ASHET members only tour to Kavanagh Balloons

At Mount Kuringai on the edge of Sydney is the factory of Kavanagh Balloons that a party of ASHET members visited on 17 September. We saw here how Phil Kavanagh and a handful of employees make their big hot air balloons. Just how big they are can be seen from the photo of one that dwarfs the two storey factory building and the people around it. It contains 450,000 cubic feet of air, enough to fill the interior of around twenty average size houses.

Hot air balloons are an old idea. The first recorded are the Kongming lanterns used by the Chinese for military signalling in the Shu Han kingdom of 220–280 AD. The first documented European flight was in 1709, when a Portuguese priest Bartolomeu de Gusmao lifted a small balloon of paper full of hot air in front of King John V and the Portuguese court. The first recorded manned flight in a balloon was made in France in 1783 in a balloon made by the Montgolfier brothers. The first successful balloon flight in Australia was in 1858.

Modern passenger carrying hot air balloons with an on-board heat source, dating from the 1960s, are primarily for recreation. Phil Kavanagh began building them in 1979, and his company has since built 400. It is the only builder of hot air balloons in Australia.

These balloons have a limited life of typically around 500 flying hours. The strength of the nylon fabric used in modern balloons is affected by exposure to ultraviolet radiation, so its exposure in each balloon is carefully recorded and the fabric strength is regularly tested. So as long as balloons maintain their popularity, the future of balloon making seems assured.

A hot air balloon is not complicated. We saw a balloon being sewn together from strips of fabric. It has vents at the top, controlled by cables from the basket, to let out some of the hot air for the balloon and allow the balloon to descend.

The basket below the balloon is made from wicker, the traditional material, on a metal frame. Phil has on his staff a basket-weaver who builds these. The largest ones he makes will hold twelve passengers as well as the cylinders of LPG fuel. The fuel burners, also made in the factory, are mounted above the basket in the mouth of the balloon itself. Most balloons are decorated in unique designs made in coloured nylon fabric stitched to the panels of fabric that make up the balloon before they are assembled. The patterns for the decorative pieces are generated on a computer. Almost every aspect of the design and manufacture of these balloons is carried out in this little factory.

Phil Kavanagh himself conducted our tour. We were fascinated to see how modern techniques and materials are being used to build on an ancient concept.

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ASHET Event

Tuesday 24 November 2009

Talk by David Craddock

The centenary of powered and unpowered flight in Australia

In December 1909, 100 years ago, the first real flights were made in Australia. The first gliding flight was made on 5 December 1909, but the centenary of the first powered flight is not so straightforward.

The ‘prize’ of the first powered flight has been claimed by several pilots who made their attempts in NSW, South Australia and Victoria between December 1909 and March 1910. World famous Harry Houdini has often been credited with the first Australian flight, but who were the other contenders? In his talk, David Craddock will explore some of these claims.

David Craddock is a founding member of ASHET, is a current committee member and has served as vice president. He is also a member of RAHS, the Royal Aeronautical Society and the Royal Society of New South Wales, of which he was president in 2001 and 2002. He began his career as a cadet engineer with Hawker de Havilland and studied at the University of New South Wales. He learnt to fly in 1971. David’s whole career has been in aircraft engineering, design and manufacturing, both in Australia and during a year seconded to work in Britain. He is currently with the Department of Defence, managing a team of technical staff performing aviation safety compliance assurance.

Venue: History House, 133 Macquarie Street, Sydney
Time: 5.30 for 6 pm
Cost: $8.00 Includes light refreshments on arrival
Bookings: phone RAHS on (02) 9247 8001 or email history@rahs.org.au

ASHET’s historic journals project

This project began in 2007 with the idea of making more accessible to readers and researchers some of the papers and articles that related to the history of engineering and technology in Australia. In New South Wales some of the earliest of these are contained in journals such as the Minutes of Proceedings of the Engineering Association of New South Wales, published from 1885 to 1921, the Journal of the Sydney University Engineering Society, published from 1894 to 1921, and the Journal of the Royal Society of New South Wales, published from 1867 to the present. There were also historic papers published in journals in other states of Australia. Copies of all these early journals are held by only a few libraries in Australia.

