NB
News Bulletin
Australian Branch

NUMBER 161 MAY 2011

Institution of MECHANICAL ENGINEERS

PRODUCED FOR INSTITUTION OF MECHANICAL ENGINEERS MEMBERS LOCATED IN AUSTRALIA
PRINT POST APPROVED PP317737/00060
PRICE $4.00

VISIT TO ETSA'S STOBIE POLE FACTORY BY THE JOINT TECHNICAL PROGRAM

In February 2011, a group from the Joint Technical Program consisting of members from the SA Panel of the Institution, Engineers Australia, the RAeS and IET went to the only Stobie Pole Factory in Australia.

Members of the JTP group in front of an original Stobie Pole and a new pole manufactured at the current factory.

South Australia generally has relatively small amounts of timber suitable for making power and telegraph poles. To make matters worse, large areas are prone to white ant and termite infestation. So, an alternative was required. Steel and concrete poles (called Stobie Poles) were designed by the late J. C. Stobie in 1924 when he was the chief design engineer for ETSA in South Australia. The basic design consists of two steel c-channels spaced at predetermined distances and then filled with concrete. Bolts running through the concrete between the two beams take on the role of

A member of ETSA explains the manufacturing stages of the Stobie Pole to JTP visitors.

A beam-bending machine originally purchased from the UK in the 1950s is still fully operational today and used on a regular basis in the manufacture of the poles.

A new manufacturing plant for the manufacture of Stobie Poles was made operational in 2008.

ON THE INSIDE

Visitors to the ETSA Stobie Pole Factory study background material on the manufacture and use of the poles.

reinforcement rods, ensuring added stability and load-bearing capability.

Originally, the poles were made individually. This labour-intensive process became mechanised in 1950, when the average throughput of the factory was 14 poles per day. Following the sale of the old property at Angle Park. South Australia in December 2006, a new mechanised plant was required. This plant, also located in Angle park started production in April 2008, leading to an increase in production throughput to 25 units per day.

Modern poles vary in length from 9 to 36 metres and the current facility consists of two separate production lines: the mechanised plant (where poles are made from 9 to 15 metres using semi-automated processes) and the heavy-section line (where poles are made mainly for transmission lines from 15 to 36 metres, using old manual processes). The majority of mechanised poles are for ETSA›s distribution system and are generally up to 13 metres in length. Most poles are used to replace old or damaged units, with only a small minority used for new lines.

The JTP group was treated to an excellent tour of 1.5 hours, including detailed explanations of the manufacturing process and the intricacies involved in achieving consistent quality and no rejects.

The JTP would like to thank ETSA Utilities for providing some of the above information and for making available time and personnel to host the group. ■

Michael Riese

While the mechanised part of the factory is capable of producing almost every pole size, some oversized poles, such as the one shown here, are still manufactured by hand using the traditional method.

A pole that has been filled with concrete is prepared so that excess concrete can be washed off prior to curing.

A Stobie Pole is bolted to the correct spacing and is ready for filling with concrete.

A pole is bolted to the correct spacing. The bolts also act as reinforcement rods. The plastic caps are the cores for future fixture holes that will be mounted to the pole once it is erected on site.

EDITORIAL

New-look Bulletin

It is my pleasure to introduce the new-look *Bulletin*. Based on the feedback received from the survey conducted in September 2010, the layout is now more contemporary and, hopefully, will make for easier reading. Also changed is the outside back cover, which now carries social content. We are aware, however, that there is always room for improvement, and we encourage your feedback and ideas.

I am delighted to have worked on this issue with the new editor, Matt Springer, who will take over from the next issue. Matt is a young engineer from Melbourne who has lots of ideas and enthusiasm – we are lucky to have him.

For the moment, the *Bulletin* will continue to be mailed to all members in hard copy. However, an email notification will also be sent to all members who have provided an email address in their membership details with a link to a pdf copy of the latest issue (uploaded to the *Near You* website). Future issues will also be more electronic-friendly – for example, hyperlinks to related articles will be provided.

I would like to thank members who have sent in articles, ideas, suggestions and words of encouragement. Also a word of thanks to past editors Stan Gaffney and Tony Creedy for their encouragement and support, and to the Branch Committee for helping out. It has been an absolute pleasure and I wish Matt and the future of the *Bulletin* all the very best. ■

Roshan Dodanwela

FROM THE CHAIR

Welcome to the May 2011 edition of the *News Bulletin*. In NB 160's 'From the Chair', did anyone pick the deliberate mistake? In the message, I stated that this would be my last Chairman's message, because the new Chairman would be elected at the February AGM. I was assuming that this *News Bulletin* would be issued after the May IMechE AGM in London. That, in fact, is when the new Branch Committee will officially take office (see below). However, this *News Bulletin* will be issued before the IMechE AGM. So, in effect, I am still Branch Chairman until 25 May. This one slipped through scrutiny and I apologise for any confusion I may have created.

To reflect on events over the past three to four months, I should like to begin with a report on an International Strategy Board teleconference with various Regional members, which was held on 15 February. Highlights of this teleconference were:

- Summary of progress on the plan for the new India Branch. The President was scheduled to visit India in April to further encourage effective working relationships with companies across India.
- Summary of progress on the plan for China. This included:
  - Establishment of four student chapters at universities in Southern China.
  - Launching of a design competition to encompass the greater China region.
  - Accreditation of two to three university engineering courses relating to automotive and mechanical engineering.
  - Establishment of company-based registration schemes at a shipyard and automotive manufacturer.
  - Planned visit by the President John Wood and the CEO Stephen Tetlow, who visited Hong Kong and China in late 2010.
- The formation of new groups in Greece, Switzerland, Italy, Spain and Texas (USA).

