

New ASHET president David Craddock

Ian Jack, president of ASHET since it was formed eight years ago, decided not to stand for re-election to the position this year. This year he was elected to ASHET's committee the committee as an ordinary committee member. This year Ian also stood down from the presidency of RAHS but remains as an elected member of the RAHS Council.

Ian played a major role in the formation of ASHET, and as president has guided its development; he has also contributed from his great knowledge of Australian history and industrial heritage in talks, writing articles and guiding tours. As president of RAHS as well as of ASHET he has helped build a strong and fruitful friendly between RAHS and its affiliated society ASHET.

David Craddock was elected as the new president of ASHET at the annual general meeting this year. He and his wife Jan are foundation members of ASHET and David has served on its committee as an office bearer or committee member in every year since its formation. David has



a special interest in the history of aviation in Australia and is the author of three books and many papers on the subject. He has been able to combine this with a career as an aeronautical engineer and senior executive with the Department of Defence Directorate of Aviation Compliance. He is active in the Australian branch of the Royal Aeronautical Society, has been president of the Royal Society of New South Wales and is a prominent member of the Hornsby and District Historical Society.

Beverley Johnson, new ASHET committee member

This year, at the annual election of office bearers and committee members, we did not receive enough nominations to fill the three vacant positions for committee member. The newly elected committee has now filled the vacancy by appointing Beverley Johnson to serve on the committee until the close of the annual general meeting next year, when a new committee will be elected.

Beverley, along with her husband Brian, now deceased, joined ASHET at the time it was formed in 2003. Since then she has always taken a close interest in ASHET activities, and has regularly attended its meetings. She retired from a career of over twenty years as a professional historian and researcher in 2005, and we are looking forward to her bringing her wide experience to the committee.

Her research and reports have covered domestic, cultural, institutional and commercial sites, and the gathering of material for data bases and registers. The sites have included the Military Barracks Complex at Port

Arthur and many industrial sites. Beverley has written the (commissioned) history: "The Corngrinder. A Hundred Years of Corn Milling on the Lane Cove River." of which 1,000 copies were published.

Beverley has been a member of the Professional Historians Association and a range of historical societies including the Sydney History Group of which she was secretary. She is currently a member of RAHS as well as ASHET.

Beverley is very fond of the theatre and gains great satisfaction from her sport – orienteering.



Mari Metzke and Beverley Johnson

Mari Metzke retires as Manager of RAHS

Mari Metzke recently retired from RAHS, after 21 years service, first as Outreach Officer and since 2005 as Manager. Her recent farewell was probably the largest gathering the society has ever held.

Mari plans to continue her associations with the Hornsby and District Historical Society and with ASHET, of which she is currently vice president.

To succeed Mari, RAHS has appointed Maria Walsh as Chief Executive Officer. RAHS is currently seeking to fill the vacant position of Administrative Officer and a new position of Communications Officer.

New home for historic testing machine

In *ASHET News* for October 2010 (volume 3 number 4) Ian Bowie wrote about the historic Greenwood and Batley testing machine at Sydney University. The machine has recently been relocated from the university to the Powerhouse Museum at Castle Hill where it is on display.

This machine is capable of exerting a testing force of 100,000 pounds and was modeled on the giant machine designed by William Kircaldy that had a capacity ten times that of the machine at Sydney. It was built in 1866 and was in regular use for 100 years. Ian writes that it has recently been restored to working order, and is on display to the public at its original site at 99 Southwark Street, London.

ASHET events

Tuesday 26 July, 2011

Talk by John Pickard

Rural fences: an archive of Australian settlement history and technology

Rural fences are almost ubiquitous across Australia, but they are almost invisible and neglected as historic and heritage objects. They form an archive recording the settlement of Australia by Europeans, and provide vital clues and information on the way our landscape has been managed. Fences also record major technological changes from iron to steel, and in manufacturing development e.g. the establishment of wire netting manufacture in Australia.

