



COVID-19 NEWS BULLETIN

From February, the spread through the world of COVID-19 has changed engineering practices in many places. It has also led to significant changes in ways the IMechE functions and offers its services to members in the IMechE Oceania Region.

This COVID-19 edition of the IMechE Oceania Region News Bulletin includes:

- Chairperson's review of the situation and new changes
- Hon. Secretary's report
- Paul Henderson Prize call for applications
- News on Papua New Guinea
- 3D Printing (technical article)
- ISB Volunteer Award to Nic Coulthard
- Visit to Ability Works in Victoria
- IMechE Diversity and Inclusion Committee

- International Strategy Board Report
- AI and Machine Learning Presentation
- Panel Committee Reports

2020 offers engineers challenges and opportunities for innovation and improvement on many fronts!

Wishing everyone the best to keep safe and healthy in this time of social distancing and limited travel.

Dr. Terence Love
News Bulletin Editor

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CHAIRPERSON'S UPDATE

Before COVID-19, the IMechE Young Members Group responsible for planning and arranging the Speak Out For Engineering (SOFE) World Finals 2020 had confirmed the venue would be the exotic Dusit Thani Abu Dhabi Hotel. With the arrival of COVID-19, everything has changed....

In a matter of a few months since the publication of the last News Bulletin, the world has been brought to its knees with the appearance and spread of a virus that we all now know as COVID-19.

In the race to slow the spread, governments have been asking their citizens to close any business which encouraged people to gather. We were introduced to the concept of "Social Distancing" and encouraged to work from home where it was possible.

Although the economies of most countries diminished, demand increased in some pockets of industries. Other than toilet paper manufacture, internet use has increased markedly over the last few months. This



Dusit Thani Hotel Abu Dhabi

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meant that technology use has increased as well from those working from home.

A glance at the Institution's website will reveal that HQ closed its doors to visitors since the pandemic began to spread in England.

There is, however, work happening behind the doors of HQ. A number of groups have been working hard to analyse and recommend changes to the way the Institution operates so that we do not see a repeat of what happened in 2018.

Plans are being put in place to ensure that the Institution adopts a more inclusive position working with its membership. You can keep up to date with the latest news from HQ by having a look at <https://www.imeche.org/news/news-article/from-birdcage-walk-27042020> whenever you are at the IMechE website.

The International Strategy Board (ISB), that was supposed to have met in Abu Dhabi in early April, 'met' using video conference techniques to discuss international issues and receive updates from HQ and discuss plans in light of restrictions on gatherings and travel.

As expected, a lot of discussion was centred around the increase of webinars and how we can progress with events online.

Over the last few weeks, we have noticed that there has been an increase in the number of free webinars available online.

I encourage you to register online at the Institution's website (<https://www.imeche.org/training-qualifications/all-training-and-qualifications>) to avail yourself of free training opportunities and to maintain your CPD.

In the following ISB Meeting in early June, I presented my paper for IMechE application to the Board of Professional Engineers Queensland (BPEQ). The presentation described our plan to apply to the BPEQ to allow the IMechE to be an 'approved assessment organisation' for the award of the Registered Professional Engineer (RPEQ) qualification.

This is an important initiative for Australia, as I believe other States will soon introduce similar legislation requiring local registration of professional engineers. The State of Victoria will be implementing a similar legislative requirement in July 2021.

Although the World SOFE Finals scheduled for early April in Abu Dhabi were cancelled, we are still hoping to organise the competition sometime later this year assuming borders open and the pandemic has been managed. I will update everyone when decisions are made.

Meanwhile, we are investigating the possibility of

organising SOFE heats to be conducted online in preparation for a possible Regional SOFE Final toward the end of 2020 assuming we return to some semblance of normality by then.

The Oceania Region's planned meeting in New Zealand in May was also cancelled due to the closure of national borders.

Instead, in early May, we held a 'virtual AGM' with our usual teleconference meeting, where we were presented with our audited financial report for 2019.

After a brief discussion, the financial report was accepted by the Oceania Region Committee. We also discussed the challenges of organising events like the SOFE without being able to gather in groups in a single location.

