

Making corrugations: a cultural journey

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Corrugated iron is a building material that has travelled the world, made itself useful, been in-favour and out-of-favour, re-invented itself and made further journeys.

Trade routes from Britain

Within a year of corrugated iron being patented and manufactured in 1829, it appeared in Australia. By the 1850s, thousands of immigrants were arriving for the gold rush complete with a portable corrugated iron dwelling. Corrugated steel is ideally suited to portable buildings. It can be readily bolted and unbolted, and the sheets stacked, moved and re-used.

Corrugated iron was born during the industrial revolution in Britain and travelled to the colonies as Britain expanded its empire. When the British Empire was sending people to the far-flung colonies, corrugated iron was part of that export. It was made from raw materials often produced in the colonies and sold as a finished product to the colonies, making the manufacturers rich.

Britain's nineteenth-century manufacturers of corrugated iron were enterprising men, conscious of the newly emerging world market and quick to adapt their products to that market. They quickly moved from selling corrugated iron sheets to selling whole buildings.

Richard Walker, the first exporter of corrugated iron, who had bought the patent for corrugated iron in 1829, ran a three-page advertisement in the 1832 edition of JC Loudon's *Encyclopaedia of Cottage, Farm and Villa Architecture* describing the many uses of corrugated iron, including portable houses for exportation.¹ Richard Walker and his son John, had a thriving business exporting all types of buildings around the world, including a corrugated lighthouse to the United States in 1851 and a large corrugated iron hotel to South Africa in 1851.

Charles D Young was an Edinburgh ironmonger, who started out making iron fencing, then graduated to 'Iron Structures for Home and Abroad'. His 1856 Catalogue illustrated stores, dwelling houses, markets, arcades, railway stations and roofing etc.

The firm of JH Porter was another father-and-son enterprise which had started out as a galvanising firm. In 1840 the son, John, was sent to Paris to study the galvanising trade, (a year after a Frenchman had patented galvanising) and returned in 1842 bringing additional trained galvanisers with him. In an advertising catalogue published in 1850, John claimed that:

The earliest application of galvanised iron to roofing purposes in this country was made in 1843 by my father who in the following year constructed a building of galvanised corrugated iron to serve as a dwelling and warehouse for a merchant in Hong Kong; and introduced roofing plates of galvanised iron in lieu of shingling for covered timber roofs, in Ceylon and the West Indies.

The catalogue continues:

The most simple, and the cheapest kind of iron building, is that of the semi-circular form. This plate represents a building of this kind, which was manufactured in 1846 for a merchant emigrating to the Cape. The simplicity of this kind of building renders it very suitable for colonial purposes, on account of the facility with which it may be erected, taken apart, or removed.²

Edward T Bellhouse, another manufacturer of portable buildings, exported portable warehouses to San Francisco, houses and shops to California and Victoria, and numerous structures throughout South America. Two of his more notable designs were an iron theatre for George Coppin in Melbourne in 1855, and an iron customs house for Peru in 1853.

Samuel Hemming of Bristol manufactured several iron churches for Melbourne. In the 1850s, he sent a vast number of houses to the gold regions of Victoria, along with groups of shops, hotels, villas. Hemming originally began manufacturing portable buildings because of a desire to provide a house for his son who was emigrating to Australia.

In the 1850s, many of these firms who had pioneered the manufacture of portable buildings, were required by the British Government to provide buildings for the Crimean War, and their previous experience with portable buildings enabled them to meet massive programs for the prefabrication of huts and hospitals. Iron was advocated as an ideal material for military hospitals because it could provide ventilation, the panelling was adjustable, it was easily cleaned, and it could be rapidly constructed and moved from site to site.

In 1916, Peter Norman Nissen, a mining engineer from Canada, was asked by the British Government to design a portable shelter that could be assembled by four men in four hours. The design he came up with, the semi-circular Nissen Hut, has become one of the twentieth century's most ubiquitous portable buildings. There are a First World War version and a Second World War version, modified with dormer windows.

Nissen huts were used as emergency accommodation at Villawood in Sydney for immigrants arriving in Australia at the end of the Second World War. Nissen huts are still being adapted and recycled around the world and within Australia.

In the nineteenth century, corrugated iron was a material of expediency, both for the manufacturer and the user. It could respond to emergency situations – the gold rush or

wartime. The material was viewed in terms of temporary solutions to problems rather than in terms of permanent solutions. It was best kept on the move.

Trade routes within Australia

At the end of the nineteenth century when Britain was exporting 75% of the corrugated iron it produced, Australia was its best customer, taking up to 25%, more than India, South Africa or the Argentine. It suited the Australian context.

The early history of building in Australia revolved around attempts to adapt European style buildings to the new climate and landscape. Lack of knowledge of local building materials and lack of building skills led to an early reliance on corrugated iron, and this material suited the new settlers who wanted to build reasonably economic shelters quickly during pastoral and agricultural development and the mining booms of the nineteenth and early twentieth centuries. These frontier people had little time to build semi-permanent structures and grasped the opportunity to use portable buildings made of lightweight iron. Life was uncertain in the mining towns and on land never before used for agriculture, so there was little incentive for people to put down permanent roots and build substantial and durable dwellings. The temporariness of their lifestyle was reflected in the use of corrugated iron.

