L 3 cylinder, direct injected, turbocharged passenger car engine. It covered the process of concept selection and refinement. Simon concentrated on showing the stages through the development life cycle and explained how he overcame some of the key design issues.

Secondly, Jack Sky a consultant with Interfleet, presented on the development of an electrically operated quick coupler for the compact excavator market during the time he worked for Bobcat in the UK. An automatic excavator quick coupler (pictured below) allows operators to change the attachment on their machine without getting out of the cab. Jack described the development of the quick coupler including the additional safety features that allowed the process to be safer and more automated than with conventional hydraulically operated devices. Jack explained that the design had



reached prototyping stage when the downturn in the world economy brought development to a halt. Jack finished the presentation with a video demonstrating the coupler in action.

Due to Simon's excellent delivery style, including his relaxed, confident approach, coupled with an excellent visual presentation, he was awarded first prize, with Jack being awarded second. Simon will now go on to the Australia finals being held during the AGM weekend in March 2013 in Brisbane where we have high hopes of his chances of success.

Following a reassessment of priorities, Monika Sud decided to step down as Chair of the NSW Panel in late October. I would like to take this opportunity to thank Monika for all her hard work over the past 3 years. During this time the NSW Panel has held a Speak Out for Engineering competition without fail every year, something that sets NSW apart from the other states. Further, we successfully hosted the Australia AGM, which ran smoothly thanks to Monika's leadership.

Monika assures us that she will return at a later date to continue the excellent start she has made to the work she would like to do with the IMechE.

I have taken over as Chairman and following tradition the latest SOFE winner took over as Honorary Secretary, the NSW Panel Committee now comprises:

Chairman: Chris Hoskin  
Immediate Past Chair: Monika Sud  
Honorary Secretary: Simon Cowling  
Treasurer: Jack Sky

Young Members Reps: Adam Benwell and Adam Warburton  
Committee Members: Ian Mash, Geoff Stone

Many thanks to, Simon, Jack, and the two Adams for joining the committee.

**Chris Hoskin**  
NSW Panel Chair

## VIC NEWS

We ran a very successful Speak out for Engineering in early October, with four very different entrants. Amy Lezala spoke on Evacuation of Trains; *her synopsis is featured on page 4.*

David Kong a PhD student at Melbourne University spoke about Innovative Material Processing Method for Potential Implants. Using powdered titanium and processing this to form a solid, followed by a surface treatment of PTFE. This resulted in an implantable metal which could be used for dental or other medical devices.

Alizara Mohammidi also a PhD student at Melbourne University presented on a novel way of self-regulated engine management for alternative fuels. Providing a retrofitable solution to achieving optimum performance and affordability.

Finally, Cuinn Andrew Harris spoke on the process of design and project selection. Cuinn is a student at Swinburne Uni and works at Rotec Aerospace. He demonstrated the process using an example of a replacement a Jabiru aeroplane engines piston head. Working through the development of the project he unveiled a water cooled solution at the end.

Amy Lezala was chosen as the winner to represent Victoria at the upcoming AGM. We are about to seek nominations for the 2013 student prizes at the local Universities who run Mechanical Engineering courses.

Again I would appeal to Victorian members that they consider joining the local Victorian Panel Committee upon which there are currently vacancies. The current members have served well, but we are looking for an influx of

new blood with new ideas to broaden our network of contacts. If you are interested, please contact the Panel Chair to discuss joining the panel – the duties are not that onerous – say a panel meeting every two to three months, and some occasional effort between meetings. The more panel members the less each has to do.

We are currently planning our 2013 programme of Technical Meetings, Site Visits and Social Functions – if you have any ideas for functions or can offer the members a site visit – please contact the panel chairman.

