



New Melbourne Tram during trials

MELBOURNE'S NEW TRAMS

In September 2010, Bombardier Transportation Australia was awarded the contract to supply the next generation of tram, or light rail vehicle, to the Melbourne tram network by the Victorian Government.



Cabin Section of the New Melbourne Tram and further trials



To put this into context, the Melbourne tram network is one of the largest networks in the world with over 250 kms of track and over 480 trams available for service. The tram network is an iconic element integrated into the fabric of Melbourne – however like any piece of infrastructure, it is aging as is the fleet of trams that services it. Added to this, the patronage on Melbourne's public transport system is continually growing and the tram network is no exception. Many of Melbourne's busiest tram routes are close to capacity, with demand projected to continue to grow into the future. To assist in addressing this, more rolling stock with greater capacity was required, for which the Victorian Government ran a competitive tender process in 2009-2010.

This allowed manufacturers to offer the best alternatives from within their portfolios without designing systems from scratch. To that end, Bombardier offered a vehicle that responded specifically to the Melbourne specification's requirements whilst

offering service proven systems from Bombardier's light rail, bogie and propulsion technologies.

The nature of the Melbourne network and operational environment drove a number of specific requirements within the specification, key among these being a need for a rotating bogie and an axle load under 10 tonnes.

All low floor tram designs represent a series of trade-offs to achieve a low floor outcome. Many of these trade-offs relate to the entry height and amount of space within the passenger saloon and its interaction with vehicle systems such as bogies. There are many different approaches to this which also effect vehicle performance. In the case of the Melbourne E-Class tram, the customer had identified that they wished to utilise the features of a rotating or steering bogie – that is the bogie rotates under the vehicle. In the case of many low floor tram designs, in order to minimise the amount of space within the passenger saloon given over to bogies, the bogies only steer or rotate a minimal amount, making it necessary for the

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vehicle to feature multiple articulations so that the vehicle can “bend” to go around corners. One of the undesirable side effects of this approach is that the wheels will rub the edge of the rail as they go around a corner, resulting in wear, which will also cause a “squealing” noise. The adoption of a rotating bogie also removes the requirement for multiple articulations – in the case of the E-Class tram, which is 33 metres long, we see two articulations linking three modules; a low floor tram of this length without rotating bogies would see a five module tram linked by four articulations.

While this means better cornering performance, less noise and less track wear, the trade-off is that more space within the passenger saloon needs to be surrendered to accommodate the movement of the bogie.

The requirement for the vehicle to feature an axle load under 10 tonnes is driven by a further desire to minimise wear and tear on the track infrastructure – the lower the axle load, the less forces are being put into the track. Due to the size of the vehicle and the resulting likely weight, this requirement essentially determined that this would be a four bogie vehicle. Again compared to many low floor vehicles of this length, a five module vehicle would see three bogies, one each under the end and middle module with the two intermediate modules supported between the two. This approach has some advantages for seating and interior layout, however is not the optimal design for an operational environment such as the Melbourne network. This four bogie design also delivers excellent ride quality.

In order to achieve this, a number of activities were implemented, including the lightening of structural members through cutting sections out of them and the use of a composite floor in the passenger saloon. Composites were also used elsewhere throughout the vehicle – for example in the air conditioning ducting.

Basic construction for the E-Class is three modules, each formed from an underframe, side walls and roof



Delivery of New Melbourne E-Class Tram to Preston Workshop

section. Two modules each have a driving cab, two doors per side and one bogie, the centre module with two bogies and a central door per side. Each of the elements (underframes, sidewalls etc.) are manufactured in parallel and brought together to form the individual driving or centre module.

This design also features a bolt on cab – which is exactly what it sounds like; a complete driver's cab that is bolted onto the front of the driving modules. The driver's cab is mainly constructed and fitted out separately before fixing to the front of the vehicle. As the Melbourne tram network has approximately 800 accidents per year, of varying degrees of seriousness, the bolt on cab design allows for the rapid repair of a crashed vehicle. This is important as some of the older tram designs could be out of service for months while repairs are carried out. Also, the growing amount of electronics present in a vehicle, especially leading into the driver's desk, make the ability to swap a complete cab and reconnect cables far more straight forward for vehicle repairs.

Once the main modules are constructed, any distortion due to welding is addressed and they are painted. Still as individual modules they then begin the fit out process with flooring, and other interior elements added in. Wiring looms are formed on site and, via a mobile frame arrangement, they are installed into the module in a single process. A similar approach is used to install the air conditioning ducting, with the complete ducting for a module assembled onto a frame and then installed in a single process.

From there, windows and doors are fitted, and other electrical equipment is installed, connecting to the previously installed wiring loom. These stages are very labour intensive, with different

trades and skills being coordinated to achieve the most efficient access to the interior of the vehicle. Interior panels, grab handles, weather shields and the like are installed also.

Roof top equipment, such as air conditioning units and propulsion equipment is fitted while work is carried out on the interior of the module. The individual modules are moved through the workshop on trolley style platforms where the bogies will ultimately be installed. In the individual work stations they are supported on stands while workers move in and out of them.

The three modules are then formed into a full tram unit and the cabs are fixed to each end of the vehicle. Cab fit out continues with the final installation of equipment into the driver's desk. Once the vehicle is essentially complete, it is moved as a single unit to the test building where it has its bogies installed – a complete vehicle set of jacks lifts the vehicle and lowers it into place for final connection of the bogies. From there it conducts static testing within the test bay, which features the 600 volt DC overhead power supply used in Melbourne, prior to undergoing some dynamic testing on the in-house test track at the Dandenong factory.

When factory testing is complete, the vehicle is delivered via road to the Preston Workshops to undergo network testing prior to acceptance and entry to revenue service. The first units undergo a series of type testing, when this is achieved the serial units undergo functional and safety testing to achieve acceptance for revenue service. ■

John Ince

*Business Development Manager
Bombardier Transportation Australia*

EDITORIAL

I have now been a member of the Institution for ten years, joining just after I finished school and went into an industry based (IBL) gap year. The changes I've seen in image, approach and support in those years has been incredible! And the changes in my last three years in Australia have been equally positive.

This brings me to the *News Bulletin*, this has changed also in my time as editor. I have tried to reflect the wishes of the membership as well as

put my own spin on the final product. Whilst putting this issue together I was amazed at how much easier it was than when I started, the States and YMS sent in their updates on time, I received several articles from keen authors without prompting and the standard of content was exemplary. I do still have the odd nudge to give but by managing the deadline and time properly I no longer have to rush to put the *News Bulletin* together last minute.

I hope you all appreciate this **Bumper Edition** with more articles and space

for the ever increasing activities and presence around the country and region.

I would like to say a big thank to everyone who has been in touch, were unlucky in the wordsearch or have authored an article. I look forward to even more feedback and interaction for the January edition.

Matthew Springer

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Check out the **nearyou** pages on imeche.org for contact details and events.

WHAT'S STOPPING YOU GETTING PROFESSIONALLY-REGISTERED?

Working together with IMechE International Business Development Manager, Rachel Leech, members of the Victoria Panel and Australian Young Members Section have been learning more about the various routes to professional registration.

Outside of Affiliate (primarily student) and Associate (graduate) membership of the Institution, there are three membership levels to aspire towards, each suitable for individuals with different roles and strengths – see inset box.

You need to demonstrate specified levels of competence, plus academic or demonstrable equivalent learning in order to apply for membership.

The phrase “or equivalent” is key. Many potential applicants to IMechE do not realise that to reach CEng, IEng or EngTech status, you are not required to have a degree or masters. There are options available to those who have all types of background knowledge.

Competences are to be demonstrated in a range of areas: theoretical knowledge and the practice of mechanical engineering; leadership; communication and professionalism.

As a progression from each of these levels of professional registration, you can also work towards Fellow (FIMechE) membership.

Rachel would like to support more members in Australia (and beyond) through the process of membership - whatever their best route may be. If you are interested in finding out more about the process for you, your employees or colleagues then get in contact.

Based in London, UK, Rachel travels worldwide, working with companies and individuals to promote professional registration and advancement through IMechE.

If there is enough interest, she would like to visit Australia in the near future, to promote registration to local engineers and technicians. If you would like to discuss developing a scheme for engineers at your company she'd be pleased to hear from you.