In this talk Dr John Pickard will describe his research across Australia, describe several obsolete fences which are now of considerable heritage value, and consider the historic information embodied in the fences. Because fences were built by individuals, the range of variation is almost bewildering and difficult to understand. John has sampled fences at over 5,000 sites across Australia, recording key attributes that will be used to develop a simplified typology of fences. Related projects include an *Illustrated glossary of Australian rural fence terms* (currently being revised for a second edition) and a *Guide to assessing the heritage significance of rural fences*. A small collection of posts, droppers and wires will be displayed to illustrate some of the changes in fence technology since the 19th century.

This is a joint activity of ASHET and the Royal Australian Historical Society.

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

Tuesday 6 September, 2011 (History Week)

Talk by Anne Arthur

A sweet story: Australia's love affair with sugar

In recent years Australians have consumed more sugar per person on average than Europeans or Americans and more than twice as much as Japanese people. It is a key ingredient in some of Australia's iconic food innovations, Anzac biscuits, Cottee's Passion and the Pavlova. In earlier times, damper spread with Cocky's Joy, (Golden Syrup) was a staple food for many Australians.

Sugar was produced in India and China over 3000 years ago and came to Europe with Arab traders in the 7th century AD. Columbus took sugar across the Atlantic and the West Indies became the sugar bowl of the world. The Dutch began refining sugar in the early 1500s.

In Australia sugar was not grown commercially until the 1860s although the first refinery, using imported raw sugar, along with a distillery to produce rum, opened in Sydney in 1842. From these beginnings, the sugar industry grew to become one of the nation's largest food producers and export industries, and the Colonial Sugar Refining Company was for a time the second largest company in Australia.

The speaker, Anne Arthur, loves food and has a special interest in the history of food and cooking. As a lecturer with TAFE she has taught and demonstrated in a wide variety of food courses. The

refreshments preceding her talk will feature some sugar products.

This is a joint activity of ASHET and the Royal Australian Historical Society.

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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

Tuesday 27 September, 2011, Joint meeting with Materials Australia

Talks by Amie Nicholas and Christophe Gerber

The history of timber as a structural material in Australia

This is the first joint meeting of ASHET and the RAHS with Materials Australia, a society that specialises in the technology of materials used in engineering, including metals, plastics and timber.

Timber has long been one of Australia's most important structural materials and these two talks will trace the history of its use. At a time when nearly all iron had to be imported, and excellent timbers were plentiful, timber was very widely used in buildings and other structures such as wharves and bridges. As a result, the design and construction of timber truss bridges in New South Wales developed to an extent seen in few other places. Amie Nicholas will talk about some of the engineers and innovations, and illustrate the talk with examples of the bridges that are part of the state's engineering heritage.

In the companion talk Chris Gerber will describe some of the more recent history of developments in fields such as laminated timber beams and plywoods and in the treatment of timbers to improve their durability.

This is a joint activity of ASHET, the Royal Australian Historical Society and Materials Australia..

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

Thursday 20 October, 2011

Talk by Rosemary Broomham

Sydney's Waterfront Gasworks; their development & technology

Some of Sydney's waterfront gasworks have been replaced by expensive apartments, others have disappeared altogether. An expert in the technology of coal gas production and its social implications, Rosemary Broomham will introduce all the gasworks sites on Sydney's waterways – Darling Harbour, Balmain, Five Dock, Neutral Bay, Parramatta, Manly, Mortlake and Oyster Cove. She will explain the types of production used from 1841 when AGL opened Sydney's first works to the arrival of natural gas in 1976.

This is a joint activity of ASHET and the Royal Australian Historical Society.

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 Study Tour to Northern NSW, 21–28 August 2011

The team that ran the very successful RAHS/ASHET tour of Outback NSW in 2009 is running this year's 8 day coach tour of northern NSW for RAHS and ASHET members, their partners and friends. This is a unique opportunity to study the history and heritage of communities and industries in northern NSW.

We will leave Sydney early on Sunday 21 August and be back in Sydney early in the evening of Sunday 28 August.

