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IN THIS ISSUE PAGE

From the Chair

Since the issue of *Bulletin 155*, several events have occurred.

The first concerns the new Branch Committee, which became effective on 27 May, the day of the Institution AGM in London. Our Immediate Past Chairman, Brian Carter, attended this event as well as various other meetings including the International Strategy Board, Council and International Forum.

On 4–5 April, Brian visited Kuala Lumpur for the 2009 Asia and Oceania Regional Forum. Ken Tushingham, the Asia and Oceania Regional Forum Chairman, also attended. During the Forum, the Regional Speak Out for Engineering Competition was held.

On 16 April, the Branch Executive conducted a teleconference with HQ. The aim of this meeting was to try and resolve some issues that had been "hanging around" for some time. We all agreed that communicating in this manner is quite effective and should be used more regularly in the future.

On 4 July, the Branch Committee held a teleconference. This was the first time such a meeting had been conducted in this manner and all participants agreed it worked well. This teleconference was a substitute for the normal Branch Executive meeting. The facilities meant that the whole Branch Committee was able to participate, instead of just the Executive (Chairman, Hon Sec, Hon Treasurer and Assistant Hon Sec). The cost of the conference, which took just over three hours, was more than made up for by the savings in Executive airfares, capital city accommodation and meals – not to mention the reduction in IMechE's carbon footprint.

Several pertinent issues were raised during this teleconference, including the annual Speak Out for Engineering competition. A competition was held on 22 April at the University of Queensland – the Queensland Panel's first SOFE competition. Remaining state competitions are planned for 15 October in Sydney, 29 October in Adelaide and 19 November in Melbourne. WA are consolidating their relationships with the Perth universities and planning for a competition either late 2009 or in 2010. PNG and the ACT have shown interest, which may result in a joint competition with the ANU and the Australian Defence Force Academy in Canberra.

The planning of the expansion of the Young Members Section into other states is progressing well. In Queensland, a student recruitment evening – when a Young Members representative will be present – has been scheduled for October.

The appointment of a Branch recruitment co-ordinator has been put on hold due to a cut-back in available funds from London – again because of the global economic turndown. However, individual Panel recruitment programmes, particularly the Young Members Section activities, are progressing well. London is gathering material and packages to assist the Branch with marketing support.

The Institution Project and Frederic Barnes Waldron Prize awards for 2008 have recently been completed and 27 prizes were awarded to 14 universities. Unfortunately, London has recently advised that the monetary value of the prizes for 2009 has temporarily been withdrawn. Hopefully, by the time the 2009 prize applications are made in early 2010, the monetary values will have been restored.

In 2010, IMechE will celebrate the 50th anniversary of its establishment in Australia. A Branch sub-committee has been formed and is planning a schedule of activities, including a confirmed Presidential visit. Themes under consideration for the anniversary celebrations include "How Mechanical Engineering has assisted in the growth of Australia", and "Engineering efforts to accommodate climate change". However, planning is still very much in progress and the sub-Committee would welcome any ideas from members. This is your Institution, so please talk to your State Panel Committee representatives.

Once again I should like to encourage members to support their local Panel by attending the lectures and company visits that their Panel Committees often go to great lengths to organise. I believe the future growth of the Institution in Australia is with all members, but in particular with our younger members. So to all members, do not be afraid to volunteer your services to your Panel Committee and assist them in strengthening the standing of the IMechE in Australia.

Clive Waters

Editorial

I have always read the Australia Branch *News Bulletin* with interest, but until I was elected Editor, it didn't dawn on me how much hard work and creative thought goes into the production process. It certainly requires a different kind of thinking to what I am used to as a mechanical engineer. I would like to take this opportunity to thank the past editors for their contribution to making the Bulletin what it is today.

Although I did my degree in Sri Lanka, my professional career as a mechanical engineer started at Westinghouse Rail Systems in Melbourne. I worked there for four years as a design engineer, a highlight being the modification of an Australian-designed electric train stop for the London Underground. I am now working as a design engineer at the CSIRO's Clayton engineering facility.

I am also a committee member of the Association of Sri Lankan Engineers Australia (ASLEA). Our primary focus is bringing together the Sri Lankan engineering community living in Australia. We also sponsor engineering students in Sri Lanka.

As a young engineer fresh out of university, I envisaged a career devoted to finding solutions to technical problems. Today I find myself enriched by the challenge of producing a *News Bulletin* and finding a way of bringing Sri Lankan engineering professionals together.

Something that struck a deep chord with me came about when I read the new IMechE President Keith Millard's address. Keith has project-managed a couple of the world's largest power and desalination plants. He also addresses the issue of energy and argues that it's common sense for engineers – whatever one's stance on global warming might be – to strive for energy-sustainable solutions. Recently, the Victorian government awarded a $3.1 billion contract to French Firm Suez Environment (part of AquaSure group) to build Australia's largest desalination plant in Wonthaggi. By the end of 2011, when it becomes operational, the plant aims to produce 150 billion litres of water annually (roughly one-third of metropolitan Melbourne's annual water requirement). What is also interesting is that the resulting energy demand to operate the plant, and the incoming national renewable energy target, are set to trigger a huge expansion of wind power across the state. Most significant is the proposed 300 MW (183 turbine) wind farm at Macarthur, north-east of Portland.

Over the next few issues of the *Bulletin*, I aim to include, amongst other things, articles and debate on Australia's energy future.

Roshan Dodanwela

New Boiler for 3801

RailCorp's Office of Rail Heritage (ORH) has signed a contract worth A$1.327 million with a world-renowned manufacturer for the supply of a replacement boiler for the flagship Australian steam locomotive, 3801.

New Boiler for 3801

Technical Notes

Locomotive Specifications

Configuration	4-6-2 Tender Locomotive
Driving Wheels	Ø5'9" (Ø1753mm)
Max. Axle Load	22 tons 15 cwt (23,115kg)
Max. Design Speed	80 mph (130km/h)
Cylinders	2 x Ø21½" x 26" (Ø546 x 660mm)
Valve Gear	Walschaerts gear with 12" (305mm) trick-ported piston valves
Boiler Working Pressure	245psig (1.689MPa)
Tractive Effort	36,200 lbf (161kN)
Tender Coal Capacity	14 tons (14,225kg)
Tender Water Capacity	8,100 gallons (35,679 litres)
Total Weight	201 tons 4 cwt (204,429kg)

Managed by IMechE Member Chris Hoskin, a Traction & Rolling Stock Senior Consultant with Halcrow, the project commenced late last year. Documents were prepared and released to the industry calling for tenders for the design and manufacture of an all-welded boiler – a direct replacement for the 1940s-built riveted boiler carried by 3801 for the last 40 years and condemned in late 2007.

A cross-industry team evaluated the tenders received: two from Australia and two from overseas. The clear winner, in terms of technical ability, past experience, price and delivery, was the Dampflokwerk Meiningen, part of Deutsche Bahn AG.

Having started as the main workshops of the Prussian State Railways, Dampflokwerk Meiningen has been manufacturing steam locomotives continuously on the same site for over 90 years. The company will be familiar to many people as the designer and manufacturer of the boiler for the new Peppercorn A1 steam locomotive *Tornado*, now running in the UK.

The new boiler will be designed to facilitate a like-for-like replacement with the original boiler, taking into account the differences encountered between riveted and welded construction techniques. The original 1940s drawings, held by NSW State Archives, have been high-resolution scanned into electronic format to assist with this process.

