



Wonders will never cease – 100 Australian Engineering Achievements

List 1.1 November 2015

1. Water & Waste

WA Goldfields Water Supply: pumped clean water 750 km inland to safeguard and develop mining communities in 1904

Chaffey Irrigation, Mildura and Renmark: beginning of irrigated farming in Australia

Humphrey Pumps, Cobdogla: an ingenious solution to large scale water pumping, now an engineering curiosity of world interest

Melbourne Sewerage: this 1890s scheme was so well designed and constructed that much of it is still in use today

Major Australian Dams: providing water supply, electricity and irrigation

Water on Tap: finding and delivering clean water to our cities is a continuing challenge for engineers

Lock Bar Pipe: before electric welding, this was a leading technology for manufacturing large steel pipes

2. Energy

Snowy Mountains Scheme: providing electricity and irrigation to three states

Tasmanian Hydro-Electric Schemes: world-class engineering delivering renewable energy since 1916

Yallourn Power Station and Mine: John Monash drove the solutions to make electricity with wet brown coal

Lake Margaret Power Scheme: still operating, this scheme replaced costly firewood for steam generation

Early electric street lighting: lighting the city streets ignited the Electric Century

Gasworks: reticulated energy supply was the mark of civilised society

Interconnected Electricity Grid: one of the longest AC transmission systems in the world

Basslink: completed in 2005 across Bass Strait, it was the longest high voltage DC undersea cable in the world

White Cliffs Solar Power: world's first commercial solar power station has demonstrated two different technologies

Duck Reach Power Scheme: first commercial hydro-electric scheme to be built in Australia

3. Connections

Kuranda Railway (North Qld): through steep tropical gorges to link mining towns to the coast – now a premier tourist attraction

Great Zig Zag Railway: in 1869 this reversing railway enabled locomotives to climb the Blue Mountains

Goldfields Railways, Victoria: the only Australian railways of their time built to the high British mainline standards

Australian Railway Workshops: these grand workshops in the age of steam were the Boeing and Airbus factories of their time

Mt Lyell Abt Railway, Tasmania: in 1896 this system enabled copper ore to reach the port of Strahan

Trans-Australian Railway, Perth to Sydney: including the world's longest straight stretch of rail, the line linked WA to the other mainland states in 1917

Early Railways: Australia built railways at a feverish rate from the early 1850s

Great North Road, NSW: completed by convicts in 1836, this 260 km highway demonstrated a will to build

Grafton to Brisbane Railway: first standard gauge rail link between Australian capital cities

Steam Locomotives: some of Australia's most iconic steam locomotives live on beyond the Age of Steam

North-South Railway: completed in 2004, the first transcontinental railway to be built anywhere in the world for over a century

Victoria Pass: first road across the Blue Mountains, completed by convicts in 1832, still carries the Great Western Highway

CityLink Automatic Billing System: the e-TAG system uses dedicated short-range communications on toll roads

Trams in Australia: the value of these efficient urban commuter transport networks is again being recognised

Stuart Highway North: built in great haste during WWII, "The Track" is the lifeline of the Northern Territory

Melbourne Suburban Rail Network: well engineered and now electrified, the rail network has served the city well

Puffing Billy Tourist Railway: one of the world's most popular heritage railways

Advanced Train Management System: Precise knowledge of location and speed will increase reliability and track capacity

4. Structures

Sydney Opera House: clever engineering enabled the architect's vision to be built

Sydney Harbour Bridge: engineers gave Australia an internationally-recognised icon

Cooma Rockbolting: techniques for tunnel roof support developed in 1960 have been adopted world-wide

Hobart's Floating Bridge: a curved floating structure made bridging the Derwent River affordable in 1943

NSW Timber Truss Bridges: many elegant and long-lived bridges were built with high-strength Australian hardwoods

Moveable Span Bridges: bridging inland rivers required a range of novel solutions

Hawkesbury River Railway Bridges: bridging a formidable barrier to a railway between Sydney and Newcastle

Annandale Sewerage Aqueducts: the first large scale reinforced concrete project in Australia demonstrated the value of this new material

Story Bridge, Brisbane: designed and built by master bridge builder J J C Bradfield

Swing Bridges: complex engineering provides an opening of unlimited height

Road Bridges after 1950: catering for road transport has given us some very significant large bridges

Tasmanian Convict Bridges: masonry arch bridges built in 1825, 1836 and 1838 are still in service

Victorian Timber Rail Trestle Bridges: include the highest and longest timber bridges in the southern hemisphere

Sydney Olympics Site: largest land remediation site in the southern hemisphere

5. Sea & Air

Black Box Flight Recorder: adopted world-wide, has saved countless lives

Australia II and the Winged Keel: innovative engineering helped win the America's Cup

