ASHET News

Volume 9 number 2
April 2016

Newsletter of the Australian Society for History of Engineering and Technology

ASHET annual general meeting: Tuesday 26 April 2016

ASHET's 2016 annual general meeting will be held at History House, 133 Macquarie Street, Sydney, on **Tuesday 26 April 2016** at 6 p.m. Light refreshments will be served at 5.30 p.m. before the meeting.

The meeting, expected to be brief, will be immediately followed by a joint meeting of ASHET and the Royal Australian Historical Society, with a talk by Bill Phippen. Non-members of ASHET are welcome to attend the annual general meeting, but not to vote, or to address the meeting except with the permission of the chairman.

Each member is entitled to appoint another member as proxy by notice given to ASHET's public officer no later than 24 hours before the time of the meeting. ASHET's Constitution requires that the proxy be in the prescribed form and that no member may hold more than five proxies. A proxy form may be downloaded from the ASHET website at http://ashet.org.au/downloads-3/

The following business will be conducted at the annual general meeting:

Confirm the minutes of the last preceding annual general meeting.

Receive committee report on activities during 2015.

Receive and consider financial statement for the year 2015.

Elect office bearers and ordinary committee members.

In accordance with ASHET's Constitution no other business may be conducted at the annual general meeting.

A copy of the financial statement that will be presented to the meeting is included in this issue of ASHET News.

Election of office bearers and committee members

At the close of the ASHET annual general meeting on Tuesday 26 April 2016, all the present office bearers and committee members retire. Office bearers and committee members for the coming year will be elected at the annual general meeting. Nominations are called for election to the following positions:

President,
Senior vice-president,
Vice president,
Secretary,
Treasurer,
Three ordinary committee members.

Nominations must be in writing, signed by two members of ASHET and accompanied by the written consent of the candidate. They must reach the secretary seven days before the date of the meeting. The secretary's address is:

Andrew Grant, Secretary ASHET
2 Malacoota Road, Northbridge NSW 2063
Email: secretary.ashet@gmail.com

A S H E T

Australian Society for History of Engineering and Technology Incorporated

INCOME EXPENDITURE for YEAR Ended 31 December 2015

INCOME	**2015**	**2014**	
Members Subscriptions (136)	1095	1,540	
Donations (102)		0	81
Income from Meetings & Activities (Nett of Expenses) (103)	1030	2,158	
Unilever Display (57)	2250		
Lightning Ridge Receipts (104)		0 212	
RAHS Heritage Grant (106)		0 1,850	
Bank Interest (108)	356	913	
Newcastle Trip (196)		0 196	
	4,731	**6,754**	
Less: EXPENDITURE			
Bank Fees (1)	34		9
Stationary Tools (2)	147		0
Insurance (6)	561	356	
NSW Fair Trading (12)	53		52
Subscriptions (HC & RAHS) (16)	100	219	
Bank Interest (44)		0	17
Office Expenses	111		0
RAHS Portion of Meeting Income (50%) (60)	807	212	
RAHS Conference (41)		0	0
Lightning Ridge Project (56)		0 3,211	
Website Expenses (50)	180	180	
Unilever Liechhardt Council Project (57)		0 9,064	
Unilever Meat Pie Project (59)	14,559	11,255	
	16,552	**24,576**	
SURPLUS/DEFICIENCY for year			
- Balance brought forward	32,377	50,199	
- Surplus/Excess of expenditure over receipts in 2015	-11,821	-17,822	
Balance carried forward: 20,556 32,377			
Cash in Hand	148	361	
Cash in Bank	533	2,958	
Cash in Bank - on Deposit	19,875	29,058	
Less Subscriptions in advance		0	0
NETT ASSETS	**20,556**	**32,377**	

Next ASHET events

Tuesday 26 April 2016

Talk by Bill Phippen

Early Metal Railway Bridges in NSW

The NSW Railways' intended destinations in the 1850s were the important rural towns of Bathurst and Goulburn. To reach these places the lines would have to cross the Nepean River and then the rugged terrain which separated the Sydney basin from the inland areas. The colonial government specified timber and masonry bridges to contain costs but in a few cases iron bridges had to be used. The two large bridges were at Menangle and Penrith but there were also various metal bridges in each area. The Nepean bridges survive in service and the smaller spans survived until recently. This engineering story will highlight the bitter controversies over corruption at Menangle and incompetence in the design and construction of all the bridges.