The long awaited mechanical overhaul has also commenced. This project is being managed by Engineers Australia Member Craig Mackey from the NSW Rail Transport Museum (NSWRTM), who has recently returned from a tour looking at best practice on heritage railways and in museums around the world.

Work started following the movement of the locomotive from the NSWRTM at Thirlmere to the overhaul facility created in part of the Bogie Maintenance Centre at Chullora, which was originally the boiler shop where the boilers for the Class 38 locomotives were manufactured in the 1940s.

The new boiler, expected to arrive in Australia in spring 2010, and the overhaul are both funded by the ORH under the NSW government-endorsed *Sustainable Rail Heritage Asset Management Strategy*, and the locomotive is expected to be steamed late in 2010.

Boiler Description

The original boiler is manufactured from steel and is of riveted construction. The boiler dates from 1943–44. It was fitted with a replacement inner firebox in the 1980s.

The barrel is a three-ring, riveted lap joint barrel, 5' 8½" (1740mm) dia. at the smokebox end, with a steam dome part way along the centre ring. The boiler has a Belpaire firebox with a 47ft² (4.37m²) grate area, 142 x 2¼" (57.15mm) dia. boiler tubes and 36 x 5½" (140mm) dia. superheater flues. Inside the firebox are mounted five arch tubes to assist water circulation and support the brick arch. A short combustion chamber is provided that extends into the boiler barrel. The regulator is a Melesco multiple valve type, fitted in the smokebox.

Chris Hoskin

Asia and Oceania Regional Forum – Kuala Lumpur, April 2009

I am pleased to have this opportunity to describe to Branch members the new 'Forum' structure and what part it plays in the overall strategy and day to day operations of IMechE. I write not as the Australian Branch Hon Treasurer (though this is a role I continue to play), but as the inaugural Chairman of the Asia and Oceania Forum. Since my election in October last year much work has been done to establish this evolving aspect of the IMechE international strategy. It is one that will reach out and impact all members who live and work outside the UK. The IMechE drive is to be truly representative of all overseas members and to allow all overseas members to benefit from what the Institution has to offer. It is obvious that overseas members cannot generally access the facilities available to those in the UK and, consequently, we wish to provide a support structure that will channel to them many of the aspects of membership that they consider valuable to their careers and professional development.

This was largely achieved in the past by the establishment of the Branch/Panel system in those geographical areas with sufficient member numbers to make such an operation viable. However, at best, only about 70% of overseas members were touched by this structure. The new Forum approach is designed to involve 100% of

Asia & Oceania Regional Forum participants from L to R: *Ricky Kan (Asia and Oceania Forum Young Member Representative), Brian Carter (Australia Branch Chairman), Dr Chan Kuan Yoong (China Corresponding Member (CM), Sam Perera (Sri Lanka CM), Dr C.W. Tso (Hong Kong Branch Chairman), Prof. Bill Banks (President), Ken Tushingham (Asia and Oceania Forum Chairman), Mathew Thomas (Malaysia Branch Immediate Past Chairman), Lim Goek Hian (Singapore Branch Chairman), Col Bhagwan Nagrani (India Branch Vice Chairman), Dr Ong Kok Seng (Malaysia Branch Chairman), P.E. Chong (Malaysia Branch Past Chairman).*

overseas members and make IMechE a truly worldwide institution. Four Forums have been established to represent the Americas, Europe, Africa and the Middle East, and the Forum of which the Australian Branch is part, the Asia and Oceania Forum. The geographical area that each Forum covers is vast and our own includes India, Pakistan, Bangladesh, China, Hong Kong, Singapore, Malaysia, Japan, Korea, the Philippines, New Zealand, many other smaller countries, and of course Australia.

The great challenge for the Forums is to reach beyond the Branch structure and make contact with, and involve, members in those countries where no Branch exists. Consequently much of my time is spent communicating with 'Corresponding Members' in countries such as Sri Lanka and Thailand. While the established Branches will continue to do the things that Branches do, a different approach is required for members in the less populous and more remote parts of the world. The thrust here is to provide a world-class member service via the internet. Few practising engineers are not connected and a significant effort is being expended on achieving an excellent system.

There are several other significant initiatives being embarked upon by the Asia and Oceania Forum. The main one involves establishing a presence and a member network in China. Another is to extend the foothold we have established in India and recruit those engineers who now practice internationally, rather than locally, as was the case until relatively recently. Each Branch within the Forum has other initiatives contained within its own 'Action Plan', which will both guide its efforts to satisfy the needs of its members, and contribute to the overall IMechE strategy. Under the new Forum structure, Branches retain their autonomy and remain as relevant as they always have.

The Asia and Oceania Forum is also a coordinating framework with a remit to assist all members within its geographical area. The Forum structure is now a significant part of the IMechE strategy and the Trustee Board has provided the appropriate authority to those involved. Each Forum Chairman is a member of the IMechE Council and a member of the International Strategy Board.

Simply establishing such a framework is a very large task and some aspects will take considerable time to put in place. Hence I will take this opportunity to ask for your patience until the results of our efforts start to become obvious. I am convinced that the arrangements described are basically sound and I look forward to being involved in taking IMechE in our part of the world to greater heights.

Ken Tushingham

Papua New Guinea

In March 2009, the Andrew Frazer Prize was awarded to Miss Joyce Kopunye, who graduated with a Degree with merit in Mechanical Engineering from the PNG University of Technology. Professor John Pumwa, Head of the Mechanical Engineering Department, presented the award. He says:

"Joyce has become the second girl to win this award in a male-dominated country and I am very pleased to see that girls are working hard to be successful in engineering. I won't be surprised to see more girls winning the award in the future.

Professor J.Pumwa presenting prize to Miss J.Kopunye.

"I take this opportunity to express my sincere thanks and appreciation to IMechE, including the Australian Branch, for your tireless efforts in promoting Mechanical Engineering education in Papua New Guinea. I look forward to your continual support in the future. It is this kind of support that makes students very competitive in their studies, which will improve their competency."

State News QLD

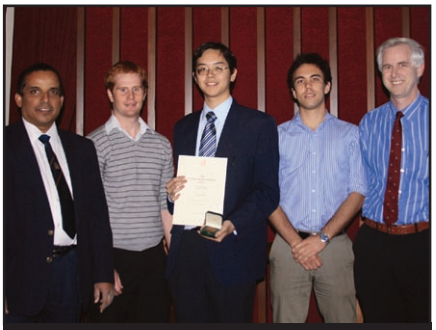
The Queensland Panel held its AGM on 18 February. A Few younger members joined the committee.

On 28 February, the Queensland Panel hosted the Australian Branch Committee Meeting, the AGM, the 2008 Australian Speak Out For Engineering Competition and the Branch Annual Dinner.

Speak Out For Engineering

On 22 April, the Queensland Panel held its first SOFE competition at the University of Queensland; 37 affiliates participated.

The winner was Mr Joshua Brimblecombe with his presentation on "Nocturnal cooling tests". His aim is to experimentally determine the radiative heat losses from selected



Uuiversity of Queensland Awards ceremony from L to R: Dayaratne Dharmasiri, James Barkla, Anthony Yuen, Joshua Brimblecombe, Professor David Mee

surfaces to the night-time sky. Joshua will now compete for the Australian competition.

The runner-up was Mr James Barkla with his presentation on "Modelling the application of a nanopatch to the human skin using finite element analysis". His research is into methods of non-invasive delivery of vaccines.