Highlights of the tour (subject to minor changes)

Uralla (two nights)

Visits to Nundle Woolen Mill and Banalasta oil plantation & distillery en route from Sydney.
Dinner at McCrossins Mill Museum in Uralla.
Tour of Uralla with visits to New England brass & iron lace foundry and Deeargee Woolshed.
Heritage walk around central Uralla.
Visits to CSIRO laboratory and Saumarez homestead.
Heritage walk in central Armidale, en route to Glen Innes.

Glen Innes (two nights)

Tour of Glen Innes with local guide to see Standing Stones, Sale-yards, Railway Station
Visit History House Museum and Research Centre.
Heritage walk around central Glen Innes.
Visits to Ottery Mine and Mining Museum at Emmaville`.

Inverell (one night)

Tour of Newstead homestead and woolshed with local guide.
Tour of Inverell with local guide.
Heritage walk around central Inverell.
Visit Wing Hing Long and Co Museum at Tingha.
Visit Moree Plains Gallery en route to Lightning Ridge.

Lightning Ridge (two nights)

Tour of Lightning Ridge with local guide
Big Opal underground mine tour.
Sunset performance at Black Queen Outback Theatre.
Lunch and visit to Old Dubbo Gaol en route to Sydney.

Practical details

The Tour leader is Rob Renew and the Tour Manager is Mari Metzke. Each tour member will receive a set of readings which provide some historical context and selected details about heritage aspects of these sites.

We will be staying in centrally located motels of 3.5 or 4-star standard, providing opportunities to explore the streets, buildings and shops in each of the towns.

We will travel in a 5-star 44-seat coach with reclining armchair seats, sound system with DVD/CD and PA, air-conditioning, storage compartments for luggage, and a toilet.



McCrossin's Mill Museum, Uralla



Standing stones, Glen Innes

Tour fees

The tour fee is **\$1450** per person, for accommodation in double or twin share rooms. The tour fee for accommodation in single rooms is **\$1700** per person.

The fee covers coach travel, seven nights accommodation, all breakfasts, three lunches, two dinners, and admission fees for all group visits to museums and other sites.



Opal mining at Lightning Ridge



Deeargee woolshed

Registration

Register now by remitting to ASHET a deposit of **\$200** per person by cheque, money order or by direct credit to ASHET's bank account with Westpac Chatswood branch account number 032 090 37 4239 and providing the details of your registration to:

Ian Arthur, secretary ASHET
11 Heights Crescent
Middle Cove NSW 2068

Email: sec@ashet.org.au
Phone: (02) 9958 8397

Please provide the following details:

Participants' names
Address
Phone, Mobile and Email
Accommodation required (single, double, twin).

The full tour fee must be paid not later than **Monday 15 August**

If you have already registered interest in the tour you will be guaranteed a place if you complete your registration and pay the deposit by **Monday 1 August** Other registrations will be accepted in the order we receive them. Late registrations will be accepted if there is space available.

If you have any questions, call or email Ian Arthur, secretary ASHET at sec@ashet.org.au or (02) 9958 8397.

If you wish to join or leave the tour at a point other than Sydney, we may be able to arrange this.

Vale Clarence Hardy (1931 – 2011)

Dr Clarence Hardy, who passed away suddenly on Monday 18 April 2011 from a heart attack, was a member of ASHET and one of the most influential figures in the development of nuclear technology in Australia. He envisaged a grand design for Australia a fully integrated nuclear fuel cycle industry in Australia – *that* would refine and enrich uranium, fabricate fuel elements to be leased to the operators of nuclear power stations (both overseas and, in due course, in Australia) then take back the spent fuel, reprocess it, recycle fissile materials and dispose of the waste – all here in this country.

Clarence James Hardy was born and grew up in Derbyshire, England and studied chemistry at the University of Bristol, receiving the degrees of BSc (1952), PhD (1955) and DSc (1971). He worked at the Atomic Energy Research Establishment at Harwell in the UK from 1955 to 1971, with a secondment to the Oak Ridge National Laboratory in the USA from 1965 to 1966.