Rachel Leech (pictured)

International Business Development Manager

r_leech@imeche.org

Ed: If you are interested in discussing professional registration at your company or for your personal development get in touch with either Rachel or your local panel – they would be pleased to hear from you.



Professional Registration Terminology

Chartered Engineers (CEng)

are professional engineers who develop answers to engineering problems using new or existing technologies in creative and innovative ways.

Incorporated Engineers (IEng)

are professional engineers who maintain, manage and apply current and developing technology.

Engineering Technicians (EngTech)

are concerned with applying proven techniques and procedures to the solution of practical engineering problems.

THE FINER DETAILS OF MODELLING HEAT EXCHANGE IN AIR COOLED CONDENSERS

Following an article in January's edition of the News Bulletin on modelling heat exchange performance of two Air Cooled Condenser (ACC) units at Millmerran Power Plant; this article provides a further look into the specifics of building such a numerical model aimed at determining whether the two units were suffering from any loss of performance due to recirculation of hot exhaust under crosswind conditions and what might be done about this.

The CFD model was built using ANSYS's CFX package through the Workbench GUI. The Design Modeller CAD front end was used to build the computational domain consisting of the two ACC units surrounded by a volume of air sufficiently large to capture all flow effects (*fig. 1*). In this domain a Boussinesq buoyancy model was used to capture the effect of the 'hot air rising'. Turbulence was modelled using a K-Epsilon formulation which was chosen in part because of its successful application in the past to similar flow problems.

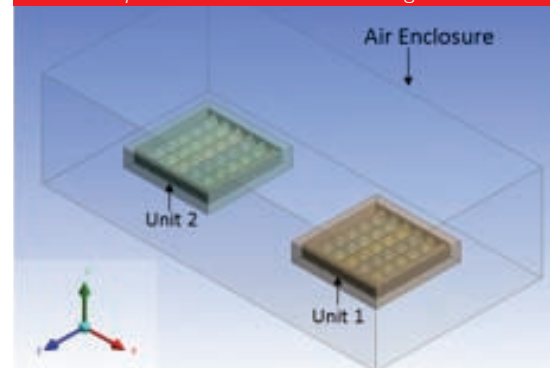
The two ACC units each consist of a 6x6 grid of fan cells which act to cool the hot turbine exhaust flowing above them through a finned tube bank. The modelled geometry of each ACC unit consists of a number of smooth, no-slip walls surrounding each fan cell which in turn contains two separate subdomains. The first subdomain being a momentum source acting as the fan and the second a momentum sink and heat source acting as the finned tube bundle.

It was necessary that the numerical model of the fan be able to hunt for its operating point in the same way a real fan would (with respect to volumetric flow rate and static pressure rise).

This was implemented in CFX through the use of user expressions and functions which effectively measured the flow rate across the fan, matched this to a static pressure rise on the fan's performance curve expression and then from this calculated the momentum to be supplied.

The finned tube bundles were setup in the model as rows of rectangular prisms in an A-frame arrangement. Their supply of heat to the model was implemented with a volumetric heat source whose source term was simply calculated by the division of the required heat rate in watts by the volume of the subdomain. The implementation of the momentum loss of the finned tubes in the CFD model was a little more involved due to the fact that the geometric complexity of these tubes prevented their inclusion on a global scale (as this complexity would cause impractical solution times). As the resistance to flow the finned tube bundles presented was unfortunately unquantified I had to develop a separate local CFD model consisting of a small section of finned tube in what was effectively a computational wind-tunnel test. This model was used to formulate an equation describing the pressure drop across the finned tube bank as a

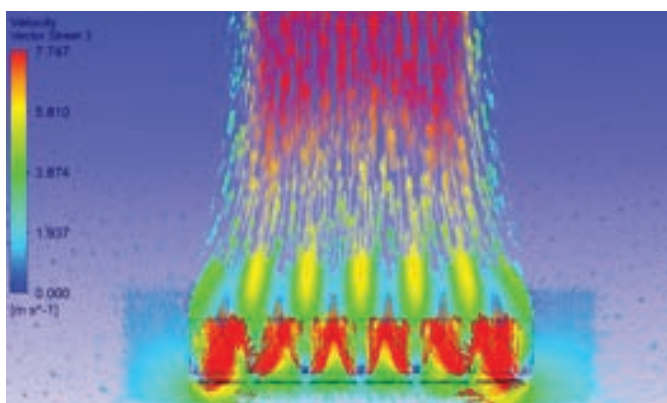
1: The computational domain built with Design Modeller



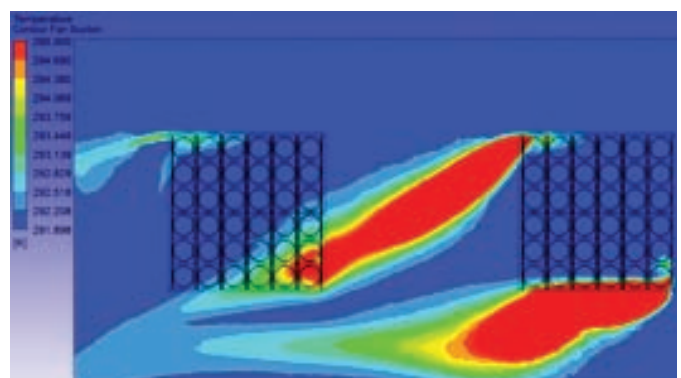
function of air speed. This equation was used in the global model to define the loss terms of the momentum sinks used to approximate the finned tube bundles.

After setting up and meshing the model, a total of 57 cases were run. These cases were made up of a number of combinations of different crosswind speeds and directions as well as several modifications to the ACC's geometry such as raising and lowering different wall sections and adding mesh screens (in an effort to improve the heat exchange performance by reducing recirculation). The CFD model was verified through iteration convergence tests, mesh convergence tests and sanity checks such as heat balances of the results. Through the use of ANSYS CFX a model was developed which was successful in determining the degree to which the ACC's performance has been reduced (*fig 2 & 3*) and in assessing the effectiveness of a number of retrofittable solutions. ■

Liam Irvine
Graduate Engineer



2: Velocity vector plot of airflow through one of the ACC Units (front view)



3: Temperature contour plot showing recirculation between the two ACC Units (top view)

FROM THE CHAIR:

Greetings!

"How would Wright brothers feel if they were here today?" This thought occurred to me while observing the moving slats, flaps, spoilers, ailerons, etc. of the plane on my flight home from the last Branch executive meeting in Hobart; How far aviation has progressed since its inception. How much the various pieces of equipment we see so regularly on aircraft today have developed. We reflect in admiration at the progress that has occurred from the very first flight to what we have today, in an amazingly short time span. The only thing that has remained unchanged is the theory or the principle of uplift. This inspirational advancement in engineering prompted me to correlate my thought to our own Institution. It was a good starting point to write.

How would our George Stephenson feel if he was here today, to see our expansion across the world with more than 100,000 members? I would like to think he would be impressed. Today we proudly look back at our 166 year history. We are grateful to our predecessors for their hard work and dedication. Our Institution would not have been as prominent as it is today without their collective work, effort and contribution. They can be pleased knowing that their hard work has been prolific.

I am humbled to take over such a healthy and prosperous organisation. The Australian Branch today is more lively and dynamic than it has ever been. There are an unprecedented number of activities occurring, its demographics are evolving, and it is going through a positive transformational phase. There were times when the majority of Branch consisted of seniors. Now it has changed and we are seeing a spike in the number of young members, bringing energy and exciting ideas to the table. I graciously thank everyone for giving me the opportunity to lead this organisation through such a marvellous period in its existence; it is indeed an honour to be the Branch Chair of this prestigious Institution.

In all honesty, this opportunity came at a good time too. Having been in the railway industry for my entire career, I

have become a victim of restructuring just one month after my taking over as Branch Chair. What a coincidental convenience, now I can invest more time in our Branch, until I find my next job of course.

I earnestly look forward to the future, and will promise to not miss any opportunity to further improve and advance the status of our Branch, as well as the Institution itself, in every way we can. I will assure you that I will do my best with utmost diligence, for the best of our Institution.

I am so glad and so proud that I have the support of such an energetic and enthusiastic team of people. My colleagues in the Branch, Panels, and Young Member Section, are like family to me; the IMechE family indeed. It has been a privilege to work with them over the last couple of years. Your invaluable support, encouragement, companionship, and guidance will assist me greatly in the years to come.