Bill Phippen joined the Australian Railway Historical Society in 1981 and spent 40 years as a volunteer in many roles. When the paid position of Manager of the Railway Resource Centre within the Australian Railway Historical Society became vacant in 2010, Bill was offered the position which he accepted.

Note that this talk will immediately follow the ASHET Annual General Meeting 2016.

Venue: History House, 133 Macquarie Street, Sydney
Time: 5.30 for 6 pm
Cost; Includes light refreshments on arrival; RAHS and ASHET members $10, others $12
Bookings: phone RAHS on (02) 9247 8001 or email history@rahs.org.au

Thursday 26 May 2016

Talk by Kerrie Dougherty

Space-Related Research and Innovation in the Australian Defence Scientific Service

In 1949, the Australian Government established the Australian Defence Scientific Service (ADSS), in order to consolidate and expand the nation's defence-related research and development efforts in association with the British weapons research to be carried out at the Woomera Rocket Range. This new agency incorporated the Long Range Weapons Establishment, which managed the Woomera Range, and the Defence Research Laboratories: they were later combined to form the Weapons Research Establishment (WRE). Although 'space activities' were not even considered when the ADSS was formed, over the following three decades it would carry out research and innovation that contributed to Australia's modest space activities between 1957-1979.

This talk will present examples of the research and innovation carried out under the auspices of the ADSS that either contributed to Australia's early space activities, or could have formed the basis of a more extensive national space program had the Australian Government decided to pursue such an undertaking.

Kerrie Dougherty is a freelance curator, writer and educator and a lecturer with the Space Humanities Department of the International Space University, based in Strasbourg France. She is also currently undertaking a PhD full-time. Formerly Curator of Space Technology at the Powerhouse Museum, Kerrie developed the museum's Space exhibitions, creating and curating its space technology collection. She is also the author of Space Australia and a number of original research papers on Australian space history. A Member of the International Academy of Astronautics, Kerrie is actively involved with international committees on space history, space education and space and society studies and has consulted for Australian and international space exhibition projects and education and outreach programs. She was awarded the 2015 Sacknoff Prize for Space History from the Society for the History of Technology.

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Thursday 30 June 2016

Talk by Duncan MacAuslan

Sydney's Horse-drawn Buses

Sydney's horse bus industry has had very little attention from transport historians. Starting in the 1840s and lasting until nearly 1920 horse buses provided public transport in the city's street and suburbs until the electric trams eclipsed them. They were heavily criticised for poor timekeeping, filth and quality and subjected to regulations by the City Council and then the State Government under the Metropolitan Transit Commission. From 1870 things improved with the formation of the Sydney Tramway and Omnibus Company which for a while monopolised the horse bus industry and attempted to develop a horse tram network. The decline began in the 1880s as the steam tram network developed and by 1904 the only horse buses were to be found in the suburbs. The talk will cover politics, people and vehicles.

Duncan has a particular interest in 19th Century Sydney transport and is a regular contributor to transport history journals. He is a board member of the Sydney Bus Museum as well as their archivist. His book on Sydney's horse bus industry will be published later this year.

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A very brief history of packaging
by Ian Arthur

Early times

There are many remains of early packaging from over 10,000 years ago, making use of readily available materials such as reeds, animal skins, fibres woven into bags and later, timber made into boxes. Barrels became common in the Middle Ages. Most of these early packaging methods are still in use today.

The earliest glass containers were made around 1500 BC by coating sand with molten glass. Glass blowing dates from the last century BC. In the following century the Romans were blowing glass into moulds to produce a range of containers used mainly for storing food and beverages. The use of glass for containers spread throughout all the early civilisations increased steadily right up to the mid-twentieth century when glass began to be superseded by plastics, which are now the most used materials for packaging liquids.

The first metal containers were made from copper at least 10,000 years ago in the Middle East. Copper smelting was invented independently in several places. From around 4,000 years BC copper was alloyed, initially with arsenic, and later with tin and zinc, to make bronze, which was harder and stronger than copper.

Production of iron dates from around 2,000 BC. It was more difficult to smelt and work than copper and tin, but gradually superseded bronze for many applications.

However, metals were never widely used for packaging until the introduction in the 17th century AD for cans and boxes of tinplate, the technique of thinly coating iron or steel sheet with a layer of tin, thus protecting it from rust.

Packaging in cans

The process of tin plating iron was developed in Bohemia in 1200 AD. The process was a closely guarded secret, delaying its commercial use elsewhere in Europe. The process was stolen by the Duke of Saxony in the early 1600s, after which it gradually became known in Western Europe. In 1764 London tobacconists were selling snuff in tinplate containers, but tinplate was considered poisonous and unsuitable for packaging food.