### John Burt

*Vic Panel Chair*

**Editors note:** *John Burt unexpectedly died during the Christmas holidays, our best regards go to all of his friends and family. He will be sorely missed by the Branch and Victorian Panel.*

## SA NEWS

The SA Panel has enjoyed a number of interesting events during 2012, organised by the South Australian Joint Technical Programme Committee. Included were lectures on Medical Lasers, The Adelaide University's Hexapod, How to Build Aircraft Carriers, SA's Railway Electrification Programme and Risk Assessment in Motor Sport. The latter was presented by a well-known interstate go-kart identity.

JTP events lined up for 2013 include a visit in February to the South Road Superway (*pictured during construction below*), a visit in March to the Techport Marine Engineering Hub, a visit to Ahrens, manufacturers of heavy mining equipment in May and a lecture on RAN Submarine Propulsion Units in June.

Further details on any of these events

will be sent by flyer a week before the event, and can be found on the *nearyou* pages.

A visit to the McLaren Vale wine district is also being planned for April. This will enable members to make a detailed study of the increasing acceptance of mechanical engineering in the production of wine, with hands-on experience at several cellar doors.

On the personnel front, we were dismayed by the recent departure of Chairman Michael Riese from our committee. Michael has recently landed a high profile position with an expanding fabrication company and the birth of his delightful daughter, Chiara, in May, has prompted a revision of priorities. We wish him well and we hope he will keep in touch.

We are urgently seeking new (or old) blood for committee activities. Those interested can contact the writer for details. On average, it involves only about one hour per month.

### Stan Gafney

*(Stand in) SA Panel Chair*

The SA leg of the 2012 Speak out for Engineering competition was held on the 6th December at UniSA. Second year mechanical engineering student Abhinav Verma presented his experience in this year's Warman Design and Build Competition, which is held nationwide as a second year engineering challenge. Abhinav detailed the requirements and solution developed by him and his peers. He explained the specific challenges placed on the team such as budget, time restrictions and the solution to contain two independent parts that had to work autonomously.

Brett Matas, a fourth year engineering student gave a presentation about the development and design of a double acting hydraulic cylinder with full detail



*Abhinav Verma and Phillip Richard at the SA SoFE competition.*

drawings ready for manufacturing. The presentation included a summary of the design specifications, the components of the hydraulic cylinder and the design process. Specific care was taken to explain the design steps including the assignment of materials, weld specifications, dimensional tolerances, appropriate seals and fittings to ensure functionality and reliability. For his presentation, Brett won second place on the night.

The 3rd presentation was given by Philip Richards and titled "Adopting Appropriate Design & Development Techniques to suit one-off Product Manufacture". Philip, a chartered engineer, focussed on the his experience in designing and developing "one-off specials". He detailed how to achieve sensible one-off build costs, often companies can only afford a small team of mechanical engineers, who are required to design with the build environment in mind. The presentation discussed some of these techniques, including project management skills, efficient design, 3D modelling, concurrent design and manufacture and awareness of the local supply chain capabilities. Furthermore he looked to the future, to anticipate how technologies, such as cloud computing, 3D printing and hand held tablet devices are presenting opportunities to mechanical engineers. For his presentation Philip won first.

Overall all three presentations were of very high standard and the South Australian committee would like to thank the entrants as well as the judges on the night. The committee also wishes Philip all the best for his entry into the national final.

### Michael Riese

*Past SA Panel Chair*





## QLD NEWS

The last three months of the year is normally an interesting one in Queensland as it is the time when the Panel hosts a student evening at the University of Queensland. Panel Committee members normally take turns in presenting a quick summary of their careers while introducing the benefits of IMechE membership to final year students. This year, we decided to do something a little different. One of our Committee Members, Ms Hilary Mercer, offered to present a paper she presented to the Royal Academy of Engineering in November 2011. The plan was to invite the general public while still presenting it at the University to students. Her paper entitled, "New Frontier: Engineers and the Global Energy Challenge" was presented in October, ably assisted by fellow panel member Jonathan Martin, to an audience of about 80 people. The presentation was well received with many questions asked of Hilary. The evening ended with the usual light refreshments and many using the opportunity to network.

