Engineering Heritage Victoria Newsletter - September 2009

*This is an occasional newsletter from **Engineering Heritage Victoria** sent to all members on our mailing list. Enquiries, discussion or correspondence related to the Newsletter should be directed to the Editor at **doringbelgrano@dragnet.com.au** or address postal correspondence to the Chairman, Engineering Heritage Victoria, Engineers House, 21 Bedford Street, North Melbourne, Vic 3051.*

1. Guest Speakers 2009

Date: Thursday 15th October **Time:** 5.30 for 6.00 p.m

Event Title: The Electrification of Melbourne's Suburban Railway Network

Speaker/Presenter: Ian Cook

Venue: Engineers Australia John Connell Auditorium, 21 Bedford Street, North Melbourne

Hosts: Engineering Heritage Victoria

About the Subject:

In 1919 the first Suburban Electric Train Services started in Melbourne. At the time Melbourne was the largest city in Australia, and was the first to electrify its Train Services. By 1923 most of the Suburban Train Services were operated by Electric Trains. It was an immediate success, with patronage soaring as a result of the quicker travel times and increased services – all achieved at a reduced cost. This was the culmination of a large investment by the Victorian Railways into the new Electric Traction Technology to replace the Steam Train Passenger Services of the time. The Electrification Scheme adopted was from the recommendations of a Report in 1912 by noted UK Electrical Engineer Charles Merz. The Scheme was to be the first application of 1500 V DC using overhead current collection in the World at the time, and boasted the largest Power Station in the Southern Hemisphere. Scheduled completion in 1915 was delayed by the hostilities in Europe of the First World War. Since then there have been long periods with no changes, and other exciting periods with huge changes, but generally it has evolved and survived the many cut backs that the Suburban Trains have endured. Currently it is facing many new challenges as Governments are belatedly investing in public transport again, including many more new trains for Melbourne and new railway infrastructure. This talk aims to give an overview of the history of the beginnings; the technology used; to track the changes in the 90 years since, and to outline the challenges for the future.

About the Speaker:

Ian Cook is an Electrical Engineer who has worked in the Victorian Railways and its various successors for his working life. He has been involved with the Traction Network since 1975, and has been instrumental in many of the changes and extensions of the Network since then.

[An extended article on this subject appeared in the Engineers Victoria Quarterly Newsletter, Vol. 31, September 2009 against the Engineers Australia 90th Anniversary logo. The author gives two references for further reading: Doran & Henderson, "The Electric Railways of Victoria", Australian Electric Traction Association, 1979; and, "Electrification of Melbourne Suburban Railways", The Engineer, 9th January 1920, pp44-47. - Ed.]

2. Engineering Heritage Victoria - Annual General Meeting, 12th November 2009

This meeting will be held at Engineers Australia - Victoria, 21 Bedford Street, North Melbourne.

The AGM Agenda will include the Annual Report for 2009, election of office bearers, and review and discussion of the program and activities for 2010, including regional tours.

Time: 5.30 for 6.00 pm. All welcome.

3. Fourth EHV Committee Meeting for 2009 - 13th August

Some notes from the minutes —

Plans to collate material from three websites associated with EHV into the Engineers Australia website are progressing, and future editions of this newsletter will (hopefully) also be added to the EA website.

An application to Heritage Victoria was made for a grant to build a shed around the Kirkstall Forge Steam Hammer and Billet Crane to protect them from the elements and allow conservation work to proceed - see further comment below.

A site visit to the Russell Place Substation on 30th July was attended by approximately 30 people. Others applied, but the numbers had to be limited. A report on the site visit is appended below.

The Board of Engineering of EA has launched a "Make it So" campaign. A CD presentation of the campaign was shown at the meeting. A website link to the campaign is http://www.makeitso.org.au/

A draft Nomination for National Engineering Landmark for the Lake Condah Aboriginal Hydraulic Works in Western Victoria was submitted to the Committee for review.

After an EHA Board Meeting request, EHV has submitted the following updated list of locations that could be plaqued in the near future:

Psyche Bend Pumping Station

Sale Swing Bridge

1860 Kirkstall Forge Steam Hammer & Billet Crane

Ballarat Railway Station complex

Bendigo Rail Line (also see below)

The death of former President of EHA Robin Black, on 13th August 2009, was reported to the meeting. *[see below for an obituary by Owen Peake - Ed.].*

The Third Australasian Engineering Heritage Conference will be held in Dunedin in New Zealand from Thursday 19th to Sunday 22nd of November (see more information below). Several members of the Committee will be attending.

In future, the Engineering Heritage Recognition Program will be adopting a simple NEL or HEM circular enamelled steel plaque in conjunction with a separate interpretive panel, in place of the traditional bronze plaques.

The need for a brochure or guide book for self-guided engineering heritage tours was again discussed. We need ideas - for sites and/or themes, a brochure or a more substantial guide - from interested members and others. The Editor would be glad to field any contributions.

Information received that one entry from Victoria for the Colin Crisp Award had been received - the Point Lonsdale Fog Horn (by the Queenscliff Maritime Museum).

4. Help Wanted

As noted in item No. 3 above, EHV has included the Bendigo Rail Line in a list of locations in Victoria it is hoped will be plaqued in the near future.
As it happens, 2012 will be the 150th anniversary of the Bendigo line, therefore EHV will aim to have any plaques for this line in situ by then.

The Committee is asking EHV members for help in preparing the plaquing nomination for the Line - including information about significant stations, bridges, signals, perway, viaducts, workshops, train sheds, turntables, crossings, etc., etc. -- all that infrastructure which makes this railway line an important historic engineering landmark.

If you can contribute to this project in any way, please get in touch with the Editor at doringbelgrano@dragnet.com.au or phone 03 5729 7668, or address postal correspondence to the Chairman, Engineering Heritage Victoria, Engineers House, 21 Bedford Street, North Melbourne, Vic 3051.

[I know little about the Bendigo Line before it gets to Echuca, except that some years ago my brother found some old disused sidings at Riddells Creek still laid in their original double-headed reversible rail lines (dog-bone profile). I wonder - are they still in situ? It is surely significant that the official name of the line on maps is the Murray River Railway, so should this plaquing include the line beyond Bendigo to Echuca and across the border into NSW? Situated on the border is the historic Echuca-Moama Road-Rail bridge, built and operated for 134 years by the Victorian Railways, to carry first wool and wheat, then rice across the border from Deniliquin and Balranald. As there is no EH group in NSW which covers this area, I propose that this bridge should also be included in the project undertaken by EHV. - Ed.]