The 51st Australian Branch AGM was held in Perth on 26 February. As reported in the last edition of the *News Bulletin*, the new Chairman will be Ian Mash and the new Hon. Secretary will be Dayaratne Dharmasiri. Ken Tushingham will continue as Hon. Treasurer and the new Assistant Hon.

L to R: David Heppenstall (Western Australian Panel Chair), Ian Mash (Branch Chairman elect 2011/12), Clive Waters (Current Branch Chairman), Ken Tushingham (Branch Treasurer), John Burt (Victorian Panel Chair), Michael Riese (South Australian Panel Chair), Matt Springer (Branch Assistant Hon. Secretary and News Bulletin Editor Elect 2011/12), Daya Dharmasiri (Branch Hon. Secretary Elect 2011/12), Leslie Yeow (Queensland Panel Chair)

[Absent: Monika Sud (NSW Panel Chair), Roshan Dodanwela (Current Branch Assistant Hon. Secretary and News Bulletin Editor)]

Secretary/*News Bulletin* editor will be Matthew Springer.

Also on 26 February, the 80th Australian Branch Committee meeting (face-to-face rather than a teleconference) was held. As well as the Executive, Panel Chairs were present, with apologies from Monika Sud (NSW Panel Chair), John Pumwa (PNG Representative), Mark McKenzie (Young Member Chair) and Roshan Dodanwela (Asst. Hon. Sec./*News Bulletin* Editor who was, unfortunately, suffering from a virus)

The Australian final of the Speak out for Engineering competition was held in between the committee meeting and AGM.

On behalf of the Branch Committee, I should like to express our thanks to David Heppenstall, the WA Panel Chairman, and his team for their excellent organisation in making these meetings at the Seasons of Perth Hotel such a success.

The Andrew Fraser Prize was again awarded on 8 April to a student at the University of Technology, Lae, Papua New Guinea, by our representative Professor John Pumwa, Head of the Mechanical Engineering department.

The Asia and Oceania Regional meeting took place over the weekend of 9/10 April in New Delhi, India. Our Branch Hon. Treasurer Ken Tushingham who is also the Regional Chairman and Ian Mash, the Branch Chairman-elect, attended.

In NB 160, I described the preparation of potential applications to the Engineering Heritage Award committee for several artefacts of engineering excellence. I am pleased to announce that the Boulton & Watt steam engine displayed in the Powerhouse Museum in Sydney is due to receive an IMechE Engineering Heritage Award. The engine was one of the earliest rotative steam engines to be built and is the oldest in existence. It is also one of the oldest in the world that still works regularly under steam. This will be the first time that the IMechE has granted the Heritage Award to an artefact outside of the United Kingdom.

Also, an application for the Humphrey Pump at Cobdogla, South Australia, has now been submitted to the Engineering Heritage Awards Committee for recognition of the UK's engineering excellence.

The application for the1855 Locomotive (No. 1), also described in NB 160 and also resident at the Sydney Powerhouse Museum, will be submitted to the EHA Committee by the time this *Bulletin* is issued.

Finally, and once again, I should like to express my thanks to all Branch Committee and non-Committee members, for all the assistance you have given me during my term as Chairman of this Branch. I have thoroughly enjoyed my tenure and I wish the incoming Chairman and his committee all the very best of luck in the ensuing two years. ■

Clive Waters

VALUE FOR MEMBERS

Branch Financial Position

Following a lengthy discussion during the Branch Committee meeting on 26 February, and subsequent to a request made during the AGM, the Branch Committee has been progressing a robust dialogue with HQ in respect to the financial position of the Branch.

Members might be interested to know that the Australian Branch submitted a budget to HQ totalling $56,550 to cover all 2011 planned activities, which service our 1504 members.The Branch was advised that our 2011 grant will be 20,000 UKP, or about $31,628. This represents a reduction of about $25,000 or 44 per cent.

A dialogue with HQ continues in order to seek an understanding of how this issue could be resolved without our need to reduce those few activities that incur costs. During discussions, the Branch clarified for HQ that:

- the funding requested was the minimum required to fund those few activities we incur costs for.
- the majority of this funding is used to print and issue to our members the three editions of the News Bulletin each year – the only Australian-focused communication the members receive, and something we felt the Trustee Board and ISB would support as being a core activity of our Branch.
- for our other activities, the Branch typically incurs:
  - few or no costs for lecture theatres for the delivery of the technical programme of 50 or so events nationally per annum.
  - few or no costs for refreshments prior to these lectures.
  - few or no costs for presenters who take the time to prepare and present papers.
  - few or no cost for the quantity of professional interviews undertaken by our volunteers.
  - few or no cost for the state Panel activities that organise the learned institution events enjoyed by our members; and,

- no costs for work in compiling, editing and making each edition of the News Bulletin ready for print.

Ian Mash

Current Hon Secretary
and Branch Chair elect 2011/12

Below is a response from Stephen Tetlow, the CEO of IMechE…

Dear Ian

Thank you for your letter of 21 March advising the Australia Branch concerns on funding and the potential impact on membership and Institution growth locally and internationally.

I know that you and other members of the Branch Executive have had a telephone conference with Colin Brown, Director Engineering and Maria Taylor from the International RIO team. I hope I have interpreted the outcome of your discussions correctly as I record the actions below:

Firstly we must double our efforts to ensure the accounting systems work quickly. I am pleased to see that you have agreed a clear new process for your treasurer to get 'top-up' funds within seven days. I will be watching closely to check that this process runs smoothly.

Secondly, I can only emphasise the importance of executive members meeting with each other to share best practice and innovate to resolve issues as they arise not only in Australia Branch but in all regions across the world. Your attendance at the Forum in Delhi this month and then at the International Strategy Board here in London in May are key to improving the way the Institution learns about what goes on and hence how it can improve. Many thanks to you and your colleagues for making the time to travel and meet.