My vision for the future is to see our Institution be a truly global organisation of which every single mechanical engineer in the world strives to become a member. I would like to see the day where we do not need to campaign for members. I firmly and honestly believe that this is possible. We shall begin this endeavour with our Branch.

We need new ideas and younger members. We need to think above and beyond member benefits. We need to think what we can collectively do to benefit society and humankind. Imagine 100,000 members. We will have enough momentum and energy to spin the world ourselves if we work

together. What we need to emphasise is that there is no demarcation between the Institution and its members. We are not customers of the Institution. We, the members, are the Institution. I strongly encourage you to join a local Committee and help our course. If you have new ideas or initiatives please don't hesitate to put them forward, either to me or any of our team members, so we can endeavour to put them into action. My contacts are below.

With the intention of meeting our members in person and probable commencement of Speak Out for Engineering (SOFE) competition in Tasmania, we held our last executive meeting in Hobart, see below. It was a very encouraging and engaging affair. We met 30% of the Tasmanian membership, a statistic hard to achieve in any other State. We also met with Dr Jason Lavroff and established relationships with the University of Tasmania. All discussions were fruitful, and we are confident that Tasmania will soon be in our SOFE programme.

I pledge, together we will work relentlessly to further advance our Branch and our Institution in the promising years to come.

Kind regards.

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Branch Executive meeting in Hobart

LATERAL THINKING LEADS TO LATERAL SIGNAL MAST

Melbourne's Metro rail network is expected to do the heavy lifting when it comes to future public transport usage in the southern capital. The rail network is currently comprised of 15 lines carrying over 200 six-carriage trains through 217 stations.

Patronage has climbed to over 800,000 daily journeys along 869km of track, so the engineers employed by Metro have to think outside the box to build capacity for future growth.

Metro Signalling Engineer, Bryan Lai, has risen to the occasion with an award winning design for a tilting signal mast (top right). The signal mast can be lowered via an internally mounted winch to a safe working level for on-going maintenance.

This piece of lateral thinking has demonstrable benefits for the business.

Technicians will no longer need to work within the proximity of live overhead wires. The old signal design also requires a technician to climb ladders and maintain a signal from an elevated platform. A tilting mast allows technicians to keep their feet firmly planted on the ground.

What's more, the design of the mast requires significantly less materials and fabrication to construct and install which also provides economic benefits to the industry.

Metro has given the green light to use the new signal mast and the first installation of has taken place near Dandenong Station. The Regional Rail Link Project is currently considering its deployment along new sections of track.

"The methodology for testing and approving the design has been a cross-functional exercise. We've seen strong collaboration across Metro Operations, Network Asset Management, Infrastructure Delivery and our dedicated drivers to ensure we develop robust operational and safety procedures" says Bryan Lai,



Award winning design for a tilting signal mast

"we expect to see this new style of signal replacing older style equivalents during continued maintenance and renewal works."

Bryan won the Australasian Railway Association 2012 Annual Rail Industry Young Achiever Award for his tilting mast design. The award was presented at a gathering of hundreds of rail industry colleagues at the AusRail conference in Canberra.

Rail networks often refer to engineering as the 'backbone of the company' and it's no wonder, given the dependencies that hang on a high performing infrastructure. Metro's tilting mast is a great example of in-house expertise planting the seed for an industry-wide advancement of international significance. ■

Chris Fletcher
Metro Trains



Bryan Lai receiving the 2012 Annual Rail Industry Young Achiever Award

IMECHE CPD UPDATE

IMechE has re-launched its CPD support services now offering a range of tools, case studies etc. to support members achieve, record and monitor their CPD.

The Institution is encouraging its members to become aware of, and put to use, all the career developing mechanisms it provides for them. Engineers often say that they learn something new each day: now you can make this count towards your Continuing Professional Development (CPD). Capture the benefits of your new learning by logging it on **Career Developer**, and demonstrate your on-going commitment to your career.

Career Developer has recently been modified specifically for those who hold professionally registered status. Now, more members can record their CPD using the Institution's highly valued online resource, including those who want to progress from Member to Fellow. Traditionally,

Career Developer has been used by students and early graduates, who also structure their progress through the Monitored Professional Development Scheme (MPDS). Feedback to the Institution has revealed, however, that many engineers have continued to use Career Developer beyond professional registration as they accrue further experience, finding that this method of recording and chronicling skills, goals and achievements is the perfect structure to support their progression.

Enquiries can be sent to cpd@imeche.org, where a team will endeavour to respond to an engineer's query about their activities on Career Developer. <http://www.imeche.org/membership/professional-development-and-cpd/continuing-professional-development-cpd>

t p h a u s t r a l i a e
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NB167 – Wordsearch Competition

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

AUSTRALIA CARBON CHARTERED
ENGNOV EXCHANGER FUTURE HEAT
HONG INCORPORATED KONG MAST
MELBOURNE PATHWAYS PROFESSIONAL
PUMPS REGISTRATION SAFETY SENIOR
SIGNALS TECHNICIAN TILTING
TRAM VULCAN

SAFETY – WHAT'S IN IT FOR ME?

Whether you are giving or attending a safety talk you frequently see that not everyone is engaged - why is that? To understand this better you need to understand the processes around why people think the way they do. The Australian cultural norms of “give a fair go, mateship and fair dinkum or authenticity, defiance and escape” mean that an audience's internal questions are often: ‘What's in it for me?’ and ‘How do I get out of this?’. This type of internal dialogue occurs when limits, rules or directives are imposed on strongly independent-minded people: it is unlikely to happen in more hierarchical societies with entrenched respect for superiors.

I attended a Health & Safety forum where a psychologist from Sentis Pty Ltd (specialists in the brain science of safety) spoke to us about how people process information. The brain has two functions, one is to sort information and the other is to question. In every 1/18th of a second our brain is exposed to 1850 pieces of information (internal and external) which needs to be processed then sorted. To do this the brain sorts by what they referred to as DIPI:

Danger - things, people or experience that threaten our physical wellbeing

Important - information that is significant based on an individual's perception of its value

Pleasure - events, objects and experiences that are perceived as enjoyable

Interest - novel, different or unusual, people, objects and events

Everyone's perception of danger is different, can you imagine the reaction you would get from a group of mountain climbers as you sit them down to explain the importance of holding onto the handrail as they walk up and down the stairs? What would be their thoughts when every weekend they hang suspended 200 feet above the ground by their fingertips?

Our perceptions influence each of these criteria, ‘What is important to me may not be important to you’ but there are some areas where we have common ground and this is the focus for group attention. For one-on-one engagement (be it safety, work or personal) you need to build relationships to understand what is

important to the individuals and how you can change perceptions.

Pleasure is about making a presentation enjoyable, you remember more seminars when you had a good laugh but still took away the key message and on leaving became an advocate (well for a short time) on the theme.

The last one is interest, when you were watching your favourite team playing on TV and your partner walks in and starts talking just as they are about to score, where is your focus? Applying this to safety talks, you can get caught up telling your audience what is important to you but not to them, produces similar results.

Understanding how people think gives us the best opportunity to successfully get a message across. This is vital when it comes to safety, so remember to think DIPI and structure your delivery so that when people leave they stop to thank you for making a difference.

What's in it for me? A safer workplace where relationships and communication are just as important as rules and processes. ■

Andrew Gagg

Senior Project Engineer KBR

HOW TO REDUCE YOUR CARBON TAX - IF YOU REALLY WANT TO!

Whatever the politics of the situation, there is a now a **Carbon Tax**. That is the reality. In the future there will be an energy trading scheme and the shape of this is to be defined. This tax has been introduced in an attempt to get industry to invest in more energy efficient processes. Notwithstanding the Earth is not going to cool markedly because of this tax the investment in energy savings affects the bottom line in a positive way.

Studies in the USA by the Hydraulics Institute have concluded a number of significant avenues to reduce the use of energy. Firstly it is noted that 35%

of the energy in the USA is consumed in pumping fluids. We, in Australia, live in a developed nation where distances are somewhat greater than in the USA. It could be concluded that we consume similar amounts of energy in the pumping of fluids.

