

RECOGNISING ENGINEERING EXCELLENCE.

Institution of
**MECHANICAL
ENGINEERS**

Engineering Heritage Awards
Fifth Edition



Improving the world through engineering

FOREWORD

The Institution of Mechanical Engineers is one of the world's fastest growing engineering institutions, with over 110,000 members based around the world. Its role is to develop engineers to the highest calibre, and facilitate the exchange of knowledge. Indeed, this principle was enshrined by our founding president, George Stephenson, back in 1847. For an Institution with a long and distinguished history, it is important that we acknowledge the past engineering achievements of our members. Many will be recognisable to readers of this book, such as the Stephenson's, Charles Parsons, Sir Frank Whittle, Sir Nigel Gresley to name but a few. However, for every famous engineer, there are many more who have made huge contributions to our industrial evolution with little recognition at all. It is the cumulative talents of these engineers throughout the decades that have helped advance and improve the things we all take for granted such as cars, trains, aeroplanes, engines, pumps and mass-manufacturing.

In 2009, the founding chairman of the Institution's Engineering Heritage Committee, Past President Professor Isobel Pollock, set a target to reach at least 100 Engineering Heritage Awards by 2014, the 30th anniversary of the scheme. This was an ambitious target for the newly formed Committee however, one which they embraced and actually achieved some 12 months ahead of schedule.

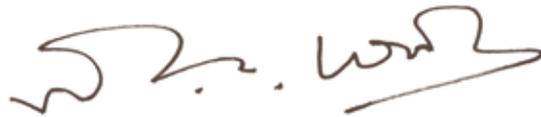
A key factor to this success has been the growing enthusiasm of sites and societies to apply to our award scheme, as well as the rising public interest in industrial heritage. This is hugely encouraging as these sites are vital to our understanding of how we have developed as a society over the last 250 years.

Over the past five years, we have seen applications for the awards grow from only one or two a year to over 20. Each application is assessed on its importance, as part of the engineering story, and on its uniqueness. Increasingly, however, we are also keen to recognise the hard work and commitment of volunteers who dedicate much of their free time to restore and maintain these sites and artefacts across the UK. Indeed, the vast majority of sites receive little to no funding from government, and rely on public donations, entry fees and the free time of volunteers to preserve and maintain them.

Looking forward, the Committee already have a number of interesting applications to consider which will keep them busy well into 2015 and beyond. In addition to the continuing growth of the Engineering Heritage Awards, the Committee will also be undertaking more work with other bodies associated with the preservation of the UK's heritage. The 2015 ICON Awards promoted by the Institute of Conservation will, for the first time, have two awards specifically aimed at organisations and groups conserving and preserving industrial heritage. Both awards are sponsored by the Institution and will be assessed by members of the Committee. Furthermore, we will continue to engage with organisations such as English Heritage to find areas where we can help each other.

It is my hope that you enjoy reading about the first 100 recipients of Engineering Heritage Awards and, where possible, that you visit and experience some of these sites or artefacts for yourself. Furthermore, we hope you will help us spread the word about these awards and encourage groups and individuals to apply.

I would like to thank all the members who have committed their time to the Engineering Heritage Committee over the years. In addition, I would like to thank members who have taken the time to apply for awards, worked within our regions to promote sites, or who have attended our award presentations. It is this collective appreciation of our industrial heritage which will ensure sites and artefacts are saved and preserved for our nation and for future generations.



John R Wood FIMechE
Past President
Chairman, Engineering Heritage Committee
Institution of Mechanical Engineers



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SCOTLAND & NORTHERN IRELAND



CRUACHAN POWER STATION



Category Sites & Societies
Awarded 30 November 2012

Background

Cruachan, one of four pumped storage facilities in the UK, was built during the 1960s and opened by Her Majesty Queen Elizabeth II on 15 October 1965. The station is built deep in the heart of Ben Cruachan, with the only visible evidence of the power station being the high storage dam on the slopes of the mountain.

Cruachan can generate up to 440MW of electricity during peak demand, using water from the reservoir to drive the turbines. During times of low demand, the turbines are reversed to act as pumps to lift water back to the storage dam.

The main engine hall in the mountain is 36m high by 90m long and is large enough to contain a seven-storey building on a full-size football pitch. Today, Cruachan is one of the main tourist attractions in the local area.

Citation

Balancing supply with fluctuating demand.

Transforming electrical energy to potential energy and back again, Cruachan is the world's first high-head reversible pumped-storage power station. Opened by Her Majesty Queen Elizabeth II in 1965, Cruachan can generate over 440MW of electricity during peak demand or use surplus electricity to pump water to the reservoir 300 metres above.

Location

Cruachan Power Station
Lochawe
Dalmally
Argyll PA33 1AN
T 01866 822 618

www.visitcruachan.co.uk

FALKIRK WHEEL

Background

The Falkirk Wheel is the only fully rotating boatlift in the world. Opened in 2002, it connects the Forth & Clyde Canal with the Union Canal and replaces a series of 11 locks, which fell out of use in the 1930s. The difference in height between the two canals at the wheel is 24m.

Planners decided early on to create a dramatic 21st century landmark structure to reconnect the canals, instead of simply recreating the historic lock flight. The wheel is a fusion between ancient mechanical principles and modern design and technology.

On 24 May 2002, Her Majesty Queen Elizabeth II opened the Falkirk Wheel as part of her Golden Jubilee celebrations. The opening was delayed a month due to flooding caused by vandals who forced open the wheel's gates.

Citation

Opened by Her Majesty Queen Elizabeth II in 2002, this is the world's only fully rotating boatlift.

A sublime fusion of ancient mechanical principles with cutting-edge design and technology, the Falkirk Wheel serves the local community and adorns the landscape.



Category Structures
Awarded 6 July 2012

Location

Falkirk Wheel
Lime Road
Tamfourhill
Falkirk FK1 4RS
T 08700 500 208

www.thefalkirkwheel.co.uk

PS WAVERLEY



Category Maritime
Awarded 13 August 2011

Background

The PS Waverley was built in Glasgow in 1946 and is named after Sir Walter Scott's first novel. She was a replacement for an earlier PS Waverley which was sunk at Dunkirk in 1940.

The paddle steamer was originally built for the London & North Eastern Railway to sail on its Firth of Clyde steamer route from Craigendoran Pier, near Helensburgh, up Loch Long to Arrochar.

The paddle steamer was withdrawn from service in 1973. Between 2000 and 2003 the ship underwent a substantial rebuild and had new boilers installed. Currently PS Waverley operates passenger excursions from various British ports, such as Glasgow, Southampton, Bournemouth and London.

PS Waverley is the last seagoing passenger-carrying paddle steamer in the world. She is powered by a 2,100hp triple-expansion diagonal steam engine and can carry up to 800 passengers.



PS WAVERLEY IS THE LAST SEAGOING PASSENGER-CARRYING PADDLE STEAMER IN THE WORLD.

Citation

PS Waverley
A&J Inglis Ltd – Glasgow

Built in 1946 for the London & North Eastern Railway, Waverley is the last seagoing paddle steamer in the world. She has a displacement of 693 tons and a Rankin & Blackmore triple-expansion steam engine producing 2,100hp at 58rpm. In acceptance trials she has achieved a speed of 18 knots.

Location

Check website for current location
T 0845 130 4647

www.waverleyexcursions.co.uk

SHORT SC1 VTOL AIRCRAFT

Background

The Short SC1 was the first British fixed-wing VTOL aircraft. SC1 is a single-seat, low-wing, tailless delta wing aircraft of approximately 8,000lb all-up weight. It is powered by four vertically-mounted, lightweight Rolls-Royce RB108 lift engines providing a total vertical thrust of 8,600lb, and one RB108 cruise engine in the rear to provide thrust for forward flight.

Constructed at Short's Belfast, the SC1 first undertook initial engine runs at this facility. After moving to England, the first conventional take-off and landing flight was made on 2 April 1957, the first tethered vertical flight on 26 May 1958 and the first free vertical flight on 25 October 1958. The first in-flight transition was made on 6 April 1960.

The SC1 flew for over ten years, providing data that influenced later designs of aeroplanes, such as the Hawker Siddeley Harrier.

Citation

Short SC1 Research Aircraft
Designer: David Keith-Lucas FIMechE

In 1960 the SC1 became the first British fixed-wing aircraft to switch from vertical to horizontal flight and back again.

Using four Rolls-Royce RB108 engines for lift and one for forward propulsion, the SC1 advanced knowledge in control systems and the safe operation of VTOL aircraft.



Category Aerospace
Awarded 4 October 2012

Location

Ulster Folk & Transport Museum
Cultra
153 Bangor Road
Holywood
Co Down BT18 0EU
T 028 9042 8428

www.nmni.com

THEO WILLIAMSON'S HOUSE



Category Sites & Societies
Awarded 14 February 1995

Background

This house was occupied for 30 years by David Theodore Williamson, a renowned mechanical engineer. He was the inventor of the first amplifier with no valves, and the lightweight 'pick-up' for record players.

In an industrial engineering capacity, Williamson worked for many years for Ferranti, gaining prominence through his development of the computerised lathe. In later years he achieved recognition for his development of computerised manufacturing techniques.

Incidentally, his father was responsible for making this house one of the first in Edinburgh to have electricity.