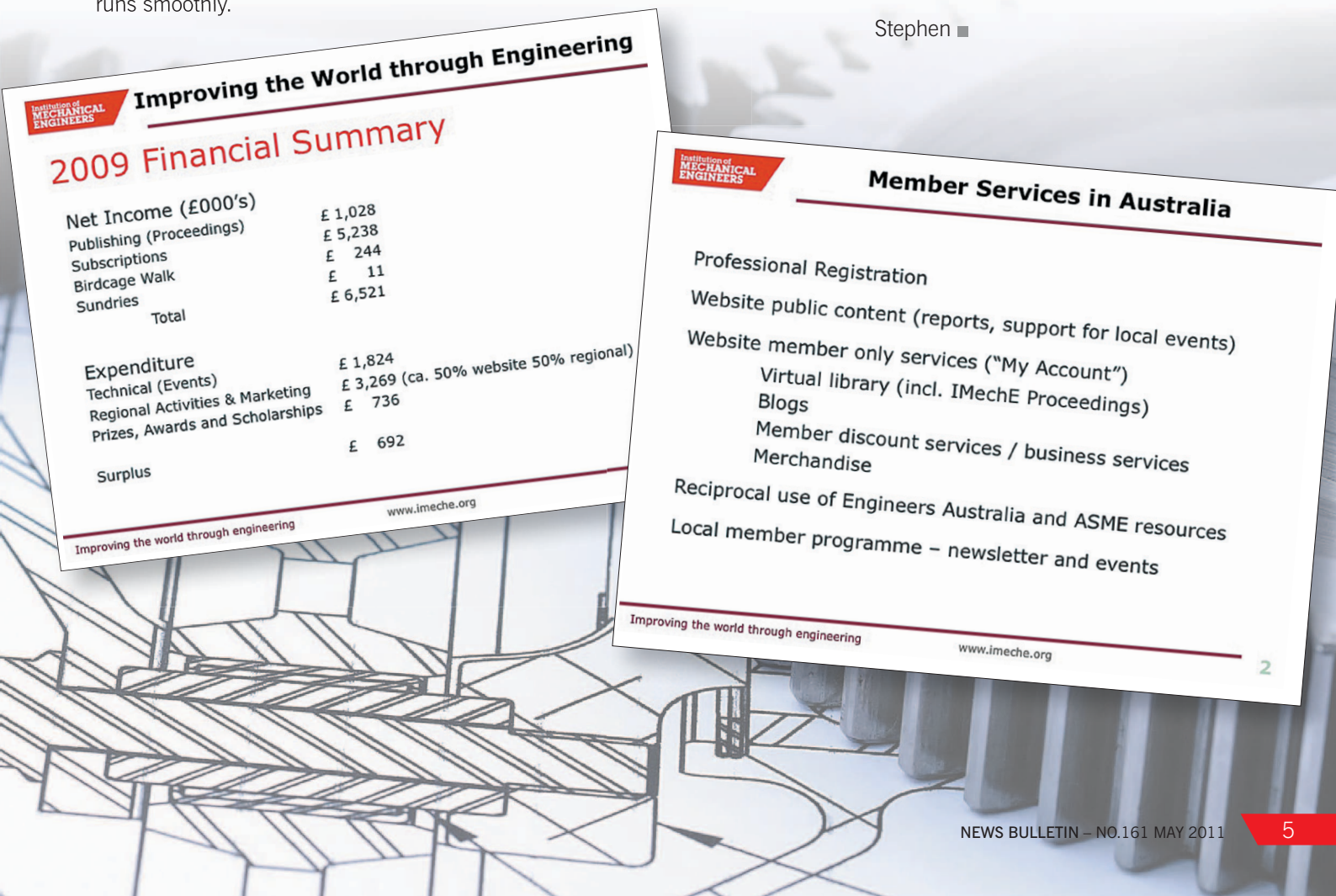
Finally, in my view the programme you propose does indeed reflect the desires of the Trustees to engage members and non-members alike. You should continue to make requests for funding to deliver that programme even when your allocated grant is exhausted. We will make every effort to ensure that the financial needs for your good work are met. Clearly anything you can do to constrain those costs (e.g. by electronically sending the *Bulletin* to the 9 per cent of your members who are happy to receive it that way) would be much appreciated.

In conclusion, I know that you also discussed more broadly the aims and priorities of the Institution. I have attached a couple of slides that may be of use to you in communicating that locally. The first one uses information from our website (http://www.imeche.org/about-us/annual-review/financial-summary <http://www.imeche.org/about-us/annual-review/financial-summary>) and shows how we apportion our expenditure in our goal of 'improving the world through engineering'. The second is a list specific to Australia of the benefits that I hope your members to a greater or lesser extent enjoy.

In closing I feel that one of the underlying problems here has been the 38 per cent reduction in the value of Sterling against the Australian Dollar over the last eight years. Whilst that has reduced the true cost of membership for your Branch, it has also clearly reduced the value of your grant by a similar amount. I will make sure that exchange rate becomes a more visible part of our thinking in future. Please do contact the International Team when you require a top-up of funds, via the new process.