5. Reviews and Comments -- Past EHV Site Visits and Presentations

The 1860 Kirkstall Forge Steam Hammer and Billet Crane at Newport Railway Workshops

After the presentation about the Newcastle Craven Bros Rope Drive Crane and the Newport Steam Hammer and Billet Crane in April, the EHV Committee set up a sub-committee to work towards the conservation and restoration of the Steam Hammer and Crane. The sub-committee decided that the best way to start this process would be to erect a very basic shed over them, similar to the Forge Building which protected them until the Railways demolished it around them in circa 1985.
Members of the sub-committee studied the site and worked out an estimate for the size and cost of such a shed. Both the Steam Hammer and Crane are widely acknowledged to be of international heritage significance and both have been listed on the Victorian Heritage Register since 1994. Thus it was determined to make an application for the necessary funding under Victoria's Heritage Grants scheme. The following is part of the letter subsequently sent to the sub-committee by Heritage Victoria:

VICTORIA'S HERITAGE GRANTS Financial Year 2009/10
Newport -- Kirkstall Steam Hammer and Cane (sic) Conservation Project

Thank you for your recent application for funding under the State's Victoria's Heritage Grants Strengthening our Communities program. I wish to advise that after careful consideration, your application has been deemed ineligible for funding as the objects are currently owned by Victrack, a state government agency. I would also comment that construction of new buildings to protect heritage objects is considered beyond the scope of the grant program. [!! - Ed.]

This was a blow -- and not easy to digest. It seems illogical the State Government will not support the protection of its own heritage. And how else does one protect exposed (very) large objects except by covering them from the elements! In the New Year the sub-committee proposes to make a funding submission to VicTrack along the same lines as the application made to Heritage Victoria.

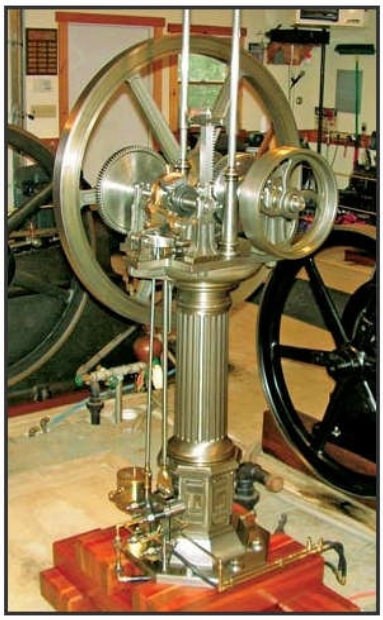
Gas Engines in Victorian Industry, presented by Matthew Churchward

On 20 August Matthew Churchward gave EHV a fascinating talk about a form of motive power which most of us don't think much about – the gas engine, invented by Lenoir in 1860 and developed by Otto in 1866. Matthew is Senior Curator, Engineering and Transport, Museum Victoria and has wide interests particularly in various forms of motive power.

Gas engines were an important source of motive power from about 1880 until electricity supply from the grid became ubiquitous. In 1876 Otto developed a four stroke version of his earlier "atmospheric free piston engine" and he licensed Crossley Brothers in the United Kingdom to manufacture the engine. Crossleys became the largest manufacturers of Otto engines. Later, manufacturers such as Richard Hornsby, Tangyes of Birmingham and National also made gas engines.

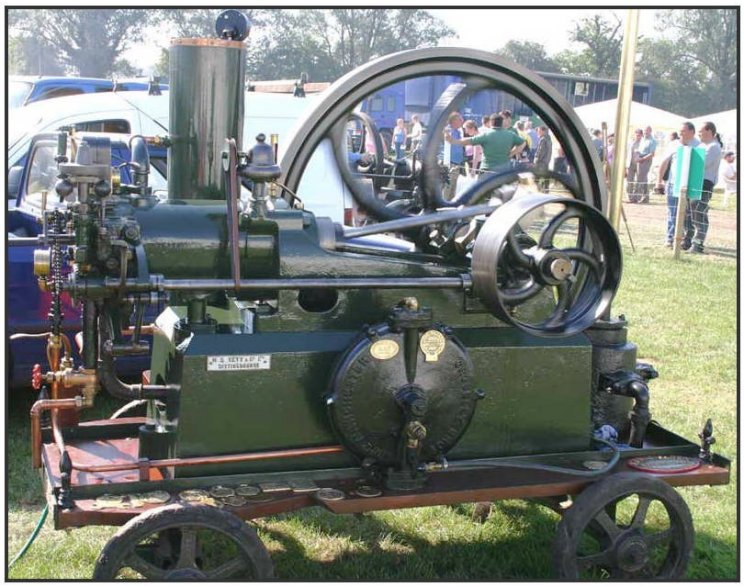
During the latter days of the nineteenth century gas engines, running on coal gas became popular as a motive power for small manufacturers, such as printing works and the garment manufacturers, whose modest needs for power did not justify steam plant. Engines in these duties were typically from a fraction of a horsepower up to a few horsepower. Of course this was before the ready availability of reticulated electricity. Later, suction gas generators, which made a fuel gas consisting of carbon monoxide and hydrogen from coal or coke, were marketed to supply gas engines. This allowed larger horsepower gas engines to compete with steam, and freed gas engines to operate in areas without reticulated gas supply.

There was some limited manufacture of gas engines in Victoria with E Coulson of 116 A'Beckett Street, Melbourne being perhaps the most successful. Their "Simplex" gas engines came in sizes from half a horsepower to 30 horsepower. The company also manufactured oil engines. In the years just before World War I there were reportedly 40,000 oil and gas engines worldwide including 5000 in Australia of which 1000 were in Victoria. At this time many larger gas engines were in use in Victoria in industries such as power generation, cool stores, freezing works, mining, breweries, irrigation pumping, saw milling and flour milling. During this time Hornsby had 80% of the market with Tangyes coming a distant second. Surprisingly there are few survivors from the gas engine era in Victoria. Matthew reports just two plants still in operating condition. These are a power generation plant at Murtoa near Horsham and a hydraulic sluicing plant used for gold mining at Chewton, near Castlemaine. Both these plants have suction gas generators.
Owen Peake.



LEFT:
Otto Atmospheric Free Piston Gas Engine.

RIGHT:
Crossley Gas Engine built under licence from Otto.



Russell Place Substation - beneath Melbourne

Engineering Heritage Victoria arranged a visit to this fascinating site on 30 July 2009. The site is still an operational substation so the visit was limited to 30 people split into two groups. The EHV visit was arranged shortly after another more public inspection when on 19 July a Committee for Melbourne initiative called Melbourne Open House provided Melbournians with the opportunity to take guided tours of 32 interesting buildings in the city. The program attracted 50,000 visitors. One of the sites in the program was CitiPower's Russell Place Zone Substation, an underground substation with an electricity supply history going back to the very beginnings of public electricity supply in 1882. About 800 people visited the substation and many waited for hours as small groups were given 20 minute tours of the installation.