Ian Marshall, the Panel Treasurer, stepped down from his membership of the Industry Advisory Board at the University of Queensland. Our fellow Committee Member, Jonathan Martin was elected to take his place. The Panel welcomed the opportunity for the IMechE to continue to provide input to the Board.

Looking ahead, the Queensland Panel will be awarding the FBW prize to the best Mechanical Engineering graduate at the University of Queensland in mid December.

The Young Members section, enthusiastically driven by Committee Member, Ms Belinda Herden, will be starting up activities with an initial meeting scheduled for December. There are also plans for a Young Members "Engtravaganza" to happen in the New Year. The Queensland Panel is keen to support this initiative and looks forward to hosting some fun filled activities in 2013.

As we look to the New Year, the Queensland Panel will be busy making plans to host the next Australian Branch Annual General

Meeting and National SoFE finals in March 2013. The Queensland Panel Annual General Meeting will be held in late February 2013 to elect their representatives for the year prior to the Australian Branch AGM.

As the year comes to a close, the Queensland Panel would like to wish all its readers a safe and happy festive season.

**Leslie Yeow**

*QLD Panel Chair*

## YOUNG MEMBERS PANEL NEWS

The Australian Young Members have made some great strides in 2012 and are busy planning for an even bigger year in 2013. The 2012 IMechE Young Member of the Year awards saw two members from Australia topping their categories. This is the first time two awards have gone to members from the same country outside of the UK.

Congratulations to Matthew and Belinda and keep up the good work.

The IMechE Australian Young Members Twitter and Facebook pages are now up and running. Posts are being added daily and feature topical engineering articles, details on IMechE events and services.

Preparation is currently underway for a Young Member 'Eng-travaganza' weekend to be held 1-3 March 2014. This event will tie in with the Australian Branch AGM in Brisbane. Plans so far include a Student Careers Evening with a panel of industry representatives, the Speak out for Engineering national final and a visit to one of the Gold Coast theme parks. Keep an eye on the Near You page for event details in the coming months.

The Australian Young Members are looking for volunteers across Australia and New Zealand. If you would like to be involved in IMechE in any way, shape or form, please don't hesitate to contact us on OceaniaYM@imechenetwork.org.

**Belinda Herden**

*Oceania & QLD YM Rep*

## WA NEWS

The WA Panel has been fairly active over the past tertile organising technical presentations and site visits.

In early October John Bills, who was an IMechE Best Project Prize Winner whilst studying at Curtin University, presented his final year thesis on "improvements to train positioning velocity profiles". The presentation focused on the forces experienced when indexing railcars through unloading bays at the port and how changes to the velocity-time profile of the positioner can reduce coupling failure along the train.

Later that month, members of the WA Panel participated in a guided tour of the RAAF Aviation Museum at Bull Creek.

In early December WA Panel Committee Member Mark Smart, organised a visit to Verve Energy's Kwinana Power Station, which houses the most efficient open cycle gas turbines in WA – the GE LMS100. The tour proved to be extremely popular and became fully booked within hours of the invitation being circulated to the membership. Further visits will be arranged during 2013 for those that were unable to attend.

The WA Panel Committee met twice during this period and was recently advised by the Branch that a professional review interview for someone wishing to apply for Membership and Chartered status in WA had been received, this will take place in the New Year. Conducting professional review interviews are an excellent career development opportunity and members are encouraged to contact David Heppenstall at dhoq@chevron.com to register their interest in being a professional review interviewer.

Events that are planned for the early part of 2013 include the Australian Branch AGM and a presentation on the Gorgon Horizontal Directional Drilling shore crossing project, which recently won a national excellence award.

**David Heppenstall**

*WA Panel Chair*

# ELECTIONS

An inevitable adjunct to the better class communities, although they may, alas, act as a shop window for the frailties of human nature. Any logical analysis of the phenomenon must consider three things: Firstly, the people forming the electorate. Until the end of the 19th century, in practice only the well-to-do males had any real chance of a vote. Today, anyone over 18, (could even become lower), may be enrolled, with a few exceptions, such as those of unsound mind, or so one would hope.