Best wishes

Stephen ■



LATEST TECHNOLOGIES AND PRACTICAL NOTES ON GAS TURBINES FOR OFFSHORE APPLICATIONS

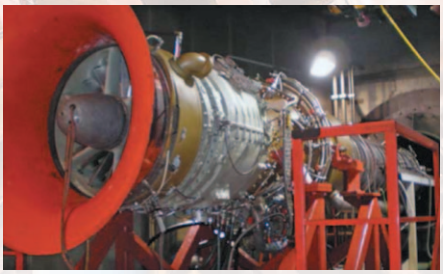
Considerable demand existed to grow aero-derivative gas turbine products in power, efficiency, reliability and availability for offshore applications. Clients now want to operate the gas turbines for longer periods before shutdown and efficient part-load operation as well as to mitigate the various reliability weaknesses such as various fatigues, fuel quality effects etc. Practical notes and guidelines on various gas turbines for power generation and mechanical drive in offshore applications are addressed. Main concerns are best performance, high efficiency, low maintenance and compact design as well as competitive commercial conditions. This article covers different performance, mechanical and reliability aspects of main gas turbine models in today's market. Latest achievements and most advanced technologies are also outlined.

Introduction

High efficiency, compact and light designs make aero-derivative gas turbine products the ideal choice for any offshore application. Aero-derivative gas turbine components and modules can usually be replaced in a very short time, facilitating maintenance. This article discusses the latest gas turbine technologies for offshore applications.

Aero-Derivatives and Multi-Shaft Gas Turbines

Aero-derivative machines typically leave a footprint of 45 per cent smaller and weigh 35 per cent less than heavy-duty machines with the same power rating. For offshore and floating applications, the best (and, in many cases, the only feasible) option is aero-derivative gas turbines for power generation and mechanical drive. The move towards aero-derivative gas turbine drivers is also about efficiency. Aero-derivative gas turbine efficiency is around 41–45 per cent, compared to 30–35 per cent for heavy-duty machines. Aero-derivative machines use the most advanced aircraft engine technologies. They have features that facilitate on-condition maintenance, and a very effective and efficient monitoring/maintenance method that considerably increases reliability and availability. Numerous bore-scope ports are provided to facilitate inspection. They allow very intelligent operation and monitoring of gas turbines. Rapid replacement of major modules is a great advantage; in most cases, major modules can be removed and new modules installed so that the turbine is back in operation within two days.



Avon 200 The modification for the upgrade can be fitted to the old Avon gas turbine during the scheduled overhaul.

Avon Gas Turbines

The earliest Avons were introduced in the 1960s. Since then, more than 1200 Avons have been sold worldwide, of which more than 900 are thought to be still in active service. The latest Avon 200 (see Fig. 1) extends its lifespan further. Avon 200 aims to improve the machine's gas generator base load power capability and thermal efficiency over a higher ambient temperature range, and to improve the component robustness to high-cycle fatigue excitation and high-temperature creep damage. The power of Avon 200 is 9 per cent greater (around 19.5 MW compared to 17.5 MW in the Avon 1535) and the heat rate is 5 per cent greater.

RB211 Gas Turbines

RB211 gas turbines are widely used for power generation as well as mechanical drive. More than 700 RB211 gas turbines have been sold worldwide. RB211 gas turbines are offered in various models. Their power capacity is around 30–44 MW (depending on the model) and their efficiency is about 36–41 per cent. Power turbines can offer a shaft speed 4800 or 6000 rpm for mechanical drive (depending on the model). RB211-H63 is the latest version of this large family. Its power capability is around 44 MW, with thermal efficiency of up to 41.5 per cent. This new model generates at least 11 MW more power than the old RB211 model. Modular exchange provides ease of maintenance. Full load power can be obtained in ten minutes from cold.

Titan Gas Turbines

The Titan 250 is the latest model of the Titan gas turbine family and extends the power output range to 22.4 MW. It is available for use in a mechanical drive package and in generator drive sets. It is a two-shaft design. The package has a footprint of approximately 10.5 x 4 x 4.2 m and weighs around 51 t. The Titan 250 can produce 50 per cent more power than the Titan 130 with the same footprint, is 40 percent more efficient and has a 30 per cent reduction in emissions compared to the Titan 130. It uses variable inlet guide vane technologies for efficient part-load operation. It incorporates a vertically split casing design. The combustion chamber uses annular-type, lean-premixed, dry, and low-emission design technology. It is designed to operate on a broad range of gaseous and liquid fuels. The power turbine section is a three-stage reaction type with a maximum speed rating of 7000 rpm.

LM2500 Gas Turbines

The LM2500 family is the most popular gas turbine for industrial use. There are more than 2600 LM2500 sold for various applications. The LM2500+ gas turbine is a 31MW aero-derivative two-shaft machine with efficiency of about 40 per cent. It is derived from the LM2500 engine but increases its airflow and pressure ratio by around 23 per cent. The two-stage power-turbine provides a shaft normal speed around 6100 rpm (the operating range is 3500–6300 rpm). Variable geometry air compressor inlet guide vane and variable stator vane technologies are used to improve starting as well as reasonable efficiencies in part-load

operation. LM2500 gas turbines are usually offered in a single base-plate configuration, including gas turbine, enclosure and auxiliaries. The footprint is around 6.5 x 3.6 x 4 m and it weighs 39 t. LM2500+ has an annular combustion chamber (30 fuel nozzles), and a single annular combustor (SAC). It uses modern aircraft engine technologies such as the latest combustor system design, advanced internal coating, modern thermal barrier etc. Individually replaceable fuel nozzles are provided to facilitate maintenance. The newest version of LM2500 is LM2500G4, which retains the basic design of the LM2500+ but increases its power capability by around 10 per cent. LM2500G4 can produce more than 34 MW of power. The old LM2500 can be upgraded to the G4 version within the same space constraints. Modification improves the power capability by increasing the airflow, improving the materials and increasing the internal cooling. The number of compressor and turbine stages, the majority of airfoils and combustor designs remain unchanged.