The substation's underground vaults contain three 22kV to 6.6kV, 10MVA transformers and three banks of 6.6kV metal-clad switchgear for supply to distribution substations in nearby areas. Two distribution substations are housed within the zone substation itself and supply low voltage loads in the immediate vicinity of the zone substation. Perhaps the most interesting part of the substation is the Direct Current (DC) section. This is no longer in commercial service but can be demonstrated for visitors. The DC section previously provided supply to premises, some of which had been DC customers for up to 100 years.

In 1882 the Australian Electric Company (AEC) commenced a public electricity service from a small central generating plant on the site of the present Russell Place Substation and supplied electric lighting to nearby premises as well as arc lights in adjacent parts of Bourke and Swanston Streets. It was the first public electricity supply in the southern hemisphere and was contemporary with Thomas Edison's first public electricity schemes in London and New York. When the Melbourne City Council established its own electricity supply service in 1894, it subsequently acquired the AEC Russell Place site and later integrated it into its 460/230 volt DC supply network. The facility was rebuilt as a rotary converter station in 1929. In 1950 it was completely reconstructed as an underground substation, taking supply at 22kV from the State Electricity Commission's Richmond Terminal Station. From 1962, it also housed two glass bulb mercury arc rectifier assemblies to supply the remaining DC load – then mainly lifts – in the CBD. This service was only finally shut down in 2003. The mercury arc rectifiers and open-panel DC switchboard are still in place and were demonstrated to the visitors. Transparent front panels allow visitors to see the eerie blue glow of the mercury arc rectifiers when they are in operation. CitiPower is to be congratulated for making access to its Russell Place site possible. We hope that this event might be an inspiration to other operators who have interesting engineering heritage equipment hidden away in their operational sites away from public view.

Authors: Miles Pierce and Owen Peake.

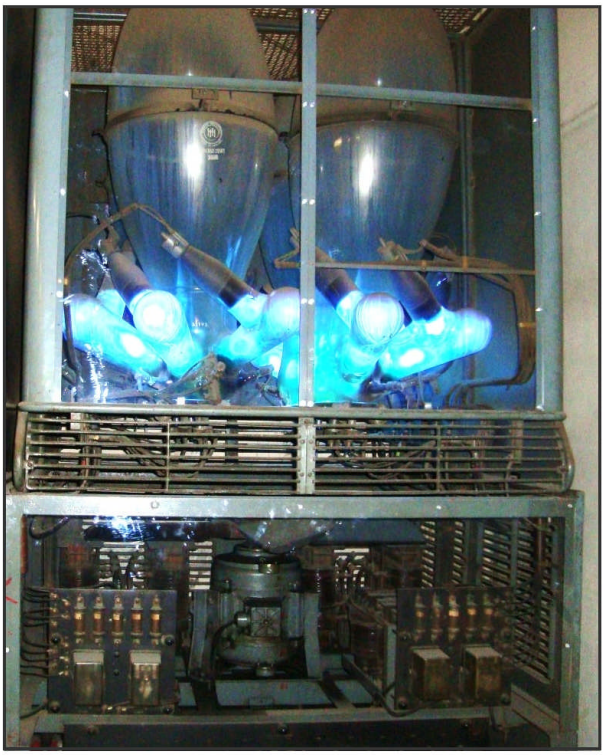
[This story was also printed in
The Journal of Engineers Australia,
Vol.81 No.9, September 2009. - Ed.]

Images:- (all at Russell Place Substation)

Right: Open-panel Direct Current Switchboard

Below: Mercury Arc Rectifier

Lower Right: Metal-clad 6.6kV Bulk Oil switchgear



6. Members of EHV

Emma Russell -- Profile of the Committee Secretary.

This is my first year as part of the Engineering Heritage Victoria committee. I began attending the EHV seminars early last year after attending one about Sir John Monash that interested me and I joined the committee at the AGM last year after being invited by past Chairman Don Bartlett. Although I don't have much knowledge of engineering heritage, the presentations are fascinating and I'm learning more about it all the time.

My role as Secretary involves taking committee meeting minutes and other administrational tasks. It has been interesting finding out how the committee is run and it is great to see the passion committee members have for their particular field of interest. Being involved in the committee has given me the opportunity to get to know people I otherwise would not have met.

I completed a degree in Civil Engineering at Melbourne University in 2006 and have been working as a structural engineer at Winward Structures since graduating. Over the past few years, I've been lucky enough to be involved in projects such as Waterfront City and Tooronga Village. I've also been involved in the Young Engineers Victoria (YEA-V) committee as Events Co-ordinator and now as Vice Chair.

Mark Williams — An Engineer working abroad – Article No. 4 – 22/07/09 -- The Battersea Power Station

The Battersea power station, located on the south bank of the Thames has been a part of South West London since 1930 and is the largest brick building in Europe. Still now, it dominates the landscape with four chimneys rising above Battersea Park. It was designed by Sir Giles Gilbert Scott, who famously designed the red telephone box. The head of the engineering team was Dr S. Leonard Pearce of the London Power Company, and civil engineer Henry Newmarch Allott.

The building measures 160 meters by 170 meters, with the roof of the boiler house standing at over 50 meters. The chimneys stand at a height of 103 meters. The site's iconic and symmetrical beauty has played a part in ensuring it was placed on the heritage list in 1980 and was used in the Beatles movie 'Help!' and Pink Floyd's album cover 'Animals.'

The 'A' power station was in operation from 1933 with the second phase 'B' completed in 1957, using coal fired heaters to drive steam turbine generators which produced 509 MW of electricity for one fifth of London. The station used 1,000,000 tons of coal per year from Wales and North East England. The heat generated as a by-product of power production provided heat for 11,000 residents making it the most thermally efficient power station in the world. The stations drew 680,000,000 gallons of water from the Thames per day.

Due to pollution issues, including sulphur in the emissions and a toxic effluent, Station A was closed in 1975, followed by Station B eight years later. Since closure, the building's condition has been described as "very bad" by English Heritage, who include the power station on its Buildings at Risk Register. In 2004 the power station was on the World Monuments Fund's List of 100 Most Endangered Sites.

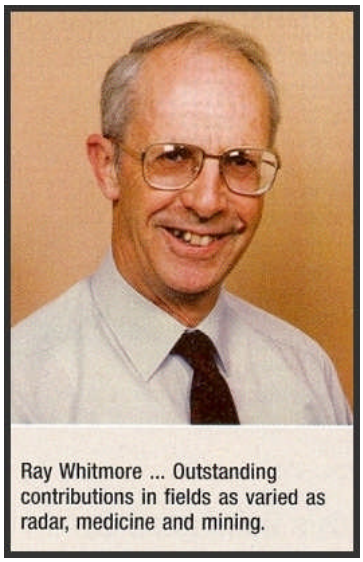
The £4 billion redevelopment plans were released in 2008. They include reusing part of the station building as a power station, fuelled by biomass and waste, with additional areas for shopping space and a park. An energy museum would also be housed inside the former station building. The restoration of the power station building would cost £150 million.