Citation

In this house lived David Theodore Nelson Williamson 1920–1992. Mechanical and Electrical Engineer. Originator of high-quality sound reproduction through his amplifier. World pioneer in the application of Numerical Control to Machine Tools which led to Computer-Aided Manufacture.

Location

The house is now a
4-Star Bed and Breakfast
65 Gilmore Place
Edinburgh EH3 9NU
T 0131 229 1985

www.edinburghbedandbreakfast.com





TITAN CRANE

Category Structures
Awarded 5 July 2012

Background

Built in 1907 by Sir William Arrol & Company, the Titan Crane is the oldest crane of its type in existence. Titan was initially fitted with two 'hoists': the main one able to lift up to 150 tons and a 30-ton 'auxiliary' hoist. This lifting capacity was increased to 200 tons in 1938 to assist with the war effort.

Despite the Titan Crane being a major target during the Second World War, the crane and shipyard survived the devastating Clydebank blitz in March 1941.

In 2004 Clydebank *re-built* took ownership of about 10 acres of the former John Brown's site, including the Titan Crane. Following consultation with the community, the decision was taken for the crane to undergo a £3.75 million restoration and open as a heritage attraction.

The Crane is Category A heritage listed, the highest listing in Scotland, putting it on a par with both Edinburgh and Stirling Castles.

Citation

Clydebank Titan Crane, Sir William Arrol & Co

Built in 1907 for John Brown's shipyard, the Titan Crane is the oldest of its type in the world.

With a lifting capacity of 200 tons, Titan was instrumental in the prosperity of the shipyard and Clydebank's rich shipbuilding heritage.

This giant cantilever crane dominates the local landscape, inspiring all who visit it.



**THE CRANE IS CATEGORY A
HERITAGE LISTED, THE HIGHEST
LISTING IN SCOTLAND.**

Location

The Titan Crane
1 Aurora Avenue
Queens Quays
Clydebank G81 1BF
T 0141 952 3771

www.titanclydebank.com

WALES



BEYER PEACOCK GARRATT K1 LOCOMOTIVE

Background

K1 is an 0-4-0+0-4-0 articulated Garratt, one of a pair built in 1909 by Beyer, Peacock for the North-East Dundas Tramway in Tasmania. In 1947, K1 was repatriated by the builders and is the first example of a locomotive imported for preservation.

As Beyer, Peacock's business was coming to a close in 1965, it contacted the Ffestiniog Railway, which purchased the K1 in 1966. After being on display at Harbour Station for several years, K1 was then loaned to the National Railway Museum at York in 1976, where it was cosmetically restored in a distinctive 'photographic grey' livery.

When the Ffestiniog Railway's plans for rebuilding the Welsh Highland Railway (WHR) took shape, it was recognised that this would offer a line where K1 could be of real use. In April 1995 K1 was released from the National Railway Museum to be restored for use on the WHR.

Citation

Built in 1909 to HW Garratt's patent, the first of over 1,000 Garratt-type articulated locomotives exported from Manchester to all corners of the world. They gave reliable service in some of the most remote places on Earth.



Category Railway
Awarded 5 October 2008

Location

Ffestiniog Railway
Harbour Station
Porthmadog
Gwynedd LL49 9NF
T 01766 516 000

www.festrail.co.uk

FFESTINIOG RAILWAY



Category Railway
Awarded 9 April 1985

Background

The Ffestiniog Railway is the oldest independent railway company in the world, founded by an Act of Parliament in 1832. The railway was built as a gravity and horse-drawn line to transport slate from the quarries in the mountains around Blaenau Ffestiniog.

The railway was extremely successful and introduced many innovative engineering solutions to cope with the rapid increase in output from the quarries and in the number of passengers it carried. Engineers from around the world came to study the Ffestiniog Railway, which therefore influenced the design and construction of railways in many countries.

However, with the decline of the slate industry, the railway finally closed in 1946. Luckily, pioneering railway enthusiasts were determined that the railway should survive and it was re-opened in 1954.

Over the last 60 years, the Ffestiniog Railway has become a leader in railway preservation and is now one of Wales' top tourist attractions.

Citation

In 1863 the company pioneered the use of narrow-gauge steam locomotive haulage. The Fairlie patent design of articulated bogie locomotive and Britain's first bogie coaches were successfully introduced in the 1870s. These innovations led to worldwide exports for British technology.

Location

Ffestiniog Railway
Harbour Station
Porthmadog
Gwynedd LL49 9NF
T 01766 516 000

www.festrail.co.uk

THE POCKET POWER STATION



Category Engines & Pumps
Awarded 21 June 2010

Background

The Pocket Power Station was the idea of SWEB Chairman AN (Bill) Irens, who realised that the creation of small, remote-controlled generators could help offset peak demand.

The engine chosen was the Bristol Siddeley Proteus. The engine develops a 4,250 shaft horsepower which, when coupled to a 1,000-rpm 11kV alternator, produces 3MW output.

The first station was installed at Princetown, Dartmoor in 1959. The plant was operated over the telephone system by datofonic control. Princetown is considered to be the world's first unmanned power station.

A further four sets were commissioned: Lynton in 1960, Porlock in 1963, Roseland in 1964 and Mevagissey in 1965.

The set on display at the Internal Fire Museum of Power consists of parts from the first two stations to be commissioned. The engine is considered to be the only operational set on public display in the world.

Citation

Powered by the Bristol Siddeley Proteus engine and conceived by AN Irens, this 3MW unit was commissioned in 1959. It pioneered the concept of unmanned power stations and the use of lightweight gas turbines for power generation.

This is the only operational set on public display in the world.

Location

Internal Fire Museum of Power
Castell Pridd
Tanygroes
Ceredigion SA43 2JS
T 01239 811 212

www.internalfire.com

TALYLLYN RAILWAY

Background

The Talyllyn Railway is a narrow-gauge preserved railway running 7.25 miles from Tywyn to Nant Gwernol near the village of Abergynolwyn. The line was opened in 1866 to carry slate from the quarries at Bryn Eglwys to Tywyn, and was the first narrow-gauge railway in Britain authorised by Act of Parliament to carry passengers using steam haulage.

In 1951 it became the first railway in the world to be preserved as a heritage railway by volunteers who undertook to make the line into a local tourist attraction. In 1976, an extension was opened along the former mineral line from Abergynolwyn to the new station at Nant Gwernol.

The Talyllyn is considered to be one of the influences for the Thomas the Tank Engine books by the Rev Wilbert Awdry, who joined the railway as a guard in 1952.

Citation

Opened in 1866, the Talyllyn Railway is the oldest continuously operated narrow-gauge railway in Britain. In 1951 it became the world's first volunteer-operated preserved railway.

At 7.25 miles long and with a gauge of 2ft 3 inch, the Talyllyn Railway is an important part of Welsh industrial heritage.



Category Railway
Awarded 30 October 2011

Location

The Talyllyn Railway
Wharf Station
Tywyn
Gwynedd LL36 9EY
T 01654 710 472

www.talyllyn.co.uk

TREVITHICK'S PENYDARREN LOCOMOTIVE



Category Railway
Awarded 7 February 1996

Background

In 1804 the Penydarren Locomotive, with its single horizontal cylinder, 8ft flywheel and long piston-rod, became the first steam engine to run successfully on rails.

Trevithick's locomotive employed the very important principle of turning the exhaust steam up the chimney, so producing a draught which drew the hot gases from the fire more powerfully through the boiler.

Trevithick's Penydarren Locomotive made only three journeys. Each time the seven-ton steam engine broke the cast-iron rails. Samuel Homfray, owner of the Penydarren Ironworks, came to the conclusion that Trevithick's invention was unlikely to reduce his transport costs and so decided to abandon the project.

Today, the replica locomotive is exhibited at the National Waterfront Museum.



**THE PENYDARREN
LOCOMOTIVE BECAME THE
FIRST STEAM ENGINE TO RUN
SUCCESSFULLY ON RAILS.**

Citation

Richard Trevithick's Penydarren Locomotive was constructed in 1804 and was operated by the Merthyr Tramroad. This is a replica of that machine which drew widespread recognition of the potential for rail traction of Trevithick's high-pressure steam engine.

Location

National Waterfront Museum
Oystermouth Road
Maritime Quarter
Swansea SA1 3RD
T 029 2057 3600

www.museumwales.ac.uk

SOUTH WEST ENGLAND



BOULTON & WATT ENGINE

Background

Crofton Pumping Station was built in 1807 to provide water to the summit of the Kennet & Avon Canal. Situated six miles from Marlborough, this Grade I listed building houses two Cornish beam engines.

The first engine installed was a 36 inch-bore Boulton & Watt, which had a wooden beam and began working in 1809. In 1812, a 42 inch-bore Boulton & Watt engine was installed. This engine is the oldest working beam engine in the world still in its original engine house and capable of doing the job for which it was installed. In 1846, the 36 inch-bore Boulton & Watt was replaced by a Sims Combined Cylinders Engine, constructed by Harvey of Hayle.

When the pumping station is in steam, it actually carries out the job for which it was built, with the current electrically powered pumps switched off.

Citation

The world's oldest steam engine still able to perform its original function. Presented to mark the year of the 250th anniversary of the birth of James Watt (Engineer) 1736–1819.



Category Engines & Pumps
Awarded 19 October 1986

Location

Crofton Pumping Station
Crofton
Marlborough
Wiltshire SN8 3DW
T 01672 870 300

www.croftonbeamengines.org

South West England

CLAVERTON PUMP



Category Engines & Pumps
Awarded 28 October 1984

Background

Claverton Pumping Station was built by John Rennie and worked continuously from 1813 to 1952. The station's purpose was to pump water from the River Avon to the Kennet & Avon Canal.