In 1971, Clarence was appointed Chief of the new Chemical Technology Division of the Australian Atomic Energy Commission and in 1987 Director of Industrial Technology with the Australian Nuclear Science and Technology Organisation (ANSTO). Following his retirement from ANSTO in 1991, he was a consultant to the nuclear industry, and continued an active involvement in organisations including the Australian Nuclear Association, of which he was secretary at the time of his death and a past-president, and the Pacific Nuclear Council, in which he served terms as vice-president and president.

Clarence was the author of over 100 published papers and two books, 'Atomic Rise and Fall: The Australian Atomic Energy Commission 1953-1987' in 1999 and, in 2008, "Enriching Experiences".

He is survived by his wife, Mollie, and children, Christopher, Anthony, Sarah and John. He will be missed



Esme Martens: making history in local government

On the ASHET weekend tour to Glen Davis, Kandos and Rylstone earlier this year we met Esme Martens, President of the Kandos Museum Committee. Esme has made history as a woman engineer in Australian local government over a career of so far 47 years and still going.

In her engineering course at the University of Queensland Esme was the only woman among 600 male students. When she graduated in 1962 in Civil Engineering in 1962 it was some time before she was able to find a position as an engineer but eventually found one with the Department of Main Roads where a part of her duties was considered to be making tea for the male staff. She was soon appointed foreman of a construction crew in central Queensland constructing culverts and doing road work. Seeing little future with main Roads, she moved to New South Wales to work as an engineer with the Tweed Shire in Murwillumbah.

At the age of 27 she was appointed Shire Engineer of Woodburn Shire at Coraki, the first woman to be appointed to a Shire Engineer position

in Australia. The Town Clerk told the Council they had gone stark raving mad appointing a woman. A few years later after the Town Clerk's wife died and he had retired he married the young Shire Engineer. The position of Shire engineer at Woodburn disappeared with amalgamation of the shire and rather than accept a position as deputy in the amalgamated shire, Esme found a Shire Engineer position at Rylstone which she held for 18 years. She took a leading part in community affairs and was Chairman of the Rylstone Hospital Board for many years. She was honoured with an AM and nominated a bicentennial woman of the year in 1988. Over the years Esme has continued to study and has earned a degree in economics a diploma in front line management and a university certificate in construction management.

Now retired from engineering, she runs the farm at Running Stream since her partner died in 2006. She was elected to the Mid Western Regional Council based in Mudgee in 2006 and re-elected in 2008.



A short history of fibro-cement in Australia

Ian Arthur

The beginnings

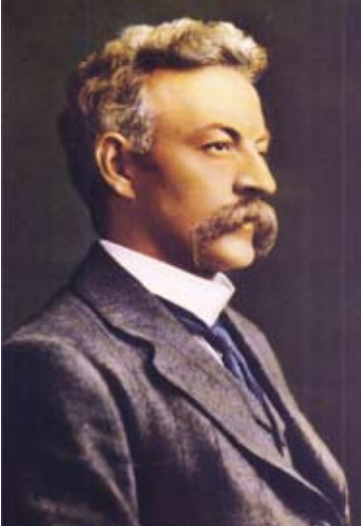
In 1887 James Hardie, aged 36, emigrated from Scotland and immediately commenced business as a merchant in Melbourne. He specialised in importing supplies and equipment for the tanning industry, which he knew from working in his father's tannery in Scotland.

In 1891 to Andrew Reid, a fellow Scot, wrote asking about prospects in Australia. 'I am working up what with care may develop into a very good business', Hardie replied. In November that year, Reid left for Australia and was soon working for Hardie, mainly as a travelling representative. In 1 January 1896 he became a partner in the business established on that day as James Hardie and Co. Members of the Reid family were to hold leading positions in the company until the late 1980s. In 1900 Reid moved to Sydney to open a new office for the company. Almost immediately he recruited two young staff, George Sutton and Stewart d'Arrietta, who would both rise to important positions in the company.