Europeans use corrugated iron to enable them to become mobile over the Australian continent in the same way that Aborigines used a portable, light material such as bark to enable them to have territorial mobility. Peter Myers, an Australian architect, sees corrugated iron as being the means for a subtle interchange between European Australians and Aboriginal Australians. In an unpublished paper that Myers gave at a student conference in Brisbane in 1979, he suggested that 'galvanised iron sheets are actually the European Australian's imitation of the Aboriginal's stringybark sheeting'.³

Aboriginal Australians in turn needed corrugated iron to replace the diminishing supplies of their indigenous material. In his book *Leaves of Iron* Philip Drew talks of Aborigines using 'bark in large sheets which were bent or shaped to form shelter...it was therefore natural for aborigines to adopt corrugated iron as an improved type of bark...as a man-made bark'.⁴

During the nineteenth century, Australia was the willing recipient of vast amounts of corrugated iron, either as stacked sheets or ready-made buildings. The only value-adding done in Australia was to curve the iron with curving rollers for use as water tanks or verandahs. The material was valued for its quick response qualities.

The material fulfilled a need in Australia for a lightweight, stackable, transportable, bendable, temporary material. It was useful. But once it began to look like it was settling in to stay, and the rusting showed, it became disparaged, and was banished to the country. In country Australia it continued to fulfil a much-needed role for farm buildings, water tanks, roofs, grain silos, bus shelters. It survived and became an integral part of the Australian psyche.

The nature of corrugated iron, being light, easy to stack and portable, made it an ideal material for export to Australia, and unnecessary for the young colony to manufacture its own corrugated iron.

It was the shock of the First World War, cutting off supplies from mother Britain, that jolted the Australian government into taking steps to establish an Australian steel making business. BHP steel was established in Newcastle in 1915 and Lysaghts Galvanising, a Bristol company, was encouraged to set up business in Australia. They opened a sheet rolling and galvanising works next to BHP in Newcastle in 1921. By the World War Two, Australia was exporting corrugated steel back to Britain.

After the Second World War 'the Big Australian', BHP, saw a potential market beyond Australia and Britain and began exporting steel to South-East Asia. In 1979, BHP took over Lysaghts Pty Ltd, and gradually began to fade out the name Lysaghts, until by 1995, the name ceased to be used. However, since 1999, the name Lysaghts has again begun to appear in BHP marketing literature – the company readily admitting that the Lysaght name still carries marketing value.

BHP also began to fade out the use of galvanised steel products in favour of 'zincalume' products. Galvanising refers to the coating of sheet steel with molten zinc, the process that was patented in 1839. Zincalume was developed by the Bethlehem Steel Company of the United States. It is a hot-dip coating for steel consisting of a mixture of aluminium and zinc, theoretically being able to resist atmospheric corrosion 4 times as effectively as hot-dip zinc coatings. In the early 1990s, BHP took over the world-wide patent for zincalume from Bethlehem Steel, and has been exporting the product world-wide since then.

Trade routes to Asia

Corrugated iron has been used in Asia since the early twentieth century to replace traditional roofing materials such as bamboo and thatch.

Corrugated steel as a lightweight, flexible, curvable material is ideally suited to the easy re-cladding of traditional roofs in Indonesia and Malaysia. Corrugated steel is light enough to be able to be fixed to existing roof framing systems. It can be worked into the existing shapes easily, comes in manageable sizes, is easy to transport to remote sites. It comes pre-finished whereas traditional thatch requires much preparation.

While the use of corrugated steel may be changing the appearance of the structure, it is evident from the vigorous ways in which the material is often used and detailed that it need not detract from the essential character of the building or the integrity of its place in the life of the village. Traditional roofs in Indonesia and Malaysia embody important messages regarding social patterns and village life. Over the centuries, the roof form has adapted to many influences including the religious and technological. Corrugated steel is part of this on-going cycle of adaptation and change.

BHP currently exports flat steel sheet to its operations around the world where the local rolling plants turn the flat sheet into corrugated buildings products for the local market. BHP markets zincalume, preferring not to market galvanised corrugated sheeting, which is considered an inferior product. BHP markets to the top sector of the market, making few concessions for local needs. Traditional roofs in South East Asia, therefore, are not clad with BHP products.

A global company

The invention and manufacture of corrugated iron in the nineteenth century coincided with the growth of the British Empire. Enterprising British manufacturers quickly adapted their existing businesses to produce iron products to suit the needs of the emerging colonial markets. They produced finished products to suit the thrifty settler, the wealthy settler, or government; - all packed and ready for shipment anywhere in the world.

The marketing of corrugated iron by Britain to its colonies fuelled Britain's industries and helped to make it the wealthiest country in the world at the end of the nineteenth century. It also prevented Australia from establishing its own industries until the twentieth century. In the nineteenth century, Australia supplied raw materials to Britain and became the market for the finished products. Throughout the twentieth century, Australia has grappled with its role as a producer of raw materials or of finished products.

In May 2001, BHP shareholders voted in favour of BHP merging with the British steel giant Billiton. BHP has argued that its survival depends on becoming a global company. As BHP Billiton, it will now be the world's largest diversified mining company. But this has meant shedding its Australian steel making business – BHP closed its steel making operations in Newcastle in 1999 – and is concentrating, once again, on production of raw materials. The British partners will retain the manufacturing side, and Australia will supply the raw materials.

Endnotes

¹ Loudon, J.C. *Encyclopaedia of Cottage, Farm and Villa Architecture*, London: Longman 1832.

² Porter, J.H. *Examples of Iron Building and Roofing*, Southwark, c 1850.

³ Myers, Peter. 'Corrugated Galvanised Iron: A component of the National Culture?' Unpublished paper from the Architectural Student Conference, Brisbane August 1979, p.2

⁴ Drew, Philip. *Leaves of Iron*, Sydney: The Law Book Company Ltd 1985, p.64.