Water is diverted from the river at Warleigh weir, about 180m upstream. The water flows down the leat to the pumping station where it powers a 7m waterwheel.

At full power, the wheel uses two tons of water per second, and rotates five times a minute. Although some changes were made during the early years of operation, much of the original pumping machinery can still be seen today.

After the pumping station was closed in 1952, the site lay derelict until a group of volunteers from the Kennet & Avon Canal Trust restored the waterwheel, beam engines and pumps to full working order. The Claverton Pump was re-opened in 1978. Claverton has been designated a Grade II listed building.

Citation

Designed by John Rennie (1761–1821). Built 1810–1813. Restored by Kennet and Avon Canal Trust 1969–1976.

Location

Claverton Pumping Station
Ferry Lane
Claverton
Bath BA2 7BH
T 01225 483 001

www.claverton.org

G-LYNX HELICOPTER

Background

The Lynx is a British multi-purpose military helicopter designed and built by Westland (now AgustaWestland). It went into operational usage in 1977 and was later adopted by the armed forces of over a dozen nations.

In 1985 Westland decided to break the world speed record for a helicopter, which was at that time held by the Soviet Union. G-LYNX, Westland's demonstrator helicopter, underwent a substantial upgrade, being fitted with advanced composite rotor blades from the British Experimental Rotor Programme. In addition, G-LYNX was fitted with powerful, modified 1,200shp Rolls-Royce Gem 60 engines along with an uprated WG-30 transmission.

On 11 August 1986, G-LYNX set a new world speed record for a helicopter of 249.09mph at 500ft over the Somerset Levels. Chief Test Pilot John Trevor Egginton was at the controls alongside Flight Test Engineer Derek Clews.

Citation

Westland Lynx
Record-Breaking Helicopter

G-LYNX, a modified Westland Lynx helicopter powered by 1,200shp Rolls-Royce Gem 60 engines driving composite rotor blades and a titanium semi-rigid main rotor head. It broke the Helicopter World Speed Record on 11 August 1986 when it reached 249.09mph over the Somerset Levels.



Category Aerospace
Awarded 25 September 2014

Location

The Helicopter Museum
Locking Moor Road
Weston-super-Mare
Somerset BS24 8PP
T 01934 635 227

www.helicoptermuseum.co.uk

KING EDWARD MINE



Category Sites & Societies
Awarded 17 May 2013

Background

The King Edward Mine operated as a commercial mine in the 1890s albeit with limited success. In 1904, the mine was acquired by the Camborne School of Mines, and completely re-equipped with modern mining machinery.

The mine regularly produced tin until 1921, when the adjacent Grenville Mine stopped working. As the two mines were interconnected, the consequent flooding of Grenville Mine also flooded the King Edward workings.

Although much of the underground operations ceased, the surface area was retained and used to teach mining, ore dressing and surveying until 1974, when most of the functions were moved to the main school in Camborne.

In 1987 a volunteer group was formed to conserve the site as an educational resource for the future, and to operate it in a manner that benefits the local community. Using rescued machinery, the mill has been restored to working condition much as it would have been in the early years of the 20th century.

Citation

Training Generations of Mining Engineers.

Opened by the Camborne School of Mines in 1904 this, the oldest complete Cornish tin mill, marked a major change in tin concentration processes and technology.

Restored to working condition, the mill continues to demonstrate to visitors how mined ore is treated to produce finished tin concentrate.

Location

King Edward Mine Museum
Troon, Camborne
Cornwall TR14 9DP
T 01209 614 681

www.kingedwardmine.co.uk

KINGSWEAR CASTLE PADDLE STEAMER



Category Maritime
Awarded 20 May 2014

Background

Kingswear Castle was built by Philip & Son of Dartmouth in 1924 for the Great Western Railway service on the River Dart. She was one of three ships built for the River Dart in the 1920s, the other two being the Compton Castle and Totnes Castle. Her engines date from 1904 and were removed from her predecessor of the same name.

After many successful years of operation, and a spell being loaned to the US Navy during WWII, Kingswear Castle was finally withdrawn from service in 1965 and became the first purchase of the Paddle Steamer Preservation Society two years later. After various difficulties and 15 years of restoration work, she was eventually brought back into service in 1985 and based at Chatham Historic Dockyards in Kent.

In December 2012, the decision was taken to return Kingswear Castle to the River Dart under charter to the Dartmouth Steam Railway and Riverboat Company. After an absence of over 45 years, the Kingswear Castle once again offers passenger cruises around Dartmouth Harbour and up the River Dart to Totnes.



BRITAIN'S LAST OPERATIONAL COAL-FIRED PADDLE STEAMER.

Citation

Paddle Steamer Kingswear Castle.
Britain's Last Operational Coal-Fired
Paddle Steamer.

Built in 1924 by Philip & Son of Dartmouth, Kingswear Castle is powered by a Cox & Co compound diagonal steam engine.

The engine, built in Falmouth in 1904, is from an earlier vessel of the same name and drives a pair of paddle wheels, ten feet in diameter, propelling Kingswear Castle at eight knots.

Location

South Embankment
Dartmouth
Devon TQ6 9BH
T 01803 555 872

www.dartmouthrailriver.co.uk

LYNTON & LYNMOUTH CLIFF RAILWAY



Category Railway
Awarded 18 September 2014

Background

On 7 April 1890, the water-powered Lynton & Lynmouth Cliff Railway, designed by George Marks, opened to the public after three years of construction. It has been in continuous use ever since its opening, and is the UK's oldest water-powered total-loss funicular railway.

The railway comprises two cars, each capable of transporting 40 passengers. The cars are joined by a continuous cable running around a 5ft 6 inch pulley at each end of the incline. Water feeds through 5 inch pipes from the West Lyn River into tanks under the floor of the upper car. Each car has a 700-gallon tank mounted between the wheels. Water is discharged from the lower car, until the heavier top car begins to descend, with the speed controlled by a brakeman travelling on each car.

Citation

The Lynton & Lynmouth Cliff Railway
The Oldest Water-Powered Total-Loss Funicular Railway in the UK.

Designed by George Marks, it has been in continuous operation since 1890. Using the potential energy of water from the West Lyn River and incorporating innovations such as a 'Dead Man's Handle' and fail-safe braking, the railway continues to benefit the local economy.

Location

The Cliff Railway
The Esplanade
Lynmouth
North Devon
EX35 6EQ
T 01598 753 486

www.cliffrailwaylynton.co.uk

LITTLE WILLIE

Background

Little Willie, or the N°1 Lincoln Machine, was a prototype vital to the development of the British Mark I tank. Constructed in the autumn of 1915, it was the first completed tracked armoured vehicle in history, and is the oldest surviving individual tank in the world.

Although armoured cars had appeared before then, they could not operate off-road without becoming bogged down. The breakthrough that was achieved by Tritton and Wilson, and demonstrated for the first time on Little Willie, was the development of a reliable robust track system capable of giving a vehicle cross-country mobility under the appalling conditions that were found on the Western Front.

Little Willie was powered by a 105bhp Daimler engine and fitted with a non-rotatable dummy turret mounting a machine gun. This turret was subsequently removed as it made the tank top-heavy.

While the vehicle never saw action, it proved the viability of a tracked, armoured fighting machine and led to the classic rhomboid tanks that were used in WW1 and beyond.

Citation

William Foster & Co. Designed by William Tritton and Walter Wilson, Little Willie, originally the N°1 Lincoln Machine, was built in 1915. It subsequently introduced a new design of caterpillar track able to cope with the rigours of the Western Front.

This machine pioneered the combination of armour, firepower and mobility that led to the modern tank.



Category Automotive
Awarded 13 December 2013

Location

The Tank Museum
Bovington
Dorset
BH20 6JG
T 01929 405 096

www.tankmuseum.org

SS GREAT BRITAIN



Category Maritime
Awarded 5 February 2000

Background

SS Great Britain is a wrought-iron steamship built under the supervision of Isambard Kingdom Brunel for the Great Western Steamship Company. Originally conceived as a paddle steamer, her design was quickly altered to take advantage of the new technology of screw propulsion. When launched in 1843, she was the largest ship in the world at almost 100m and the first screw-propelled ocean-going, wrought-iron ship.

Weighing 1,930 tons, she was designed initially for the Trans-Atlantic luxury passenger trade and carried 252 first and second-class passengers and a crew of 130. However, her protracted construction and high cost had left the owners in financial difficulties, going bust in 1846 after the ship was stranded by navigational error.

After being sold and repaired, SS Great Britain carried immigrants to Australia before being retired from service to the Falkland Islands in 1884. In 1970 she was returned to dry dock in Bristol.



SS GREAT BRITAIN WAS THE FIRST IRON-HULLED, SCREW-PROPELLED VESSEL TO CROSS ANY OCEAN.

Citation

An outstanding example of IK Brunel's innovative design that made a significant contribution to society and mechanical engineering. It was the first iron-hulled, screw-propelled vessel to cross any ocean. It was conceived as a key element in the integrated transport system from London to the new world.