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Nicolas Appert's work on the preservation and packaging of foods

Nicolas Appert, born in 1850, was the son of a brewer and innkeeper in the small French provincial town of Châlons-sur-Marne. He was trained and employed as a chef and served in several aristocratic houses before setting up at aged 31 as a confectioner in Paris. He became obsessed with developing processes by which foods could be safely preserved and remain palatable after months of storage.

In 1803 he delivered to the French navy some samples of his soup, boiled beef in gravy and beans and peas preserved in glass jars, all of which he declared would be effective in combating scurvy. After three months storage they were sent to Brest for sea trials. The report sent to the Navy Minister in Paris confirmed Appert's belief in his product and described the peas and beans, with and without meat, as having 'the freshness and flavour of freshly picked vegetables'.

Nicolas Appert

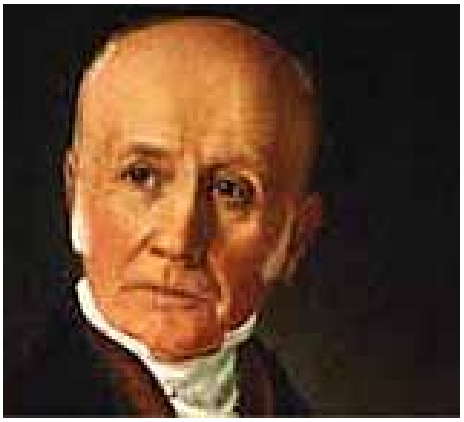
Appert's process consisted of heating the food in a glass container to boiling point and taking care to remove all air from the container before sealing it.

In 1809 he demonstrated his methods to members of a government commission and was offered 'an encouragement' of twelve thousand francs if he published the details of his method. His work was published in 1810 and was soon translated into German and English. At the time Gay-Lussac, a famous French chemist, maintained that oxygen was responsible for putrefaction and that Appert's process locked up the oxygen. Appert later demonstrated, after inactivating yeast by heat, that food contained what he called fermenting agents that were destroyed by heat and that residual air did not matter. This was much later explained by Pasteur in terms of microbiology, and he acknowledged that Appert had actually carried out pasteurisation by his work on preservation of beer, wine and milk.

Louis Pasteur

The development of food canning

Appert's book was published in May 1810 while Britain was still at war with France. In August that year an English merchant Peter Durand was granted a British patent for 'Preserving Animal and Vegetable Food'. He acknowledged that the method was 'communicated to him by a certain foreigner residing abroad'. The name Appert was not mentioned but much of the wording was identical to that used by Appert in his book. Durand's patent specification covered vessels of 'tin and other metals' as well as the glass jars used by Appert in all his work.



Bryan Donkin

Durand's objective was to sell the patent to a British manufacturer who would develop it. It appears that he made contact with a John Gamble who had family connections with France, and who had previously worked with an English engineer Bryan Donkin and a London iron-maker John Hall to develop a paper making machine. The outcome was that Gamble, Donkin and Hall acquired Durand's patent and conducted a series of experiments to help decide how to proceed with its exploitation. According to a history written by Gamble's son Frederick, they decided that because of the porous nature of the corks used by Appert and the fragility of glass containers, it would be preferable to develop the invention using tinned iron cans.

The partners then proceeded to commercialise the development, with great success. Donkin played the leading part in designing the cans and his designs formed the basis of the canning industry for nearly a hundred years until they were superseded by machine made cans that were automatically filled and sealed.

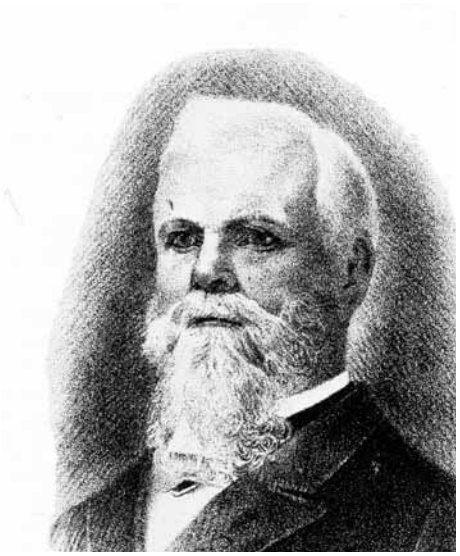
An English immigrant, William Underwood introduced canning to America when he arrived there in 1817.