The socialising aspect of our events have been compromised by the social distancing we are being requested to observe. But we are still trying to deliver information and events as best we can. For example, we have completed a Professional Review Interview by video conference.

We are still continuing our work online via platforms such as Microsoft Teams, which has allowed further debate on our Governance Review to continue.

In line with the present situation of being unable to gather in groups, the Institution is expediting its rollout of Microsoft Teams to the Regions to enable use of video conference systems on stable and safe platforms. I will be contacting the Panel Chairs to get them on to the system.

There have also been some changes to our Oceania Region Team.

Ken Tushingham, has decided to step down from his position as Treasurer after having served in this position for many years. Over the past 21 years, Ken has served as both Treasurer and Chair within the Australian Branch and Oceania Region.

Although the Region is sad to be losing the wealth of experience Ken brought into his roles with IMechE, we wish him well in his retirement from the Region and thank him for his many years of valuable contribution.

Our current Hon. Secretary, Ian Mash, will be taking over as Treasurer. We welcome Colin Sheldon, the Queensland Panel Chair, as our new Hon. Secretary.

Both Ian and Colin will start in their new roles from June, in line with the normal AGM date at the end of May in London.

Latest statistics reveal that membership renewals are reducing in the present climate.

This is not surprising considering the current situation which may force our members to re-prioritise their

expenditure. Hopefully, this situation will not last for too much longer and we should be having plans in place to navigate our way out of this event.

The relevance of our membership should therefore be seen as a complement to an engineer's career and a worthwhile pursuit. In times like these, maintaining professional registration should be viewed as valuable and advantageous to enable someone to be considered for a position in the profession.

HQ is willing to assist where it can to ensure that you do not lose the professional registration that you worked so hard for. If you are in need of assistance, contact them at <https://www.imeche.org/membership-registration/become-a-member/membership-fees>.

When the environment presents us with challenges, we need to adapt to address those challenges. As engineers, I am sure we can modify how we do things to achieve a desired outcome. Let us embrace these challenges....



Les Yeow
Chairperson, IMechE Oceania Region



HON. SECRETARY REPORT

Hats. Who doesn't like hats? Particularly as hair thins with age, hats become important. Hats are also a good metaphor for the roles one plays in life, and in the context of this article, in our Institution. I currently wear 3 hats – as your Hon. Sec. at the Oceania Level; as (the last ever!) Australian Branch Chair; and as an ordinary member of the IMechE Council.

Taking each in turn:

Hon. Sec. at the Oceania Level

Being chief note-taker and minute producer has been something I have done for a couple of years now to support our current Oceania Regional Chair (Leslie).

The Hon. Sec. role is not time intensive, and the critical competence (in these COVID times) is being able to recognise who is talking so the minutes are accurate! Thankfully it's not a "he said, she said" account of our largely virtual meetings, but rather the actions and key decisions that get captured.

Now having just about become proficient at that,

the imminent retirement of our Hon. Treasurer, Ken Tushingham after only 20+ years in the role (really Ken – where's your commitment!) means the pen is being passed to Colin, and I will inherit Ken's abacus to count the beans.

Seriously, Ken stepping back after so long consistently volunteering his time, energy and considerable experience to the benefit of our Institution locally is not something to let pass without due recognition.

Now all I need to do is remember how to do double entry bookkeeping again....

Australian Branch Chair

This is a hat to be retired too!

As per your vote, the Australian Branch has been dissolved. Sounds somewhat aggressive, but in reality was anything but. It represented a necessary and appropriate amendment to the way the region functions in the 'back of house'.

Front of house – nothing has changed. That said, if any member feels something has changed for them, detrimentally, then we'd welcome that feedback. It is wrong to assume silence equates with agreement – so if you want to say something, we want to hear it and understand it.

Ordinary member of IMechE Council

A hat that used to make 2 economy-class dashes to the UK per annum. Now in these COVID times, Council business is being done entirely remotely. My back welcomes that fact, though my chiropractor sees me less often!