Location

Great Western Dock
Gasferry Road
Bristol BS1 6TY
T 0117 926 0680

www.ssgreatbritain.org

NORTHERN ENGLAND



ANDERTON BOAT LIFT

Background

In 1870 a proposal was put forward to build a 50-foot vertical boat lift between the River Weaver and the Trent & Mersey Canal at the Anderton Basin. Chief Engineer, Edward Leader Williams, settled on a design involving a pair of water-filled caissons that would counterbalance one another and require relatively little power to lift boats up and down.

Construction started in 1872 and it opened officially on 26 July 1875. Apart from regular maintenance, the only significant improvement made to the lift over the years was its conversion to electrical operation in 1908. However by 1983 extensive corrosion had been found in the superstructure and the lift was closed.

In 2000, a £7m restoration programme commenced to restore the lift to its original hydraulic operation. It re-opened to traffic in March 2002.

Citation

Anderton Boat Lift
The World's Oldest Operational Boat Lift

Designed by Edwin Clark and opened in 1875 to raise boats 50 feet from the River Weaver to the Trent & Mersey Canal using hydraulic power.

Later converted to electric drive, it was restored to hydraulic power in 2002 and continues to provide a navigable link between the two waterways.



Category Structures
Awarded 21 March 2014

Location

Anderton Boat Lift
Lift Lane
Anderton
Northwich
Cheshire CW9 6FW
T 01606 786 777

www.canalrivertrust.org.uk

Northern England

APT-E



Category Railway
Awarded 24 May 2013

Background

The Advanced Passenger Train – Experimental was a prototype tilting train consisting of two driving power cars and two trailer cars. Each power car was equipped with four Leyland 2S/350 gas turbines (and a fifth for auxiliary power supplies). These initially produced 300hp each but were progressively up-rated to 330hp. Two GEC 253AY nose-suspended traction motors powered the leading bogies.

The APT-E made its first run on 25 July 1972 from Derby to Duffield. However, due to industrial relation issues, it would be over 12 months before it ran again on the main line in August 1973.

The prototype was eventually tried out on the Great Western Main Line and achieved a new British railway speed record of 152.3mph between Swindon and Reading on 10 August 1975.

The unit was intended only for testing and was retired from service in June 1976.

Citation

Advanced Passenger Train – Experimental.
British Rail – Derby.

The world's first self-propelled active tilting train and the first to use computer designed wheelsets and active suspension to eliminate hunting.

Powered by ten 350hp British Leyland gas turbines, the APT-E set the British speed record for non-electric traction of 152.3mph in 1975.

Design principles of tilting trains in use today can be traced back to the APT-E.

Location

Locomotion
Shildon
County Durham DL4 1PQ (DL4 2RE for SatNav)
T 01388 777 999

www.nrm.org.uk

THE BESSEMER CONVERTER

Background

The Bessemer Converter was invented by Sir Henry Bessemer and first used at his Sheffield Steelworks in the 1800s. It was the first means of producing low and medium carbon steels cheaply and in bulk.

Bessemer Converters proved particularly suitable for producing steel for the railway industry, including the rails themselves. This allowed the rapid expansion of rail networks in many countries around the world.

Citation

In recognition of the outstanding contribution to the steel industry by Sir Henry Bessemer through his invention of the Bessemer Process for steelmaking as embodied in this last remaining example of the Bessemer Converter.



Category Inventions
Awarded 26 March 2004

Location

Kelham Island Industrial Museum
Alma Street (off Corporation Street)
Sheffield S3 8RY
T 0114 272 2106

www.simt.co.uk

BRAMAH HYDRAULIC PRESS



Category Inventions
Awarded 7 April 2005

Background

Invented by Joseph Bramah, the press depends on Pascal's Principle that pressure throughout a closed system is constant. The press had two cylinders and pistons of differing cross-sectional areas. If a force is exerted on the smaller piston, this will be translated into a larger force on the larger piston. The difference in the two forces is proportional to the difference in area of the two pistons. In effect, the cylinders act in a similar way that a lever is used to increase the force exerted. Bramah was granted a patent for his press in 1795.

Bramah's hydraulic press turned out to have many industrial applications and still does to this day. At the time, hydraulic engineering was an almost unknown science, and Bramah, with William George Armstrong, was one of the two pioneers in this field.

The hydraulic press is still known as the Bramah Press after its inventor.

Citation

Presented in recognition of the outstanding contribution to mechanical engineering made by Joseph Bramah in laying the foundations of fluid power engineering, as embodied in this last remaining example of a Bramah Hydraulic Press.

Location

Kelham Island Industrial Museum
Alma Street (off Corporation Street)
Sheffield S3 8RY
T 0114 272 2106

www.simt.co.uk

CLASS A1 STEAM LOCOMOTIVE (TORNADO: 60163)

Background

The class A1 locomotives were designed by Arthur H Peppercorn (1889–1951), the last Chief Mechanical Engineer for LNER. The original 49 Peppercorn Class A1s were ordered by LNER but built for British Railways in 1948–49 after nationalisation. With the rapid onset of diesel-fuelled locomotion in the 1960s, all 49 A1 steam locomotives were scrapped after an average life of only 15 years.

In 1990 the A1 Locomotive Trust was formed with the intent of building a new class A1 locomotive. The A1 Trust intended Tornado to be built from scratch. It was designed and built as the next evolution in the A1 Peppercorn class, incorporating design improvements that would have occurred had steam locomotive continued on the mainline railway.

Work on the Tornado continued for 18 years until 2008, when the first mainline tests were conducted. HRH The Prince of Wales officially named the train on 19 February 2009.

Citation

Tornado – A1 Pacific Locomotive
Designer: AH Peppercorn

Completed in 2008 using a blend of traditional and modern engineering skills, Tornado is the first mainline steam locomotive to be built in this country since 1960. The A1 Pacifics were the last LNER express passenger design, able to run 118,000 miles between repairs. None were preserved at the end of steam.



Category Railway
Awarded 23 May 2009

Location

Various – visit the website for current location.

The A1 Steam Locomotive Trust
Darlington Locomotive Works
Hopetown Lane
Darlington DL3 6RQ

www.a1steam.com

Northern England

CRAGSIDE



Category Sites & Societies
Awarded 26 November 1985

Background

Cragside is the first house in the world to be lit using hydro-electric power. Built into a rocky hillside above a 4km² forest garden, it was the country home of Lord Armstrong.

In 1868 a hydraulic engine was installed, with water being used to power labour-saving machines such as laundry equipment, a rotisserie and a hydraulic lift. In 1870, water from one of the estate's lakes was used to drive a Siemens dynamo in what was the world's first hydro-electric power station.

The resultant electricity was used to power an arc lamp installed in the Gallery in 1878. The arc lamp was replaced in 1880 by Joseph Swan's incandescent lamps in what Swan considered "the first proper installation" of electric lighting. The generators, which also provided power for the farm buildings on the estate, were constantly extended and improved to match the increasing electrical demand in the house.

Citation

The House of Lord Armstrong (1810–1900) inventor, engineer and armaments manufacturer. His hydraulic and hydroelectric inventions were applied throughout his estate. The house was the first in the world to be lit by electricity derived from water power.

Location

Cragside
Rothbury
Morpeth
Northumberland NE65 7PX
T 01669 620 333

www.nationaltrust.org.uk/cragside/

ELLENROAD ENGINE

Background

Ellenroad was built as a cotton mule spinning mill in 1890 by Stott and Sons. To power the mill, J&W McNaught built a four cylinder triple-expansion horizontal engine.

On 19 January 1916, the mill was destroyed by a fire. When rebuilt, the engine was upgraded by Clayton, Goodfellow & Co by removing the high-pressure and intermediate-pressure cylinders and installing two new high-pressure cylinders. The engine therefore became a twin-tandem compound engine. The twin engines are named Victoria and Alexandra.

The engine house was taken over by the Ellenroad Trust and the Ellenroad Museum Society, who maintain and run Victoria and Alexandra. The engine is still in its original house and powered by one of the remaining 1920 Lancashire boilers using the original 212ft chimney.

Citation

Victoria and Alexandra, The Ellenroad Engine

The only working survivor of the great twin horizontal tandem compound steam engines that powered the largest Lancashire mills.

Built in 1892 as a four cylinder triple-expansion engine by J&W McNaught of Rochdale and rebuilt in 1921 by Clayton, Goodfellow & Co of Blackburn.

Developing 3,000hp at 200psi, it drove all 122,000 spindles at the Ellenroad Mill.



Category Engines & Pumps

Awarded 4 November 2012

Location

Ellenroad Engine House
Elizabethan Way
Newhey
Rochdale OL16 4LE
T 07789 802 632

www.ellenroad.org.uk

THE ENGLISH ELECTRIC LIGHTNING



Category Aerospace

Awarded 12 September 2008

Background

The English Electric Lightning was a supersonic fighter aircraft of the Cold War era, remembered for its great speed and natural metal exterior. It is the only all-British Mach 2 fighter aircraft.

Renowned for its capabilities as an interceptor, RAF pilots described flying it as "being saddled to a skyrocket." English Electric was later incorporated into the British Aircraft Corporation, later versions being developed and produced as the BAC Lightning.

The Lightning was used throughout much of its service life by the Royal Air Force and the Royal Saudi Air Force.

It was a regular performer at airshows and was the first aircraft capable of supercruise (the ability to cruise at supersonic speeds without the use of afterburners).

The Lightning was also one of the highest-performance planes ever used in formation aerobatics.

Citation

The first and only all-British fully supersonic fighter aircraft type. In frontline service with the RAF 1960–1988, a record for a fighter jet.