Supplying the leather industry was still the main part of the business at the time Hardie visited his London agent W. A. Sparrow in 1903, but that was soon to change. Hardie was offered some samples of a new product that Sparrow's had received from France and in which they were not much interested. Hardie, apparently



James Hardie



Andrew Reid

to their surprise, ordered around £100 worth for trial in Australia. The product was called fibro-cement. It had been invented three years earlier by Ludwig Hatschek, an Austrian, and was a building board, a few millimetres thick, made from asbestos fibres bound together with cement. It was made on a machine adapted by Hatschek from machines used for making heavy paper or cardboard. A cylindrical sieve rotating in a vat of cement and fibre slurry picked up a thin layer and transferred it to a felt belt where water was removed. The thin layer of partly dried pulp was transferred to a forming roll on which several layers were built up and then removed.

The sheet was then flattened, pressed and cured in the air for several days. The process has changed little since Hatschek's time, except that the air-curing stage has been largely replaced by autoclaving.

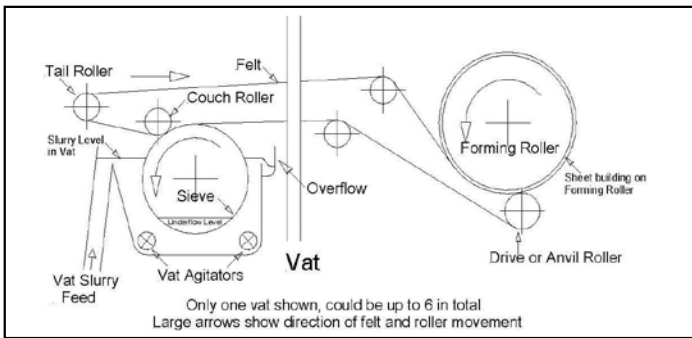


Diagram of Hatschek machine

Hardie's trial shipment was sold to Victorian Railways as cladding for workers' huts. The material was brittle, but water resistant, fire-proof and suited to external use. Another early application, at the time thought to be a very promising one, was in roofing slates. Fibro soon came to be widely used in sheet form for both houses and industrial building walls and roofs. Hardie imported the product from England, where manufacturing had been established. Several other firms started importing from England and the Continent, and marketed it here under various trade names.



1906 house in Sydney with a fibro tile roof, photographed 49 years later

Manufacture in Australia

By the start of the First World War, selling fibro-cement had become an important part of Hardie's business, but the war was interfering with supplies from England. Reid went to Britain to purchase the machinery for manufacture in Australia, and around the same time, Wunderlich, a Sydney building products manufacturer, made a similar decision. Wunderlich started to manufacture fibre-cement in Sydney in 1916, and Hardie in 1917. By that time over £1 million pounds worth of fibro-cement had been imported into Australia. Wunderlich called their product Durabestos and Hardie named theirs Fibrolite.

Through the 1920s, fibro-cement became a popular cladding material for houses, because it was much cheaper than brick or stone and usually cheaper than weatherboard. It also became widely used also in industrial buildings, particularly after Hardie commenced to make corrugated sheets for roofing in 1926. The first major building to be roofed with fibro-cement sheet was the Roxy Theatre at Parramatta. Once talkies appeared, fibro-cement was seen to have the advantage for roofing cinemas of being much quieter in heavy rain than corrugated iron. Fibro quickly became a favoured material for industrial roofing.

Hardie began to manufacture in Perth in 1921, Melbourne in 1927, Brisbane in 1935 and Auckland in 1938. Wunderlich and Hardie jointly built a plant in Adelaide that commenced production in 1941, and named its product Asbestolite. Hardie bought out Wunderlich's interest in the plant in 1960 and the brand name Asbestolite disappeared.