A plastic built "eco-dome" is also to be built to the east of the power station. The eco-dome would house offices, and aim to reduce energy consumption in the buildings by 67% by using towers to draw cool air through the building. 3,200 new homes are also planned. Construction is due to begin in 2011, with completion in 2020.

7. Vale Two Distinguished Heritage Engineers

Professor Ray Whitmore AM, 1920-2008

Professor Raymond Leslie Whitmore was a man of many and varied talents who died peacefully on 20 December 2008. His professional life spanned a wide range of disciplines and he made outstanding contributions in fields as varied as radar development, medical research into the properties of blood and the circulation system, mining and metallurgical engineering and as a noted Queensland historian. His contribution to professional and community organisations was outstanding and included important roles with Engineers Australia, the Australasian Institute of Mining and Metallurgy, Brisbane and Ipswich City Council Heritage Committees, the Queensland Museum and the Royal Historical Society of Queensland.



Ray Whitmore ... Outstanding contributions in fields as varied as radar, medicine and mining.

On finishing school he was appointed a laboratory assistant in the Mining Department at the University of Birmingham. Mining and metallurgical engineering was to underpin the rest of his professional life. He completed an external physics degree at the University of London and then undertook a course of practicals and lectures organised by the Physics Department at the University of Birmingham which started his involvement in the development of radar - then a new and highly secret technology. For most of the war years, Ray worked on radar development, particularly with the group producing counter measures to German radar. Following demobilisation, he initially resumed his academic studies and in November 1949 was awarded his PhD.

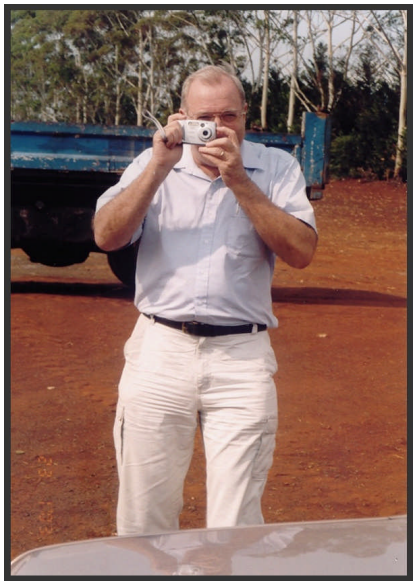
In 1953 he was appointed as senior lecturer in the Department of Mining and Fuels at Nottingham University. In addition to teaching, his research focussed on the cleaning of coal, especially the viscosity and sedimentation of material suspended in fluids. He published extensively and in 1959 was awarded a DSc by the University of Birmingham. Ray had recognised for some time that the flow of suspended particles had relevance beyond minerals preparation. In 1959 he co-authored a paper on *The Theory of the Flow of Blood in Narrow Tubes* in the American Journal of Physiology. This led to extensive research and publishing in Britain and the United States relating to the behaviour of blood in the circulation system.

In September 1967 Ray was appointed Chair of Mining and Metallurgical Engineering at the University of Queensland. As well as expediting a new building for the department at the St Lucia campus, he developed close links with the mining industry. This yielded increasing support for scholarships for students and provided the basis for discussions between the University and MIM Holdings into the establishment of a research centre associated with the university and funded by industry. The Julius Kruttschnitt Mineral Research Centre was soon built at the university experimental mine site at Indooroopilly. Ray became very involved with the mining industry and relevant associations. From 1970 to 1974 he represented the University on the Australian Research Grants Commission, and held the first of a series of positions with Engineers Australia, ultimately serving as chairman of the Queensland Division in 1982, and as a member of the National Council – service which was recognised by the conferring of an Honorary Fellowship in 1998. Ray continued lecturing in minerals processing and was Dean of the Faculty of Engineering from 1974 to 1975. In 1976, he relinquished the headship of the department. This allowed him to focus more on scholarship and research. His latent interests in history were now apparent and he wrote the definitive three-volume history of Coal in Queensland with the first volume published in 1981. At the same time, concerned that engineers seemed insufficiently interested in the identification and preservation of the nation's engineering heritage, he formed the first local and national Engineering Heritage Panels within the Institution of Engineers Australia. The foundations that he did much to establish have supported a sustained program of identification, recording, assessment and conservation, supported by regular conferences.

Following retirement from the university in 1985, Ray was able to devote his full attention to heritage. He was a member of the Ipswich City Council Heritage Advisory Committee from 1991 to 2004 and spent almost a decade on the Brisbane City Council's Committee. Education was not ignored, with a decade of service on the board of the Queensland Museum's Science Centre and as adviser on mining education to the Papua New Guinea University of Technology, where he assisted in establishing the country's first Mining School. At the same time he was an active member of the Royal Historical Society of Queensland, the Brisbane History Group, the Queensland Heritage Council and other heritage groups. It is rather fitting that one of his last pieces of research was on a radar station in Queensland. In all he produced some 40 heritage related papers in addition to six books. Ray was awarded the John Monash Medal for Engineering Heritage in 2005 and appointed a Member of the Order of Australia in 1994. He is survived by his wife Ruth and two sons, John and Mark as well as six grandchildren and two great-grandchildren.

This obituary was written by John Whitmore, a son of Ray Whitmore and published in Civil Engineers Australia in March 2009.

Robin Black, 1940-2009



Robin Black died at his home in Queensland on the 13th August 2009. Engineering Heritage Australia had resolved to make an Award of Merit to Robin at its May meeting and the award was presented to Robin by a delegation consisting of Bill Oliver, Bevan Boyce and Brian Becconsall on 5th August, just a week before his death. The citation for the Award of Merit, read as follows:

Robin Black has made major contributions to engineering, engineering education and engineering heritage in Queensland over a period of forty five years. In particular, through Engineers Australia, he has actively promoted Queensland's engineering heritage.

Born in Ashgrove, Brisbane in 1940, and after secondary schooling at Warwick and Brisbane, he graduated BE (Civil) from the University of Queensland in 1962. His professional career was essentially water-oriented. He won a scholarship from the Irrigation and Water Supply Commission and after graduation spent five months in their Irrigation Branch Head Office. He then joined the Mareeba-Dimbulah Irrigation Project, where he reported to Henry Hannan, grandson of the Hannan of Kuranda railway fame.