These days, searching for books, articles and other published material is generally quick and easy with on-line electronic databases and search engines such as Google. But the older a publication or paper, the less likely it is to be included in an electronic database. Old books can generally be located by searching library catalogues, but individual articles and papers in old journals are much more difficult to find. We found that this problem could be easily overcome if the tables of contents of journals were on a website. In fact a few organisations, including RAHS, have the tables of contents of every issue of their journals on their website. As a consequence a search using Google for the name of an author or words in the title will turn up a reference to any paper ever published in the Journal of the RAHS. We demonstrated that providing such a search aid was practical by compiling an on-line set of tables of contents of one journal, the Journal of the Ashfield and District Historical Society that contained a number of interesting articles relating to the history of technology, putting these tables of contents on the ASHET website and conducting searches.

In 2007 ASHET received a RAHS Heritage Grant to assist it in producing on-line tables of content for the complete sets of the two engineering journals mentioned above. Before we started work on this, we received from the Sydney Mechanics School of Arts a much larger grant of $6,000, a substantial donation from ASHET member Don Fraser and an offer of assistance from the library of the University of Sydney to undertake a larger project, to provide on line the complete texts of these journals. The offer form the University of Sydney library included coordinating the work of scanning the texts, undertaking the scanning and digitisation, and making them freely available in a convenient searchable form on its website.

Work commenced in 2007 but proceeded slowly because a number of problems were encountered. The scanning equipment was out of service for several months while parts were obtained from overseas, staff were assigned to other duties, and there were technical problems to overcome with obtaining good quality images of the large fold-out drawings included in some volumes of the journals. Scanning of all the documents is now complete, and the complete texts and sets of drawings are being posted on the University of Sydney website as pdf documents. So far, four volumes of the Minutes of Proceedings of the Engineering Association of New South Wales and four volumes of the Journal of the Sydney University Engineering Society are available on line. They can be viewed on the UniversityOfSydneywebsiteatthefollowingaddresses:http://escholarship.library.usyd.edu.au/journals/index.php/EANSW/issue/archive and http://escholarship.library.usyd.edu.au/journals/index.php/SUES/issue/archive.

The software being used for the on-line display of the journals is Open Journal Systems (OJS), which is in use world-wide for this purpose, and makes it very easy to search tables of contents and full texts and to read and download individual articles. The tables of contents of each volume appear in a form on-line that allows every article to be found by simple searches for author name or word in the title using search engines such as Google.

Grant for ASHET website upgrade

ASHET has received a grant of $850 under the NSW Cultural Grant Program administered by the Royal Australian Historical Society to assist in a project to upgrade the ASHET website. This will enable ASHET to engage Alison Stevens, of on-line publishers Redwine Publications, to design for us an upgraded website with new layout and features.

This is a good time for ASHET members who have ideas that might be incorporated in the new website to let us know. Send them by email to ASHET secretary Ian Arthur at sec@ashet.org.au.

One of the new features to be included on the website is a set of ten guides to walks and tours of places around Sydney that are important to the history of engineering and technology. Each of the short guides will describe one tour and will be designed for downloading and printing on a desktop printer.

The new website will be designed so that, like ASHET’s present website, it can be managed easily by ASHET members with computer skills. We expect the upgraded website will replace the present one early in 2010.
The earliest engineering societies in Australia

In 1870, about six engineers met in a small room at the Masonic Hall in York Street, Sydney, to discuss the idea of a society. Subsequently one of them, John Laing, issued a notice inviting ‘all the Leading Members of the Mechanical Engineers and Iron Trades’ to a meeting at the School of Arts on 12 September 1870 to consider the idea of forming an association. Twenty five attended, including the senior engineers from Mort’s Dock and its associated company Waterview Bay Engineering Company, engineering firms P.N.Russell and Company and Vale and Lacey, the Roads Department, the Railway Locomotive Works, Harbour and Rivers Department and the shipping companies Australian Steam Navigation Company and the Hunter River Steam Navigation Company. A committee was elected that led to the formation of the association with 56 members. After much discussion the originally suggested title of Mechanical Engineering Association of New South Wales was discarded in favour of Engineering Association of New South Wales, but the membership was always predominantly mechanical engineers. The members met regularly and the association expanded steadily. From 1887 it published a journal, the Minutes of Proceedings. In 1906 it received a bequest of £3,000 from the estate of P.N.Russell, which it used mainly to establish and expand its library, which later became the foundation of the library of the Institution of Engineers Australia.