The majority of fluids in industry and domestically is pumped by centrifugal pumps. The HI concluded that over 80% of the centrifugal pumps in the USA were poorly selected and operates outside their best efficiency point (BEP). How does this happen? Who is to blame? This article will attempt to describe what has happened in the design of a process and its equipment.

Mechanical engineers receive information as to the process from the process engineer. Not wanting to end up with undersized equipment that cannot meet the process needs the

chemical engineer includes a margin for error in the performance data. He mechanical engineer uses the data to determine the head loss in a system and specifies the pump performance data. Now the mechanical engineer is no fool and wants to ensure the pump meets the criteria so designs based on an empty tank pumping to a full tank with the pipes, heat exchangers and other process equipment fouled with deposits. His boss not trusting the workings of his junior then arbitrarily adds 105 to the calculated figure. As the Irish would say **“To be sure To be sure”**. So now we have a pump whose differential head may be more than 30% higher than when the system is new, clean and operating as it should do.

On top of this the manufacturer does not want to be in breach of contract. Hence the test data for

NB167 – Wordsearch Winner

Peter Adams from Victoria was the first to respond with all the words found correctly, rapidly followed by several others minutes later. Peter will receive an IMechE prize at an upcoming event in Victoria.

the pump has been manipulated to provide a performance graph. This has a safety factor built in to avoid contractual disputes or failures during a witness test.

If you examine the typical pump curve below you can see why these errors lead to the centrifugal pump being poorly specified. If the duty point ΔH is specified 10% higher than it should be then the amount of fluid that can be delivered is greater. Hence the power used is greater. Not only that the pump would operate to the right of BEP at a more inefficient position.

What corrections are employed?
A control valve could be added to increase the head to bring the duty point back to BEP. This would provide process flow control. Said FCV will burn of energy needlessly. An alternative would be to trim the impeller to a smaller diameter to return the pump's performance to meet the BEP. Does this happen or is an orifice plate inserted or a valve throttled?

What does today's engineer do without thinking too much? They add a variable frequency drive (VFD). Not only does this impact on the capital work costs but it takes up valuable real estate, needs screened cables

and specialised motors. A VFD also adds inefficiencies not considered by the mechanical or process engineer. These inefficiencies include energy losses in the VFD cubicle, need for air conditioning or cooling the switchroom & electric motor inefficiency running at reduced speed. In addition most VFDs need replacement every 10 years. More capital expenditure!

Another criterion that results in poor selection is the dreaded future process requirements. The marketing people think that in the future the process demand is likely to increase. So equipment must be capable of meeting the future needs. However the capital costs must be minimised for the new plant. So rather than designing with a combination of small and large pumps to meet the future duty the centrifugal pump is selected so that a larger impeller can be fitted. The pump may operate away from the BEP for years waiting for the future process needs to arise. Perhaps they never do. Marketing people are renowned for being overly ambitious in respect of the future.

So we have an installed asset base where the centrifugal pumps could all be improved by trimming an impeller,

installing a smaller more efficient unit, controlling the flow at BEP or adding a combination of pumps to meet diurnal and bi-annual process requirements. The Carbon Tax may be the impetus to companies to start looking at the installed assets and reducing the energy used.

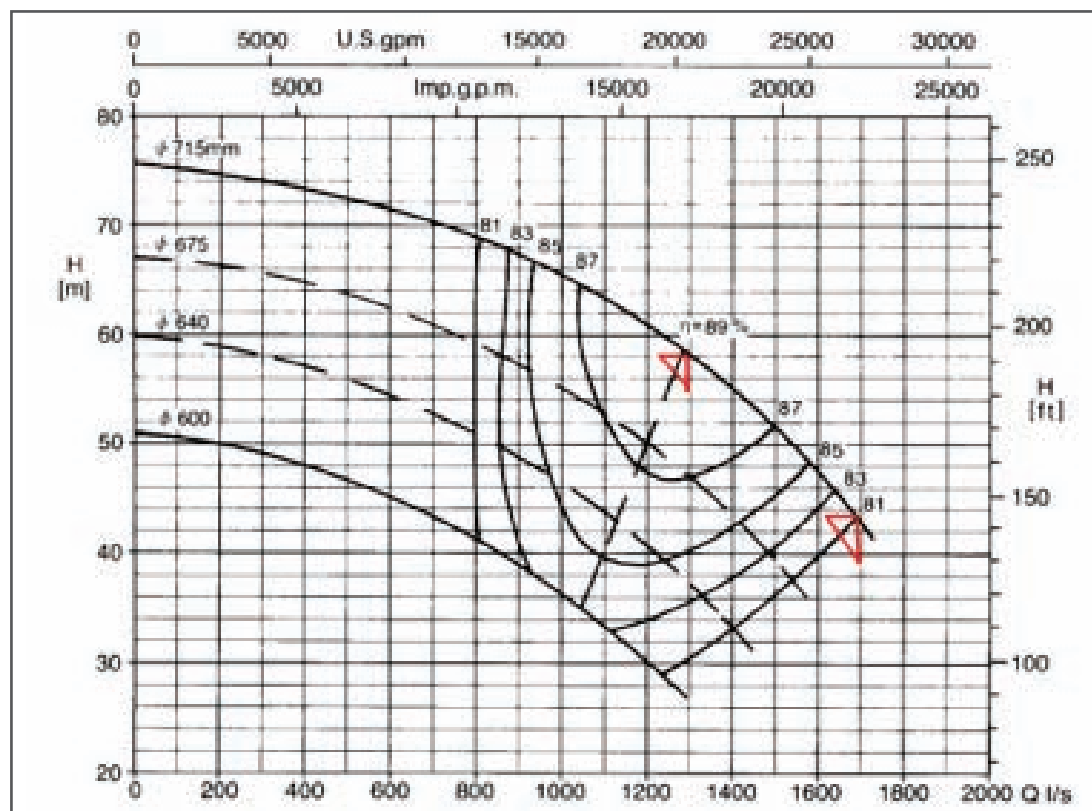
It is realised that the politics are such that management cannot count on the Carbon Tax remaining and may find it just as easy to put their prices up. For they have a good reason it will be hidden in a raft of other price rises and the great unwashed have been compensated already. Also, management may find the engineering necessary to identify the performance losses and Capex to change the asset costly. The investment may not provide a return on investment in a reasonable time frame. Is this cynical? Perhaps, but realism prevails and is the driver sufficiently onerous? Only you the engineer can make an assessment and an argument for change.

Useful papers and software can be found at links in the website below.

Geoffrey D Stone

FIMechE C.Eng RPEQ

<http://waterhammer.hopout.com.au/>



Typical pump curve

OCEANIA REGION NEWS

There are three aspects of IMechE in the Oceania Region that I would like to bring to you in this update. The first is the event to be held in Hong Kong between 13 and 17 September that will bring together over 700 young engineers from throughout the region, and known as EngNow. The earlier 'working' name for this event was the Asia Pacific Initiative.

Members within the North East Asia Region have worked extremely hard to put together a wide programme aimed at providing a 360 degree view of what "leadership" is to the young engineer of today, top right shows some of the organisers at the launch. The programme is very comprehensive and of great depth with many eminent speakers. Five young Oceania engineers will participate in this Young Leadership Conference, three of whom are our Oceania contestants in the Speak out for Engineering (SOFE) Regional final. The event starts with a Reception on 13 September at the

British Consulate in Hong Kong. This is to be followed on 14 September with the SOFE Regional final, and on 15 September with the final of a region wide Design Competition. The Young Leadership Conference runs over two days, 16 and 17 September, and is based at the Hong Kong Polytechnic University. The event concludes on the evening of the 17 September with a Gala Dinner at the BP International Hotel.

I would also like to acknowledge progress made within the Australian Branch in expanding the Young Member Section structure to establish Young Member Groups in the five major cities. In turn these Groups are establishing Student Chapters aligned to universities in their locale. This marks significant progress in achieving an objective set this year by Belinda Herden, the Oceania Young Member Representative.

Finally I wish to cover two successes



Oceania EngNow Organisers at the launch event in the Speak out for Engineering (SOFE) Regional final

within the Region concerning the IMechE Heritage Awards Committee. We have been successful with two submissions, being the Repco Brabham BT19 Grand Prix Car in Melbourne, and the Armstrong (Disappearing) Gun near Dunedin in New Zealand. We are now working towards presentation ceremonies for these two artefacts, probably in 2014, and we will provide you with details as they are put in place.