At Mareeba, Robin met his future wife Robyn who was then a CSIRO tobacco research officer. He returned to Brisbane for further study and lectured at the Queensland Institute of Technology (QIT), later Queensland University of Technology. In 1972, he graduated Master of Engineering Science at the University of Queensland and was promoted to Senior Lecturer at QIT, a position he held until his retirement. An articulate and entertaining lecturer, communicator and author of several papers, he is well known and highly regarded throughout Queensland's engineering profession.

Robin has spent the eleven years since retirement endowing Engineering Heritage Australia (EHA) with his enthusiasm, energy and wit. He joined the EHA Queensland Division Panel in 1997, chairing it from 1998 to 2007. Over this period the panel ran the 2003 National Engineering Heritage Conference at Toowoomba, published Eminent Queensland Engineers Volume 2 and a walk-drive Heritage Trail of inner Brisbane. He was active in the recognition of the Cairns-Kuranda Railway, the Victoria Bridge in Townsville, the Southern Cross windmill at Toowoomba and initiated heritage recognition of the minimum energy loss culvert at Redcliffe.

Robin joined the EHA National Board in May 1999 and facilitated the upgrading of the EHA Strategic Plan in 2004. He served on the Plaquing Committee for four years from 2001. For nine months in 2007, Robin chaired the Engineering Heritage Australia National Board, but had to relinquish the chair when diagnosed with leukaemia. His serious illness has restricted but not dulled his almost lifelong enthusiasm for engineering history and heritage.

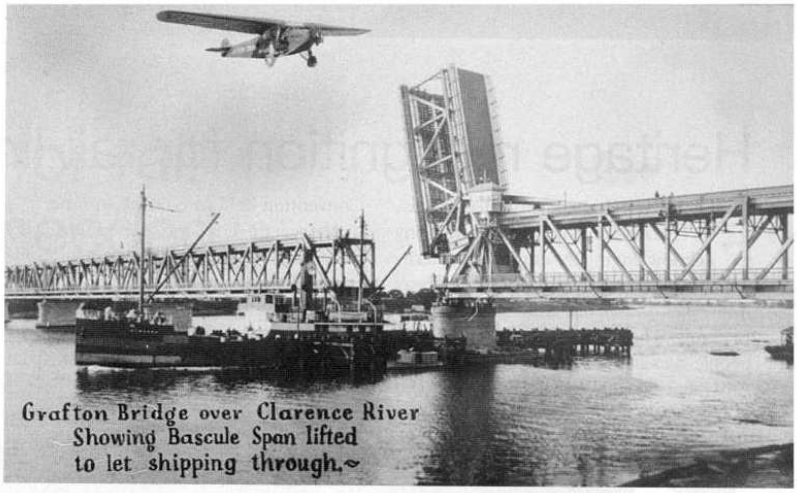
I (Owen Peake) attended the service to celebrate Robin's life at the Great Northern Garden of Remembrance, Deception Bay, 35 km north of Brisbane on the 19th August. There was a very large crowd and the service was full of wonderful memories of Robin's life presented by a wide range of family and friends. It was indeed an impressive occasion. Andrew Barnes, Chair of Engineering Heritage Australia (Queensland) was present along with committee members Norm Traves, Brian Becconsall, Geoff Smethurst and Jim Simmers. Bill Oliver was not present due to other pressing family business however he made a contribution to the service which was read.

Owen Peake, Chair, Engineering Heritage Australia, National Board.

8. News From "Abroad"

Heritage Recognition for Rail Link to Brisbane -- EA Journal, Civil Edition, Vol. 81, No.9, September 2009.

Engineering Heritage Australia Newcastle (EHAN) recently held a ceremony acknowledging the engineering heritage of the NSW North Coast railway line extending from South Grafton to Brisbane. The ceremony, attended by 95 people, was held as part of the Engineers Australia, Newcastle Division, Regional Convention held in Grafton in June. Newcastle Division president Barry Finlay and national president Peter Godfrey, officiated at the ceremony, which was addressed by five speakers.



The bridge at Grafton was depicted on the cover of this souvenir booklet for the bridge's opening ceremony in 1932. Sir Charles Kingsford Smith's famous Southern Cross aircraft was added for effect.

A short history of the railway was recounted by Dr Robert Lee, a railway historian from the University of Western Sydney. The NSW North Coast railway link, opened in 1932, was significant as it was a precursor to later federal and state managed programs linking Australia with a uniform gauge railway system. Prior to 1932, the only rail connection with Queensland was inland, via the NSW Main Northern Line. This line, which is now closed north of Armidale, had a break of gauge at Wallangarra on the Queensland border.

The North Coast railway included significant engineering accomplishments, including a double-deck bridge with an opening bascule span across the Clarence River and the Cougal Spiral elevating the railway into a long tunnel crossing under the border range into Queensland. For these achievements, the railway was accorded a National Engineering Heritage Landmark. The mayor of Clarence Valley Council Ritchie Williamson presented a local perspective on the railway's heritage, before the guest of honour, the federal member for Page, Janelle Saffin and Godfrey unveiled the heritage marker and interpretation panel.

Restoring a Brisbane Landmark -- EA Journal, Civil Edition, Vol. 81, No.9, September 2009.


The ceiling shown here is made from plaster and horsehair, and would fare poorly in a fire. PHOTO: KIRILL REZTSOV

Engineers are working with architects and heritage experts to restore Brisbane City Hall, trying to bring it into line with modern building codes while preserving the heritage-listed materials and fittings. Aurecon has been appointed as structural, geohydraulics and vibration consultant for the project. A report published last October found a plethora of engineering problems behind the building's thin, decorative sandstone facade. Problems include subsidence and water ingress at the foundations, and electrical wiring insulated with old newspapers.

The average strength of concrete in the building is 6MPa where modern building codes specify 40MPa – 50MPa. In some places it is corroding. Several ceilings, including the Main Auditorium, are made from horsehair and plaster, and would disintegrate in a fire. In March, the Brisbane City Council announced a $215 million plan to restore the building, financed by local, state and federal governments and community fundraising. The requirement to bring the building in line with current fire regulations is one of the main drivers for the project and would entail structural engineering works. *If you fix the structure, 90% of the problem goes away*, Brisbane City Council senior project manager Jim Mavronicholas said. Other factors include the importance of preserving a Brisbane landmark and the possibility of revenues from renting out the facilities for performances and functions. Stage one of the restoration will begin after the building is emptied of occupants in December.

The restoration will include installing a new ceiling for the Main Auditorium and specific absorbent material to improve acoustics. Aurecon principal structural engineer Ralph Belperio said the project presents a steep learning curve. The team has to analyse the building materials and come up with a workable solution, identifying the necessary and optional work to be done. As Aurecon's commission is tied to the budget, the firm's scope will change as the engineers learn more about the building. A cafe on the ground level has already been refurbished. Engineering reports including analyses of fire safety, concrete, and electrical and hydraulic services are available at www.brisbane.qld.gov.au .