An engineering branch of the Royal Society of New South Wales was formed in 1891 and continued for a few years. A number of engineering papers were published in its journal, notably 18 papers, between 1886 and 1910, by Professor William Warren, who had migrated to Sydney in 1881 and became the foundation professor of engineering at the University of Sydney in 1884.

An important development was the formation in 1895 of the Sydney University Engineering Society with 43 members, representing 66 per cent of the graduates, undergraduates and teaching staff of the Engineering School. Professor Warren was the foundation president. Unlike the Association, its membership was representative of every branch of the engineering profession and this is reflected in the range of topics of the papers published in its journal.

The Australasian Society for the Advancement of Science, with an architectural and engineering section, was formed in Sydney in 1888 and Warren contributed a paper on the history of civil engineering in New South Wales that it published in that year. That society has survived to the present day as a national society that for many years was strongly supported by the scientific community, but it has never had many engineers involved in its activities.

In Victoria, two societies, the Philosophical Society of Victoria and the Victorian Institute for the Advancement of Science, with similar aims to promote the advancement of science, were formed in 1854, and amalgamated the following year as the Philosophical Institute of Victoria. In 1859 it became the Royal Society of Victoria, which survives to the present day. In its early years it published a number of significant engineering papers. The Victorian Institute of Engineers was formed in 1889, with mainly mechanical engineers, followed in 1899 by the Melbourne University Engineering Society, and in 1909 by the University Engineering Society, the major branches of the profession. Unlike the Association, its membership was representative of every branch of the engineering profession and this is reflected in the range of topics of the papers published in its journal.

Australasian Institute of Mining Engineers which had seen itself as a national organization right from the start.

It was largely due to the energy and diplomacy of Mr D.F.J.Harricks, chief engineer of the Colonial Sugar Refining Company and a member of the Engineering Association of New South Wales, that most of the engineering associations decided to amalgamate to form the Institution of Engineers Australia, which held its first council meeting in October 1919. Professor Warren was elected as the first president.

The Australasian Institute of Mining Engineers, by far the largest of the engineering societies in Australia at the time, with nearly 400 members, decided not to become part of the Institution of Engineers Australia, and still operates independently as the Australasian Institute of Mining and Metallurgy. The Victorian Institute of Engineers and the Victorian branch of the Local Government Engineers also decided against amalgamation; neither has survived to the present day as an independent organisation.

The papers published by these early societies provide a record of the history of engineering in colonial Australia. The two most significant sets of publications are those of the Engineering Association of New South Wales and the Sydney University Engineering Society. An ASHET project to provide the full sets of these in digital form online is nearing completion, and is described in another article in this issue of ASHET News. Members of Engineering Heritage Victoria are currently engaged in a program to provide online texts of selected papers relevant to the history of engineering in Victoria. A recent report on their activities is at http://www.consuleng.com.au/ recently.

100 years ago in Melbourne

The editor has been spending some time in Melbourne, and discovered a couple of notable centenaries, described in the two following articles in this issue of ASHET News.

Bryant and May commenced the manufacture of safety matches in Melbourne in 1909, in an impressive building completed that year in Church Street, Richmond. It went into production at a time when matches containing the hazardous white phosphorus were still being phased out in most countries. They were cheaper than safety matches, free of hazardous materials, which were the only kind ever made by Bryant and May’s.

The other centenary article is about William Kernot, the first person to qualify in an engineering course in Australia and first professor of engineering at the University of Melbourne. He died unexpectedly in 1909, aged 64.
William Charles Kernot (1845–1909)

Most of the material for this note comes from the excellent entry, written by Stephen Murray-Smith, in the Australian Dictionary of Biography.

William Kernot, eldest son of Charles Kernot, was born at Rochford, Kent, in 1845 and migrated with his family to Geelong in 1851. His father, a dispensing chemist, brought with him to Australia a printing press, and, after a brief and unsuccessful stint on the goldfields, commenced business in Geelong as a chemist and stationer. His business prospered, and in 1858 he built a fine house and entered local politics, serving on the local municipal council for eight years, becoming mayor in 1864. In 1868 he become a member of the Victorian Legislative Assembly, and served there with one brief interruption until his death in 1882. Charles Kernot took great interest in engineering and had a fine hoe workshop.