By 1818 Donkin, Hall and Gamble were supplying the Admiralty with large quantities of canned foods. Captain (later Sir Edward) Parry

took their canned foods on his Arctic voyages in 1829-20, and they were a significant factor in his success.

During the 1830s others began to enter the canning business and by 1852 there were eleven suppliers of canned food to the British Navy. The British Navy was insisting on being supplied with meat in large cans, containing up to 17 lb. Instances of food poisoning were occurring because the centre of the cans reached an insufficient temperature during processing to ensure sterilisation. Stefan Goldner was granted a patent in 1841 for the use of calcium chloride or calcium nitrate brine to raise the processing temperature. This was a major improvement that became universally adopted.

Meat canning in Australia



Sizer Elliott

Sizer Elliott, a migrant from Britain, arrived in Australia in 1835 at the age of twenty one, and settled in Sydney where he opened a grocery business. Australia's pastoral expansion was at its height and money was pouring in from England. By the end of the 1830s the expansion had reached the limits beyond which the quality of the land fell off and the cost of transport was prohibitive. In the financial crisis that followed in 1841 -1844 the money supply dried up and large quantities of meat were being boiled down to extract the tallow. This waste inspired Elliott to try recovering the meat by converting it to canned products for export.

Elliott had no experience of food canning, but he experimented. He found that heating in boiling brine did not produce the temperature he felt was necessary for safe canning, and knowing nothing of the recent developments using calcium chloride brine, he used whale oil and found that it was satisfactory. He developed a method for ensuring that air was fully removed during the canning process and for sealing the cans. He tested the results under conditions that would be experienced in a ship's hold at the equator.

Elliott exhibited a range of products in Sydney and won commendations from two ship's captains and also a first prize in 1848 at the Floral and Horticultural Society's exhibition. But this did not translate into sales. Elliot's only significant sales were to the American whaling fleet. The local market in Australia was glutted with supplies of cheap fresh meat, and by this time he had to compete with two larger scale operators who imported their technology from Britain and who had connections with the British market. Elliott gave up his grocery and canning businesses and by 1851 was looking for gold. In 1852 he moved to Melbourne where he lived for fifty years as a prominent and successful businessman.

One of Elliott's competitors was Moses Joseph, a prosperous Sydney merchant, who opened a large canning business in Sydney in 1847, after visiting Britain to learn the process from one of the patentees. His other competitor was the three Dangar brothers who established a boiling down and meat processing plant in Newcastle which was managed by Charles Gedye, related by marriage to the Dangars. Gedye received training in Britain, probably in Goldner's London factory. Gedye became a partner in the Dangars' company. Most of the product from their Newcastle cannery was exported.

The Australian meat canning industry was thriving in 1870, but over the following years suffered seriously from American competition in the British market. From 1880, Australia's frozen meat export trade grew rapidly and by the end of the century far more frozen meat was being exported from Australia than canned meat.

By the end of the 19th century, mechanisation of canning was well under way. In Australia John Heine, who arrived from Britain in 1882, immediately set about making improvements to food processing. Around 1900 he produced an automatic can forming and soldering machine that he supplied to the Sydney Jam Company. In 1907 he produced a can-making machine that dominated the Australian industry for twenty years.

Further improvements to tinplate and canning technology were made steadily during the twentieth century. They included thinner tinplate, electrolytic tinplate, welding in place of soldering for the side seams and coating of the interior surfaces to eliminate direct contact between metal and the can contents. Tinplate was not manufactured in Australia until 1957

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Canned and bottled fruit and vegetable products

From the 17th century jam and preserve making was a common farmhouse industry in Britain, using glass bottles and sometimes glazed earthenware containers. Appert's work and the development of the tin can paved the way for canning of fruit and vegetables on an industrial scale. The science was not well understood until Pasteur's work on microbiology was published, showing that processing at a temperature that will kill bacteria is the essential element in safe canning and not the exclusion of air, as had been widely thought. The natural acidity of fruit makes it resistant to bacterial infection, so fruit canning is inherently less risky than meat canning.

George Peacock's first jam factory in Hobart,

In 1812 Thomas Kensett established the first hermetically sealed canning factory in New York. He initially used glass jars, but moved to tins because they were more affordable and durable than glass. Canning of fruit, berries and tomatoes was a thriving industry by 1850, particularly in America..