Vale Harold Naunton Davies, MBE, GCSJ, ME. Hon FIEAust. (1903-2009) -- Engineering Sydney Newsletter, Vol. 2, Issue 3, September 2009.

Harold Naunton Davies on the Sydney Harbour Bridge c. 1929

Tram bridge and Sydney Harbour Bridge April 1932

It is with regret that we record the passing, at the age of 105, of Harold Davies who graduated from the University of Sydney as Bachelor of Engineering in Civil Engineering with first class honours in 1927. We believe Harold may be the longest lived alumnus of the Faculty. During the first years of his undergraduate course, Harold was taught by Professor W. H. Warren before the appointment of Professor W.A. Miller in January 1926. Harold's fellow students included Bob McMillan and Sandy Britton, soon to be eminent engineers in Sydney and with whose company there was to be a later link.

After graduation Harold joined the New South Wales Department of Public Works team under J.J.C. Bradfield that worked on the Sydney Harbour Bridge project. In this capacity he designed the 67-metre steel arch bridge, well known to many Sydney commuters, that carried the tram lines from what are now known as Lanes 7 and 8, over the Bradfield Highway to Blue Street in front of North Sydney station (lower photograph).

The design of this bridge was submitted as a thesis to the University of Sydney in 1930 and this resulted in Harold being awarded the degree of Master of Engineering with first class honours and a University Medal. Tram services over this bridge ended in 1958 and the structure was demolished several years later to make way for the Warringah Expressway.

During the Second World War, Harold went on to head the Design Office of the Australian Base Command of the United States Army, working as the senior engineer in Macarthur's headquarters in Brisbane.

After the war, he founded the Brisbane-based consulting engineering organisation Cardno and Davies. In Sydney, the similarly large consultants McMillan and Britton became McMillan, Britton and Kell, later MBK. In 1999 the Brisbane-Sydney reunion of graduates was in effect completed with the formation of Cardno MBK, now Cardno. The Cardno and Davies firm, with particular direction from Harold, was responsible for much of the engineering for the Gold Coast development, a great many bridges and the transformation of the City of Brisbane sewerage system from a primitive state to one worthy of a modern city.

After a distinguished engineering career, the Institution of Engineers Australia made Harold a Life Fellow at the age of 100 and he was awarded the Institution's prestigious Peter Nicol Russell Medal in 2002. It would be an understatement that his work has been a credit to the profession and an inspiration for young engineers.

Article by Ian Bowie.

9. Events, Conferences etc. of Possible Interest

2009 SIA Fall Tour - Mid-Hudson River Valley, New York, starting Thursday evening Oct. 8 to Sunday Afternoon, Oct. 11, 2009. I just missed getting this Society for Industrial Archeology (sic) notice into the last newsletter, so it's not much use now, unless some lucky recipient happens to be in the US right now! However, just so you know what you are missing, this tour will focus on the area ranging from Newburgh to Kingston, NY along the Mid-Hudson River Valley. The tour includes sites in Kingston, Poughkeepsie, Newburgh, and Beacon in addition to Rosendale and will take in the history of cement making, brick manufacture, shipbuilding and more. In case there is anyone interested to know more, email the Editor at doringbelgrano@dragnet.com.au and I will send you a copy of the packed tour schedule brochure, describing site visits relating to shipbuilding, quarrying, steam mills, foundry, barbed wire, concrete products, cement works, a distillery and more!

Challenges of Military Engineering - Design, Materials & Construction in the Field, Tuesday 13th October 2009:
It is not often that we hear of the work of our fellow engineers in the Australian Defence Force. Most of us carry out our design work and supervise our construction in a very "controlled " environment, yet our Defence Force engineers carry out very similar work, but often in outlandish locations under extreme conditions with limited resources. The goodwill they create with their work often far exceeds the military or engineering objectives. This seminar will be presented by two 2 Defence Force engineers, Captain Rachael Brennan and Captain Lee Gibson who will describe the work they do and some of their experience within Australia, Timor and Afghanistan. This event is presented by the Structural Branch and Young Engineers Australia - Victoria. (See attached PDF flyer).
This seminar is not related to engineering heritage, but, as the Convenor says, it *should be of interest to all engineers and the event should also provide an opportunity to meet with your colleagues and allow you to discuss items of common interest and concern in a convivial atmosphere.*
Time: 5.30 for 6.00 pm **Venue**: EA Auditorium, 21 Bedford Street, North Melbourne

Another National Award for the Snowy Mountains Hydroelectric Scheme
A July message from Michael Clarke in the EngineeringHeritageAustralia email chat group: In the late 1950s the Snowy Mountains Hydro-electric Authority developed a revolutionary technique of installing rock bolts in a designed pattern that made the rock in its tunnels and underground power stations self supporting. The technique saved many millions of dollars in construction of the Snowy Scheme, speeded up work and vastly increased safety in underground excavations. As a consequence this Australian innovation was rapidly adopted world-wide. It has been described as *"probably the most significant engineering development made on the Snowy scheme".*
On 18 October 2009 the site in Lambie Gorge, Cooma where the new rock bolting techniques were tested will be recognised as a National Engineering Heritage Landmark. The award ceremony will be part of the reunion celebrations on the 60th anniversary of the start of the Snowy scheme. For details visit
www.snowyschemecollection.com.au/snowy60th All are welcome to participate in the award ceremony.

Third Australasian Engineering Heritage Conference, 19th to 25th of November 2009:
This conference was mentioned in the February Newsletter, regarding a 'Call for Papers'. That time has passed, but it is still possible to register or download the Registration documents at:
http://www.ipenz.org.nz/ipenz/nzecal/HEB_paper_registration_form.doc
The title of the Conference is **Engineering in the Development of a Region – Heritage and History,** to be held at **SALMOND COLLEGE, UNIVERSITY OF OTAGO, DUNEDIN, NEW ZEALAND, 22–25 NOVEMBER 2009**
This conference is part of a cycle of Australia & New Zealand engineering heritage conferences. There is a conference every other year, but most of these are held in one of the Australian cities. The 1st Australasian conference was in Christchurch 1994 and the 2nd in Auckland 2000. Items from the Dunottar Collection of engineering, surveying and other calculating devices from the 1800's through to the present day will also be on display at the Conference. This is a world call collection. Probably only one of two or three in the world, and the Conference will provide a unique opportunity to view items from it.
Pre-Conference Tour: Thursday 19th November ~ Sunday 22nd November
Conference Delegates and Partners are invited to book for the Tour when they register for the Conference.
The 4 day guided Tour will include a circuit of North Otago, Waitaki Valley, Wanaka, Queenstown, Cromwell, Maniototo and Strath Taieri, visiting many engineering heritage sites and other attractions. It will include coach travel, accommodation and a return to Dunedin on the Taieri Gorge Railway.
View the Pre-Conference Tour Programme http://www.ipenz.org.nz/ipenz/nzecal/PreConferenceTour.pdf
Conference Programme: Conference Themes and Topics include:
Agricultural Development (irrigation & drainage; flood protection; refrigeration engineering; process industries; machinery; sawmilling; buildings)
Power (hydro-electric; wind; steam; diesel; gas)
Transport and Communications (roading; bridges; railways; shipping and shipbuilding; harbours and ports)
Resource Extraction (Gold-mining; sluicing; dredging; tunnelling; smelting. Coal. Scheelite. Oil shale)
The People (entrepreneurs; communities; businesses; manufacturers; engineers; innovators)