Annual Awards – UQ

On the same day, the Queensland Panel presented its Annual Awards at the University of Queensland. This was done in conjunction with the University's Annual Awards Evening.

The Panel Chairman presented the Frederick Barnes Waldron Best Student Prize to Mr Anthony Yuen and the Best Project Prize to Mr Jeremy Taylor.

Annual Awards – USQ

For the second year, the Queensland Panel presented its Annual Awards at the University of Southern Queensland. Awards were presented on 17 April at their Annual Awards Night held at the USQ Toowoomba Campus.

The Panel Chairman presented the Frederick Barnes Waldron Best Student Prize to Mr Craig Kitto and the Best Project Prize to Mr David Salomon.

IMechE is grateful to Professor David Mee and Dr Bo Feng of the University of Queensland and Dr Selvan Pather of the University of Southern Queensland for their continuous support.

Dayaratne Dharmasiri

Chairman

QUOTATION

"There is nothing in machinery, there is nothing in embankments and railways and iron bridges and engineering devices to oblige them to be ugly. Ugliness is the measure of imperfection." *– H. G. Wells*

David Heppenstall, WA Panel Chairman, awarding the Fredric Barnes Waldron Prize to Bradley De San Miguel.

State News WA

Members of the Western Panel recently attended prize-giving ceremonies at two of Western Australia's leading universities to award prizes on behalf of the IMechE. Curtin University of Technology and Murdoch University both submitted nominations for the Fredric Barnes Waldron Prize for Best Mechanical Engineering Student and the prize for Most Outstanding Mechanical Engineering Project. Each University is entitled to have one winner of each prize and each prize includes a certificate, a medal and GBP £200 (AUD $410) in prize money.

Curtin University's prize-giving ceremony, held on 17 April in the Elizabeth Jolley Lecture Theatre, was well attended. The IMechE awarded two out of a total of 79 prizes given out that day. George Brown was the recipient of the prize for the Most Outstanding Mechanical Engineering Project, whilst Bradley De San Miguel was awarded the Fredric Barnes Waldron Prize. The prizes were presented by David Heppenstall, Western Panel Chairman, on behalf of the IMechE.

The Awards Ceremony at Murdoch University was held on 12 May at the Kim E. Beazley Lecture Theatre. Julian Gordon Holmes was presented with the Frederic Barnes Waldron prize and Andrew Duncan Fraser was presented with the Institution Project Prize. Both recipients were students in the Faculty of Engineering and Energy. The prizes were presented by Dr Terence Love, Member of the Western Panel, on behalf of the IMechE.

The Western Panel would like to congratulate all prize winners on their outstanding achievements and to wish them well in their future endeavours.

David Heppenstall
WA Panel Chairman

State News VIC

Victorian Panel Barnes Waldron and Best Student Prizes 2008

As in past years, the Victorian Panel invited each of the universities in Victoria offering a Mechanical Engineering degree to nominate students for the Frederic Barnes Waldron Best Student and the Best Student Project awards for 2008. The selection is carried out by the universities, and the prizes come from headquarters in London. We consider these awards prestigious, as they are presented in most areas of the world where there are active branches of the IMechE.

The 2008 winners in Victoria are as follows:

University	Best Student Award	Best Student Project Award
Deakin University	Jun Wei Wu	Grant Greenaway
Monash University	Adam Risborg	Adam Risborg
RMIT University	Franco Liocci	Kai James Morgan
Swinburne University of Technology	Luke Brown	Dale Hayter
University of Melbourne	Ashleigh Brianne Gutteridge	Dayne Blair Nankervis
Victoria University	Benedict John Stewart-Steel	

Another initiative for younger members is the Victorian Speak Out For Engineering competition scheduled to take place on 19 November 2009 at Engineers Australia. It would be greatly appreciated if members would encourage any undergraduate or recently qualified mechanical engineers that they know to consider entering this competition and/or to be present in the audience. In the past there have been some outstanding presentations, with the Victorian winners going on to win the Australian competition and to come second in the regional competition.

State News NSW

The evening of 19 May proved to be most rewarding (or rather awarding) for the NSW Panel as the IMechE was invited by the Faculty of Engineering at the University of Wollongong to present the Fredrick Barnes Waldron and Project Prizes to two impressive young engineers.

Ian Mash, NSW Panel and Australia Branch Hon Secretary presenting Tim McNeice with Best Project Prize.

Ian Mash (the NSW Panel and Australian Branch Hon Sec) attended the prize-giving, and presented Phillip Howlin with the Fredrick Barnes Waldron prize, and Tim McNeice with the Best Project Prize.

In addition to these awards, both recipients are eligible for free associate membership of the IMechE, and it is understood both Phillip and Tim are considering entering the NSW Speak Out For Engineering competition to be held in October.

State News SA

At the South Australian Panel mid-year lunch, outgoing SA Panel Chairman Ken Sumpter handed over to Michael Riese. On behalf of the Panel, Stan Gafney presented Ken with an IMechE wine-stopper set. In making the presentation, Stan outlined Ken's membership of the SA Panel, which has extended over 30 years, and his services to the Australian Branch as Hon Sec, Assistant Hon Sec and *Bulletin* Editor (15 years!), and Branch Chairman. While continuing to run his busy engineering consultancy, Ken hopes to be able to spend more time gliding and flying ultralight aircraft.

These personnel changes were developed following a joint meeting of the SA YM and Senior Panel Committees on 24 June, when the need to introduce younger members into the SA Panel was discussed.

Outgoing SA Panel Chairman Ken Sumpter (left) being felicitated by Stan Gafney on behalf of Panel.

State News SA

The SA Panel comprises Michael (Chair), Peter Stopford (Vice Chair and Hon Treasurer), Stan Gafney (Hon Sec), and committee members Ken, Derek Marley, Patrick Donovan and Elizabeth Smith (Academic Liaison Officer). The YM Committee comprises Nathan Valente (Chair) and Committee members Natalie Harsch, David White (IT and Special Events Coordinator), Brian McAvaney and Mark McKenzie.

Elizabeth will act as Academic Liaison Officer and David White will perform the role of IT and Special Events Coordinator for both Committees. As a temporary "caretaker" measure, Stan has offered to take the minutes for the YMs and Peter will act as their Hon Treasurer.

Stan Gafney

Guaqui Locomotives

Continued from *News Bulletin no. 155…*

The exhaust steam injector is located on the fireman's side. Some of the exhaust steam is tapped from the smokebox blast pipe, through an oil separator, to the injector. Here, more extensive nozzles carry the water to the boiler. This injector can also change over and work in live steam mode whenever the locomotive is not using steam. The exhaust steam injector, working on a lower pressure, is less simple to operate than the live steam injector, but economises in the use of live steam (a fuel saving of up to 8% is claimed by the makers).

Steam-Operated Auxiliaries and Cab Equipment

Cab Manifold. This is mounted on the boiler, in the cab. It is fed from the dome and supplies the steam-driven auxiliaries, namely:

- the steam pressure gauge (mounted on the manifold)
- the electrical generator
- the fuel and blower controls (mounted at the fireman's position)
- the two compressors (mounted one on either smokebox side)
- the two injectors (described above)
- the displacement oil lubricator (described below).

The manifold carries shut-off cocks to control all the above.