Current Council business seems to revolve around the findings from, and implementation of, changes proposed in, the 3 reviews that followed the Special Meeting in May 2018.

The Finance Review, Governance Review and Code of Conduct Review all resulted in proposals to be adopted to firstly shore up the short term financial situation of the Institution.

These have been successful, and an even financial keel has been achieved.

The findings of the Governance and Code of Conduct Reviews go well beyond the short term, and go into 'softer' territories of governance, culture and behaviours.

My reflection is that these are works in progress – there have been great strides made – but there remains a distance yet to travel to get to the kind of Institution where the checks and balances are in place to address the root causes of the issues in 2018.

So, some changes of hats, some consistency and some progress to report. And just one more time, a doffing of our collective hats to Ken.

Thanks, Ken.



Ian D. Mash
Hon. Treasurer, IMechE Oceania Region

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3D PRINTING: CURRENT TRENDS & POSSIBILITIES



3D metal printing system

3D printing technology is adding value to product delivery in multiple ways: even into space. For example, SpaceX Company's aim to colonize Mars may depend on 3D printing technology to make tools to support survival on the planet's surface.

Wohlers Associate Report (2019) forecasts the 3D printing and additive manufacturing (AM) market for 2020 to be \$15.8 billion and predicted to rise to \$35.6 billion by 2024 (these figures are pre-COVID-19).

Why 3D printing?

3D printing offers ways of reducing high labour costs and pollution issues; fulfilling demand for rapid manufacturing; and offering the opportunity to combine multiple parts into one while minimizing consumption of materials and non-renewable energy.

The production process for single specialist items can also be streamlined.

The processing of some materials into complex shapes can be problematic with traditional manufacturing. For example, titanium alloys are hard materials with a very high melting point, which makes

them difficult and expensive to machine. 3D printing of titanium alloys offers many benefits.

Additionally, it is possible to hold or deliver a software library of instructions to 3D print particular products. This offers potential benefits in convenience, reduced stocking, reduced transport costs, reduced capital for stockholding and rapid sourcing.

3D Printing Materials

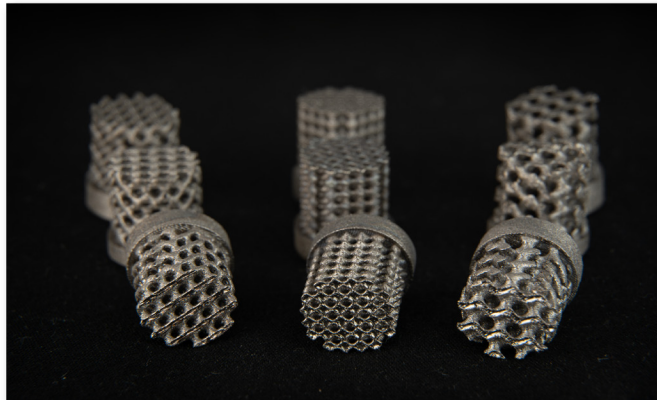
Polymers (plastics)

Polymeric 3D printing is widely used in rapid prototyping and creating proof of concept samples.

There are now hundreds of companies making affordable desktop 3D polymer printers using fused deposition modelling (FDM) technology. Recently, more advanced stereo-lithography (SLA) printers (previously only found in larger institutions) have also appeared in the consumer market. These processes along with selective laser sintering (SLS), are now well-established in industry, especially for medical products and the fabrication of casting patterns.

Metals

Any complex metal object can be 3D printed as long as the dimension of the object is within the build volume of the 3D printer.



3D printed metal products

At the time of writing, the largest current build volume metal 3D printer is, 800x400x500 mm³.

3D printers can also print sections of a mould that in turn can be used cast metal objects. This has virtually no dimensional limitations. Currently, the largest has a dimension of 4000x2000x1000 mm³ and compared to traditional sand-casting methods, the mass of the component and the total energy consumption are reduced.

Ceramics and Glasses

It is only recently that 3D printing of ceramics and glasses has been possible. The extreme hardness and

brittleness of these materials make them unique and also difficult to process and machine.