The panel of invited speakers includes a wide range of interests and expertise to initiate presentations and discussions:
Sir Neil Cossons (UK), industrial archaeologist and former Chairman of English Heritage;
Paul Davies (Australia), heritage management consultant;
David Dolan (Australia), Professor of cultural heritage at Curtin University;
Wayne Johnson (Australia), Sydney Harbour Foreshore archaeologist;
Euan McQueen (NZ), geographer and NZ railway heritage historian;
Robert McWilliam (UK), editor for vol.3 of ICE Biographical Dictionary of Civil Engineers;
Duncan Waterson (Australia), historian - settlers, agriculture, railways, politics, et al.

University of Canberra – Heritage Conservation Summer Schools
The University of Canberra is pleased to announce that Australia's leading heritage conservation professional development programme is now approaching its twentieth year. The programme is based on two intensive summer schools:

- The Conservation of Traditional Buildings (12 days)
- Cultural Heritage Management (7 days).

The schools are held in January each year with the topics alternating. Next year will be Cultural Heritage Management (17–23 January 2010), and The Conservation of Traditional Buildings will be in January 2011. For details go to: http://www.canberra.edu.au/faculties/arts-design/conservation-summer-schools. For all enquiries about these summer schools please contact: David Young, Donald Horne Institute for Cultural Heritage, University of Canberra ACT 2601. Email: David.Young@canberra.edu.au

10. Publications of Possible Interest - In Print & On the Web

Consultants Tracker - an initiative of the IStructE (Institution of Structural Engineers UK):
This is something that Harry Trueman drew our attention to in July. I have already found it useful when trying to find a design firm from the 1950s which seemed to have disappeared off the face of the earth. And then a mysterious new firm of consultants turned out to be the same group I had dealt with in the 1980s. The Tracker site says: *The Consultants Tracker is intended to help trace a firm of civil and structural engineering consultants that has merged, been taken over, closed down or changed its name. The list will never be complete but if you can supply the IStructE with any additional or corrected information we would be very grateful. Please contact Rob Thomas, Manager, Library and Information Services.* Most of the present entries are UK firms, but it could be useful for Australian researchers to add some Australian examples - many of which have become international in the process of changing their names. The direct link to the tracker is http://www.istructe.org/Library/consultanttracker.asp *[Ed.]*

IStructE Journal Paper: *Researching drawings & records for existing buildings* (Volume 87, Issue 4)
ABSTRACT: This paper describes the authors' considered best practice towards obtaining information on an existing building structure. The paper also describes how The Institution of Structural Engineers' Library can assist in this process.Structural engineers are rarely engaged as early as RIBA Stage A (Feasibility) and yet information on an existing building structure may be critical in the decisions being considered for refurbishment and/or redevelopment. Even if the existing building is to be demolished, information on the existing structure is important with regards to the chosen demolition method, including the type of temporary works to be deployed. Most demolition contractors dislike the National Building Specification (NBS) section C20 demolition clause that requires them to survey the existing building, determine the structural frame and clarify the existing stability system. This is better undertaken by the structural engineer/design team where knowledge of the existing building is learnt ahead of swinging of the demolition ball. As part of this quest, the IStructE Library has been at the forefront of providing an e-archive of articles from The Structural Engineer as well as preparing a Consultants' tracker to assist in the search for existing building records from now-defunct, taken over or name-changed consulting engineering practices. This paper is illustrated with a number of project examples where SKM anthony hunts has been appointed as consulting engineer and where the finding of an existing record of a building has shaped the course of events.

AUTHORS: Paul Perry BSc(Hons) CEng, MIStructE, MICE, MHKIE, Technical Director, SKM anthony hunts consulting engineers
AND Rob Thomas BA(Hons) MCLIP, Manager, Library and Information Services, IStructE

[Obviously this paper is mainly about UK conditions and regulations, but it could be a useful source of ideas for consultants encouraging conservation and re-use of existing structures. The Abstract and how to buy the paper can be found at http://www.istructe.org/thestructuralengineer/Abstract.asp?PID=7998. - Ed.]

Heritage and Sustainability - a new link on the Heritage Victoria website

In July, I got the following message from Heritage Victoria: *The new sustainability link on our homepage is here! The heritage sector can play an important part in coming up with innovative solutions to reducing environmental impacts. We've come up with our position, what we've been doing thus far, our future projects, links to resources and case studies. Check out http://heritage.vic.gov.au/Sustainability.aspx*
[I know it's mostly about buildings, but this site looks interesting and potentially useful to many owners of heritage properties. Ed.]

An *Illustrated Glossary of Australian Rural Fence Terms*.

Author - Dr John Pickard, Department of Environment and Geography, Macquarie University NSW.
Publisher - Heritage Branch, NSW Department of Planning.
A 7.5 MB PDF of the *Illustrated glossary of Australian rural fence terms* is now available for free download at the web site of the Heritage Branch, NSW Department of Planning. Go to http://www.heritage.nsw.gov.au/03_index.htm, click on "Publications G-I", and scroll down until you find it under "I" .
The glossary is 170 pages, and is arranged alphabetically, with definitions, quotes from primary and secondary sources, illustrations (both contemporary and modern images), and a rather exhaustive list of references. The glossary will be useful to anyone conducting heritage work in rural NSW *[or Victoria - Ed.]*, and to those interested in the history of rural fences in Australia.
[An excellent resource - I have downloaded this text, printed and bound it, and shelved it in my reference library. Ed.].

***Inherit e-news* – Heritage Council of Victoria's publication available online**

The Heritage Council of Victoria has issued its first email version of *Inherit*, replacing its printed publication. The e-newsletter will be issued monthly, providing information and updates on heritage matters. Subscription is free e-newsletter. Please send your details to: inherit.magazine@dpcd.vic.gov.au. You can view the first copy online at http://heritage.vic.gov.au/admin/file/content2/c7/AUG09.pdf . The Heritage Council welcomes story suggestions and ideas for future editions.