New fibro products

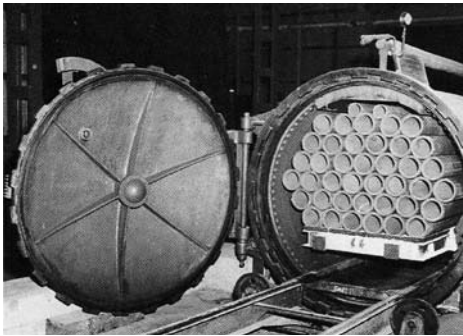
Andrew Reid visited Italy in 1922 and saw asbestos-cement pipes being made. On his return to Australia he started to experiment with their manufacture. George Sutton invented and patented a process and manufacture commenced in 1926. The process consisted of wrapping sheets of 'green' fibre-cement around a collapsible cylindrical mandrel with calico and then with wire rope. After the cement had set, the mandrel, calico and wire rope were removed, and the pipes were cured in water for 14 days and air dried for another 14 days. They became widely used for water supply, and were manufactured in Sydney, Melbourne and Perth. After a few years they were superseded in Sydney, Melbourne and Auckland by much superior products made by Hardie using Italian Mazza and Magnani technology, but Sutton pipes were still being made in Perth and Brisbane until after the Second World War.

After the Second World War, fibro-cement pipes enjoyed a growing market for water supply, sewerage, irrigation and as conduits for electricity and telephone cables. They were 50 per cent cheaper than concrete pipes, though not as strong, and were much lighter. For a wide variety of low-pressure applications they proved very satisfactory. From 1951, the curing and air-drying process began to be replaced by autoclaving with steam under pressure for eight hours. This also enabled part of the cement in the product to be replaced by cheaper silica.

Hardie had no competition in the Australian and New Zealand fibro-cement pipe business until 1961 when Hume's and Wunderlich formed a company to manufacture in Sydney and Melbourne. After three years of losses they closed down and Hardie bought them out. In the 1940s and 1950s CSR manufactured fibro building materials and developed the Wittenoom mine in Western Australia to provide the asbestos.

Growth of fibro as a building product in Australia

Fibro-cement made slow but steady progress in replacing brick and timber as a material for home building. Opening of Hardie's Sydney and Perth plants coincided with a surge in home building that followed the First World War. The attractiveness of fibro was initially based on price, with Hardie claiming in 1925 that an equivalent house could be built in fibro for 27 per cent less than in brick and 15 per cent less than weatherboard. At the time of the 1933 census, 23,000 dwellings were clad in fibro, 2 per cent of the total in Australia. The new suburb of Bankstown in that year had probably the highest proportion of fibro homes, 12.5 per cent of the total of 7,000 new homes in Sydney. By the 1947 census, 40 per cent of Bankstown's homes were fibro, and three years later the proportion was 90 per cent.



Autoclave with fibro-cement pipes

In the housing boom that followed the Second World War, a high proportion of dwellings were built by owner-builders, averaging 35 per cent over the 1950s, and there was a strong emphasis on keeping construction costs low. These trends were very favourable to fibro. A number of prominent architects designed houses that showed off the virtues and possibilities of fibro. Architect Robin Boyd designed a 'House of Tomorrow' featuring fibro for the Melbourne Modern Homes Exhibition in 1949. But fibro featured in few of the houses that architects designed for their clients. Boyd's book *Australia's Home*, which includes a long chapter on building materials, makes not a single mention of fibro. Fibro had a distinctly working-class image.

Hardie introduced new and improved fibro-cement products during the 1950s and 1960s. The first was autoclaved sheets in 1957, using the technology already developed for pipes. Another was New Tilux, a much-improved version of a product first made by Hardie in 1929 that imitated tile for internal use, and came in a range of colours. The most important improvement would turn out to be the introduction in 1964 of Hardiflex, a sheet in which part of the asbestos was replaced by cellulose fibre in the form of wood pulp. It had the advantages of being lighter, more flexible and easier to work than Fibrolite, which it replaced in the marketplace. A further innovation was the production of thicker and stronger compressed sheets that could be used for floors, stair treads and balustrades.

Problems with asbestos

The initial motivation for replacing asbestos by cellulose in sheet products was not to eliminate asbestos on health grounds, but to improve the properties and reduce the cost of the sheet. But as concerns about the health hazards from asbestos exposure increased during the 1960s, Hardie undertook research work in conjunction with CSIRO to further reduce or eliminate entirely the use of asbestos in building products. Early in the 1970s it began a formal project to progressively reduce the asbestos content to zero. This took time. In 1979 the company dropped the word asbestos from the company name. In 1980 the flat sheet product was asbestos free and renamed Hardiflex II. In 1981 Hardie announced that 85 per cent of its building products would be asbestos free by mid 1982. In 1984 with the installation of a new press was in Perth to produce corrugated sheet asbestos was finally eliminated from all Hardie building products.