Massachusetts Institute of Technology has developed 3D printing of glass objects by having the print head keep the glass in a pliable stage at high temperature, with the rest of the process similar to a polymer 3D printing process using controlled slow cooling for the glass to solidify without thermal shock fracture.

ETH Zurich have developed a different 3D glass printing method using printing of glass precursors. The printed object is then sintered to create the glass/ceramic structures. However, a significant volume shrinkage occurs in the structure.

Interestingly, the microstructure of the above objects can be modified by using different glass-forming material at the micrometre scale in each printed layer and this can, for example, create different optical properties in the final product - not easily possible using traditional glass forming processes.

Design and 3D printing

3D printing offers increased design freedom and optimization of material consumption. Computer generated designs for 3D printing can be stored (e.g. as an open source library of GrabCAD™) and then modified for specific customer requirements.

Conventional manufacturing design typically leads to over-engineered components. Numerical optimization of 3D-printed components can reduce the weight of parts, improve performance, deliver unique properties and reduce waste.

3D Printing Uses

3D printing is attractive for fabrication of unique structures where low-production custom-made parts can be fabricated within days with minimal setup cost.

In biomedical applications, 3D printing and 3D scanning technology can create patient-specific devices. Complex geometries can also be incorporated within the biomedical implants to provide a porous network for cells to grow into.

3D-printed components are also found in fields needing weight optimization such as aerospace, aeronautics and motorsport, and, more recently, electric cars, where low weight enhances battery life.

Current Challenges

Properties of 3D metal printed parts directly correlate to machine process parameters such as layer thickness, powder particle size and energy density. These process parameters depend on complex physics.

Creating a better surface finish than machining is

still challenging, and 3D printed metal parts often require post-treatments to reduce surface roughness. Controlling metal porosity for critical applications can be addressed through heat treatment. However, the combination of high surface roughness and residual internal porosity can significantly lower component durability. Residual stress due to repetitive thermal gradients during printing can lead to cracking and warping when printing distortions exceed the mechanical strength of the material.

Additionally, thermal management of the print process presents challenges where cooling rates within the print chamber and in printing can alter physical properties of the final product.

Finally, toxic and carcinogenic substances in 3D printing can be problematic, e.g. 3D sand mould printing uses toxic furan-based resins common in the sand casting industry.

The above technical, health & safety, and economic factors need to be addressed before the use of 3D printing technology is likely to become widespread.



*Dr Tharmalingam Sivarupan and Nicolas Soros
University of Queensland*



HELLO FROM COLIN SHELDON: NEW IMECHE OCEANIA SECRETARY

The departure of Ken Tushingham, an invaluable member of the Oceania Committee, has seen a reshuffle.

Ian Mash has moved into the Honorary Treasurer role and I have stepped into the Honorary Secretary role.

This is a challenge that I am very much looking forward to, with the support of both Ian and Les during the transition period.

Both Ian and Les have experience in multiple roles within the Oceania Regional Committee (the Hon. Sec being one of those) and will be able to provide guidance to me, a newcomer in the role.

For those who don't know me, I have been involved with IMechE since joining as a student member. For the last 2 years I have chaired the IMechE QLD Panel and as part of that role been a member on the IMechE Oceania Committee.

I hope to contribute in the new role as Secretary by ensuring effective communication within the committee to provide the best outcomes for our region's members. I'll be supporting our Chairperson (Les Yeow) in the smooth functioning of the Oceania committee, whether in the form of detailed meeting agendas, comprehensive meeting minutes and record keeping, or deputising for the Chair in certain cases.

There is increasing need to develop and maintain relationships with Engineers Australia and other professional engineering organisations. I hope to support this linkage with IEAust through my existing involvement with them as a board member of the Mechanical College Board of IEAust and a committee member of the Mechanical College QLD Branch.

My working background as an engineer is as CEng and RPEQ having worked for consultants and major mining companies within the resources sector, completing projects across Australia.



My current role is as an Asset Management Specialist covering mining, transport and rail clients focusing on the management of the entire equipment life cycle from feasibility, operational readiness, maintenance, operation, reliability improvement and performance optimisation.