High Speed Catamarans: Australian designed and built, these ferries greatly reduced travel times around the globe

Australia Airline Engineering: continuous improvement has achieved world-leading results

Interscan Microwave Aircraft Landing System: invented in Australia, this technology helps land aircraft safely

Paddle Steamers of the Murray/Darling: these iconic boats opened up the inland before roads and railways

Refrigerated Shipping: equipping ships with refrigeration plants to export frozen meat from Australia and New Zealand

Great Harbours: shipping depend on iconic man-made harbours such as Fremantle, Newcastle and Melbourne

Hargrave's Box Kite: this invention laid the foundation of European aircraft design

Lighthouses in Australia: formed the "highway of lights" when Australia relied on maritime transport

Maritime Trade Facilities: post WWII the container ports of Melbourne and Sydney have led the way for general cargo

6. Communications

CSIRO Wi Fi: this ubiquitous technology is an Australian invention

Alf Traeger's Pedal Radio: put the Outback in touch with the Flying Doctor

Overland Telegraph, Darwin to Adelaide: cut communication time between Australia to England from months to minutes

Perth-Sydney Wireless Stations: in 1912, wireless messages were sent directly across the continent for the first time

East West Telegraph, Perth to Adelaide: a direct link between one-third of the continent and the rest of Australia

Radio Australia Transmitting Stations: powerful short wave transmitters have helped develop democracy in Asia

Bass Strait Telegraph Cable: first and longest undersea cable in Australia

7. Manufacturing

Grain Harvesters: locally-developed machines have underpinned our wheat export industry

1948 Holden Car: designed for local conditions, the 48-215 was Australia's first mass-produced motor car

Smith's Stump-Jump Plough: opened up the mallee lands to wheat farming and still a feature of agricultural equipment

Southern Cross and Comet Windmills: their distinctive silhouettes are icons of Australian farming

World War II Industrialisation: Australia geared up to supply the Allied War Effort and these industries drove our economy until the 1970s

Bishop's Variable Ratio Power Steering: originally for aircraft, this invention is now used in motor vehicles world-wide

Lithgow Blast Furnace: foundation of the Australian iron and steel industry, established in 1886

BHP at Whyalla: iron ore was transformed into ships in this fully integrated steelworks

8. Resources

Broken Hill Mining: developing one of the world's largest silver-lead-zinc deposits created Australia's biggest company

Kalgoorlie-Boulder Mining: from alluvial gold to the Superpit, Kalgoorlie-Boulder mining has prospered longer than most

Pilbara Mining: the iron ore of this parched and desolate coast has made Australia rich

Cornish Mining Sites: Cornish miners brought the best technology and mine management to SA copper mines

Hay Point Coal Loader: deep water oil platform techniques and off-site fabrication created the world's largest coal export terminal

Gold Mining, Ballarat: winning fabulous amounts of gold created a leading centre for engineering manufacture

Mount Morgan Mine (Qld): after, 108 years, the oldest continuously-operated metalliferous mine in Australia

Mt Isa Mines: one of the world's largest underground mines pioneered mining and processing innovations

Mount Lyell Copper Mine: operating for over 100 years, Mt Lyell pioneered blast furnace smelting of pyritic ores

Offshore Oil and Gas: Australia will soon become the world's largest exporter of LNG, much of it from offshore fields

Export Coal Industries: abundant and easy-to-mine coal resources have built a huge export industry

9. Defence

Jindalee Over-the-Horizon Radar: Seeing beyond the horizon was done first by Australian engineers and scientists

The Owen Gun: Simple, reliable and light, the Owen gun was a favourite weapon with Diggers during WWII

Collins Class Submarines: the world's most capable non-nuclear submarines

Active Phased Array Radar: Australia is a leader in this technology which makes for more capable warships

Air Defence of Darwin: the arrival of RAAF Spitfires over Darwin ended Japanese aggression against the city

10. Technology

Cochlear Hearing Implant: enabling the profoundly deaf to hear

Michell Thrust Bearing: this Australian invention is a vital component in every propeller-driven ship

CSIRAC Computer: this large valve-type computer had a long working life in Australia

HIFAR Reactor, Lucas Heights: Australia's first nuclear reactor operated safely and reliably for nearly 50 years

Radio Telescope, Parkes: one of the first large movable dish telescopes continues to collect data from the stars

Australian Space Tracking Stations: brought to Earth the first images of man walking on the Moon

Mt Stromlo Observatory: the oldest active observatory in Australia once housed the largest optical telescope in the Southern Hemisphere

Woomera Rocket Range: the largest land-based rocket and weapons test facility in the western world launched the first Australian-made satellite

Julius Automatic Totalisator: an ingenious mechanical device, capable of real-time calculations, adopted throughout the world

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