The displacement oil lubricator consists of a lower oil reservoir communicating, through sight-glass-equipped needle valves, with five upper chambers. The chambers are piped, one to each cylinder and valve chest, and also to the two compressors.

Each upper chamber contains water and is under boiler steam pressure. The oil, a special high-temperature grade, is lighter than water, and flows slowly up, in droplets, through the needle valves. The oil flow can thus be observed and regulated. An oil–water mix is then carried to the cylinders etc. by the fluctuating pressure in each. More modern locomotives have mechanical lubricators, but no trouble was experienced with the type described.

Guaqui Locomotives

Frames and Suspension

Bar frames. These consist of one-piece continuous steel slabs, one each side below the boiler, and forming a pair of beam-trusses, cross-braced together at intervals and extending from the cylinders back to the tender, coupling at the rear of the locomotive. The side frames are continued to the pony truck and front buffer beam by steel bars above and below the cylinders.

The lower members have openings to take the driving wheels and axle boxes, closed by steel "keeps" once the wheel sets are installed. Between each wheel position the trusses have rectangular spaces which lighten the whole and provide space for suspension gear etc.

The joints between the above cylinder bars and the frames, and also those at the axle box "keeps", have a wedge form for tightness and to take longitudinal forces. They are secured by long vertical steel bolts which do not carry traction forces and are in tension only. Thus two framing steel trusses extend the whole length of the locomotive, with a minimum of joints, providing a continuous traction force path between the cylinders and both couplers.

Motion

Axle boxes, suspension and liners. The axle boxes are supported by long leaf springs. The outer ends of these are connected by a system of balancing beams and coil springs to compensate for unequal loading when running over uneven track. A lever system above the cylinders transfers some load to the pony truck. The cast-steel axle boxes, on their long leaf springs, move up and down between pairs of rectangular cast-iron liners. These are bolted into the frames and have a wide slot in the back, machined to provide a snug fit. Forward liners have all sides parallel. The slot of the rear side liners has an inclined inner face, mating with a similar face on the frame, and so can be drawn up to take up wear.

Main and side rod bearings. The main connecting rod big-end bearings – which, between them, carry all the traction forces – are in the form of rectangular brass castings, termed "brasses". These are machined all over and flanged to retain them in the rod ends. They are split about a vertical centre line and bored to suit the crank pin. The split faces are skimmed so that there is about a 3 mm "gap" when they are first assembled on the pin. A wedge at the inclined rear face forces the brass forward to take up wear.

The distance between centres of the main rod bearings is critical in maintaining the piston in its correct position in the cylinder, and is adjusted by inserting packings, initially mostly at the brass's rear. As the forces in these bearings are largely longitudinal, the bearing brass tends to wear oval. As the wear progresses the wedge is tightened, reducing the "gap" and allowing the piston to move forward in the cylinder. Eventually a further skim must be taken off the split faces and the packings moved from rear to front of the brass, thus maintaining the piston in its design position. The little-end bearing of the main rod (in the crosshead) is of similar construction, but wear at this point is usually small.

Valve gear operating mechanism. The big end of the eccentric rod is driven by an arm on the end of the main crank pin, and rotates continuously when the locomotive is working. The other joints in the valve gear operating mechanism rotate through only a small angle in service. All these joints consist of steel pins moving in steel bushes, both case-hardened on the bearing surfaces, and arranged for manual oil lubrication.

…to be continued

Luke Marsden-Smedley

Longest Serving IMechE Member in Australia

Congratulations to Mr Hugh Douglas Nelson, who has been a member since 1935. Hugh is 97 years of age and was born in New Zealand. He has been living in Australia since 1956.

Around 1940, Hugh designed a range of axial flow pumps with high efficiencies (up to 91%). He also devised an innovative system of installation to achieve considerable cost savings; he was awarded the Prince Philip Prize for Australian Design for this system in 1968.

Hugh formed a manufacturing services company in 1965 in Sydney. After success in Australia (particularly in pumping from rivers), he provided design assistance and pumping systems to many large projects around the world, including the rivers Murray, Darling, Macquarie, Irrawadi, Mekong, Tigris, Nile, Musi (Sumatra), Awash (Ethiopia), Volta (Ghana) and Shire (Malawi).

Hugh is currently living in Edgecliff NSW.

To find the longest serving member, we looked at the date on which members first joined IMechE, irrespective of how long they have lived in Australia.

Summary of Presidential Address 2009

Keith Millard, IMechE's 124th President.

In May this year Keith Millard became the Institution's 124th President. Ever since one of his first engineering projects – designing a cucumber slicer in his early teens – he has found that engineering has provided him with a rich source of challenges, experiences and well-being. Ultimately, it has led to a position of management and leadership. Here is a summary of his Presidential Address.

Keith's career began as a sea cadet and then as a junior engineer with Shaw Savill and Albion. This was followed by a period as shift engineer with the Central Electricity Generating Board at Peterborough and Staythorpe power stations. He then joined consulting firm Ewbank and Partners, which led to a stint as a project manager in Saudi Arabia for the Jeddah 3 (200MW + 9000 m^3/day) and Jeddah 4 (500MW + 22500 m^3/day) power and desalination plants. In 1983 Keith joined Gilbert Associates (Europe) as Managing Director. Since 2000 he has been in a mentoring and coaching role under the umbrella of the Chief Executive membership organisation, Vistage.

"Managing to improve the world through engineering" is the subject of Keith's Presidential Address. He stresses that it is becoming increasingly apparent that we must turn to engineers for solutions to two of the human race's greatest challenges: **energy** and **environment**.

These are two of IMechE's strategic themes. The third, **transport**, presents its own set of dynamics; as well as being an important element in working toward resolving the energy and environmental crises, transport is critical to our economic security.

Engineers of this generation have a particularly weighty responsibility to inspire the very young with engineering so that they join our profession in sufficient numbers, and with the right qualifications and skills, to continue to meet the threats now faced by society. To that end, **education** is IMechE's crucial fourth strategic theme.

Engineers can only be truly effective if engineering is well managed and strategically focused. Keith cites three pillars of management which he sees as fundamental to successfully creating and managing the future: Project Management, Strategy and Leadership.

When someone embarks on a career in engineering, they are making an investment in their future that will open a wide range of possibilities anywhere in the world. Keith's experience leads him to believe that not only does engineering education and experience offer an opportunity to play a significant role in addressing the world's challenges technically, but also provides a foundation for those who want to manage the journey in meeting these challenges. Great engineering can only be achieved with great management.

Whilst finance is only given a brief mention in the address, Keith considers it the lubricant that makes the future possible.

Keith's areas of focus are:

Inspiring the younger generation – IMechE ambassadors are already working extensively in schools, and extra focus will be given to encourage efforts that particularly target 11–14-year-olds, as they approach critical maths and science subject choices or opting for an engineering diploma. Engeneration (a free-to-join membership run by IMechE for all 13–19-year-old students who are following courses that can lead to a career in engineering) will provide support to those who have embarked on a diploma course or are interested in taking up an engineering career. Through Vision awards and other opportunities to recognise achievements by members of the Institution, engineering role models will be actively promoted.

Membership engagement – "I undertake to do all that I can to raise your awareness of the Institution and all that it can do in front of the wider membership and public at large." Wherever possible, the benefits to career development through engagement in the Institution's programmes will be highlighted. Members will be encouraged to be active rather than passive, by engaging in networks, participating in debates and contributing to the work of the Institution.