I look forward to this new responsibility in the Oceania region and the IMechE at large.



Colin Sheldon
IMechE Oceania Secretary



PAPUA NEW GUINEA

IMechE members and students in Papua New Guinea (PNG) and other islands are a distinctive and unique part of the IMechE Oceania Region. We have a long connection with the University of Technology in PNG.



Currently, feedback is that Papuan New Guinea (PNG) has been quiet. The country has a State of Emergency Order in force and travel is restricted to only those who have permission to do so.

PNG has adopted similar COVID-19 procedures to Australia in requiring 14 days quarantine for anyone coming into the country (if you have been given permission to do so). A difference is that you have to quarantine at your own cost.

Most flights are from Port Moresby to the provinces to bring citizens back home. Flights back to Moresby are usually not allowed unless you have special permission. I have not heard much from the university recently and I don't think I will going over anytime soon to view their SOFE: if it is going ahead at all.



Les Yeow
Chairperson, IMechE Oceania Region



APPLICATIONS INVITED FOR THE PAUL HENDERSON PRIZE

Applications are invited from IMechE Oceania members (any class) for the Paul Henderson Prize awarded for a paper of appropriate quality in mechanical engineering published in an IMechE journal or equivalent.

The founder of the prize was Paul Henderson, an Australian IMechE member and Chair of the Australian IMechE Branch. The award of the Paul Henderson prize is on the advice of the IMechE Oceania Region committee (previously the Australian Branch Committee) and is awarded by the IMechE Trustee Board Awards Committee.

The Paul Henderson prize comprises a certificate and a financial award of £500 (this year increased from the previous value of £275).

Last year, the Paul Henderson Prize was awarded to Dr. Michael Riese for his paper on 'The Influence on Data Variation Versus Sampling Time in Achieving Accurate Representation of Refrigeration System Performance'.

Applicants are invited to submit applications to the Chairperson of the IMechE Oceania Committee, Leslie Yeow.



*Dr. Terence Love
Editor, IMechE News Bulletin*



NIC COULTHARD WINS ISB VOLUNTEER OF THE YEAR AWARD



I am very proud to have been selected as winner of the IMechE's ISB (International Standards Board) Volunteer Award for 2019.

There are only two recipients each year and this is the second time in the past five years that an Australian based member has been recognised.

Since 2015, my work with the IMechE's Victorian Panel and Oceania/ Australia Branch has provided me with

motivation, purpose and recognition - even at times when my career did not.

Highlights have included organising panel events, mentoring young engineers, and as a few of you know, producing this News Bulletin!

Over the next 12 months I will be representing the IMechE in discussions with the Victorian State government as it prepares to introduce a mandatory registration scheme for Engineers.

The opportunities I pursued were infectious and all started with a simple decision to attend an IMechE Panel meeting. So, thank you Paul Draper for encouraging me to attend that first meeting, and thank you Roshan Dodanwala and Les Yeow for supporting my nomination for this award.

If anyone reading this is considering getting involved with the IMechE volunteer network but hasn't yet taken the plunge, why not email your local panel right away and ask how you can get involved? There's so much you can do and I promise you won't regret it.

*Nic Coulthard
Member, IMechE Victoria Panel Committee*



IMECHE VICTORIA PANEL VISITS ABILITY WORKS AUSTRALIA



Thanks to Sue Boyce, the CEO of **Ability Works Australia**, IMechE Victoria members got the chance to visit this fantastic company.

Ability Works is a not for profit social enterprise operating since 1963 in Kew, Melbourne. It is a people-centric supported workplace, operating commercially to create opportunities for people living with a disability and those socially excluded, with the aim to discover their potential and enhance their lives.

The organisation produces and trades in goods and services with many businesses through their four

business units:

- Wire & metal fabrication,
- Digital technology
- Packaging and assembly
- Logistics and fund-raising,

IMechE members were thrilled to see how practical engineering and innovation can be used to create opportunities for those with disabilities.

An example is the story behind an ingenious hand power drill application to enable a person with a disability to complete a commercial task.