Ken Tushingham

Chairman Oceania Region

Editor's Note – A full article on the EngNow event will be in the next edition.

NANOTECHNOLOGY – A NEW AREA FOR HIGH VALUE / LOW VOLUME MANUFACTURING?

Nanotechnology is slowly transforming a steadily increasing number of products and eventually will significantly affect manufacturing.

A range of new and consumer products with enhanced properties were created based on nanotechnology and are already commercially available such as stain-resistant clothes, clear sunscreens, cosmetics, scratch resistant coatings and paints, self-cleaning surfaces, ever-smaller and more powerful smart phones and tablets with astounding functionality, faster computers and communication systems, and antimicrobial tapes and bandages based. There are also new processing methods in agriculture and food treatment, stronger construction materials, higher performance sporting equipment, and novel sensors and nanomaterials that can monitor and improve environmental health. Revolutions in medicine such as

slow-release pharmaceuticals and targeted drugs for cancer diagnosis and treatment are at the verge of commercialisation.

Australia's nanotechnology research is at the forefront of many aspects of this broad discipline area and has already led to significant commercialisation in diverse areas of manufacturing, producing revolutionary new products based on Australian-developed nanotechnology. There is an exciting opportunity for Australia to build on this strong foundation of achievement by fully exploiting its leading nanotechnology research for the benefit of the nation that has the potential to build a strong nanotechnology-led manufacturing base of high value / low volume products and product components.

The reason for these astonishing developments worldwide is the fact that materials behave very differently at scales below about 100 nanometres, which equates

to 200 times smaller than the width of a human hair. Desirable properties of nanomaterials can be exploited for exciting applications such as improved chemical reactivity, enhanced antimicrobial efficiency, ability to absorb, reflect, guide, and bend light, and differences in material strength, flexibility or response to rises in temperature or pressure, and particular magnetic properties. Moreover, patterned materials and modified surfaces at the nanoscale, such as in advanced silicon chips and nanosensors as well as antimicrobial surfaces, result in amazing enhancements in desired properties. Our ability over the past decade to observe, engineer, manipulate and exploit materials and manufacturing techniques at the nanoscale has led to the current nanotechnology revolution.

A recent assessment of the potential impact of nanotechnology on society by 2020 reveals that the number of nanotechnology-enabled

products and workers worldwide will double every 3 years, achieving a global \$3 trillion market with 6 million (new) workers by 2020. The strong implication is that economies and industries that fail to invest in nano-inspired technology will be left behind as new products with improved or entirely new functionality replace the old.

To ensure that it reaps major economic benefit from the nano revolution, the United States has invested more than \$12 billion since 2000 in nanotechnology research and development (R&D), second only to the space program in terms of civilian science and technology investment.⁵ For the year 2000, 578 U.S. Patents were granted that referenced nano within the patent text. In 2009, more than 360 nano patents were granted each month and more than 49,000 U.S. Patent applications were pending that reference nano as of December 29, 2009.

Japan, Korea, the European Union and its individual member economies, China, Taiwan, Russia, Brazil, India and several Middle Eastern countries have made similar investments as a proportion of GDP since 2000. Based on this global investment, by March 2011 more than 1300 new nanotechnology-enabled products had been commercialised. Therefore, among the key drivers for investment in nanotechnology is the pervasive economic impact.

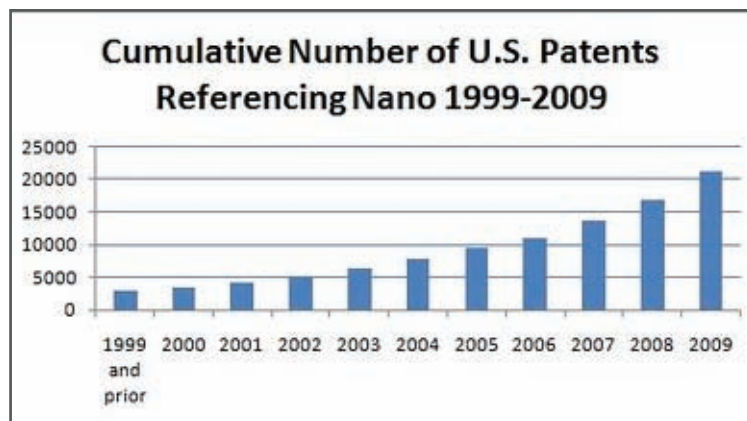


Nano Scale mechanical cog system,

of R&D investment in nanotechnology and so far has been able to keep pace with the strong global increase in nanotechnology R&D, largely as a result of the early government investment in the field. However, with global publications and patents related to nanotechnology increasing at a rate of 20% a year over the past decade compared to far more modest growth in scientific output more generally, there is no scope for complacency.

For example, China in particular has made nanotechnology a priority of its R&D investment. As a result, a disproportionately high level of research in this field now originates from China compared to its overall scientific output. This shift of emphasis towards nanotechnology is likely to be replicated by other developing countries experiencing rapid growth, making it even more challenging for Australia to remain competitive not only in R&D but, more importantly, in the uptake of nanotechnology by industry.

Analysis suggests that Australia is well-placed to benefit from nanotechnology. A survey has found that 76% of the public are already aware of this field and 85% were 'excited or hopeful'⁹, suggesting a higher level of community acceptance than in most developed countries.¹⁰ Based on both Australia's early successes and the global trends in industry uptake of nanotechnology highlighted above, it is clear that nanotechnology can be an important economic driver for Australia. Not only will there be benefits to the economy, but nanotechnology research can be a vital contributor to solving the grand challenges Australia faces such as sustainable energy and clean water. Only through sustained investment and policy settings that promote commercialisation will we be in a position to exploit our present strong research base in nanotechnology and translate this into benefits for the nation.

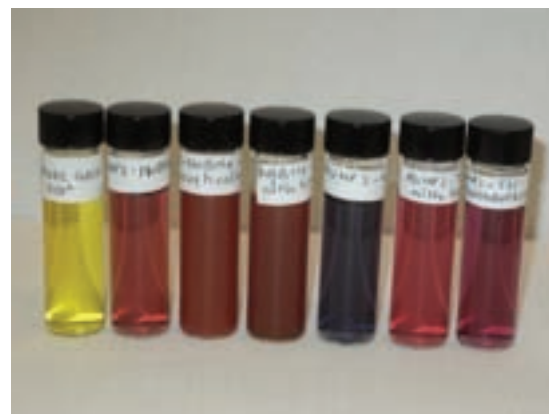


Increase of patent applications related to nanotechnology in USA

Australia needs to invest in nanotechnology to build an economy of the future. ■

Prof. Peter Majewski

Head of School, School of Engineering
Mawson Institute, University of South
Australia



Suspensions of gold nanoparticles with different size. Yellow: gold chloride solution; pink: about 20 nm gold nanoparticle suspension; blue: about 50 nm gold nanoparticle suspension.

Source:
Peter Majewski, unpublished data, 2012

Further reading:

National Nanotechnology Research Strategy, <http://www.science.org.au/policy/documents/nanotech-research-strategy.pdf>

Mihail C. Roco, The long view of nanotechnology development: the National Nanotechnology Initiative at 10 years, *Nanopart Res* (2011) 13:427–445

DAM BUSTING 70 YEARS ON

May of this year marked the 70th anniversary of the legendary Second World War dam busting raids flown by the Royal Air force (RAF) 617 squadron. "Operation Chastise" was an attack on German dams using a newly developed bouncing bomb.

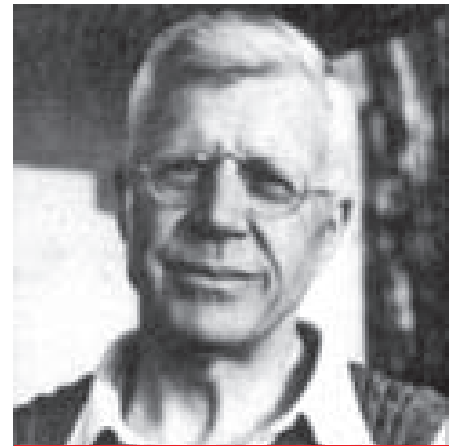
The primary objective of these raids was to inflict heavy damage on German industry by destroying key hydroelectric dams and hopefully slowing German production feeding the war machine. The United Kingdom celebrated the anniversary in style this year with a flypast featuring a Lancaster bomber, two Spitfires and two Tornado Fast jets. It therefore seemed fitting to pay tribute to the British Engineer/Scientist and Inventor Sir Barnes Wallis whose vision, rational thought, determination and persistence was behind this incredible operation.