William attended Christ Church School and the Flinders National School in Geelong and entered Melbourne University at age 15, graduating BA in 1864 and MA in 1866. With a certificate in engineering gained in 1866 he became the first qualified engineer produced by the university, and from anywhere in Australia. In 1883 he became the university’s first professor of engineering, just one year before William Warren was appointed as the first professor of engineering at the University of Sydney.

Kernot joined the Victorian public service in 1865, doing work at the Department of Mines for which he considered his engineering qualifications were quite useless. He was dismissed after 18 months, and joined Water Supply with colleagues who ‘as far as I could discern were perfectly unconscious even of the existence of physical laws’. When this office was disbanded he worked for a few months at the railways where the chief engineer Thomas Higinbotham ‘never missed an opportunity of impressing upon me the uselessness and undesirability of University training for engineers’.

Kernot started work as a part time lecturer in surveying at the university at the university in 1868, and in civil engineering a year later. After leaving the public service in 1875, he engaged in consulting work, that he found much more to his liking. One of his first projects was with Louis Brennan, inventor of a steerable torpedo. He went to Europe in 1878, visiting engineering schools and industrial establishments and meeting engineers and scientists. On his return he continued with consulting work, government commissions and inquiries, and serving on three juries for the 1880 International Exhibition. In 1882 he helped form the New Australian Electricity Company which introduced electric lighting to Melbourne. He was chairman of the board of the company from 1882 to 1900.

In 1883 the university decided to award four new chairs to local candidates, and Kernot was appointed to one of these, in engineering. The first bachelor’s degree in engineering was awarded in that same year. In 1898 Kernot himself was awarded the degree of Master of Engineering.

Kernot was also closely associated with the Working Men’s College, which the grazier and philanthropist Francis Ormond had struggled from 1881 to establish in Melbourne. It was formed in 1887 with Ormond as the first chairman of the council, succeeded by Kernot on Ormond’s death in 1889. Kernot spent ten difficult years as chairman, commenting that the democratic atmosphere of a university ‘altogether unfit men for submitting to the despotism either of a Russian Czar or a Victorian Education Department’.

In 1891 Kernot made another overseas trip, visiting engineering schools in Europe and America. He regretted that his grand plans for the engineering school in Melbourne that he hoped to implement on his return had to be put aside because of the ‘great slump’. Although he gave generously of his time to many other activities, Kernot’s principal concern was always the university and his engineering students.

Kernot served as a councillor and president of the Royal Society of Victoria from 1885 to 1900, and an inaugural member of the Australian Antarctic Committee, set up jointly by the Royal Society of Victoria and the Geographical Society of Australasia. This committee laid the foundations for Antarctic exploration and the Royal Society’s long term interest in Antarctic research. Kernot was president of the Victorian Association of Engineers on four separate occasions and president of the Institute of Surveyors in 1883–4. He contributed papers to all these institutions.

Murray-Smith writes: ‘Kernot was probably best known as what a later generation would call a ‘stirrer’; indeed, his character and influence cannot be assessed without examining the stiff sense of professional dignity and ethics which led him into many disputes. His early humiliations in the public service made him a relentless scourge of bureaucratic incompetence and nourished a sense of self-righteousness in his many campaigns for safety, economy and the application of scientific principles in public works. He sternly lectured, in forthright categories, government and municipal engineers when he found faults in their designs, especially when these menaced public safety, and referred to the ‘ordinary ignorant empiric who calls himself an engineer’.

Kernot never married. He built in 1880 a large house ‘Firenze’ in Parkville where he lived with members of his family. He was a ballooning enthusiast. Alfred Deakin wrote that he was known for his sense of justice and kindness; Ernest Scott, historian of the Melbourne University, mentioned his ‘unruffled generosity and kindness’; Alfred Lynch, one of Kernot’s first engineering students at the University of Melbourne, wrote in his autobiography that William Kernot was ‘the only professor he knew at the University of Melbourne devoid of that detestable academic exclusiveness and starchiness’.
Bryant and May, British manufacturers of safety matches, acquired this fine building in Church Street Richmond, to commence production in Australia. The building, originally known as the Empire Works, was designed by Melbourne architect William Pitt. It was purchased shortly after its construction by Bryant and May who made extensive additions including a third floor and a clock tower. It had many features unusual in an Australian factory, reflecting the philosophy of the match company’s founders, two Quakers William Bryant and Francis May. The Melbourne factory included gardens, a bowling green and basketball court, a dining hall, recreation rooms and accommodation for the industrial nurse. Production of matches at the factory ceased in the 1980s and the building was converted to offices in 1989. It is heritage listed and the original exterior is preserved.