Eliminating asbestos from pipes proved more difficult. Hardie made asbestos-free non-pressure pipes with similar technology to that use for sheet products, but could not do this successfully for pressure pipes. Instead it produced a fibreglass pipe, using European technology, to replace fibro-cement in pressure pipes and finally eliminated the use of asbestos in pipes in 1987.

There was medical evidence in the early 1900s that working with asbestos could be hazardous to health. The health effects were well documented by the 1920s and accepted as a hazard associated with working in the industry. The first known workers' compensation claim for asbestos related disease was in 1927 in America. In 1933 Metropolitan Life Insurance doctors found that 29 per cent of the asbestos workers in a US Johns-Manville plant had asbestosis. That company, the largest producer of asbestos products in the US, was showing strong awareness that it had a serious occupational health problem by the mid 1950s and dealt with it by introducing dust control measures, settling claims to avoid litigation and avoiding actions such as attaching hazard warnings to products that might attract adverse publicity. In Australia, Hardie tightened its dust control measures during the 1960s, and in 1979

publicly announced that when dust control measures were introduced 1.4 in every 100 of its asbestos workers were diagnosed as having pulmonary asbestosis in varying degrees. New cases were being identified at the rate of 4 per year in a workforce of 4,000. In that year Hardie reached agreements with unions for compensation to asbestosis sufferers. It also removed the word asbestos from company names, although it was still heavily involved in making asbestos products.

Appreciating the seriousness of another asbestos-related disease, the cancer mesothelioma, took much longer, mainly because the time between exposure and the development of symptoms is rarely less than 15 years and can be as long as 40 years. It eventually became clear that mesothelioma posed an even greater health problem than asbestosis.

In June 1982 an American asbestos worker was awarded a record \$5.5 million in damages. Two months later the Manville Corporation, successor to Johns-Manville, filed for bankruptcy. Analysts have estimated that the costs of asbestos litigation in the US will eventually exceed \$200 billion. In Australia, Hardie, a much more diversified organisation than Johns-Manville, survived, but faced a growing liability for compensation payments.

From 1995 Hardie began to move assets from the two subsidiaries that would bear the main brunt of compensation claims, and estimated its total asbestos liabilities at \$186 million, for which it planned to make provision. The figure was disputed and unions and governments became involved in a long and acrimonious series of inquiries, court cases and negotiations over liability and compensation. The figure was indeed found to be grossly inadequate. A voluntary settlement involving Australian governments, Hardie and the unions was finally reached in 2004 to provide funding for claims from asbestos victims. The Commonwealth Crown Prosecutor then dropped criminal charges against Hardie executives on the grounds there was insufficient evidence and in 2010 seven directors were cleared of charges that they had breached the Corporations Act.

Meanwhile fibro-cement products, free of asbestos, maintained a strong position in the market-place. In the mid-1980s Hardie began to export a range of fibro building products the U.S.A. Woodgrain fibro roofing shakes and fibro building panels proved to be very successful in the US market and Hardie quickly established manufacturing there at several locations. By 1997 Hardie's US production was double that in Australia and New Zealand. CSR resumed the manufacture of fibro products in Australia in 1996.

A bright future, but a large cloud

Clearly fibro has overcome a down-market image and problems resulting from its originally being based on one of the most hazardous substances known to mankind. It enjoys a well-established position as a building and industrial material, not only in Australia, but around the world. One serious problem still exists; in most of the developing world fibro-cement products are still being made with asbestos. The Australian experience has shown that this can and should be changed, quickly.

Further reading

Brian Carroll, *'A very good business': one hundred years of James Hardie Industries Limited 1888-1988*, James Hardie Industries, Sydney, 1987.

Charles Pickett, *The fibro frontier: a different history of Australian architecture*, Powerhouse Publishing, Sydney, 1997.

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