Energy sustainability – There are wide-ranging debates around the use of fossil fuels and the environment; however, whatever your position with respect to these debates, there is a commonsense case for engineers to strive for energy-sustainable solutions wherever that is practical. One aspect of this was addressed earlier this year at an experts' meeting organised by the EESG (Energy, Environment and Sustainability Group) to discuss the latest thinking on Distributed Energy Systems. This has generated some leading-edge thinking on the subject, which is being developed and will form the basis for a seminar during 2009.

Inventions

Pallet Splitter

During the last century, I owned and managed a small engineering business. Many and varied were the tasks tackled, some more successfully than others. It certainly opened my eyes to the disingenuous among us.

Most folk will be aware of the humble wooden pallet, sometimes known as a CHEP pallet (from the international company Commonwealth Handling Equipment Pool). These pallets reside in the ranks of the great unloved. They are abused by forklift drivers, builders and foundry men, and often end up in a sorry state.

A small local pallet-repair company approached me to help them return damaged pallets to a usable form. The principal repair was to replace the outer two wooden bearers, which were usually jarrah, a very hard wood. This was achieved by employing some burly, semi-clad workmen armed with pry-bars, sledge hammers, angle grinders and a colourful turn of phrase.

The CHEP Pallet.

We developed a piece of equipment which came to be known as "The Pallet Splitter". To determine the forces required for design purposes, I took the sample pallet supplied and, using a pair of bathroom scales as a lever, I came up with a figure to separate the deck from the bearer – and then doubled it. The splitter was agricultural in concept: heavy black mild steel plates perforated with holes and slots, bench mounted, and with its two cylinders driven by a hydraulic power pack. Fig 1 shows the idea, end on, in successful mode.

With the pallet in this situation, the operator uses an angle grinder to cut the nails flush with the timber deck. The hydraulics are then relaxed and the pallet is passed on to a colleague for a new bearer to be fitted.

In Fig 1, the left-hand bearer has been hydraulically clamped by hinged plate A against the spikes on fixed plate B. The second hydraulic cylinder then moves actuator plate D, forcing C upwards and E downwards, and separating the upper and lower decks of the pallet. Plate F is a stationary keep plate, holding the sandwich together.

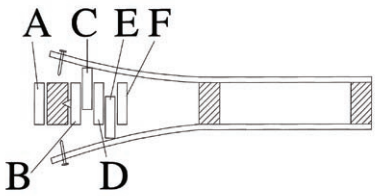


Fig 1: Diagrammatic end view (the pallet bearers are shaded)

Fig 2 is a diagram showing the principle used. The centre lines indicate the axes of various pins and rollers, which were of case-hardened steel. In practice, two sets of inclined slots were used in plate D to ensure even travel of plates C and E.

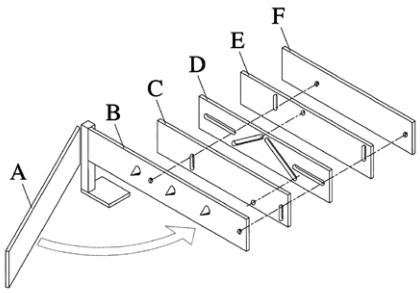


Fig 2: Exploded view of plates before actuation

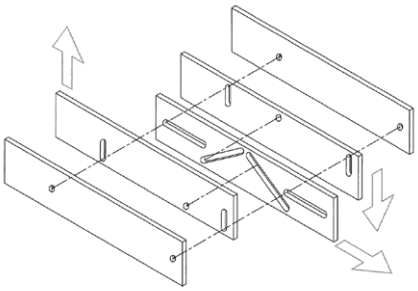


Fig 3: Exploded view of plates after actuation

After building and testing, the machine was delivered to the Pallet Man. He rang later that day with a spring in his step to advise that, by using the machine, he was able to shed two men from the job. My business partner and I slept soundly that night.

However, the next day PM turned up with the (flaming) thing on his ute, together with a partially split pallet and a Streets ice-cream carton containing some bent pins and fractured rollers. As we had not yet received payment for the equipment, we nervously and rapidly bent to the task of finding out what had gone wrong. There were several contributory causes. The rollers had been too deeply case-hardened and the pins not hardened at all. The slots in the plates had been cut with oxy-acetylene and were somewhat "notchy". All of the sliding and working surfaces were covered in a mixture of foundry sand and brick dust. But the principal cause of failure was probably due to the offending pallet's decks having been screwed on. With 75mm screws! Nobody had ever mentioned screws.

We found a friendly milling machinist who opened out the ragged slots. We made some oversize pins and rollers and sent them to an alternative heat-treatment company. Thereafter the machine gave only spasmodic trouble and we experimented with alternative steels for the pins and rollers. Eventually the Pallet Man's ute stopped turning up at our premises. With all the extra work needed to keep the customer happy, deep furrows appeared in our bank manager's brow.

A lesson learned in earlier years, and reinforced by this later experience: always prepare a written specification for the equipment needed, and get both sides to sign off, before quoting.

Stan Gafney

Kinetic Energy Recovery Systems (KERS)

Deakin research could make KERS an option for standard road cars

Kinetic energy recovery systems (KERS) continue to be one of the hottest topics in Formula One motor racing this year and now researchers at Deakin University are working to develop KERS technology for standard road cars.

Project leader Dr Clive Ferguson said the potential benefits of KERS included improvements to vehicle efficiency and emissions.

"KERS is a way of harvesting and storing the energy generated when a vehicle brakes. This stored energy can be used by the vehicle, potentially improving its fuel efficiency and emissions. We also believe there is the potential to improve vehicle handling, so this will be part of our research as well," he explained.

The harvested energy can be stored in various ways, including electrically, using batteries – the method mostly used in Formula One to date – or mechanically, using a flywheel. Although there are technical issues with both approaches, Dr Ferguson believes mechanical storage has a number of potential advantages.

"Compared to battery storage, mechanical storage devices potentially provide significant savings in weight and space. They are also friendlier for the environment because they remove the need for highly toxic lithium-based batteries. Battery storage can also be damaged by electrical spikes due to emergency braking," he said.

Dr Ferguson said he believed a flywheel KERS had the potential to "significantly outperform batteries in hybrid vehicles in efficiency, green footprint, size and weight.

"Our aim at Deakin is to research, design, build and test a flywheel KERS that efficiently harvests regenerative braking energy for volume-based production vehicle applications. We plan to independ-ently identify the technical difficulties in developing an affordable mechanical KERS for both front and rear-wheel-drive production vehicles and identify cost-effective solutions.

"I would like to think that our research may lead to KERS one day being available on standard production vehicles, maybe as an optional extra," he said.

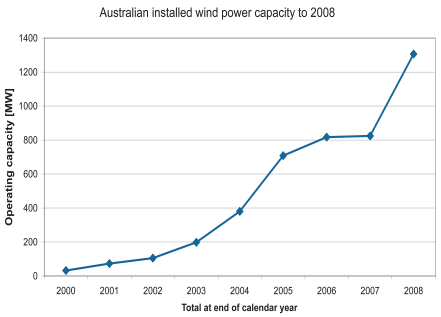
The Deakin KERS project has received initial funding from the Cooperative Research Centre for Advanced Automotive Technology (AutoCRC) and includes researchers from both the School of Engineering and the Centre for Material and Fibre Innovation, bringing together Deakin's expertise in mechanical engineering and carbon fibre research.