Peacock's,canned jams

In 1861 George Peacock began to can jam in Hobart and by 1863 there were four companies in Hobart making jam for export. Peacock made his own cans from imported tinplate. The Victoria Jam Company was established in Melbourne in 1871. It went bankrupt in 1885 and was taken over by Peacock who already had factories in Melbourne, Sydney and New Zealand. In 1883 the Victoria Jam Company brought George Ward, an American who had experience in several jam factories, to assist the company which was again experiencing financial difficulties. He brought with him American equipment for canning fruit and vegetables and helped to introduce world's best standards of practice to the Australian industry. In 1903 the company became Henry Jones IXL Ltd.

For home preserving, glass jars proved to be very popular following the invention by John Mason in 1858 of a glass jar with a threaded zinc cap, and its improvement the following year with the introduction of a rubber sealing ring. Despite the growing popularity of home bottling, Mason died a pauper in New York at age 70 in 1902.

Joseph Fowler and domestic food bottling in Australia

John Mason with his bottled preserves

Modern Fowler bottling kit

Joseph Fowler was born in England in 1888 and in the early 1900s worked with an uncle in a fruit-preserving business in Kent. He emigrated to Australia in 1913. He set up a small fruit-bottling business in the rear of his house in Camberwell, a suburb of Melbourne. In 1915 he began producing home-bottling kits containing a steriliser, bottles, lids, rings and a thermometer. He initially sold door to door. His kits became increasingly popular with housewives during the Depression, and in 1934 he registered Fowlers Vacola Manufacturing Company as a public company. The demands of World War II encouraged Fowlers Vacola to diversify its products and to supply canned goods to Allied troops in the South Pacific. After World War II it expanded further and supplied canned and bottled food throughout Australia and abroad. Fowlers Vacola is no longer in the business of commercially caning and bottling foods, but still makes and markets home bottling kits.

The Australian food industry in World War II

The need to feed military forces in remote places placed new and pressing demands on the food packaging industries in Australia. The entry of America to the Pacific war added enormously to the challenge. By 1942 there were 100,000 American forces in Australia and New Guinea, and they were accustomed to far greater amounts of vegetables and fruit, particularly fruit juice, in their diets than were Australians. Australian industry had no experience of vegetable canning, which is technically more demanding than fruit canning because vegetables lack the natural acidity of fruit, which assists in eliminating bacterial infection. The seriousness of he situation was highlighted by two incidents of food poisoning in 1942 in which eight American servicemen died in Australia from eating Australian canned beetroot. At this time the Americans readily acceded to requests that they send teams of food technologists and other experts, along with new food processing equipment. The American teams were established under Colonel (later Brigadier-General) H. B. Hester. Food laboratories in Australia became involved, and the overall result was a transformation of the whole Australian canning industry with lasting effect.

Australian food packaging since World War II

Since World War II the industries have benefited from a series of changes, including automation and process control, an increasing emphasis on health and safety, new materials and improvements to existing ones, and a steadily increasing consumer interest in the quality and variety of the products they buy.

One of the results of these changes has been that there has been a huge increase in the range and quantity of products that are transported over large distances, resulting in greater demands being made on packaging.

Other significant changes have been the greatly increased use of plastics, freezing as a means of preservation, and the move of the retail food businesses to customer self-service, which has required that almost every product sold needs to be packaged before it is offered for sale.

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Paper and paper-board packaging

Henri Fourdrinier

Until the early 19th century all paper was made by hand one sheet at a time. There was little commercial use of paper for packaging until the invention of the continuous paper making machine that greatly reduced its cost and convenience of use. In 1799 Louis-Nicolas Robert of Essonnes in France was granted a patent for a continuous paper-making machine, in which the web of pulp was formed on a moving wire mesh belt on which most of the water was removed. Robert sent his brother in law John Gamble, an Englishman living in Paris, to London to arrange for its development in Britain since with the Napoleonic Wars at their height there was little opportunity for this to proceed quickly in France. He was introduced to the Fourdrinier brothers, stationers in London, who agreed to finance the development. Gamble was granted a British patent in 1801. He engaged British engineer Bryan Donkin to develop the invention. Donkin had a machine working in 1809, and by the following year 18 machines had been installed in several mills. In 1812 the company Donkin, Hall and Gamble was formed to manage the businesses of building and operating paper machines and also to continue the development of food canning, in which Donkin was also involved. By 1851 nearly 200 of these large and complex paper making machines were working in various places around the world.

Paper bags were first manufactured commercially in Bristol in 1844, and in 1852 Francis Wolle invented a bag-making machine in America. He and his brother patented it and founded the Union Paper Bag Company. Many variations to the basic paper bag were invented over the following years, including a machine that would make flat-bottomed bags invented by Margaret Knight in 1871, and a machine to make square bottomed bags with pleated sides.