Significance 2.0 - A Guide to Assessing the Significance of Collections

Significance 2.0 is published by the Government funded Collections Council of Australia and is freely available as a PDF online at http://significance.collectionscouncil.com.au/pdf/colour/Significance20.pdf or it can be purchased for $29.95 by sending an email to: info@collectionscouncil.com.au. This book could be extremely useful to anyone engaged in the management of small museums or similar organisations.
Part 6 (Significance in action – applications) of ***Significance 2.0*** gives only the names of 22 case studies, details of which have to be downloaded separately via the Part 6 webpage. In July, the Collections Council of Australia announced that the complete version of *'Part 6 – Significance in action – applications'* is now available ONLINE. If you already own or have seen a hard copy of ***Significance 2.0 – a guide to assessing the significance of collections***, you will know that only a summary of this section is printed in the book. Now you can access Part 6 in its entirety.
Go to http://significance.collectionscouncil.com.au/online/848 to read the full case studies for the applications of interest to you.
*[Significance 2.0 is significantly (no pun intended!) different from its previous edition - **Significance - A Guide to assessing the Significance of Cultural Heritage Objects and Collections**. It appears to have been completely reordered, rewritten and redesigned, with some illustrations re-used and some different ones. Even if you already have the first edition, it's probably worthwhile downloading Significance 2.0. - Ed.]*

***Small Museums Cataloguing Manual - A Guide to Cataloguing Object and Image Collections* - 4th Edition**

[Another vade-mecum for collections people! - Ed.] The publishers, Museums Australia Victoria:
*are pleased to present the Small Museums Cataloguing Manual (4th edition), the industry-standard reference for community museums wishing to start or develop their collections cataloguing. This essential practical tool is **FREE** to download* at http://www.mavic.asn.au/services/small-museums-cataloguing-manual/. *This user-friendly, full-colour edition has been fully revised to include guidance on using cataloguing software on computers, 'how to' examples of worksheets and up-to-date lists of useful resources. The Small Museums Cataloguing Manual accords with Benchmark A2.4.2 of the National Standards for Australian Museums & Galleries*
(see http://www.collectionsaustralia.net/sector_info_item/107) *and links to our Community Collections Training program*
(see http://www.mavic.asn.au/services/professional-development/).
The full publication is a PDF document and additional downloadable resources include an example cataloguing worksheet, an *Art and Architecture Thesaurus Online*, an *Australian Picture Thesaurus* and *Cataloguing Supplements* to the Cataloguing Manual (47 pages of *Classification and Authority Lists, 1996 Edition*).

***What House is That?* -- from Heritage Victoria**

[Here is another little gem from Heritage Victoria - actually nothing to do with Engineering, but loads of fun. It does have some glitches - it is sometimes difficult to return to a previous location on the screen. It is best if you have high speed broadband. If you don't (like us), you just need to be a bit patient. - Ed.]

On **What house is that? interactive** at http://heritage.vic.gov.au/Heritage-places-objects/What-house-is-that/interactive.html you'll find *real stories of the houses of Victoria, from the people who design them to those who live in them. The story covers the various housing styles from Early Victorian to Modern houses, and everything in between.* (Well almost everything. Ed.)

On **What house is that? HTML** at http://heritage.vic.gov.au/Heritage-places-objects/What-house-is-that/index.html there is a sort of introduction to the interactive site and an HTML version of it.

On **What house is that? forum** at http://whathouse.wordpress.com/ there is a forum which seems only vaguely related to **What house is that?** - but you can insert your own opinion!

English Heritage - *Conservation Bulletin*

Some of you may be interested to know that all volumes of the English Heritage publication *Conservation Bulletin* have now been digitised and are available as PDFs on the web - Volume 1 to the current issues Volume 61. They can be found at http://www.english-heritage.org.uk/server/show/nav.11241 *[One Bulletin I noted was Conservation Bulletin 38 in which Sir Neil Cossons, then Chairman of English Heritage, reviews former industrial sites in relation to regeneration and public understanding. - Ed.]*

Gleanings from the EA Books List

[I occasionally browse the EA catalogue. Very seldom is there anything clearly related to Engineering Heritage, and the books that catch my attention are usually too expensive for our library. But four in this month's list I would like to have: 1 for my own conservation work, 2 & 3 for the builders and designers in our family and No.4 just for fun. - Ed.]

1.*Concrete Structures - Protection, Repair and Rehabilitation*, R. Dodge Woodson
$113.64 + GST = $125, 2009, 9781856175494, 280pp
This book provides guidance in dealing primarily with the evaluation and repair of concrete structures and presents the reader with a step-by-step method for the evaluation and repair of structures, covering all types ranging from bridges to sidewalks. It contains handy tables outlining the properties of certain types of concrete and their uses. Case studies are included along with diagrams and schematics.

2.*Building a House: Footing Systems*, Charles Simpson, Barry Hodgson
$40.91 + GST = $45, 2009, 9781420256246, 88pp
This is an Australian book that examines in detail the wet processes involved in constructing a house. It covers footing systems used in various types of house construction and has been written to current Australian Standards. Both slab on ground construction and the setting out and construction requirements for concrete strip footings are covered. Over 150 detailed drawings.

3.*Solar Power in Building Design*, Peter Gevorkian
$151.77 + GST = $166.95, 2008, 9780071485630, 476pp
Here is a complete guide to designing, implementing and auditing energy-efficient, cost-effective solar power systems for residential, commercial and industrial buildings. Filled with case studies and illustrations, this state-of-the-art design tool covers new solar technologies; design implementation techniques; energy conservation; the economics of solar power systems; and passive solar heating power. There is expert guidance on using solar power in any type of building — from basic theory through project planning, cost estimating and manufacturing.

4.*The (Fabulous) Fibonacci Numbers*, Alfred Posamentier, Ingmar Lehmann
$57.27 + GST = $63, 2007, 9781591024750, 385pp
The most ubiquitous and perhaps most intriguing number pattern of all in mathematics is the Fibonacci sequence - beginning with two ones, each succeeding number is the sum of the two numbers immediately preceding it (1, 1, 2, 3, 5, 8, 13, 21 ad infinitum). This sequence recurs throughout nature, from the regeneration patterns of bees and rabbits to the arrangement of spirals on pinecones and pineapples. This book takes you on a fascinating tour of the Fibonacci numbers.

This newsletter has been prepared on behalf of Engineering Heritage Victoria which is a Special Interest Group of the Victorian Division of Engineers Australia and the Institution of Engineers (Australia). The Editor is Margret Doring, who can be contacted on 03 5729 7668 or doringbelgrano@dragnet.com.au . Contributions for the next Newsletter will be gratefully received.

UNSUBSCRIBE:** If you do not wish to receive further material from Engineering Heritage Victoria, please inform the Editor on* ***doringbelgrano@dragnet.com.au