Deakin University Media Release 25 June 2009

Wind Energy in Victoria

During the last decade, wind energy has emerged as the fastest growing electricity generation sector in the world. In Australia over the last decade, growth in the sector has been steady, if somewhat slower than in many other nations. To date, South Australia has been home to the greatest share of existing wind farm projects in the country; however, in terms of future proposed wind farm projects, Victoria has the largest portion of any state.

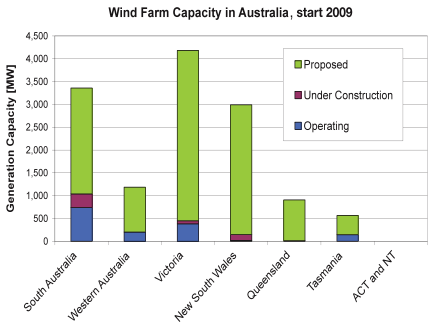
The growth of installed wind power capacity in Australia is reported in the Global Wind Energy Council's annual reports of 2007 and 2008 and is shown in the graph below:



Australia's wind project pipeline is rapidly evolving. The development of wind projects can be tracked via various sources, which offer the latest project data sorted against various categories of status, including:

- Operating – commissioned and generating power into the market.
- Under construction – construction has commenced but the wind project is yet to be fully commissioned.

- Proposed – at an earlier stage of development (includes wind projects for which plans or proposals have been publicly announced and applications have been made to government bodies – for example, those which have applied to the Department of Environment, Water, heritage and Arts for a 'referral' on whether an Environmental Effect Statement is required) OR development approval has been awarded but construction is yet to commence.



Sources: Department of the Environment, Water, Heritage and the Arts – database of operating and proposed renewable power stations, http:www.ga.gov.au/renewable/ accessed April 2009

The distribution of these projects by Australian state is shown in the chart below:

The data on which this chart is based was provided by an online database maintained by the Department of the Environment, Water, Heritage and the Arts. The data fields are sortable by state, and have been analysed to obtain the figures shown in the table below:

Location (State)	Operating [MW]	Under Construction [MW]	Proposed [MW]	Sum of operating, under construction and proposed [MW]
South Australia	740	299	2,319	3,358
Western Australia	203	0	982	1,185
Victoria	384	66	3,732	4,182
New South Wales	17	132	2,843	2,992
Queensland	13	0	894	907
Tasmania	144	0	421	565
ACT and NT	0	0	1	1
Total (MW)	1,499	497	11,193	13,189

Wind Farm Capacity Pipeline in Australia, early 2009

In early 2009, South Australia had roughly 50% of all operating wind capacity within Australia, and around 60% of all wind project capacity under construction.

Looking towards the future project pipeline, major amounts of new wind power are proposed in Victoria, New South Wales and South Australia, with Victoria containing 33% of the national proposed project capacity. (The geographical spread of all these projects is available through the online maps provided in the Department's website.)

The wind industry in Victoria has made significant achievements in the last 10 years.

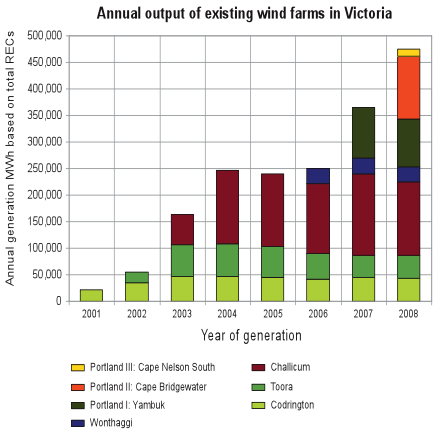
In July 2001, Pacific Hydro's Codrington wind farm, in Port Fairy, was fully operational. At 18.2 Mega Watts (MW) capacities, this was Australia's largest operational wind farm at the time.

In July 2009, Acciona's Waubra wind farm, near Ballarat, was fully operational. The only operating wind project in Australia with a higher capacity than Waubra's 192MW is the combined Lake Bonney 1 (2005) and Lake Bonney 2 (2008) sites in South Australia. Waubra wind farm can be considered the largest wind farm in Australia built in a single phase.

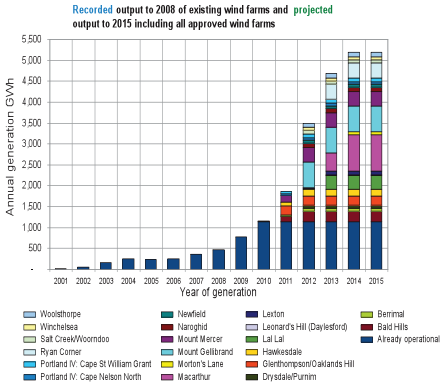
As accredited renewable energy generating stations, wind farm operators are eligible to create one Renewable Energy Credit (REC) per MWh of power generated by the wind farm. Marginal Loss Factors (MLF) are applied to REC earnings in the same way as they are applied to power payments. MLFs reflect transmission losses and are usually up to a few per cent. All RECs which are created are registered on either of two public registries: the Office of the Renewable Energy Regulator, which manages RECs throughout Australia, or the Essential Services Commission, which manages the Victorian Renewable Energy Credits (VRECs) in Victoria.

These public registers can be accessed in order to determine how many RECs and VRECs were generated by each generator. This provides a very close approximation to power generation during each calendar year.

Using this approach, the productivity of the wind farms in Victoria has been assessed, and is presented in the graph below:



Delivered wind farm yields in Victoria, annual totals.



Actual output to 2008 and projected output to 2015 of wind projects in Victoria.

Operational Wind Farms in Victoria, 2009

Historical overview of wind energy in Victoria

Significant events within the wind industry and broader events affecting the industry

1987
- 60kw wind turbine installed at Breamlea near Geelong in Victoria, with funding assistance from State Electricity Commission of Victoria. The turbine was manufactured in Western Australia by Westwind.

1997
- 20 November: Prime Minister John Howard announces the Australian Government will commit to a 2% increase in the proportion of electricity produced from renewable resources by 2010.
- Planning applications lodged for Codrington wind farm, Pacific Hydro's first wind farm development.
- Planning application lodged by Pacific Hydro for Portland I: Yambuk wind farm

2000
- November: Construction begins on Codrington Wind Farm.

2001
- MRET introduced, targeting 2% on 1997 levels, to reach 9500 GWh/year of new renewable generation by 2010.
- July: Codrington wind farm (Australia's largest operating wind farm at the time) opened.

2003
- September: Panel report on Wonthaggi wind farm published, recommends wind farm to be approved.
- December: Sustainable Energy Authority publishes the Victorian Wind Atlas.

2004
- Vestas commits to construct a wind turbine blade factory in Portland; project budget around $8.6M.
- Vestas acquires rival firm NEG Micon.
- Siemens acquires Bonus.

2005
- October: Sustainable Energy Authority and EcoRecycle Victoria merged to form Sustainability Victoria, created by the Sustainability Victoria Act.
- December: Victorian Government begins consultation on a Victorian Renewable Energy Target.

2006
- Victorian Renewable Energy

The Breamlea turbine
(www.skyfarming.com.au/normal/cwfhistory.htm)

Act 2006 enacted, mandating electricity retailers in Victoria to source an increasing percentage of power from renewable sources.

2007 • Vestas announces closure of blade factory in Portland.

2008 • November: Federal election – incoming Labor party promises to increase the renewable energy target to 20%, 45,000 GWh/year by 2020.