Location

BAE Systems
Warton Aerodrome
Preston PR4 1AX

www.baesystems.com

FLOAT GLASS PROCESS

Background

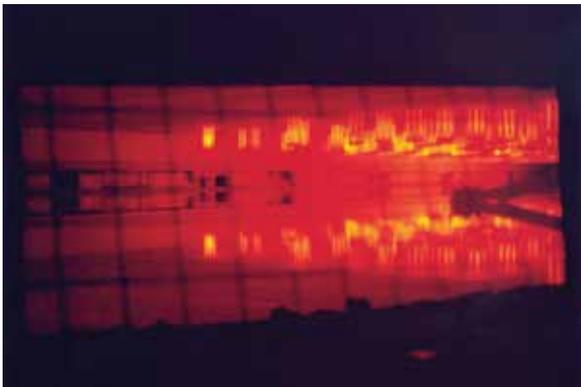
At the heart of the world's glass industry is the float glass process, invented by Sir Alastair Pilkington and his team in 1953. However, it was not until 1958 that the first saleable glass was produced using this innovative process.

The process works by pouring the 1,000°C liquid continuously onto a shallow bath of molten tin. The glass floats on the tin and spreads out to form a level surface. The thickness of the glass is controlled by the speed at which the glass ribbon is drawn off from the bath. After annealing, the glass emerges as a fire-polished product with parallel surfaces.

This process manufactures clear, tinted and coated glass for buildings and vehicles. The process can make glass from as thin as 0.25mm to 25mm.

Citation

Invented by Sir Alastair Pilkington and his team of engineers, scientists and production workers in 1953 at Pilkington Brothers, St Helens. This process has revolutionised window and automotive glass production throughout the world since the 1960s.



Category Inventions
Awarded 2 November 2004

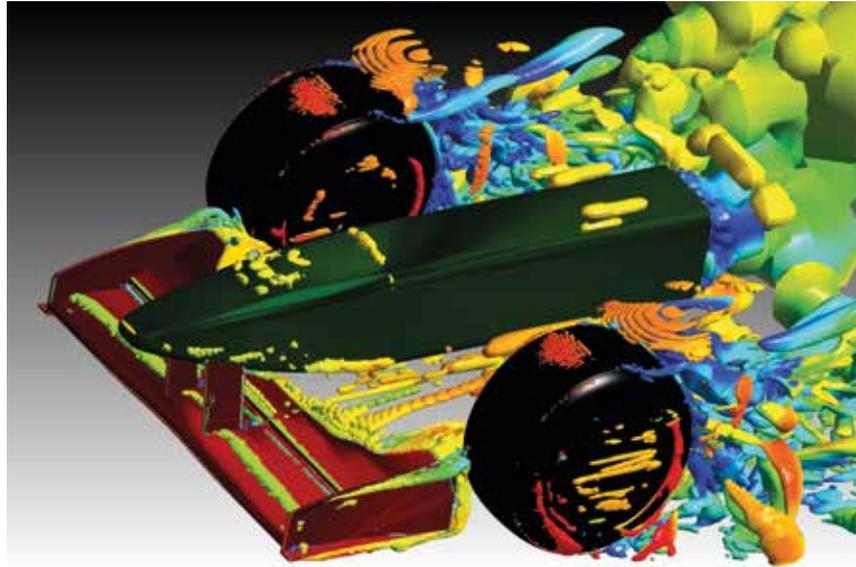
Location

Pilkington Group Limited
Prescott Road
St Helens
Merseyside WA10 3TT
T 0174 428 882

www.pilkington.com

Northern England

FLUENT CFD SOFTWARE



Category Inventions
Awarded 1 April 2002

Background

The first version of Fluent Code was launched in October 1983. Its success, in line with the Computational Fluid Dynamics (CFD) market's rapid growth, enabled Fluent to become a standalone company in 1988.

CFD is a computational technology that enables the user to study the dynamics of things that flow. Using CFD, it is possible to build a computational model that represents a system or device that is being studied. The fluid flow physics are then applied to this virtual prototype, and the software outputs a prediction of the fluid dynamics. In May 2006, Fluent was acquired by ANSYS.

Citation

Awarded in recognition of the significant impact of the Fluent CFD software (Releases 1–5, 1983 to 1998) on knowledge, excellence and innovation in mechanical engineering, and for its resultant contribution to the health and well-being of society, the economy and the environment.

Location

ANSYS UK
Sheffield Business Park
6 Europa View
Sheffield S9 1XH
T 0114 281 8888

www.ansys-uk.com

GARDNER 4L2 ENGINE

Background

The Gardner 4L2 on display at the Anson Engine Museum is the original engine (40bhp at 1,000rpm) that was first produced and shown at the Shipping, Engineering & Machinery exhibition at Olympia in September 1929.

At this time, many diesel engines were criticised for their noise, smoke, smell and high maintenance costs. The Gardner engine, a highly developed example of the open chamber type, stood in a class of its own thanks to the meticulous skill and care in its design and workmanship.

Gardner succeeded in making a small, high-speed, open-chamber engine with a multiple-orifice injector. Its compact size, fuel efficiency and total reliability appealed to the automotive industry and it was developed to produce the lighter automotive requirements in the L-range of engines.

Citation

The Gardner 4L2 engine was the first consistently reliable, high-speed direct injection diesel engine. Its fuel efficiency, total reliability and longevity were to transform road transport.



Category Engines & Pumps
Awarded 7 May 2005

Location

Anson Engine Museum
Anson Road
Poynton
Cheshire SK12 1TD
T 01625 874 426

www.enginemuseum.org

1930 GARRATT CLASS STEAM LOCOMOTIVE N° 2352



Category Railway
Awarded 26 September 1985

Background

The Beyer-Garratt articulated steam locomotive is the largest exhibit in the Manchester Science & Industry Museum's Power Hall. Made at Beyer, Peacock's Gorton foundry in 1930, this Garratt ran on the South African Railways until 1972.

The Garratt articulated locomotive was developed by Herbert William Garratt, a British locomotive engineer who, after a career with British colonial railways, was the New South Wales Railways' Inspecting Engineer in London. Garratt licensed the British firm of Beyer, Peacock & Company to build locomotives to his patent design.

After the original Garratt patents expired in 1928, Beyer, Peacock continued to market Garratts under its own brand, Beyer-Garratt. With continuing development and patent improvements, Beyer, Peacock maintained its leadership with the Garratt, and just under two thirds of all Garratt locomotives (1,023 of 1,651) were built at its Gorton Foundry. The final Garratts were built in 1967-68.

Citation

Made by Beyer, Peacock and Company. Established in 1854 at Gorton, Manchester, the firm became world-renowned for its locomotives. Charles Beyer and Richard Peacock were founder members of the Institution of Mechanical Engineers.

Location

Museum of Science and Industry
Liverpool Road
Castlefield
Manchester M3 4FP
T 0161 8322 244

www.mosi.org.uk

HUNTSMAN CRUCIBLE FURNACE AND TILT HAMMERS

Background

Benjamin Huntsman's (1704–76) famous invention of the Crucible process yielded more uniform cast steel which had fewer impurities than any steel previously produced. The Crucible steel process enabled large quantities of steel to be produced. Before 1742, less than 200 tons of steel was being made in Sheffield each year. By the 1840s, this had increased to 20,000 tons per year.

Sheffield steelmakers used the Crucible process to achieve worldwide dominance in the production of tools and other high-quality steels. The technique was used for producing cast or tool steel, and involved heating small pieces of carbon steel in a closed fireclay Crucible placed in a coke fire.

This was the first process used in Europe in which the temperature (2,900°F, or 1,600°C) was high enough to melt the steel, producing a homogeneous metal of uniform composition. Abbeydale Industrial Hamlet has the last remaining intact Crucible in the world.

Citation

The furnace (1829) is the world's oldest surviving example of the type developed by Benjamin Huntsman. In its day it represented a great metallurgical achievement.

The tilt hammers (1785) are probably the oldest set on their original site. They exemplify engineering technology in the heyday of water power. Together they symbolise the achievement of steel-makers and engineers which provided the foundations of the Industrial Revolution.



Category Inventions
Awarded 12 May 1988

Location

Abbeydale Industrial Hamlet
Abbeydale South Road
Sheffield S7 2QW
T 0114 236 7731

www.simt.co.uk

Northern England

JCB DIESELMAX ENGINE



Category Engines & Pumps
Awarded 9 October 2008

Background

The JCB Dieselmax was designed specifically for breaking the land speed record for a diesel-engined vehicle. On 23 August 2006, the FIA international class record for diesel-powered cars was broken by Dieselmax, driven by Wing Commander Andy Green, when it achieved an average of 563.418km/h (350.092mph) over three runs.

The Dieselmax engine on display at the Anson Engine Museum is one of the two used to power the record-breaking car. The engine is based on those used in JCB's 3CX and 4CX backhoe loaders, telescopic handlers and wheeled loading shovels, and uses major components from these series production engines.

Citation

One of the pair of JCB444-LSR engines that powered the JCB Dieselmax Car to a speed of 350.092mph at the Bonneville Salt Flats on 23 August 2006. Presented in recognition of its success in setting the FIA international record for diesel-powered cars.