Craig Young and his team were given large number of M30 bolts and nuts to tighten to a certain length for construction purposes.

To make this task suitable for a person with a disability, they designed a frame to enable the operator to tighten the bolt correctly. Since doing this task manually was both time consuming and physically challenging, they decided to use a hand drill to tighten the nuts. They used a reduction gearbox to increase the torque output of the hand drill.



The set up shown in the above image allows a person with disabilities to produce parts that meet the client's requirements in a very short time frame.

*Farbod Rahimi
Young Members Rep., IMechE Victoria Panel*

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YOUR IMECHE: DIVERSITY AND INCLUSION

'Your IMechE' is a new section about different parts of the IMechE relevant to Oceania members. The focus this edition is the IMechE Diversity and Inclusion Committee (D&I) who provide guidance to the Trustee Board.

The vision of the IMechE Diversity and Inclusion Committee includes that:

- All IMechE activities and campaigns should be inclusive and representing the diversity of the membership and the engineering profession.
- Ensure that diversity and inclusion sits at the heart of the Institution's core values and business ethics and encourage fairness, trust and transparency.

As a matter of policy, all IMechE activities, events and initiatives are intended to be inclusive and represent the diversity of membership in the engineering profession and the IMechE. The aims of the Diversity and Inclusion policies and the D&I committee are to:

- Support a diverse and inclusive profession that inspires, attracts and retains people from different backgrounds, reflecting our increasingly diverse society
- Identify and address any perceived barriers within the Institution
- Tender advice and make recommendations to the Trustee Board concerning the direction and strategy of the Institution in relation to diversity and inclusion
- Develop and support the implementation of the IMechE's diversity and inclusion programme in line with the Institution's strategic objectives
- Engage and collaborate with other relevant bodies and PEIs as appropriate to the objectives of the Diversity and Inclusion Committee, and IMechE
- Develop a diversity and inclusion benchmark and gain best practice
- Collaborate with advocates in the area such as disability, gender and ethnicity

The role of the Diversity and Inclusion Committee is important especially for women. Currently, less than 10% of IMechE members (Affiliate, Associate, Member and Fellows) are women.

Why is the percentage of women so low in IMechE and why is it changing so slowly?

Some would argue it is due to the lack of diversity in UK industry: lower than other countries such as India (30% of engineering students are women,) or Iran (70% of engineering students are women,) or Denmark (38%), Russia (36%), Tunisia (41%), Malaysia

(50%) and 53% in Brunei.

However, more than a quarter of IMechE members are from countries outside the UK that have much higher representation of women in engineering.

This suggests the low proportion of women in the IMechE is more to do with the IMechE itself rather than conditions in the UK.

The latter was an important reason for the formation of the D&I committee and points to the importance of its work.

More details are available at: <https://www.imeche.org/news/news-article/women-in-engineering-at-the-imeche>



Dr. Terence Love
Editor, IMechE News Bulletin



INTERNATIONAL STRATEGY BOARD REPORT

The International Strategy Board (ISB) usually meets three times a year to discuss issues relating to IMechE members residing outside the UK. The participants comprise the Regional Chairs from the seven regions around the world, the International Vice-President who usually chairs the meeting plus additional invitees to introduce initiatives which are of interest to international members.

At our latest meeting, held via video conference link, we discussed the following issues.

Digital Engagement Project

In this project, the IT department in London are in the process of upgrading the Lyris system we use to provide mass communication to our members. While the current system is fairly easy to use, it does not provide transparency in terms of who the emails go to and more importantly who they miss out.

The introduction of GDPR laws have constrained our ability to contact all IMechE members as necessary to advise them of key events such as Annual General Meetings and invitations to special local events.

The GDPR appears to prevent us from automatically sending information to members and instead requires

members to opt into receiving such information. Perhaps it is timely that everyone reviews their profile on the IMechE website to ensure that you are opting in to being informed of events. You will miss out otherwise.

The **NearYou** general events management page from which we find information relating to regional-based events is also being upgraded to a more user-friendly system. The original target date for implementing the new system was initially set for the end of 2020. We hope that the pandemic does not delay it.