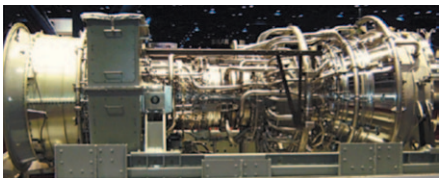
LM6000 Gas Turbines

The LM6000 (see Fig. 2) is a multi-spool machine that exhibits a large speed range. It is around 42 percent efficient with more than 44 MW of simple-cycle power. The six-stage turbine offers 3600 rpm speed for both electric power generation and mechanical drive application. Its design allows a full-speed range capability or around 55–105 per cent nominal speed. It is usually offered in a single base-plate configuration.

The LM6000PG is the next generation of LM6000PC, both of which use Single Annular Combustor (SAC). These are relatively simple changes to enable the LM6000 to function at higher temperatures and pressures. The low pressure (LP) air compressor can operate at higher speeds to increase the flow. Increasing the flow boosts the power and heat rate. In addition, in the latest version, the high pressure (HP) turbine rotor has been modified based on modern aircraft engines. The new LM6000 series provides a guaranteed NOx level of less than 15 ppm, as well as a very low CO2 footprint.

Trent 60 Gas Turbines

The Trent 60 is a large and modern aero-derivative gas turbine available for industrial use. It can deliver up to 64 MW of power (42 per cent efficiency). This machine offers great flexibility. The same gas turbine can be used for power generation as well as mechanical drive application.



LM6000

LMS100 Gas Turbines

The LMS100 is a large aero-derivative three-shaft gas turbine. It can produce more than 100 MW with around 45 per cent efficiency. The LMS100's aero-derivative core and power turbine allows an operating flexibility that is very rare in other gas turbines of 100 MW size. It uses an annular combustion chamber (30 nozzles) and inter-cooling technology to increase power and efficiency. It combines aviation's highly successful characteristics, modern turbofan engine technologies and the most extensive and advanced design and manufacturing techniques in aero-derivative gas turbine field for power and mechanical drive applications. Given its size, the LMS100 provides a very high level of performance, flexibility and reliability. It has three turbine sections (HP, MP and LP). The power turbine can be optimised for 3000 or 3600 rpm drive shaft speeds. The modular design, part-load efficiency, operational characteristics and the ability to change-out the main modules in 24 to 48 hours provides increased flexibility, availability and reliability that is unique for 100 MW gas turbines. ■

Amin Almasi

Amin Almasi is lead rotating equipment engineer at WorleyParsons, Brisbane, Australia. He holds chartered engineer certificate from Engineers Australia and IMechE in addition to a M.Sc. and B.Sc. in mechanical engineering. He specialises in rotating machines. Amin is an active member of Engineers Australia, IMechE, ASME, IEEE, Vibration Institute and others. He has authored more than 45 papers and articles dealing with rotating equipment, condition monitoring, offshore, subsea and reliability.

PANEL NEWS

VICTORIAN PANEL

The Panel is off to a slow start for 2011. At the first meeting in February, planning for the year's program has been put in place.

A site visit to Leica Biosystems was organised in late March, and a full report will appear in the next *Bulletin*.

I attended the Australian Branch Meeting, the Speak Out for Engineering Australian Final and the AGM in Perth in late February.

The nominations from Victorian Universities for the IMechE Barnes Waldron Best Student and Best Student Project prizes are all in, and I have already attended a formal dinner at the Victoria University to make presentations to Sean Kennan for the Best Student prize, and Justin Rhodes for the Best Project prize. More presentations will be made later in the year.

J. W. Burt

Panel Chair Victoria

NSW PANEL

News from the NSW Panel in this period has been dominated by two key successes in the development of a 'Very Young Members' Section.

Your chair, Monika Sud, gave birth to a son, Tarun Hirsch, on 24 February. Both are well. Not long afterwards, your treasurer, Jason Groombridge, became the proud father of a girl, Sarah Elizabeth. Mother and daughter are both doing well and Jason is becoming familiar with the engineering design features of modern nappies.

Needless to say, adjusting to their new roles as parents has been the key focus for both Jason and Monika.

In amongst all this, the activities of the Panel have continued to assist with membership growth. Coordinating with the UK HQ, a professional interview was organised in February. The interview panel was convened, the necessary paperwork reviewed and the interview carried out. Recommendations have been forwarded to the UK HQ for the next membership committee meeting. The Panel continues to support interview processes for applicants in NSW, including applicants who are living or working in NSW for a period of time but are normally based elsewhere in the world.

During March, the Sydney Mechanical Chapter enjoyed a most enlightening paper in relation to the new PPP Trains being delivered by Downer EDI rail for RailCorp. The paper, entitled 'Advances in Energy Efficiency of Trains for New South Wales', was delivered by Phil Pearce and Guy Collishaw and highlighted a number of class-leading features, and the potential for even greater energy efficiency, whilst delivering a level of lighting, comfort and information technology to customers and clients. Their paper discussed the design targets of three leading energy-consuming systems – Traction, Climate Control and Saloon lighting – and focused on reducing direct energy consumption, and increasing energy recovery and mass reduction, which affect both energy use and vehicle performance. The large audience was surprised to learn that energy consumption in a simple area such as lighting will potentially save in the order of 1500 MWh per year for the Waratah fleet over the standard fluorescent solution.

Finally, at the AGM held in Perth on 26 February, our own Hon Sec, Ian Mash, was elected unopposed as the next Chairman of the Australia Branch of the IMechE. Ian will formally take up this position in May when the IMechE AGM is held in London. In the meantime, Ian will make a flying visit to Delhi to represent the Branch at the Regional Forum. Perhaps some feedback from this trip will feature in the next *Bulletin*.

Ian Mash and Jason Groombridge

QLD PANEL

The main news for Queensland over the last few months has been the occurrence of natural disasters!