Location

Anson Engine Museum
Anson Road
Poynton
Cheshire SK12 1TD
T 01625 874 426

www.enginemuseum.org

LION LOCOMOTIVE



Category Railway
Awarded 23 November 2012

Background

Lion, built by Todd, Kitson & Laird, came into service in July 1838 as a luggage engine on the Liverpool & Manchester Railway (LMR). Built to a 0-4-2 wheel arrangement specification, it was designed for speed rather than hauling capacity and could reach speeds of nearly 40mph. However, in 1859 Lion was sold to Mersey Docks as a stationary pumping engine.

In 1923 Lion was rediscovered by rail enthusiasts, who undertook an extensive restoration of the locomotive for the centenary celebrations of the LMR in 1930. In 1931, the newly restored Lion was installed on a plinth at Lime Street station.

In 1970 the locomotive was given to the Museum of Liverpool, where it remains on display today. Until 1989, Lion was the oldest working locomotive in the world, but is now retired for conservation reasons.



UNTIL 1989, LION WAS THE OLDEST WORKING LOCOMOTIVE IN THE WORLD.

Citation

Lion Locomotive
Todd, Kitson & Laird of Leeds

Star of track and film, Lion is the oldest locomotive to have been steamed in Britain.

Lion was built in 1838 and worked for 20 years on the Liverpool & Manchester Railway, before being sold to Mersey Docks & Harbour Board as a stationary pumping engine.

Rescued in 1927, this 0-4-2 represents the typical British locomotive of her era.

Location

Museum of Liverpool
Pier Head
Liverpool L3 1DG
T 0151 478 4545

www.liverpoolmuseums.org.uk

LNWR 'COAL TANK' N°1054

Background

The London and North Western Railway (LNWR) Webb Coal Tank is a class of 0-6-2T steam locomotive. These locomotives were called 'Coal Tanks' because they were a side tank version of Francis William Webb's (1836-1906) standard 17 inch Coal Engine, a 0-6-0 tender engine for slow freight trains.

The design was introduced in 1881 and had the same cheaply produced cast-iron wheels and H-section spokes as the tender engines. A trailing radial truck supporting the bunker was also added with two similarly cast-iron wheels. Between 1881 and 1897, 300 Coal Tanks were built with many still in regular use up to World War Two.

Coal Tank, N°BR 58926, ex-LMS 7799, originally LNWR 1054, remained in service until 1958. After retirement, the locomotive was preserved by the National Trust at Penryhn Castle for a number of years, before being placed in the care of the Bahamas Locomotive Society.

Citation

Designed by Francis Webb. Built in Crewe Works by the London and North Western Railway in 1888, this 0-6-2T steam locomotive was not withdrawn until 1958, having travelled over one million miles in 70 years of public service.

With its preservation in 1960, it became a pioneer of today's heritage railway movement.



Category Railway
Awarded 19 October 2013

Location

Ingrow Loco Museum
Ingrow West Station
South Street, Keighley
West Yorkshire BD21 5AX
T 01535 690 739

www.bahamas45596.co.uk

Northern England

LOCOMOTION N°1



Category Railway
Awarded 19 May 1988

Background

Locomotion N°1 (originally known as the Active) is an early British steam locomotive. Built by Robert Stephenson & Company in 1825, it hauled the first train on the Stockton & Darlington Railway on 27 September 1825.

Locomotion was effectively a beam engine on wheels with vertical cylinders. It was one of the first locomotives to use coupling rods rather than chains to drive its 0-4-0 wheel arrangement. In 1828 Locomotion's boiler exploded, killing the driver. However, it was rebuilt and remained in service until 1841 when it was turned into a stationary engine.

George Stephenson, the credited designer of Locomotion N°1, was the first President of the Institution of Mechanical Engineers in 1847. He was succeeded by his son, Robert, in 1848.

Citation

Locomotion was built to a design originated by George Stephenson, the first President of the Institution of Mechanical Engineers.

On the opening day of the Stockton and Darlington Railway, 27 September 1825, he drove this engine, hauling the inaugural train, on the world's first steam-worked public railway.

Location

Darlington Railway Museum
Station Road
Darlington DL3 6ST
T 01325 460 532

www.darlington.gov.uk/leisure-and-culture/head-of-steam





LNER CLASS A4 4468 'MALLARD'

Category Railway
Awarded 5 April 2013

Background

Built in Doncaster in 1938, N°4468 Mallard is a London and North Eastern Railway Class A4 4-6-2 Pacific steam locomotive. The A4 class was designed by Sir Nigel Gresley to power high-speed streamlined trains. Its distinctive aerodynamic body and high power allowed the A4 class to reach speeds of over 100mph (160km/h), although in everyday service it was relatively uncommon for any steam-hauled service in the UK to go beyond 90mph. The locomotive is 70ft (21m) long and weighs 165 tons, including the tender. It is painted LNER garter blue with red wheels and steel rims.

Mallard attained the world record speed for a steam locomotive of 126mph while descending Stoke Bank on 3 July 1938.

In 1963, Mallard was retired from service after travelling almost 1.5 million miles (2.4m km). It was restored to working order in the 1980s and is now part of the National Collection at the National Railway Museum in York.

Citation

Mallard: The World's Fastest Steam Locomotive

Designed for speed by Sir Nigel Gresley,
Past President of the Institution of
Mechanical Engineers.

Mallard was built in Doncaster in 1938 and was the first A4 Pacific to have a Kylchap double chimney, reducing exhaust back pressure and increasing power output at high speeds.

It attained 126mph descending Stoke Bank on 3 July 1938.

“”

**MALLARD ATTAINED THE
WORLD RECORD SPEED FOR
A STEAM LOCOMOTIVE OF
126MPH WHILE DESCENDING
STOKE BANK ON 3 JULY 1938.**

Location

National Railway Museum
Leeman Road
York YO26 4XJ
T 0844 815 3139

www.nrm.org.uk

PEACE ENGINE



Category Engines & Pumps
Awarded 25 November 2010

Background

Queen Street Mill at Harle Syke, near Burnley, was built in 1894 as a workers' co-operative, commencing production in early 1895. It remained steam-driven throughout its working life until production ceased in March 1982, making it the UK's last 19th century steam-powered weaving mill.

The driving force behind the 990 looms and associated machinery in the mill was a horizontal tandem compound condensing steam engine, supplied by William Roberts & Sons (Millwrights & Engineers) of Phoenix Foundry in nearby Nelson.

Initially installed as a slide-valve engine, it was updated in 1913 with more efficient Corliss valve cylinders. At first the engine was called Prudence after Prudence Crowther, the first engineer's wife. At the time of the Armistice in 1918, the engine was renamed Peace in memory of the fallen soldiers, particularly those who were mill workers prior to hostilities.

Citation

This Horizontal Tandem Compound Condensing engine was built by W Roberts and Sons of Nelson in 1894 and powered the mill until the Queen Street Manufacturing Company closed down in 1982. Now Peace is preserved and can be seen working in her original location.

Location

Queen Street Mill
Textile Museum
Queen Street
Harle Syke
Burnley
Lancashire BB10 2HX
T 01282 412 555

www.lancashire.gov.uk/museums

PRIESTMAN OIL ENGINE

Background

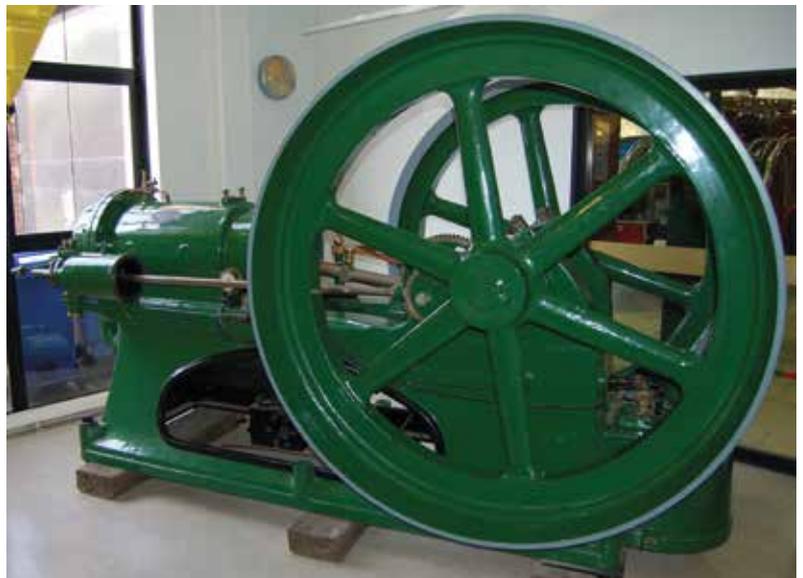
The Priestman Oil Engine was the first internal combustion engine to successfully use heavy oil for combustion. Between 1887 and 1905, more than 1,000 engines were produced. Engine N°654, now exhibited at the Streetlife Museum, is a 14.75 inch bore by 16 inch stroke engine and was sold to JC Hawkshaw in 1894. It is considered to be the only known example of the largest Priestman Oil Engines built to run on heavy oil. The final location and the application of the engine are unknown.

The engine was returned to the Priestman factory in the early 1950s, and after restoration was placed in the Apprentice School and operated on special occasions.

In the early 1970s, the engine was offered to the Streetlife Museum. Today, the engine is restored and is now in fine static display condition. Its location is less than one mile from its place of manufacture.

Citation

William Dent Priestman (1847–1936) patented in 1885 an internal combustion engine to burn fuels heavier than petrol. Introduced in 1886, it was the first successful engine of its type in the United Kingdom. The quality of his mechanical engineering has lasted.