Modifications to the Terms of Reference for the ISB

Discussions were had in relation to the election of the ISB Chair. To date it has been assumed that the International Vice President chairs all ISB Meetings. In future, the chair will be elected from the Regional Chairs within the ISB.

There are further issues to address in terms of Council and Trustee Board membership of the ISB Chair. It was also decided that Regional Chairs would be allowed to serve two terms if appropriately elected. This is in line with Council membership which is also two terms. Future election results will be publicised in detail to provide transparency in the election process.

Professional Review Interviews (PRI)

In view of current social distancing requirements and travel restrictions, it was decided that the IMechE would encourage PRIs to be conducted virtually using the video conference platforms available in the market. Additional administrative procedures would be introduced to ensure a fair interview process. Application procedures from candidates remain the same.

Volunteers Handbook

The International Volunteers Handbook will be updated to reflect the many changes that have been happening over the years.

Closer cooperation with the Verein Deutscher Ingenieure (VDI)

VDI is Germany's version of Engineers Australia. They have approached the IMechE to seek closer cooperation in terms of events and mutual recognition of credentials. Discussions are ongoing.

Application to the Board of Professional Engineers Queensland (BPEQ)

This is to enable the IMechE to become an approved assessment organisation for the RPEQ qualification.

I presented a business case to the ISB to seek endorsement for our intention to apply to the BPEQ for IMechE to be an approved assessment organisation.

As I made the case, I impressed upon the team that Victoria and NSW will be implementing local state-based professional registration by July 2021. I feel that this is an important initiative for the IMechE to pursue in Australia or risk becoming irrelevant in the coming years if the IMechE qualification is no longer recognised as local professional registration: which is a requirement to practise.

It appears that a few of the other regions are also looking to achieve the same things in other parts of the world. While some may involve the signing of a Mutual Recognition Agreement with a local Professional Engineering Institution (like the IMechE and EA), others may require more criteria to be satisfied like those in the United States where a candidate may be required to undergo a professional examination to qualify as a Professional Engineer (PE) in that State.

The ISB has proposed that a strategy is developed to address the initiatives being suggested in this area. Another meeting has been planned by the ISB for mid-July to discuss the development of such a strategy. I will be making a very strong case that we proceed with this application as soon as possible in order to maintain the value of our credentials in Australia.



Les Yeow
Chairperson, IMechE Oceania Region

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AI & MACHINE LEARNING



Ricardo Garcia-Rosas on AI and Machine Learning

On 7th July, the Victorian Panel hosted its first virtual event, presented by Ricardo Garcia-Rosas of the University of Melbourne.

The presentation was delivered via Zoom to participants from Australia, UK, Netherlands, Pakistan, India, Sri Lanka and Hong Kong

Ricardo's presentation covered the following areas:

- **Artificial Intelligence (AI)** - machine-based problem solving.
- **Machine Learning** - where a computer is not explicitly programmed but instead relies on statistical or neural network methods.
- **Deep Learning** - problem solving using multiple hidden layers of neural networks.

Machine Learning (ML) relies on very large amounts of data and teaching. ML examples include face recognition, speech recognition and synthesis and control systems in self driving vehicles.

Ricardo drew attention to the problems of bias and ethics, especially of concern in Machine Learning. E.g. bias can emerge in ML staff hiring and criminal justice systems. Bias is complex and hard to fix. An example of a Machine Learning ethical issue is where an automated bank mortgage lending system maximises bank profit via predatory customer recommendations.

AI and Machine Learning offer benefits in many areas of Mechanical Engineering including:

- Prediction and optimization applications
- Faster computational and fluid dynamics simulations with improved modelling
- Ability to create simulations from videos
- Reliability and failure prediction
- Generative design
- Bio-engineering
- Supply chain optimization
- Materials synthesis

Ricardo drew attention to the need for engineers to understand the benefits and limitations of AI and Machine Learning and the need for new ethics regulations around their use.



Paul Draper
Victorian Panel Chairperson

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NSW PANEL REPORT

The NSW Panel are looking to remobilise after the lifting of restrictions that have been in place in NSW.