The first commercial paperboard carton (or cardboard box) was produced in England in 1817. In the 1870s Robert Gair introduced mechanically die-cut and creased cartons, made in a single operation, that could be shipped flat and assembled at the time they were filled.

Corrugated paper was patented in 1856, and during the 1870s corrugated board was produced with liners on one or both sides that permitted large and strong paperboard cartons to be produced.

Innovations in paper and paperboard packaging appeared regularly through the first half of the twentieth century and production received a boost when supermarkets and self serve shopping became popular from the 1950s creating a need for packaging a vast range of products.

Plastic bags were introduced in the 1970s, replacing paper bags for many uses.

Packaging in plastic

Cellophane was the first plastic to be widely used in packaging.. It was invented by a Swiss chemist Jacques E. Brandenberger, who set out to

Cellophane pack

develop a table cloth that would repel liquids rather than absorb them. His idea was to coat the fabric with a film of cellulose but he was unable to produce an acceptable product. He abandoned the idea, but realised that the transparent and flexible cellulose film he had produced offered other possibilities, including use for packaging. By 1912 he had produced a machine to manufacture the cellulose film, which he named cellophane, and he patented his invention that year. It was slow to take off but has been in continuous manufacture since the mid-1930s and is still in wide use. In 1933 Richard Drew, an American engineer with 3M, invented Scotch cellulose tape based on cellophane.

The first user of cellophane in Australia was Abel Hoadley, for his Violet Crumble, introduced in 1913. A French company , La Cellophane, invented a metallised cellophane especially for Violet Crumble as an aid to keeping it fresh.

In 1933 Ralph Wiley, a chemist with Dow Chemical, accidentally discovered another plastic film, poly vinylidene chloride, which had the property of clinging to almost anything. Dow marketed it under the name Saran, but today the plastic films that have these properties are generally called cling wrap and they are widely use in commercial and domestic packaging.

Plastic bottles

Polystyrene was discovered in 1839 by Edouard Simon in Berlin. I. G. Farben began to produce it in 1931 hoping that it would replace diecast zinc in a number of applications. General-purpose polystyrene is clear, hard and rather brittle. But it is relatively cheap, and widely used for containers and for other purposes. In 1941 Dow Chemical invented a Styrofoam process. Expanded polystyrene foam has since become widely used in packaging.

In 1946 Earl Silas Tupper developed a range of polyethylene containers that he marketed as Tupperware. There is now on the market a vast range of similar containers with an airtight seal used commercially and domestically, mainly for food.

Blister packing

Plastic bottles were first used commercially in 1947 but remained relatively expensive until the early 1960s when high density polyethylene was introduced. Ongoing improvements in the manufacture of plastic bottles and reductions in their weight, along with their robustness, have resulted in plastic bottles replacing glass for most packaging applications.

Blister packs made entirely from plastics or from combinations of plastics and cardboard or aluminium have proved to be very convenient, and are widely used for packing a wide range of articles and food for retail sale, and also for packaging pharmacy and medical items.

Since the middle of the twentieth century a wide range of plastic materials have been developed and can be produced in the form of films, laminates and mouldings for packaging purposes. They are able to compete in price and suitability with traditional materials including metals, paper and natural fibres in most packaging applications and have opened up many new opportunities for manufacturers and suppliers and also for domestic users.

Beverage canning and bottling

One of the first products to be regularly packaged in bottles was wine. When combined with a high-quality stopper, such as a cork, it facilitated long term ageing. The use of cork stoppers became common from the mid 17th century. 'Château bottling", where wine is bottled at the source, provided assurance that the contents of a purchased bottle were genuine.

Codd bottle

Bottle-making became semi-automated in 1887 when Howard Ashley, of Castleford, Yorkshire, introduced a machine a could make 200 bottles per hour. He formed the Ashley Bottle Co. and between 1886 and 1889 patented his invention in a number of countries, including America. The first fully automated machine making 2,500 bottles per hour was developed in America in 1907 by Michael Owens, and used by his company.

In 1872, British soft drink maker Hiram Codd of London, designed and patented a bottle designed specifically for carbonated drinks. The bottle was designed to enclose a marble and a rubber washer in the neck. The bottles were filled upside down, and gas pressure forced the marble against the sealing washer. The bottle was shaped to allow the marble to be pushed aside and captured to pour out the contents. The Codd bottle quickly become popular with the soft drink and brewing industries in Britain, Europe and Australia.