Category Engines & Pumps
Awarded 29 March 2000

Location

Streetlife Museum
High Street
Kingston-upon-Hull
HU1 1PS
T 01482 300 300

www.hullcc.gov.uk/museums

QUARRY BANK MILL



Category Sites & Societies
Awarded 11 March 2011

Background

Quarry Bank Mill was founded by Samuel Greg in 1784 in the village of Styal in Cheshire. The factory was founded for the spinning of cotton and by Greg's retirement in 1832 was the largest such business in the country. After Greg's death in 1834 his son, Robert, introduced weaving at the mill.

To house the mill workers, farm buildings in the nearby village of Styal were acquired and converted. However, as the mill increased in size, purpose-built housing in Styal was constructed. The mill is also notable for its use of unpaid child apprentices, a system that continued until 1847, with the last child to be indentured starting work in 1841.

The mill and estate were donated to the National Trust in 1939 by Alexander Carlton Greg. Today, the Styal Estate surrounding the mill is the most complete and least altered factory colony of the Industrial Revolution.

Citation

A unique collection of working textile and power machinery enabling visitors to experience the whole process from spinning raw cotton to weaving finished cloth.

Quarry Bank Mill is a site of educational importance, providing a link for the children of today with children of a bygone era.

Location

Quarry Bank Mill
Styal
Wilmslow
Cheshire SK9 4LA
T 01625 445896

www.nationaltrust.org.uk/quarry-bank-mill

Northern England

RIVER DON ENGINE

Background

The 12,000hp River Don Engine was built by Davy Brothers of Sheffield in 1905. It was made to drive Charles Cammell's armour plate rolling mill located at his Grimsthorpe Works. The engine was one of four built for the same purpose.

The second engine went to John Brown's Atlas Works, the third to the Japanese government, while the destination of the fourth engine is unknown. The River Don Engine ran at Cammell's mill for almost 50 years. The engine was then transferred to what was formerly known as the English Steel Corporation's River Don Works. At the works, the engine continued to drive a heavy plate mill, producing products such as stainless-steel reactor shields and steel plates for North Sea oil rigs. In 1978, the engine ceased production and was transferred to Kelham Island museum.

Citation

A three-cylinder 12,000hp engine with Joy Valve Gear, one of the most powerful surviving steam engines in the world. Built in 1905 by Davy Brothers of Sheffield, and installed at Cammell's Grimsthorpe Works to drive an armour plate rolling mill, this engine was transferred to the River Don Works of English Steel Corporation where it remained until Easter 1978.



Category Engines & Pumps
Awarded 10 October 1985

Location

Kelham Island Industrial Museum
Alma Street (off Corporation Street)
Sheffield S3 8RY
T 0114 272 2160

www.simt.co.uk

ROBERT STEPHENSON'S WORKS

Background

In 1823, George and Robert Stephenson, along with three partners, opened the world's first purpose-built locomotive works on Forth Banks, Newcastle upon Tyne. Robert, at the age of 19, was the Managing Partner.

The famous locomotives Locomotion and Rocket were built here, and the works subsequently exported locomotives to developing railways all over the world – often the first to be seen in those countries.

After the buildings were vacated in 1972, they suffered from both neglect and vandalism. However, in 1988 the Robert Stephenson Trust was formed to prevent the buildings being demolished. In 1993, conservation work to consolidate the building began, completing in 2002.

The premises of 20 South Street are currently listed Grade II as an example of a relatively unaltered industrial building of the 1840s–60s.

Citation

The Stephenson Works on South Street in Newcastle housed the world's first purpose-built locomotive works. These buildings were the birth of the steam locomotive, which revolutionised the railway industry worldwide.



Category Sites & Societies
Awarded 5 September 2005

Location

The Stephenson Works
20 South Street
Newcastle upon Tyne NE1 3PE

Stephenson Works is now part of the Stephenson Quarter and it is often used as an events venue.

www.robertstephensontrust.com

TEES TRANSPORTER BRIDGE



Category Structures
Awarded 2 December 1993

Background

The Tees Transporter Bridge was built by Sir William Arrol & Company following a 1907 Act of Parliament to construct a bridge across the River Tees. Construction of the bridge started in 1910, opening on 17 October 1911.

The bridge has an overall length of 260m (including cantilevers), leaving a span between the centres of the towers of 180m, the beam of the bridge being carried at a height of 49m above the road. This, combined with an overall height of 69m, makes this bridge the second largest example remaining in the world, and the largest still in full operation. A moving car suspended from the bridge carries 200 people or nine vehicles across the Tees to Port Clarence in just under three minutes. The bridge was listed as a Grade II building in 1985.

The plaque was rededicated on 19 October 2011 during the centenary celebrations of the bridge.

Citation

This is the world's longest operational transporter bridge.

Since its opening in 1911 it has provided a reliable crossing of the Tees, without the need for approach embankments, allowing freedom of passage to ocean-going vessels. Designed by Mr GC Imbault of Cleveland Bridge and Engineering Co Ltd and built by Sir William Arrol and Co Ltd.

Location

Ferry Road
Middlesbrough TS2 1PL
T 01642 247 563

www.middlesbrough.gov.uk/transporterbridge

TRENCHERFIELD ENGINE

Background

On 3 October 1908, Trencherfield Mill was opened on the banks of the Leeds & Liverpool Canal. It contained 60,000 ring and 24,000 mule spindles. The mill was driven by a 2,500hp triple-expansion four-cylinder engine built by J&E Wood of Bolton. The engine drove a 26ft flywheel with 54 ropes at 68rpm.

With the decline of the Lancashire cotton industry in the 1930s, the mill was eventually taken over by the Lancashire Cotton Corporation, an organisation set up by the Bank of England to save about 100 mills in the local area. In 1964, Trencherfield was bought by Courtaulds, but ceased production in 1968.

In 1983 the engine house was taken over by Wigan Museum Services, while the mill underwent commercial and domestic redevelopment. In 2003, an 18-month restoration of the engine was undertaken, which allowed it to be steamed once again.

Citation

Trencherfield Mill Steam Engine

This magnificent horizontal twin-tandem triple-expansion engine powered all the cotton spinning machines in the mill for 60 years.

Built by J&E Wood in 1907, the engine could produce 2,500hp at 68rpm. Today, it still drives the mill's unique multi-floor rope race through the 70-ton flywheel.



Category Engines & Pumps
Awarded 4 November 2012

Location

Trencherfield Mill Engine House
Wigan Pier Quarter
Heritage Way
Wigan WN3 4EF
T 01942 828 128

www.wlct.org (search Trencherfield)

Northern England

TURBINIA



Category Maritime
Awarded 30 November 1995

Background

In 1894, Turbinia was the first steam-turbine powered ship to be built. Furthermore, Turbinia was, at this time, the world's fastest ship, having three turbines each driving a separate shaft with three propellers on each shaft; the power output was 2,000hp.

Built by Sir Charles Parsons' company, Marine Steam Turbine, Turbinia would become famous for turning up unannounced at Queen Victoria's Diamond Jubilee Navy Review, at Spithead in June 1897, and outrunning every other ship on display. From this clear demonstration of Turbinia's speed and power, the Admiralty commissioned Parsons to build two turbine-powered destroyers for the Navy, both launched in 1899.

Turbinia was decommissioned and cut into two pieces in 1927. However, in the 1960s she was restored and put on display at the Military Vehicle Museum. Today, Turbinia is a focal exhibit at Newcastle's Discovery Museum.

Citation

TS Turbinia epitomises the achievements of Sir Charles Parsons (1854–1931), world-renowned engineer and inventor.

Turbinia is powered by his greatest invention, the first practical steam turbine, which transformed high-speed ship propulsion and established the foundation for present-day electrical power generation.

Location

Discovery Museum
Blandford Square
Newcastle-upon-Tyne NE1 4JA
T 0191 232 6789

www.twmmuseums.org.uk/discovery

VULCAN BOMBER XH558



Category Aerospace
Awarded 27 October 2011

Background

XH558 was the 12th Vulcan B2 to be built. It first flew in 1960 and was delivered to RAF Waddington on 1 July 1960. It was then relocated to RAF Finningley where the aircraft spent eight years, before returning to Waddington in 1968.

The aircraft was converted to a B2 Maritime Radar Reconnaissance in 1973 and subsequently to the air-to-air refuelling variant K2 in 1982. It was returned to standard B2 configuration in 1985 and was the last Vulcan in service. From 1986 to 1992, it was the RAF's display aircraft.

Several years after its retirement, the Vulcan to the Sky Trust acquired the aeroplane. After undertaking a full refurbishment of the Vulcan and a number of test flights, the CAA granted the aeroplane its Permit to Fly on 3 July 2008. In March 2011, XH558 was relocated to its new home at Robin Hood Airport in Doncaster.



THE VULCAN WAS THE LAST AIRWORTHY REPRESENTATIVE OF THE RAF'S V-BOMBER FLEET.

Citation

Designed by Roy Chadwick and Stuart Davies

The last airworthy representative of the RAF's V-bomber fleet, the British strategic deterrent from 1955 to 1969, the Vulcan is a stirring example of British leadership in aviation.

XH558 was in service until 1993 and is powered by four Rolls-Royce Olympus engines.