By the start of the Second World War, Barnes Wallis was working as an Aeronautical Engineer for the UK Company Vickers. At 53, Wallis was a seasoned engineer and had already made some very impressive contributions including the design of a geodesic airframe. Wallis was a naturally quiet and introverted fellow, and many people were surprised by his stubbornness and resolve. Working autonomously, Wallis strongly believed that destroying key dams within Germany could shorten the war. Wallis stated 'I thought to myself what would be an engineer's way of stopping the war? And that would be to cut off the power supply to their great armament factories'.

Wallis's early idea was the use of a massive bomb designed to be dropped into the water near the dam wall

and the shockwave of the explosion would destroy the dam. Initial testing indicated this was not the case and Wallis was forced to investigate alternative options. Other concepts such as a torpedo fired directly at the dam wall were ruled out as the Germans, aware of this potential threat, had defensive booms and nets in place protecting the dams. Further calculations and experiments determined that the bomb needed to rest right against the dam wall when it exploded for maximum effect. It was here that Wallis had a great epiphany; he was reminded of his children's games on a recent summer holiday of skipping stones across a lake. He devised a masterful plan of designing a bomb that would be bounced down the reservoir and collide with a dam wall, but rather than exploding on impact, the bomb (really a mine) would then sink down against the wall. This was aided by backspin that was delivered to the weapon before release from the aircraft (empirical testing had highlighted that backspin was essential to the stability of the bomb). A depth charge would then explode the weapon at a carefully calculated depth for maximum destruction. See image below.

Between 16 & 17 May 1943 specially modified Lancaster bombers were flown by RAF squadron 617 as part of 'Operation Chastise'. Despite being



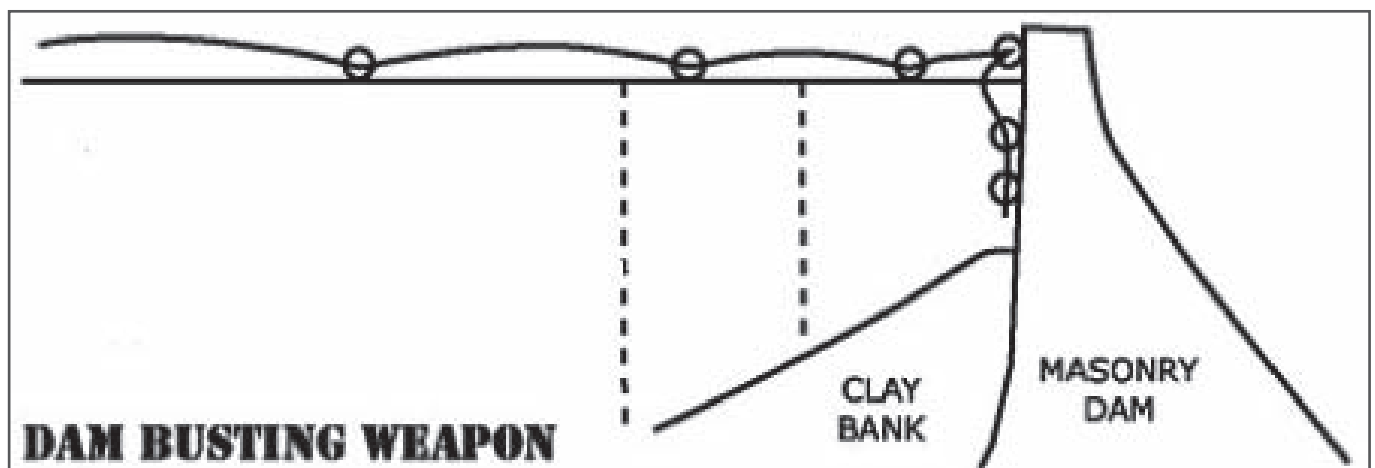
British Engineer/Scientist Barnes Wallis

required to fly at night, incredibly low (60ft from the reservoir surface) and under heavy anti-aircraft fire, the missions successfully destroyed the Mohne and Edersee dams while Germany's Sorpe dam was damaged. The squadron sadly sustained heavy casualties, but the exploits of Guy Gibson and 617 squadron are well worth further reading. Even after this success, Barnes Wallis continued to contribute to the war effort, designing a number of famed massive bombs including Tall Boy and Grand Slam.

Seventy years on, the sheer audaciousness of the subsequently named 'Dam Buster' raids still captures people's imagination. Sir Barnes Wallis contribution to the war effort was acknowledged in 1968 when he was knighted.

Matthew Cook

*IMechE Victoria Panel, Committee Member
Senior Mechanical Engineer*



How the dam busting weapon was designed to work

VOL-CON 2013

The following is a report from Leslie Yeow's trip to England for the Volunteers Conference in June.

On the first day, all delegates were welcomed by the Director of Engineering, Dr Colin Brown. This was followed closely by an introduction to the Institution's Library facilities by the Manager of Information & Library Services, Sarah Rogers. The Programme Head, Heather Williams then made a presentation on "Tomorrows Engineers" which was followed soon thereafter by a presentation of the Support Network (Benevolent Fund) by Anni Broadhead, the unit's Chief Executive.

After the welcome and presentations, it was time for the volunteers to participate in their chosen workshops. I chose to participate in

- **Chairs**
- **Social Media**
- **Inspiring the next Generation**
- **The International Institution**
– our relevance to the global engineering community

The Chairs workshop provided an opportunity for me and NSW Panel Chair, Chris Hoskin, to discuss the joys and challenges of the role amongst our peers from around the world. Led by Maureen Carter (Head of Engineering Innovation), the workshop allowed participants to understand the requirements of the role. We found that many of the Chairs were doing a lot of the work themselves. The Chairs agreed that they should not be doing everything themselves but delegating more of what they do to their Committee Members. Succession planning was also discussed and it was agreed that more participation by other Committee Members could ensure that they were trained to eventually succeed the present Chair.

I joined the workshop on Social Media to learn about how to say a lot without saying a lot. Interestingly, I learned that one of the biggest let downs in Social Media is not having enough to say. Popular Social Media users provide interesting information that

readers want to read and pass on. I also found that the Institution has over 150 Social Media accounts attributed to it with over 75% of these inactive over 10 weeks. This inactivity portrays a poor image of the Institution and suggests that either it has little to say or is disinterested and unproductive. Having said that, the Institution has well managed and popular accounts that are targeted to specific audiences like our Young Members section. The remainder of the workshop focussed on the setting up of accounts and learning how to get accurate and brief messages across to our audience.

I then joined the workshop which explored our experience as part of an International Volunteer Network. While we discussed what the Institution had achieved so far from the efforts of teams around the world, there was some confusion as to what Membership and CEng meant in different parts of the World. For example, while Membership of the IMechE was recognised under the Mutual Recognition Agreement with Engineers Australia as being equivalent qualifications, it was not so in, perhaps, Singapore or the United States where success at specific professional exams were the only ways to achieve PE (Professional Engineer) status. There were also discussions as to maximising benefits of Membership of the Institution and areas of emerging international markets where it would be worthwhile for the Institution to focus.

The workshop on inspiring the next generation was focussed on education and a review of what worked for the STEM (Science, Engineering, Technology and Mathematics) initiative. Ideas included providing educational outreach programmes to engage members. Examples of current UK initiatives include

- **IMechE Education Ambassadors** representing engineering at school events
- **Engineering Careers** project and the **Tomorrow's Engineers** resources available
- **Bloodhound project** and the IMechE involvement on the Education side

There was also some discussion around teacher placements in industry and research institutes which could possibly be done in Australia.

On the following Monday, all international attendees to the Conference were invited to HQ for a tour of the facilities and to speak to Jo Horton (Head of International Development) and Mary Weeks (International Member Development Coordinator). I took this opportunity to visit 1 Birdcage Walk for a formal tour and to discuss issues with International participants to the Conference. It appears that the IMechE struggles to attract Members in places like Canada where the PE qualification is a requisite for practicing as Professional Engineer as no reciprocal agreement exists for IMechE Members to qualify as a PE without passing qualifying exams. Then there are places like Hong Kong where there is significant uptake of Membership by those who view the British CEng qualification as a prestigious title to hold.