The crown seal was invented in America by William Painter in 1892 and was an instant success, largely superseding the Codd bottle..

Beer was first marketed in cans in America in 1935. Shortly afterwards, soft drinks, with higher acidity and higher pressure than beer, were also available in cans. The development that made this possible was the use of plastic can lining, to prevent the contents reacting with the metal of the can and spoiling the flavour. With the liner technology not perfected, consumer acceptance was slow. At the beginning of World War II canning had gained only 10 per cent of the beverage container market

Crown seals

The original beverage containers were tin-plated steel. Today, the majority of beverage cans are aluminium.

In 1959 Ermal Fraze invented the ring-pull, that eliminated the need for a

Old style ring-pull beverage can

tool to open the can, and they were quick adopted by the industry. In 1970 Daniel Cudzic invented a tab that did not separate from the can when it was opened, eliminating a litter problem.

Squeezable tubes

John Goffe Rand, a little known American portrait painter living in London, invented the squeezable metal tube in 1841 for storing paints. His tube was made of tin, with a screw cap. At the time, the common means of paint storage by artists was a pig's bladder sealed with string. An artist would prick the bladder with a tack to get at the paint, but there was no way to completely plug the hole afterward. And bladders didn't travel well, frequently bursting open.

Early tin tube for paints

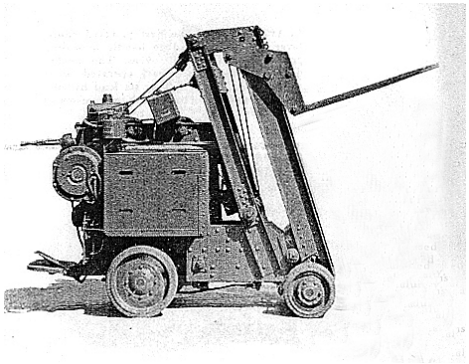
The invention was slow to be accepted; it added considerably to the cost of paint. But the French impressionists who painted out of doors with a wide variety of colours, found that paint tubes were indispensable. Pierre-Auguste Renoir said, "Without colours in tubes, there would be no Cézanne, no Monet, no Pissarro, and no Impressionism."

Eventually tubes became the preferred packaging for many products, including toothpaste and ointments. Modern tubes are made from aluminium and a variety of plastics.

Modern plastic tube

Industrial packaging; pallets and shipping containers

The modern industrial pallet dates from around 1920 when the high lift fork truck was introduced. The Australian standard pallet is 1165x1165 mm and pallets of similar size are used throughout the world. Used with the fork lift, the pallet is a convenient means for packaging a wide range of products for easy loading of trucks and stacking in warehouses. Shrink wrap is now often used to secure and protect the loads on pallets.



Early high lift fork truck, 1927

Pallets and forklifts became widely used during World War II. In 1945 the Australian government formed the Commonwealth Handling Equipment Pool (CHEP) and acquired a large amount of handling equipment and supplies left behind by the US forces. In 1949 it privatised CHEP, which was eventually acquired by Brambles Industries Limited and expanded world-wide. It now has a pool of over 200 million pallets.

In 1955, Malcolm McLean, a trucking entrepreneur from North Carolina, USA, bought a steamship company with the idea of transporting entire loaded truck trailers. He soon realised that there would be advantages in having a container that could be lifted with its contents off a vehicle directly on to a ship, and reloaded on to a truck, a train, or temporary storage at the destination. In 1956 McLean bought a converted World War II tanker and shipped 58 loaded metal containers from Port Newark to Houston. Within days he had orders for shipping goods back to Newark in the containers. Other companies soon followed in offering shipping services using containers. The first ship designed specifically for containers, the *Gateway City* operated by McLean's company Sea-Land, made its maiden voyage in 1957 and started regular services between American ports.

Classic timber pallet

It was soon realised that standardisation of shipping containers would be essential for the international development of a container trade. In 1961 the International Organization for Standardization (ISO) set standard sizes for shipping containers, the most common being the 20 foot and 40 foot lengths. The TEU (twenty foot equivalent) became the standard measure for container cargo volumes and ship capacity.

40 ft shipping conatiner

Container shipping developed at a rapid pace. In 1968 18 container vessels were built, and in 1969, another 25 were built, ten of them with capacity exceeding 1,000 TEU.

The world's container ship fleet now has a capacity of 35 million TEUs. Many of the containers are of special design such as refrigerated, liquid carrying or open topped for carrying machinery, but conform to the standard dimensions. Road vehicles and railway wagons, as well as ships are built specially for carrying containers. Most containers are handled through special purpose port facilities with cranes and storage areas designed specifically for container handling. Many of these facilities are highly automated.