2009 • Expanded MRET legislation drafted and scheduled for presentation to Parliament at delayed date of around August 2009.
• Panel report completed for Lal Lal wind farm; Lal Lal wind farm awarded planning permit approval.
• August: Mandatory renewable energy target of 20% legislated.

(Summarised from a presentation made by Demian Natakhan, of wind energy consulting firm Enhar, at the Victoria Energy Conference on 27 August 2009.)

Letters to the Editor

I read with interest the article by David Marley on electric cars. I don't know if it was a misprint, but the batteries are Lithium-ion, not Lithium Iron. As a mechanical engineer, I am not sure what an ion is, but that is correct for these batteries.

I would also take the 2.5 hours charging time with a grain of salt. Six hours is more common. For the high-powered cars to charge in 2.5 hours requires a big charger running on 3 phase. Most users will be happy to charge overnight.

Jack Moore

I would like to offer my apologies for the error which crept in describing the version of the latest batteries as Lithium Iron. It should be Lithium-ion, often abbreviated to Li-ion. As you can see, it is extremely difficult to pronounce the two versions with sufficient distinction to clarify the difference. There is no such technology as Lithium Iron, although with the wide range of possibilities of finding the best 'couple' for the most efficient battery, it might be feasible in the future.

Let me make this clear. Lithium-ion batteries should not even be confused with lithium batteries. Lithium batteries are primary batteries containing metallic lithium, while Lithium-ion batteries are secondary (rechargeable) batteries in which a lithium-ion moves between the anode and cathode. Li-ion batteries are common in consumer electronics. They are one of the most popular types of battery for portable electronics, with one of the best energy-to-weight ratios, no memory effect, and a slow loss of charge when not in use. In addition to consumer electronics, li-ion batteries are growing in popularity for defence, automotive and aerospace applications due to their high energy density.

On a more technical note, the following might help. The three primary functional components of a Li-ion battery are the anode, cathode and electrolyte, for which a variety of materials may be used. Commercially, the most popular material for the anode is graphite. The cathode is generally one of three materials: a layered oxide, such as lithium cobalt oxide; one based on a polyanion, such as lithium iron phosphate; or a spinel, such as lithium manganese oxide – although materials such as TiS2 (titanium disulfide) were originally used. Depending on the choice of material for the anode, cathode and electrolyte, the voltage, capacity, life and safety of a Li-ion battery can change dramatically. Recently, novel architectures have been employed to improve the performance of these batteries.

On the second point from Jack Carter, regarding recharging times and performance, I did include a disclaimer in the article about any of the specifications and performance figures, which are impossible to prove; however, this disclaimer appears to have been edited out. These are the figures I was able to discover, although I have to admit that they were mainly from marketing sources that, as we know, can be described as 'sprinkled with exaggeration'!

David Marley

The Committee will change soon and I hope you (Stan Gafney) will continue in the Committee. While the young take over, the seniors must extend their expertise.

There appears to be something in Dr Gorski's proposal to extend the President's term. In fact, we have been having discussions along the same lines at the Institution of Engineers, Sri Lanka and the Organisation of Professional Associations of Sri Lanka. The latter is the apex body for 43 professional associations in Sri Lanka consisting of doctors, engineers, architects, town planners, lawyers, accountants etc. We are not close to a decision yet.

Also, some of our members were unhappy with the new logo.

I am sure Albert Willis could be one of the longest-serving members of IMechE. We had a member who joined in 1938, and passed away last year.

Sam Perera
Sri Lanka Panel Chairman

I'd like to compliment Stan on a beaut *Bulletin* read. I found it a better read than the *PE*!

If I had one wish, I'd turn the clock back to the days when the Institute conducted its own examinations. I realise that this might be considered an impossible ask but in my view those exams set the standards that the universities really did have to follow – and follow they did! In this way, every corporate member matched up to uniform standards and satisfied the requirements judged to be essential, academically, to be a proper engineer. Remember too that Part III incorporated management.

That's my ask anyway.

Dr Richard Hudson

Tempus fugit ('Time flies').

Today I was delighted to receive the May issue of your *Bulletin*. It was an added pleasure to read the letter from Albert Willis. Having emigrated to Australia in October 2007, aged 81, I am wondering whether I am the oldest member with the shortest period of time in Australia! I too became a student member when I was an undergraduate at Kings College, London. Although he may not recall it, A. H. Willis was one of my lecturers at the time and, indeed, my tutor in my final year.

Maurice J. Kenn
former Chairman, Southern Area,
Greater London Region

Regarding "Inventions" (*News Bulletin No. 155*), the umbrella that can't invert may be possible with revised geometry of the flimsy mechanism. However, a simple method would be to put a high-tensile cord around the rim of the umbrella.

Now here is one for you: I want a bicycle tyre suitable for a mountain bike (all-terrain) but able to work effectively at high pressure on- and off-road (i.e. combining low friction AND flotation).

Jack Moore

Something to think about

It is said that engineers take 3 minutes to solve this, architects 3 hours and doctors 6 hours.

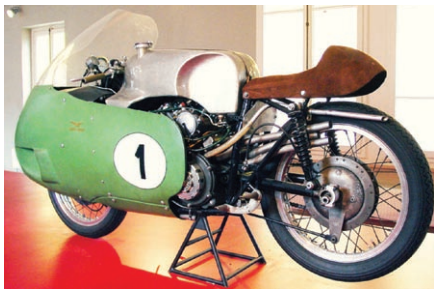
What is the 6th number in the sequence?

1, 2, 6, 42, 1806, ____

Thanks to all those readers who offered solutions to Bachet's Weights Problem in *News Bulletin 155*. The solutions are:

a) With all test weights on the same scale pan: 1, 2, 4, 8, 16, 32.

b) With some weights on either scale pan: 1, 3, 9, 27.



Name the motorbike

The first two members to identify the motorbike by 31 October 2009 will receive a much sought-after IMechE ballpoint pen.

Several readers attempted to identify the car in *Bulletin 155* without success. Stan Gafney says: "It was a 1933 Brooklands Riley, owned by a fellow ex-apprentice. As I recall, it had been driven mercilessly before he took possession and he spent considerable sums of money rejuvenating it. My most vivid recollections are of the mechanical noise from the engine and gearbox, and the pools of oil which accumulated on the road when the car was parked."

Submit a suitable caption

The author of the best caption received by 31 October 2009, to be judged by the editorial panel, will receive a fashionable IMechE stubby holder.

The editorial committee spent many humorous minutes judging the numerous captions submitted for the aircraft picture in *Bulletin 155*. The two winning entries were:

" … and I must remember to repair the starter motor before my next flight."

And:

"If only I could remember the firing order for this twin-cylinder engine."

The much sought-after IMechE ballpoint pens have been despatched.

Getting there first

The desire to be fastest and first has always been part of the human psyche. Witness the ancient Romans with their chariot races round a U-shaped course, designed to illustrate, inter alia, the benefits of Inside Running. Later, the ever-so-English predilection for horse racing was born, culminating in the famous "Derby". The full flowering of the first-past-the post urge, however, did not emerge until engineers became fascinated with improving the power/weight ratio. Previously, the ratio was abysmal – rather less than one theoretical horsepower per ton of horseflesh. (Even so, speeds in the range of 37–43 mph were possible, if only for short periods.) But dramatic improvements were inevitable, given steam, electric and internal combustion technology.