In January, Brisbane was affected by a major flood that rose to near 1974 levels. Many structures along the Brisbane River were damaged or washed away. The rising river also affected many houses, with flash flooding occurring in places like Toowoomba and the Lockyer Valley.

Then Cyclone Yasi made landfall in Far North Queensland. Reminiscent of Cyclone Larry in 2006, many homes and businesses in the township of Innisfail and along the Cassowary Coast were damaged by the category 5 cyclone.

As someone who works for ENERGEX, I was involved in 'feeder patrols' around Brisbane to investigate the damage to ENERGEX's electricity distribution assets caused by the floods. Many of ENERGEX's crews were also deployed north to assist Ergon with the reconstruction and recovery effort after Cyclone Yasi.

On a lighter note, the Queensland Panel AGM was convened in February. We welcomed a few new members to the Committee, increasing our number to 10. As the Chairman, Daya Dharmasiri, was stepping down after five years, the members elected a new Chairman and Secretary. I was elected Hon. Chairman and Roger Buckley was elected Hon. Secretary for 2011. The Committee thanked Daya for his many years of hard work. Although stepping down from the Chair's position, Daya was successful in being nominated as the Australian Branch Hon. Secretary for 2011. He will formally step into the role in May 2011 after the IMechE AGM in the UK.

In late February, Daya and I attended the Australia Branch Annual General Meeting and Committee Meeting in Perth. It was a good opportunity to meet new faces and to reacquaint ourselves with those who have been there for some years. The Committee discussed the previous year's events and plans for the coming year.

In late March, a half-day seminar was presented on the new national Work, Health and Safety Act. The legislation, to be introduced across Australia at the end of 2011, is designed to harmonise the current state-based occupational health and safety acts. The presenters gave background information on the need for change, identified those parts of the legislation most likely to affect the engineering team, and shared some experiences and insights into the types of issues likely to be faced by any members of the engineering profession encountering a goal-setting safety regime for the first time.

The year ahead looks promising with the introduction of new members to the Committee. We anticipate active participation from all involved to make the year an exciting one.

Leslie Yeow

Panel Chair, Queensland

SA PANEL

New Year's Lunch

At the start of February 2011, a group of around 25 members and supporters of the South Australian Panel met for the traditional New Year's lunch at the Robin Hood Hotel.

The lunch marks the start of an active year of the SA Panel and has been a tradition for a number of decades. The event also presented itself as an opportunity for one of our new members, Philip Richards, and his wife, Hannah, who both recently moved from the UK to Adelaide, to be introduced to the Panel committee and some long-standing Panel members.

The food was outstanding and the conversation flowed back and forth on

engineering topics and current affairs. All participants agreed that the event was a great success and look forward to attending the Antipodean Christmas lunch in June.

Annual Petanque Challenge

In March 11, the SA Petanque Challenge between the Gawler Petanque Club and the SA Panel of the IMechE was carried out for the ninth time. The event, which is by now a well-established feature of the SA calendar, took place once again at the purpose-built facilities of the Gawler Petanque Club. Seventeen members and supporters from the IMechE arrived in good spirits for a barbecue and to take up the challenge. After having won the challenge in 2010, it was up to the engineers to defend their title. While this year the weather was on the engineers' side, with beautiful sunshine and pleasant temperatures, luck was certainly not. After some hard-fought battles on the grounds, the IMechE representatives had to yield the trophy to the Gawler Petanque Club. The SA Panel of the IMechE would like to thank our hosts for their hospitality and good-natured rivalry and is looking forward to 2012 and the tenth anniversary of the challenge.

Michael Riese

Panel Chair SA

PNG NEWS

The Andrew Frazer prize for 2010 was won by Mr Gerard Schlze, who also won the Council Medal and Degree with Merit. He has immediately been employed by LNG Gas and is currently in Melbourne, Australia. The department is very proud of him and we wish him all the best in his new career.

Mr Gerard Schlze, winner of the 2011 Andrew Frazer prize

I take this opportunity to thank IMechE for its continual support in the improvement of competitiveness among our mechanical engineering students. The introduction of this award has really improved the student performance overall. Thank you very much.

Professor John Pumwa

(PNG Representative) ■

INTERVIEW:

ANDREW LEZALA

Chief Executive Officer
Metro Trains Melbourne Pty Ltd

Who influenced you most in your decision to become a mechanical engineer?

My father and uncle, both of whom encouraged me and gave me motorcycle engines to play with when I was 10 years old.

Please give a brief synopsis of your career so far, including what you see as the highlights.

Synopsis:

- Bogie & Suspensions Engineer, Brakes Engineer, Project Engineer (British Rail)
- Engineering Director (RFS Group)
- Product Manager and VP Metros, China (ABB)
- Managing Director Australia, President Metros (Adtranz)
- President Services (Bombardier Transportation)
- CEO Rail (Jarvis PLC)
- CEO SSL & BCV Infraco's (Metronet)
- CEO (Metro Trains Melbourne)

Highlights:

- turnaround of Adtranz Australia, Adtranz Metros, Jarvis Rail
- growing Bombardier worldwide services business
- winning the Melbourne train franchise

How did you come to be CEO of Metro Trains Melbourne?

I led the bid team and when we won, I was appointed as CEO.

Can you please elaborate on Metro's operations? What is Metro responsible for and what does it see as its task?

We operate the entire metropolitan train network: all train operations, timetabling, signalling, maintenance, customer service and renewals.

What are the major challenges and rewards of your current position?

- Growing reliability and capacity.
- Ensuring that equipment is reliable.
- Creating timetables that work (every minute counts!).

- Cultivating a culture that supports outstanding performance.

It seems that Australia is lagging behind Europe and East Asia in terms of rail technology. For instance, we do not have a high-speed rail network. What is your take on this? And what is your vision for Metro and rail transport in Australia?