In order to minimise the timeframe required to complete Membership applications, I also discussed the need for Professional Review Interview recommendations from Australian interviews to be reviewed by the Professional Review Committee in the UK. It transpires that, unless there are extenuating circumstances, the recommendations made by the Professional Review Panel in Australia are usually accepted without review anyway. During the welcome presentation by Dr Colin Brown at the beginning of the Conference, he mentioned that he wanted to find a way of reducing the average application time of about 26 weeks. I believe making decisions in Australia to admit Members could assist in reducing this timeframe. ■

Leslie Yeow

QLD Panel Chair & Branch Secretary

STATE NEWS

WA NEWS

The West Australian Panel visited the new Gas Turbines at Kwinana Power Station as a combined event with Engineers Australia, see picture below. The LMS100 is the first inter-cooled gas turbine for power generation, with high efficiency (43% LHV), superior hot-day performance ($\frac{1}{2}$ the de-rate of other gas turbines) and extremely flexible operation (12 minutes from cold to full load). Combining the above factors with low NOx emissions and dual fuel capability means these machines are an extremely flexible addition to Verve Energy's fleet. The units comprise a low pressure compressor based on the proven Frame 6 industrial design, a "supercore" comprising high pressure compressor, high pressure turbine and intermediate pressure turbine (all based on existing aero engine designs), and an aerodynamically coupled power turbine custom designed for the LMS100.

The air-to-water intercooler (between low and high pressure compressors) and the high cycle compression ratio of 42:1 is the key to the engine's efficiency and high specific power. Situated at the site of two demolished steam turbines at Kwinana Power Station, the units are an important means to maintain stability of the network. Significant interest was expressed in the visit, with all available places taken within 12 hours of sending out the notice. A further visit is planned for October when the units should be on overhaul and there may be an opportunity to see the inside including the "supercore".

At the start of July the more historically

inclined members enjoyed a visit to the WA Maritime Museum & Robert Steele Machinery Exhibition where many of the exhibits could be seen in operation. Further detail on this visit will be included next issue. Continuing the historic theme, a trip to No. 1 Pump Station (formally known as C Y O'Connor Museum) at Mundaring is planned for later in the year. This is the first in a series of eight steam pump stations built in 1902 to deliver water from Perth's hills nearly 600 km east, it still houses its original boilers and one of its original steam engines.

The WA Panel Committee is pleased to welcome Allison Halse who recently arrived in Perth from the UK. After starting out with an Undergraduate Apprenticeship with Rolls-Royce, Allison spent 20 years in various management and executive roles the aerospace and power generation manufacturing industry in the UK and USA. Looking for a new challenge, Allison transferred to the IT/Telecoms industry 7 years ago to take up a leadership position in British Telecom (BT). After having being abandoned by her now grown daughter, Allison decided to fulfil her lifetime objective to move somewhere warmer, and when BT offered her a position on the Fiona Stanley Contract in Perth she was quick to accept!

Andrew Gagg

WA Panel Committee Member

NSW NEWS

In June, your Chairman attended the annual IMechE Volunteer Conference being held in Birmingham, UK. The conference generated some very useful debate. Of particular interest to us were discussions on producing a Dummies Guide for when you start volunteering with information about relevant departments and information sources, and some lively debate on how to make the Institution truly international and move the focus away from the present UK-centric organisation. There were also some opportunities to discuss the recent changes to the interviewing for membership and start discussions on how this process could be devolved from Birdcage Walk to the Regions.

The NSW Panel has continued its expansion of events over recent times. In July we held our inaugural meeting

in the CBD of Sydney. To start the ball rolling I had agreed to present the first paper "What have Young Engineers ever done for us?" showcasing the achievements of well-known Engineers who at the time of their achievement would have qualified under the IMechE's original definition of a Young Engineer. The paper proceeded chronologically through the history of engineering, starting in 250BC and finishing in the late 20th Century. Fortuitous timing of a visit from the UK meant that this meeting became a double bill with David Greenway, an IMechE Council member and past Vice-President, presenting a paper Tilting Trains: More or Less, discussing the benefits of the introduction of tilting trains and dispelling some myths of their use based on his experience in the UK with the Virgin Pendolinos; Our thanks to David for giving up his time to attend.

The committee would like to build on this success and introduce bimonthly meetings. If anyone is interested in presenting, please could they get in touch with one of the committee members.

The NSW Young Members group are planning a trip to The Powerhouse Museum's repository in Castle Hill where they keep their collection which they cannot fit into the museum in Pyrmont. A report on this event will hopefully appear in the next Bulletin.

Following an appeal to our members, more than 10 volunteers came forward to register as interviewers. This is a definite boost as our limited pool of volunteers was delaying interviews. Hopefully this will help us accelerate the interview process.

Finally, this is my last report as Chairman. My family and I have decided to return to the UK. Monika Sud has kindly agreed to retake the helm which she relinquished to me while she enlarged her family! I am pleased to be able to leave the NSW Panel in fine fettle. We have a buoyant committee, an increased activity list, a vibrant Young Members group, and an expanding group of professional interview volunteers. The IMechE is well on course to continue to make its presence felt in NSW and with the present committee; the future is in safe hands. Once the dust has settled from



Gas Turbines at Kwinana Power Station

our epic move I intend to continue volunteering for the Institution, joining the NE Region of the Railway Division.

My thanks as always to the committee and our volunteers for your efforts, it is much appreciated and thanks to you my time here has been, if I may borrow a phrase from my favourite little railway in Wales, JGF! (Jolly Good Fun!).

Chris Hoskin

NSW Panel Chair

QLD NEWS

After a busy first quarter for 2013 with organising the AGM, local SoFE and awarding prizes to well-deserved students, the winter months are good for a period of consolidation.

In May, I was elected to and began my duties as Branch Secretary while Committee Member, Daya, began his duties as Branch Chair. I now have to get accustomed to the paperwork that accompanies the position of Secretary...! I will also, hopefully, have the chance to visit our membership in Tasmania in August as part of the Branch Executive Committee Meeting.

One of our Committee Members, Jonathan Martin, left Australia and relocated to The Hague. He also stepped down from his position on the Industry Advisory Board at the University of Queensland. Fellow Committee Member, Joe Percy has now stepped into that role at the University of Queensland.

A number of Professional Review Interviews were conducted during the past few months and I am pleased to report that one of our Committee Members and YM Chair, Amy Lezala,

was successful in upgrading her Membership from IEng to CEng. Congratulations also go to all the other successful applicants for CEng MIMechE.

Another highlight of the past few months was an opportunity for me to travel to England to attend the IMechE organised Volunteer Conference held in Birmingham. A separate report on my visit has been included in this News Bulletin.

I have also had the opportunity of attending a dinner with other academics from the University of Queensland and industry representatives to discuss the quality of UQ graduates and the future for Mechanical Engineering education at UQ. While technical training was viewed as being good, there were those who felt that writing skills of graduates were often forgotten as students were not "there to learn English". It was also good to catch up with fellow Committee Member and 2012 Regional SoFE winner, Yassmin Abdel Magied at the Dinner.

While it has been a quiet few months, I note that a few other Committee Members have completed their Interview training online and are now able to assist me with conducting Professional Interviews. While we have been steadily completing these interviews, it is pleasing to note that there are a few more applicants in the pipeline.

Leslie Yeow

QLD Panel Chair

SA NEWS

Following an emailed appeal to all SA Members, we welcomed the following four new committee members to a panel meeting held on 1st May: John Hanson, Barry Millar, Kiran Hiriyanna and Fei Tang. Fei has stepped forward to build up the SA Young member section, and would like to hear from any young members able to assist in organising events.

Our ever popular mid year "Christmas in July" lunch was attended by 21 members and partners, and providing an excellent network opportunities. We were particularly pleased to welcome new committee member John Hanson and his wife Sharon.



UniSA FBW Winner Daniel Shipper

Our Speak Out for Engineering Competition will be held on October 17th at the usual venue, Building MC1-02, Uni SA Mawson Campus, starting at 6pm. Light refreshments will be served prior to the event. Please come along and support the young contestants as they hone their presentation skills.