Shipping containers on a train

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Sources and further reading

Kit L Yam (ed), *The Wiley encyclopedia of packaging technology*, John Wiley & Sons, Hoboken, N.J, 2009.
This large volume, 1383 pages, is a comprehensive source of information on packaging of foods and pharmaceutical products. Available in a few libraries.

Thomas Hine, 1947-, The total package : the secret history and hiddenmeanings of boxes, bottles, cans, and other persuasive containers, Boston, [Mass.] ; London : Back Bay Books, 1997.
A readable book about packaging of consumer products, with an emphasis on marketing and labelling.

K.T.H. Farrer, *A settlement amply supplied : food technology in nineteenth century Australia*,: Melbourne University Press, Carlton, Vic.,1980.
K.T.H. Farrer, *To feed a nation : a history of Australian food science and technology*, CSIRO Publishing, Collingwood, Vic., c2005.
These two books between them provide a detailed account of the history of food packaging technology in Australia.

Sue Shephard, *Pickled, potted and canned : the story of food preserving*, Headline, London, 2000.
A very readable history of food preservation and packaging, complementing Farrer's account of developments in Australia.

There are also many short articles on specific aspects of packaging history that are readily accessible on the internet
.

Time for changes to *ASHET News?*

The first issue of ASHET's quarterly newsletter *ASHET News* was in January 2008, and there have been 33 more issues since then. I have been the editor, principal contributor of articles and producer of the newsletter for all of that period and it is now time for changes. This issue will be the last that I edit and produce.

This provides a good opportunity for changes to the content and format. ASHET's committee is giving attention to these things, along with appointing a new editor and making new production arrangements.

Both ASHET members and non-members with an interest in the newsletter are invited to assist the committee with ideas and suggestions, which may be made either formally to the secretary by mail or email, or informally to any of the committee members.

Ian Arthur

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 around 40 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 a regular program of events in Sydney, and looks forward to establishing groups with programs of activities in other centres.

Most ASHET meetings, at which talks are presented, are held in Sydney 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. In 2008, we ran a tour to Broken Hill by rail and coach, in 2011 a tour of northern New South Wales, including Lightning Ridge and in 2014 a weekend tour of Newcastle.

ASHET has completed several special projects, some assisted by government grants. The completed projects include digitising all the issues of two historic Australian engineering journals, in conjunction with Sydney University Library, and conducting oral history interviews with volunteers at the Queanbeyan Printing Museum, in conjunction with Engineers Australia.

Also completed is a project to conduct oral history interviews with two retired Engineers in Chief of the NSW Department of Main Roads who made major contributions to the history and conservation of timber truss bridges.

ASHET tour of Newcastle, November 2014

One of the largest projects completed to date, aided by a Commonwealth grant, was to research and record the history of the development of machinery for the small scale mining of opals at Lightning Ridge, and present the results in a display at the Australian Opal Centre at Lightning Ridge and on the ASHET website. This project was completed in 2013. A version of the display is on the ASHET website.

In 2012 ASHET received a grant from Leichhardt Council to compile a history of the Unilever company at Balmain, based mainly on material held in the archives of the Royal Australian Historical Society. We presented the results in the form of a graphic display of nine stand-alone panels, each approximately 2m high and 1 m wide that rolls up into a package for easy set up and transport. The display, along with an exhibition of items of memorabilia from Unilever's activities over nearly one hundred years at Balmain, was on show at the Leichhardt Library during the month of August 2014. A version of the display is on ASHET's website.

In 2013 ASHET received a Commonwealth grant to assist it in a project to show in a graphic display and on its website the history of the meat pie in Australia. This project is complete and the display in ten panels similar to those for the Unilever project, titled T*he meat pie: Australia's own fast food* was launched in February 2015 at History House by Professor Carol Liston, president of the Royal Australian Historical Society. We made two sets of display panels which are now on a tour of over 30 NSW municipal libraries which each present the display in the library for a month. . There is a version of the display on ASHET's website.

Pies display at Penrith Library, July 2015

ASHET is managed by a committee of five office-bearers and three ordinary committee members. A new committee is elected at the annual general meeting each year.

ASHET publishes a quarterly newsletter *ASHET News* that contains details of upcoming events, news items of interest to ASHET members and at least one feature article in each issue.

For more about ASHET go to the website www.ashet.org.au. It has information on ASHET activities and copies of back issues of ASHET News available for downloading.

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