Between the world wars, the land speed record was always good for a front-page headline. Assuming a vehicle driven and steered by its wheels, the practicable limit would be around 450 mph (725 kph) over one mile of flat desert in good weather with plenty of space at each end. If jet or rocket propulsion, track guidance and perhaps radio control are allowed, another 50 per cent is not impossible. For a conventional railway, it is of interest that the French TGV has achieved a trial run at 565 kph. (An engineer can't help wondering how the front end did not generate enough aerodynamic lift to lift off!)

When considering what might be done in the marine world, we must distinguish between displacement and planing vessels. The former, alas, are constrained by the fact that power increases with the cube of speed, and also, in practice, their tendency to become planers anyway. The real limit here is the cost; a non-commercial vessel such as a naval destroyer has been known to get somewhere near 50 mph in a flat calm. Submarines, which do not make waves, might realise more than 30 mph given enough power. For hydrofoils and the like, perhaps 70–80 mph is practicable, if not entirely safe.

Next we get into the air, where speed is all a matter of brute force and the thermal barrier. Anything up to orbital speeds is routinely achieved, albeit at some pain to the taxpayer. The airlines have prudently set the limits somewhat below supersonic, as they hope to stay in business. The Convair 990 probably had the closest margin, but unfortunately at the cost of an eventual commercial disaster.

To conclude, appropriately, there was the celebrated Mach 1.8 Concorde. Future historians will earn a modest income discussing its value to society. Was it worthwhile? Compared with the medieval cathedrals, the answer must be no, as many of these are still in useful existence. The Concorde did, however, provide a lot of employment for engineers. Maybe we should be grateful.

Vulcan

NOMINATIONS FOR 2010/2011 OFFICE BEARERS

Included in this edition is a nomination form for 2010/2011 Office Bearers. The election will be held at the Annual General Meeting (date TBA) and the newly elected Office Bearers will take up their duties during the third week of May 2010. The option for postal voting will remain.

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

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

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

Please send the nomination form to the Branch Chairman, Clive Waters, at the address on the form, to arrive no later than 20 November 2009.

A list of nominations will appear in the January 2010 issue of the *News Bulletin*.

NOTES:

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

AUSTRALIAN BRANCH CONTACTS

Chairman
Clive Waters
569, The Parade
Magill, SA 5072
Email: cwaters@optusnet.com.au

BRANCH AND PANEL SECRETARIES

Honorary Secretary Australia Branch and NSW Panel
Ian Mash
1, Nareen Parade
Narabeen, NSW 2101
Ph (w) (02) 9262 6011
Email: ian.mash@downeredirail.com.au

Asst Hon Sec, Australia Branch and *News Bulletin* Editor
Roshan Dodanwela
2/161 Victoria Road, Hawthorn East
Victoria 3123
Ph (w) (03) 98824410
Email: dodanwela@yahoo.com

Honorary Secretary of Victoria Panel
Varan Karunakaran
26 Sunburst Avenue
Balwyn North, Victoria 3104
Ph (w) (03) 9211 6445
Email: varan.karunakaran@mel.jpkenny.com.au

Honorary Secretary of WA Panel
David Allen
73 Seacrest Drive
Sorrento, WA 6020
Ph (w) (08) 6222 8253
Email: david.allen@ghd.com.au

Honorary Secretary of Queensland Panel
Ian Marshall
75 Christella Court
Kenmore, Qld 4069
Ph (w) (07) 3871 1755
Email: imarshall@bigpond.net.au

Honorary Secretary of SA Panel
Stan Gafney
34 Loch Lomond Drive
Modbury, SA 5092
Ph (h) (08) 8263 2229
Email: s.gafney@bigpond.net.au

Tasmania and ACT
Please contact Australian Branch Chairman, or Australian Branch Hon Sec.

PNG Representative
Dr John Pumwa
Head of Mechanical Engineering Department
PNG University of Technology
Lae, MP411
Papua New Guinea
Ph (w) (675) 4734851
Email: jpumwa@mech.unitech.ac.pg

Honorary Secretary of YM Panel
Michael Riese
14 Alison Avenue
Blackwood SA 5051
Ph (w) (08) 8362 5445
Email: Michael_Riese@gmx.net

Executive Committee:
Clive Waters
Brian Carter
Ken Tushingham
Ian Mash

Branch I.T Co-ordinator
Geoff Stone
10 Carrbridge Drive
Castle Hill NSW 2154
Ph (w) 02 8850 2313
Email: blenrayaust@yahoo.co.uk

Websites:
IMechE Australian Branch Website
www.imeche.org.au

IMechE UK Website
www.imeche.org

NOTICES

AFFILIATE MEMBERSHIP

The Affiliate Grade of Membership is available, with no joining fee or annual subscription, for students studying an approved Mechanical Engineering degree course. Upon Graduation, the student can apply for Associate Membership. For details, students should contact their nearest Panel Hon Secretary.

MEMBERSHIP.

For information on how to apply for membership of the Institution, or transfer membership grade, refer to the website at www.imeche.org. Alternatively, contact Membership Helpdesk, c/o IMechE, 1 Birdcage Walk, London SW1H 9JJ. Telephone 001144 84522 69191. Email: membership@imeche.org.

Sponsors for membership should be Chartered Engineers, although not necessarily members of IMechE. Sponsors must be satisfied that the applicant should be considered for election to corporate membership and may be contacted for further information regarding the applicant at any time during process.

Applicants for grade of Fellow must be sponsored by at least one Fellow.

Engineers Australia members are eligible to apply for the equivalent grade of IMechE membership under the terms of the Mutual Recognition Agreement.

UPGRADE OF MEMBERSHIP

Those Australian members having the necessary experience and qualifications are urged to upgrade from Member to Fellow. The appropriate forms can be downloaded from the above website, or hard copies can be requested from the Branch Hon Sec.

SUBSCRIPTIONS

Payment of subscriptions by MasterCard or Visa can be made by registration on www.imeche.org/imember/login.asp Other methods of payment include bank transfers in UK Sterling, Bankers Drafts and Cheques made payable in UK Sterling.

CHANGES OF ADDRESS.

If you change your address, please log in to www.imeche.org/imember/login.asp to make the changes. Alternatively you can write to IMechE, PO Box 87 Oakengates DO (District Office) TS3 3WT UK. (Phone number: 001144 1952 214060).

IMechE PRIZES.

The Following Prizes are administered by Australian Branch and details can be obtained from the Branch Hon Sec or from your nearest Panel Hon Sec:

- The Frederic Barnes Waldron Best Student Prize
- The IMechE Project Prize
- The Speak out for Engineering Prize
- The Paul Henderson Prize
- The Andrew Frazer Prize (PNG)

ARTICLES FOR NEWS BULLETIN

This Australian Branch Magazine is published three times a year. It features news of events being held at Branch level and in the various Panel areas. The Editor is constantly on the look out for good articles on a wide variety of engineering topics. If you have an interesting theory, mechanical engineering experience or invention, please contact the Editor.

Articles or Letters for publication in News Bulletin should not exceed 3000 words, and are preferred in Microsoft Word format. They can be sent by email or posted on Compact Disk. Alternatively, clearly typed hard copies can be submitted.

Articles should be accompanied by good quality diagrams or photographs of about 1Mb for clarity, with captions, and not embedded in the Word document.

CIRCULATION.

The Magazine is circulated free of charge to all Australian Branch Members. Should you prefer to not receive a copy of the News Bulletin, please advise the Editor, using the contact details in this publication.