High-speed rail should replace air travel, starting with Melbourne to Sydney and then extending to Brisbane and eventually Adelaide.

My vision is that in 100 years' time, Melbourne and Sydney will have extensive underground railways. The question is, when do they commence?

Why did you get involved with IMechE and what has your involvement been?

I wanted to be a chartered engineer and British Rail ran an excellent fast-track training program. I have been on the Board of the Railway Division for many years and Chairman in 2007. I was also Vice Chair of the Technical Committee. In the 1980s I was Chairman of the Midlands Centre in the UK.

What do you see as IMechE's role in Australia?

To facilitate dialogue between engineers, and to share information and world's best practice.

What advice can you give to budding engineers just starting out?

Engineers create tomorrow's world and keep today's world working. It's a great career. The more you put in, the more you get out. Get involved, make a difference, and push the envelope in your career. ■

RUNNING MELBOURNE'S TRAIN NETWORK

On 15 June 2010, Andrew Lezala (F. I. Mech. E, CEO Metro Trains) addressed the Victoria Panel. This is a condensed version of a very professional address that attracted a large audience and great interest.

Andrew has had engineering training as well as extensive experience in running other metro systems, including the London Underground and the Shanghai equivalent. Melbourne's rail system 'The Metro', took over from Connex management at the end of November 2009. It now has a joint ownership, including the Hong Kong Mass Transit Railway and John Holland. Keeping the city and suburbs mobile is a constant problem-solving operation. The basic problem is that the city's population is increasing by some 1100 people a week; by 2030, this increase will add up to an extra million. Clearly, the existing arteries will not be adequate.

Already, Melbourne's rail system is world-class in size, with 15 lines, 830 route kilometres, 212 stations, 165 six-car trains and 3500 employees. It provides about 2064 services per day, to cope with about 400,000 passengers. By 2020, the number of passengers is predicted to double, requiring a 20 per cent increase in physical infrastructure. Along with this must come more effective usage (e.g. higher frequency of service). This will require better reliability of rolling stock, a simpler overall timetable and much improved signalling to allow minimum headway between trains. It would be desirable to have eight-car trains rather than the present six-car, but all stations (including the city loop) would need to be lengthened. A problem here is that 62 stations are located next to a level crossing, making lengthening impossible or a major undertaking. Headway between trains is also complicated by passenger loading/unloading behaviour. This could be improved by a reduction in the number of seats per car (currently 100 plus) – an awkward decision.

Andrew detailed some purely engineering obstacles to on-time running:

- 61 critical locations for speed restriction.
- Tendency for poor wheel/rail adhesion. This is partly alleviated by 'sanding' with a proprietary mixture of sand, metal powder and adhesive. (All trains will have this facility by the end of 2011.)
- Sundry rolling stock shortcomings. Of the total maintenance cost, traction motors account for 10 per cent, doors 14 per cent and brakes 7 per cent. Improvements cost about $200 million per year. (An example of this is the installation of a second 'on-train' wheel rims re-profiling lathe at the Newport workshops.)
- Necessary track upgrading. (For example, by mid-2010, 28,500 new concrete sleepers were laid, 10 kilometres of new line added and 117 kilometres of ballast re-tamped.)

Andrew provided answers to numerous questions:

- Level crossings: Melbourne still has far too many (250 in all). Sydney has very few – presumably because it is more hilly.
- The 'myki' ticketing system: Apparently, the reason for the massive cost over-run and late delivery is an 'unprecedented' situation brought about by challenges in communication links to trams and buses over a large geographical area.
- The city loop: Is being re-signalled for three-minute headways.
- Graffiti: Is usually removed within 24 hours.
- Security: Is relatively good (one incident per 33 million journeys), especially off-peak, but requires greater police presence.
- One or more underground lines: Are under consideration. (Their cost/kilometre is ten times that of a surface line!) ■

Patrick Russell-Young

A MAN FOR ALL REASONS

The story of Industrial invention at Stockport finds its starting-point in the achievements of Lawrence Earnshaw, of Mottram, who got his only training from a Stockport mechanic during the earlier part of the silk mill period. When a boy, we are told he was put apprentice to a taylor[sic] and afterwards a clothier; but neither of those employments suiting his genius, after serving both for eleven years, he put himself for a short time to a clock-maker, one Shepley of Stockport. By the force of native abilities ,with the very little instruction such an education could give him, he made himself one of the most universal mechanists and artists ever heard of. He could have taken wool from the sheeps backs, manufactured it into cloth, made that cloth into cloaths and made every instrument necessary for the clipping, carding, spinning, reeling, weaving, fulling and dressing and making it up for wear with his own hands. He was an engraver, painter and gilder; he could stain glass and foil mirrors; was a blacksmith, whitesmith, copper-smith, gunsmith, bellfounder and coffin-maker; made and erected sundials; mended fiddles; repaired, tuned and played upon and taught the harpsichord and virginals; made and mended organs and optical instruments;…and carried so far his theory and practice of clockwork as to be the inventor of a very curious astronomical and geographical machine, containing a celestial and terrestrial globe to which different movements were given representing the diurnal and annual motions of the earth, the position of the moon and stars, the sun's place in the elliptic etc..all with the greatest correctness….

He likewise about 1753, invented a machine to spin and reel cotton at one operation, which he showed to his neighbours and then destroyed through the generous but mistaken apprehension that it might take bread from the mouths of the poor… He also contrived a simple and ingenious piece of mechanism for raising water from a coal-mine. He was acquainted with the equally self-taught genius and celebrated James Brindley and when they occasionally met they did not soon part. ■

From Samuel Oldknow and the Arkwrights: The Industrial Revolution at Stockport and Marple*, by George Unwin, University of Manchester, 1924, copies of which are in the State Library of Victoria and at Monash University Library.*

Contributed by another Stockport Mechanic.