Bryant and May

Bryant and May formed a partnership in 1843 to establish a business as provision merchants.
History of the safety match.

The safety match has an interesting history, and the common meaning of the term has changed somewhat over the years.

Matches, of a sort, were used by the Chinese from around AD600 for lighting fires. They usually consisted of sticks impregnated with sulphur. They were not self-igniting. They appeared in Europe around 1500. A self-igniting match was invented by Chancel in Paris in 1803. The head of the match was a mixture of potassium chlorate, sugar, sulphur and rubber. It was ignited by dipping it into an asbestos bottle containing sulphuric acid. These matches were expensive, inconvenient and dangerous. They achieved little popularity.

A British chemist, John Walker, invented the ‘friction match’ in 1826. It would light on any rough surface. These matches lit quite violently, had an uncertain flame and a nasty smell. They were marketed as ‘lucifers’ and are said to have been responsible for a marked increase in the number of tobacco smokers. The problem of odour was overcome in 1830 by Frenchman Charles Suaria who added white phosphorus. There was further improvement when János Irinyi, a Hungarian invented the ‘noiseless match’ which was a commercial success, but hazardous, both to the match factory employees and the users, because of the white phosphorus that it contained. White phosphorus is highly poisonous, with a lethal dose less than the amount contained in a box of matches, and its ingestion also causes a bone disease that came to be known as ‘phossy jaw’. Irinyi built several match factories and became wealthy. Matches containing white phosphorus spread throughout the world.

A Swede, Gustaf Erik Pasch, in 1844 invented a ‘safety match’, containing no white phosphorus, and capable of being ignited only by friction on a specially prepared surface. The brothers Johan and Carl Lundström made improvements and went into large scale production of safety matches at Jönköping in 1847. They continued to make improvements and to expand their production, with the result that the Swedes were the world leaders in safety match production for many years. These were the matches imported to Britain and later manufactured by Bryant and May.

The hazards of matches containing white phosphorus became well recognized, but as they were cheaper than safety matches, their use continued until it was prohibited by legislation. The first country to legislate was Finland in 1872, followed by Denmark in 1874 and Sweden in 1888. The Berne Convention of 1906 required signatory countries to legislate against the use of white phosphorus in matches. Britain’s legislation came in 1911, India’s and Japan’s in 1919 and China’s in 1926. USA did not ban the use of white phosphorus, but after persuading the principal American licensee of the safety match to share its licence with other American match manufacturers, it imposed a prohibitive tax on matches containing white phosphorus in 1911.

These days the term safety match has come to be applied to ones that strike only on a specially prepared surface, in contrast to the ‘strike anywhere’ matches that will strike on any rough surface. ‘Strike anywhere’ matches are still manufactured, but have declined in popularity.

About ASHET

ASHET, the Australian Society for History of Engineering and Technology, is a non-profit society, incorporated in New South Wales and affiliated with the Royal Australian Historical Society. ASHET currently has 92 members.

It was formed in Sydney in 2003. Its objects are to encourage and promote community interest and education in the history of engineering and technology in Australia. It has members throughout Australia, with most in Sydney and other parts of New South Wales.

ASHET has regular program of events in Sydney, and looks forward to establishing groups with programs of activities in other centres.

ASHET meetings in Sydney are mostly held at History House, 133 Macquarie Street, Sydney, on weekday evenings, as joint meetings with the Royal Australian Historical Society. In addition ASHET arranges daytime visits to places of historical interest.

ASHET has held weekend or longer tours to the Mudgee, Lithgow and Goulburn areas, and to northern Tasmania. For 2008, we are planning a tour to Broken Hill by rail and coach.

ASHET is managed by a committee of five office-bearers and three ordinary committee members. A complete new committee will be elected at ASHET’s annual general meeting on Tuesday 22 April 2008. Members of the present committee will be eligible for re-election but we would like to see some new blood. All members will receive a notice of the annual general meeting and a call for nominations of office-bearers and committee members. Nominations must reach the secretary seven days before the meeting.

If you are interested in the idea of serving on the committee or otherwise contributing to running ASHET or expanding its range of activities, call or email the secretary Ian Arthur, talk to any committee member or make a nomination.

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Johan Edward Lundström (1815-1888)