Following a malfunction of the Humphrey Pump, during the IMechE Heritage Plaque presentation in May 2012, the pump operators have appealed for help with the design of a fume extraction system, and several local members have offered their services.

The 2013 World Solar Challenge will be held on 6th-13th October. This event takes place every couple of years and involves solar powered vehicles from many countries, competing on a 3000km route from Darwin to Adelaide.

Details of the Cambridge University vehicle's revolutionary design appeared in PE December 2012 and panel members plan to meet the team at the finish.

For further details on any of the above, please contact me on the details below

Stan Gafney

SA Panel Chair

(08) 8263 2229, or 0407 794 436
s.gafney@bigpond.net.au

VIC NEWS

Since May we have seen a high level of activity and participation in Victoria that is very encouraging. It started with a fascinating presentation on electric vehicles organised at the CSIRO, and given what Elon Musk and his Tesla car company are producing, the paradigm is starting to change!

Remaining in the transport field,



FBW Winner Simon Thompson from USQ

we had an excellent tour of the Bombardier train manufacturing plant in Dandenong. Fortunately it coincided with the despatch of the first of the new trams for the PTV in Melbourne, and so the IMechE members were the first of the public to see the completed product. The tour took in the bodyshell production line and the assembly process. Other products like the Velocity intercity trains were in various stages of repair and there were many different types of bogies and subsystems to study. The visit was limited to 30 and was fully patronised. It was well appreciated by all attendees.

In July we held the Victorian Panel Annual Dinner at the Kelvin Club in Melbourne. Forty three guests enjoyed a good meal and drinks sponsored by Metro Trains Melbourne. Swinburne Uni students presented their FSAE themed outreach program and sought sponsors to support their entry. I also gave an after dinner talk on Metro Trains and affordable high speed for Australia.

Also in July we awarded the Frederic Barnes Waldron Prize at Swinburne University, see image below.

The presentation on the Bionic Eye held in late July at the Engineers Australia Auditorium in North Melbourne drew a full house and was fascinating!

Professional registration in Australia can be problematic and so our Panel is working with Rachel Leech, IMechE International Business Development Manager (from London HQ) to try to better understand the options, and to find ways to recognise the Australian qualifications and landscape. The goal is to help members to professional registration e.g. Chartered status whilst working in Australia. Our next step, together with the Australian Branch, is to get Rachel out here on a tour of the States for specific discussions - watch this space! (See article on pg3).



FBW winner Neyland Butt from Swinburne University

Our late Panel Chair, John Burt, had submitted the Brabham Repco BT19 Formula One race car for the IMechE Engineering Heritage Awards. After much follow up by our Panel Secretary Roshan Dodanwela, we have finally been advised that it has won - a fantastic honour. We will now try to arrange to present this award to The National Sports Museum, Repco and Sir Jack Brabham at the March 2014 Melbourne Grand Prix.

Coming up in September are two tours around the Toyota car plant in Altona, but these are already fully booked, and a presentation on Fukushima and its impact on global nuclear decisions.

Finally, the Speak Out for Engineering competition will be held on September 25th at Engineers Australia HQ, North Melbourne. If young engineers would like to enter please contact me at andrew.lezala@metrotrains.com.au. In any case, please come along and encourage the engineers of the future to hone their public speaking and presentation skills.

Andrew Lezala

Victoria Panel Chair

YOUNG MEMBERS SECTION NEWS

The Australian Young Members have had a couple of months of rest from socialising, giving time to establish the panels and arrange events for the rest of the year. I would like to start by welcoming Fei Tang as the SA representative and with him the SA Young Member group.

WA has also been hard at work over the last few months to establish a Young Members Section in the state for the first time. Following nominations in April, a Young Member Group has been established as well as dedicated student chapters in UWA and Curtin University. This extends the number of universities linked with the IMechE to 12 nationwide.

The Victoria Young Members are also recruiting for a Young Member Group (YMg) committee, with some positions filled but more volunteers welcome. This is the third dedicated YMg to be created this year, which is reflected in the increased membership and dedicated YM events.



QLD Young Members Group BBQ in New Farm Park - Andrew (Vic Panel Chair), Justin, Belinda, Dave and Kapi

Over the last few months there have been some great events for YM to attend right across the country; the tour of the WA Maritime Museum, the VIC talk on auto-design for the Victorian FSAE teams and the NSW Asset Management and Implementation lecture. QLD hosted an informal networking event in New Farm Park which Andrew Lezala (VIC Chair) kindly joined. There will be more opportunities to attend similar events in the near future, all of which contribute to CPD. Keep an eye out on the Near You and Social Media sites for news and events.

NSW and VIC are planning a number of activities. In August alone there is the tour of Chatswood's Ball Mill museum, more Victorian FSAE related training and the informal Social Networking event at Chloe's Bar in Melbourne's CBD. QLD is hosting an informal event at UQ themed 'Life After Uni' in September where students and young professionals can discuss how to bump-start a career in Engineering. I look forward to writing about these events in the next Bulletin. Please attend and take advantage of the opportunity to meet your fellow Engineers.

We are working to establish a 'Pathways to Chartership' lecture for delivery to all YMs. If this is something you are interested in, please inform myself or your local representative. We would like to know more about what specific questions you have so that we can give you the right information.

Even with this bubble of activity, there are still a number of spots available for those wishing to volunteer. Professional Development, University Liaison, Tasmania and the Territories all need representatives. Please refer to our page on the website below or follow us through social media to find out more about who we are and what we do. We are on Facebook and our handle on twitter is @IMechE_OzYM.

Amy Lezala

Young Member Section Chair

WARDROBE WAFFLE

A key achievement in our civilisation was to mechanise the spinning, weaving and dyeing of fibres from animals (wool), plants (flax, cotton) and the silk moth cocoon. Clothing materials then became much more available. Until the end of the 18th. Century, only the rich could satisfy the human desire for self-adornment. The rest, if one believes the medieval and later painters, had to make do with but one set of rather basic clothes.

From the mid-19th. Century onwards, a whole new class of people could afford not one, but perhaps several sets of clothes, some quite exotic. The fashion trade was born... but only for the fair sex, given due reason. A good quality gentleman's 3-piece made-to-measure

business suit cost, (and still does), the equivalent of two week's wages for a skilled tradesman. Not surprisingly, the style of such an outfit has remained much the same for about a century. The only exception to this rule was certain 19th. Century military uniforms, but of course these were not paid for by the wearers

So let us pay our respects to the products so charmingly portrayed in that arbiter of fashion - "Vogue" - (there is an Australian edition). Given a range of colours and materials, plus a modicum of jewellery, it is remarkable what can be achieved... and alas, allowed to become unfashionable at inconveniently frequent intervals. An impecunious husband's lament, it might be said. Any dramatic developments from Paris or Milan or wherever can be in the shops anywhere

in the world within a couple of days, after an instant debut on the TV screen.

Fortunately, our gracious majesty tends to impart a measure of stability, (at least for Anglo-Saxons,) to the haute couture scene, if only for those of mature years. Maybe our latest youthful royal couples can do something for the rising generation

VULCAN

*The final Vulcan,
Published posthumously*

SPARK ENGINEERING CAMP - MELBOURNE!

Spark is an equal opportunity initiative to reach out to school students who face obstacles to attending university, with emphasis on indigenous, refugee and low-socioeconomic backgrounds.

The program opens students up to university pathways, and broad opportunities available in engineering and for personal growth. Described by students as "life-changing", "motivational" and "inspirational", there is no doubt that Spark is creating positive change to encourage students to reach their potential and pursue higher education.

With plans to expand Spark to Melbourne in 2014, we need an active group of volunteers to support the planning process as well as become mentors. Every volunteer can see the difference they are making in the students' lives, and involvement in the program also provides professional skills development that you won't get at university. If you would like to be involved in Spark Melbourne, applications are now open for Organising Committee positions and close Friday September 27th at 5pm.

For more information, check out the Spark Website - <http://spark.ywb.com.au/>, or attend an info session at the University of Melbourne (Parkville):

Date: 5.30pm, 19th September 2013

Location: A1 Theatre, Old Engineering Building (173), University of Melbourne, Parkville (enter via Grattan St)

Lucy Shaw,

*Spark National Chair & Melbourne Director
(lucyfionashaw@gmail.com) with any queries!*



Institution of MECHANICAL ENGINEERS

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

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