SPEAK OUT FOR ENGINEERING

The three finalists for the 2010/11 Speak Out for Engineering national competition were Daniel Burdett, Belinda Herden and Chris Hoskin. Daniel, representing the South Australia Panel, spoke on the subject of 'Hydrodynamic Analysis of Floats for Seaplanes'. Belinda, representing the Queensland Panel, spoke on 'CFD Investigation: Mixing for Scramjet on Shock/Jet Region'. Chris, who represented the New South Wales Panel, spoke on '3801 and Other Stories: Turning a Hobby into a Profession'.

Daniel's presentation covered the steps taken to perform and validate a comparative CFD (computational flow dynamic) analysis of the hydrodynamic forces upon three different designs of float for a seaplane.

Belinda's presentation also covered the process of CFD, this time looking at the air/fuel mixing in a scramjet engine. She found a sufficiently accurate set of parameters, geometry and flow characteristic, remodelling the design and comparing it to a standard scram-jet geometry.

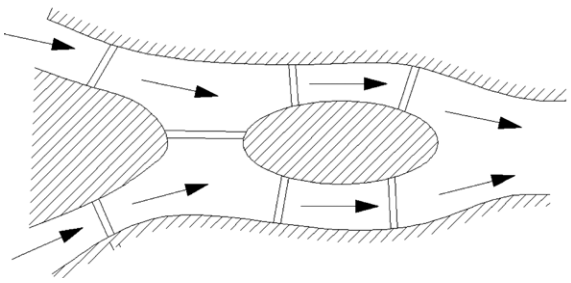
Chris's presentation focused upon a very identifiable mechanical engineering subject: rail. After working full-time at the Rheilffordd Ffestiniog Railway in North Wales, Chris moved to Australia and began working at Halcrow. In 2007, he took part in the heritage project overseeing the restoration of elements of the 3801 Boiler.

The presentations covered three very different topics and each presentation was approached in an individual way.

Speak Out for Engineering national finalists (left to right): Chris Hoskin, Belinda Herden and Daniel Burdett.

The presentations were scored and Daniel won, with Chris as runner-up. Daniel went on to represent the Australian Branch at the Asia and Oceania Forum Meeting and the regional SOfE final held in New Delhi, and came first. Congratulations to all the contestants for engaging presentations, and to Daniel for winning the regional final. ■

Matt Springer



SOMETHING TO THINK ABOUT

Another item from *Mathematical Recreation and Essays*…
The Könisberg Bridge Problem

An elemental plan of Könisberg is given below. It shows an island in the river Pregel. The river has two branches as shown. There are seven bridges in all. The problem is to define a walk such that it crosses every bridge once and only once, and returns to its start point. Clearly, this is not possible. However, it could be possible if one or more additional bridges were built. Where would this (or they) be built? ■

IMECHE VICTORIAN PANEL 50TH ANNIVERSARY SPECIAL EVENT – ENGINEERING BOOK EXHIBITION

On 2 December 2010, I spent about three hours at the State Library of Victoria, browsing the IMechE Retrospective Exhibition. I enjoyed leafing through a selection from the diverse range of mechanical engineering-related books, including some 'classics' from the nineteenth century. A two-volume set titled *Engineering Heritage*, published by Heinemann on behalf of IMechE in 1963 and 1966, was of particular interest and I was subsequently able to track down a source for the two books from a UK second-hand bookseller.

Whilst I was sitting at a table in the Redmond Barry Reading Room browsing the books, I observed at least half a dozen others – probably non-IMechE members – stop for varying lengths of time to look at the IMechE book exhibition, with several taking a book from the display to sit and peruse it. I suggest that this is indicative of the success of the exhibition. I personally commend the initiative of the IMechE Victoria Panel for arranging with the State Library to set up the Retrospective Exhibition. I certainly gained a benefit from it, along with being made aware of the 50th anniversary of the Institution's representation in Victoria.

Looking back on the Exhibition, I realise that some of your members might be interested to read my paper on The Melbourne Hydraulic Power Company and public hydraulic power systems in Australia, which was published in Engineers Australia's *Australian Journal of Mechanical Engineering* (Vol. 7, No. 2, 2009). The paper traces the development of water hydraulic power systems in the UK, which lead to the Melbourne public utility and its sister system in Sydney. ■

Miles Pierce

Chairman
Engineering Heritage Victoria
December 2010

PHOTOS FROM THE BRANCH AGM AND DINNER FEBRUARY 26, 2011

The curious photo featured in *NB160* is that of the Irvine Road Burner (also known as the Irvine Travelling Furnace). This is a great example of an Australian innovation. Production began in 1927 and only two were made. These machines literally burnt black soil to create a ceramic surface about five inches thick and was used for road-making in the Eastern Darling Downs. The machine in the photo was transported by ship to Brisbane in 1932 and did trials between Grantham and Gatton before being moved into the Darling Downs. It finished work before World War II and was never fired up again. It lay silent in the one location for 63 years until it was moved to the Jondaryan Woolshed in May 1999.

Institution of MECHANICAL ENGINEERS

Executive Committee:
Clive Waters
Roshan Dodanwela
Ken Tushingham
Ian Mash

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

Websites:
ImechE Australian Branch
www.nearyou.imeche.org/aust
IMechE UK
www.imeche.org

News Bulletin is the means by which members of IMechE and other professionals air their views. The views expressed in *News Bulletin* do not necessarily reflect the views of IMechE and/or the editor.

Please address all *News Bulletin* correspondence to:
The Editor
IMechE News Bulletin
2/161 Victoria Road,
Hawthorn East
Victoria 3123
Ph: (w) (03) 98824410
dodanwela@yahoo.com