No events are planned at this stage but we have been sharing details of IMechE online activities and looking

forward to being able to engage with our members again in the future.

We are working with others in the Oceania Region to establish options for SOFE this year.

Our Young Members representative, Jerald Skuta, has moved on from the IMechE panel. We thank Jerald for all his efforts and wish him well for the future.

We have one PRI planned.

Panel members are remaining busy in their day to day roles. The return to normal ways of working will enable us to start interacting with members again soon.



Neil Moriarty
NSW Panel Chairperson



NZ PANEL REPORT

Face to face discussions have not occurred during the NZ lockdown, but because the team are geographically dispersed, it has not impacted too much.

Our next IMechE event will be hosted through the ENZ platform, and will focus on the IMechE Environmental Prize-winning SPIKEY tool for improving dairy pastures.

An on-line SOFE competition is planned: to improve the opportunity for representation in NZ.

The new Treasurer is getting the record keeping under control. The new Secretary and ENZ Panel Committee are completing on-line IMechE training programs for managing Panel business and we have recently completed one PRI.



A practical word of advice - if the country is going into lockdown, and you are scheduled to move house... perhaps delay the move....

I didn't... and ended up moving house during the first day of lockdown. Although enjoying the new house, there has been no opportunity to unpack and no supply chain to deliver furniture, or even take away empty boxes: these are now doubling as tables and desks. My glasses gave up the ghost and I became a Jack Duckworth body double for a while!



Darren Sharpe
New Zealand Panel Chair



QLD PANEL REPORT

The QLD Panel is taking advantage of video-conferencing and now using these platforms to run PRIs remotely during isolation restrictions.

In February, we ran a successful event, 'Learn to Weld with HDPE' to kick off the new year.



Learn to Weld HDPE Pipe with +GF+

The QLD Mechanical Branch and the IMechE Queensland Panel invites you

With the current COVID-19 situation, the QLD Panel is looking to move online and investigate options to run other events over video-conferencing technologies.

The QLD SOFE competitions will be held in October as per 2019, unless remote opportunities become a possible option.

The Panel is embracing the new norm and has now held their Panel committee meetings successfully via video-conference.

We are looking to welcome the wider QLD member-base to our meetings when isolation

restriction are lifted, as well as running more events.

This quarter we have completed 2 PRI's . One was for CEng and one for IEng. Both were successful in their attempts. No further PRIs planned at this stage.

Our long serving Treasurer, Dayaratne Dharmasiri has decided to retire from the QLD Panel Committee.

We thank Daya for his contribution over his many years involvement with IMechE and look forward to continuing to see him at our events and meetings.



Colin Sheldon
Queensland Panel Chair



VICTORIA PANEL REPORT

Thanks to COVID19 we have had a quiet start to the year here in Victoria.

We have only organised one event which was a visit to **Ability Works Australia**, an organisation set up to give people with special needs meaningful work and a sense of purpose.

The visit was organised by Farbod Rahimi, our Young Members representative, and his report on the event is found elsewhere in this News Bulletin.



Paul Draper
Victorian Panel Chairperson



WA PANEL REPORT

The WA Panel committee has not met this quarter due to COVID and personal safety issues.

No events are currently planned but we anticipate an

event once restrictions are relaxed.

The WA branch is currently considering the best way forward for the SOFE competition based on the current COVID situation. We are considering whether we can complete the presentations remotely but anticipate students number to be lower based on fewer students on campus.

The WA panel is looking to recruit a Secretary and are encouraging interested IMechE members to join the committee.

No PRIs were undertaken last quarter and none are planned for the next quarter. The number of interviews is significantly behind previous reporting periods and we don't know why at this stage.



Ben Witton
Western Australian Panel Chair



Next edition

The next edition of News Bulletin will include:

- Oceania Region updates and changes
- Information about exciting technical innovations
- and more ...

News and Articles

Please send news items and articles you feel would be of interest to Oceania Region IMechE members to the News Bulletin editor, Dr. Terence Love, at:
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