Secondly, the nature of those seeking election. We need to distinguish here between the altruistic souls offering their services as Hon. Sec. or

Treasurer of a club, and the full-blown professionals aiming at Local, State or Federal government. These latter can vary enormously in their strict adherence to honourable conduct in both public and private matters. Suffice to say that the good ones are very good.

Thirdly, the sometimes intricate system of defining effective total votes. Simple enough if only two candidates – he or she with the most votes wins. Move on to five or six candidates, and some form of transferable preference votes, and you are in curious territory. One doubts if the average voter, (or candidate?), really understands the system. It is particularly baffling for senate seats.

The final result of all these minutiae is held to represent “The will of the people”, and to have an aura of impeccability. In reality, the situation is quite different. Two possibilities exist: if one political party gains a comfortable majority, it will seek to railroad sundry legislation to its own liking. Alternatively, if it gains a majority close to zero, it will be beholden to a handful of independents. But remember, in both cases much of the real power lies with the senior public “servants”, who have acquired superior experience in the shady areas of law-making. ■

## VULCAN

*Published posthumously*

### DETAILS OF AUSTRALIA BRANCH AGM – 2012/13

The AGM will be held on **2nd March 2013 in Brisbane.**

Details will follow on the *nearyou* pages

**[www.imeche.org/nearyou/Oceania/Australia](http://www.imeche.org/nearyou/Oceania/Australia)**

### Eng-travaganza Young Members Weekend – Brisbane

There will also be a Young Members weekend held in conjunction with the AGM. This will be held from Friday 1st March to Sunday 3rd March. There will be a student focussed careers event with industry panel and a day trip to see engineering-behind-the-scenes at some local attractions. Details will follow on *nearyou* and social media channels.

To get involved contact **[OceaniaYM@imechenetwork.org](mailto:OceaniaYM@imechenetwork.org)**

### COMMITTEE DETAILS FOR IMECHE AUSTRALIAN BRANCH 2012/13

The positions below were opened for nomination in the last *News Bulletin*. The positions were uncontested and the following people will take the officer roles for the coming year:

- **Branch Chairman** – Dayaratne (Daya) Dharmasiri
- **Branch Hon Secretary** – Leslie Yeow
- **Branch Treasurer** – Ken Tushingham
- **Branch Assistant Hon Secretary/News Bulletin Editor** – Matt Springer

The newly elected Office Bearers will take up their duties during the third week of May 2013.

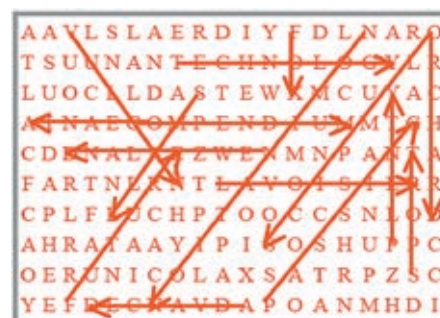
**Daya's Vision:** My vision is a truly global IMechE which mechanical engineers around the globe will strive to be members of. We can achieve this by understanding members and prospective members' needs and their perception of IMechE. With your support, I shall pursue interests of IMechE and its members. I shall work hard to promote the IMechE amongst members and non-members, I shall work in close co-operation with other professional bodies and educational/academic institutions, and I shall make every effort to recruit younger members.



### NB166 – Wordsearch Competition

Prize for first entry with all words found correctly – email editor.

AGM BULLETIN COMPETITION COMPRESSOR  
ELECTION ESCAPE FIRE FORMULA MOTORSPORT  
NETWORK NEWS OCEANIA PRIZE RISK SAFETY  
STUDENT SUPPORT SUSPENSION TRAIN  
TWITTER YOUNG



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IMechE – **[www.imeche.org](http://www.imeche.org)**

Social Media – **Twitter: @IMechE\_OzYM**

Check out the young members on **Facebook** as well! Follow the links on their *nearyou* page.

*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.