Location

Vulcan to the Sky
Hanger Three
Robin Hood Airport
Doncaster DN9 3RH
T 0845 124 7285

www.vulcantothesky.org

WORLD'S FIRST PROTOTYPE CAST STEEL NODE

Background

In the 1970s, the offshore industry had an emerging concern for the fatigue life of welded tubular joints and the escalating costs associated with the manufacture of complex components. While castings were well known to have superior fatigue life, it was a major step to design and manufacture large, lightweight components in place of such offshore fabrications.

In 1978, River Don Castings produced 26 prototype nodes to prove the technology at full size. One node was destructively tested to confirm mechanical property data as well as actual material integrity, using results from magnetic particle and ultrasound examinations.

A further four years elapsed before the first nodes were sold. However, once the first orders were secured, and quality and delivery reliability established, the breadth of applications increased rapidly and cast node technology achieved acceptance within the offshore industry.

Citation

The world's first cast steel node made in 1978 at the nearby foundry of River Don Castings, now part of Sheffield Forgemasters.

Used to join the tubulars of offshore oil platforms, the design in cast steel represented a significant milestone for both the development of casting technology and offshore structures.



Category Inventions
Awarded 30 March 2000

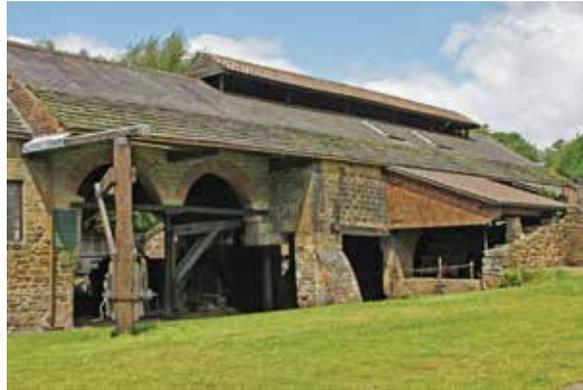
Location

Sheffield Forgemasters
(Roundabout outside works)
Brightside Lane
Sheffield S9 2RX
T 0114 244 9071

www.sheffieldforgemasters.com

Northern England

WORTLEY TOP FORGE



Category Sites & Societies
Awarded 25 March 1994

Background

Wortley Top Forge is a water-powered iron forge whose history can be traced back to 1620. The site has been used for various processes, but it is best known for the wrought-iron railway axles that were produced between 1840 and 1908.

Following the final abandonment of the site in 1929, various bodies have been involved in securing the site, which now forms the heart of an industrial museum. Exhibits at Top Forge include the original water wheels and water-powered tilt hammers within the original Forge building, now being progressively restored to their original condition. All three water wheels can be run subject to conditions.

Adjoining buildings house a 1920s machine shop that is used for most of the restoration work, displays of medium-sized and small stationary steam engines, and displays of old machine and hand tools.

Citation

The world's oldest surviving heavy-iron forge, operated from 1620 to 1908.

It earned a worldwide reputation for the quality of the railway axles produced in the 19th century. It was a pioneering example of integrated engineering, combining research, design, and manufacture and testing.

Location

Wortley Top Forge Industrial Museum
Forge Lane
Thurgoland
South Yorkshire S35 7DN
T 0114 288 7576

www.topforge.co.uk

MIDLANDS



BATTLE OF BRITAIN MEMORIAL FLIGHT

Background

The Battle of Britain Memorial Flight (BBMF) was developed from the Historic Aircraft Flight, formed in 1957. The original aim of the Flight was to commemorate the Battle of Britain. However, this was expanded to honour the RAF's involvement in all the campaigns of the Second World War.

With the current fleet, the BBMF successfully represents a broad spectrum of RAF WWII aviation in the form of the aircraft, the units they flew with, and the men and women who flew and worked on them. In current airworthy condition are aeroplane types from Transport Command, Bomber Command and Fighter Command.

On 20 August 2010, the BBMF participated in the 70th anniversary of the Battle of Britain, including a fly-past over London following the re-enactment of Churchill's famous "Never in the field of human conflict was so much owed by so many to so few" speech.

The Flight also undertook fly-pasts for the Duke and Duchess of Cambridge's wedding in 2011, and the Queen's Diamond Jubilee celebrations in 2012.

Citation

The Avro Lancaster, Hawker Hurricanes and Supermarine Spitfires of this Flight are a tribute to the airmen who lost their lives in the service of this country and an inspiration to all.



Category Aerospace
Awarded 8 April 2010

Location

RAF Coningsby
Lincolnshire LN4 4SY

www.raf.mod.uk/bbmf

Midlands

BELLEROPHON



Category Railway
Awarded 19 March 1988

Background

Built in 1874, Bellerophon was one of six almost identical locomotives built for the Haydock Collieries between 1868 and 1887. The locomotive was designed by Josiah Evans, son of Richard Evans who owned the collieries. Uncommonly, the locomotives were given letters instead of numbers, with 'C' being Bellerophon – an indication that it was the third to be built.

Unusually for the time, the locomotives had outside motion-and-piston valves, a revolutionary aspect nearly 20 years before this type of valve gear was generally recognised as being in use. When the coal industry was nationalised in 1947, the six locomotives were relocated to other collieries where they continued to work for a further 20 years.

In 1966, Bellerophon was donated to the Keighley & Worth Valley Railway, where it became a static exhibit at Haworth. Bellerophon was finally restored to working order in 1985.

Citation

Built in 1874 to Josiah Evans' design at his family's Haydock foundry. The earliest surviving example of piston valves in a steam locomotive. Restored to full working order by the Vintage Carriages Trust in 1985.

Plaque location

Museum of Rail Travel
Ingrow near Keighley
West Yorkshire BD21 5AX

The locomotive is on loan to:

Foxfield Railway
Caverswall Road
Blythe Bridge
Staffordshire ST11 9BG
T 01782 396 210

www.vintagecarriagestrust.org
www.foxfieldrailway.co.uk

CLAYMILLS PUMPING STATION

Background

By 1888, Burton-upon-Trent had more than 30 breweries producing in excess of 100 million pints of beer per year. The brewing process generates large quantities of waste products such as hops, yeast and hot water, which were finding their way into the rudimentary sewage system.

To find a solution to this problem, the Council engaged eminent engineer, Joseph Mansergh, who recommended a sewage farm at Etwell/Eggington and the building of a pumping station to pump the sewage at Claymills. In 1885 the buildings, engines and pipelines were completed and pumping of the sewage to the farm commenced.

The pumping station comprised two large Italianate-style engine houses, each containing two beam pumping engines, built by Gimson of Leicester. The boiler house contained a range of five boilers and associated ancillary equipment, including at least six ancillary steam engines and a rail siding for the delivery of coal.

Citation

Awarded to the Claymills Pumping Engines Trust for their restoration of Britain's most complete example of a Victorian sewage pumping station.

From 1885 to 1971 this site dealt with the effluent from Burton-upon-Trent's brewing industry. Among its many treasures is the oldest working steam-driven dynamo in the country.



Category Sites & Societies
Awarded 12 November 2010

Location

Claymills Pumping Station
Meadow Lane
Stretton
Burton-upon-Trent
Staffordshire DE13 0DA
T 01283 509 929

www.claymills.org.uk

JAGUAR E-TYPE



Category Automotive
Awarded 25 November 2011

Background

The E-type was manufactured between 1961 and 1974 in three distinct versions: Series 1, Series 2 and Series 3.

The Series 1 was introduced in March 1961. The cars used the triple SU carburetted 3.8-litre 6-cylinder Jaguar XK6 engine. There was a transitional series of cars built in 1967–68, unofficially called 'Series 1½', which are externally similar to Series 1 cars.

The Series 2 version had open headlights without glass covers, a wrap-around rear bumper, repositioned and larger front indicators and tail lights below the bumpers, better cooling aided by an enlarged 'mouth' and twin electric fans, and uprated brakes.

The Series 3 had the new 5.3-litre 12-cylinder Jaguar V12 engine. The short wheelbase FHC body style was discontinued and the V12 was available only as a convertible and 2+2 coupé.

In all, over 70,000 E-type cars were sold over its lifetime.

Citation

Designed by Malcolm Sayer under the direction of Sir William Lyons (HonFIMechE) the Jaguar E-type is a direct descendant of the cars which won five Le Mans 24-hour races during the 1950s.

It introduced breakthrough motor engineering technology such as the combined monocoque-spaceframe, which in later years was adopted by Formula One.

Location

The Jaguar Heritage Museum closed in 2012. The collection has been divided between the Coventry Transport Museum and the Heritage Motor Centre at Gaydon.

www.jdht.com

NEWCOMEN ENGINE



Category Engines & Pumps
Awarded 9 November 2012

Background

This is a replica of the original 1712 Newcomen steam engine. The engine was completed in 1986 after ten years of research to make this model as close as possible to the original.

As far as it is known, there are no original plans for the 1712 engine and all the early versions would have varied slightly in design, although following the same basic principles. The first known drawings of the Newcomen engine are from 1717 for an engine built in Newcastle. There are also some 1719 etchings by Thomas Barney showing the engine and how it worked.

Using all the data available, the team at the Black Country Living Museum created a set of drawings which were used to build the replica. Their aim was to create, as close as possible, the original Newcomen engine before changes and innovations were added to improve the engine's efficiency.

Citation

The Newcomen Engine

This is a full-size working replica of the earliest documented steam engine. Built in 1986 using contemporary 18th century engravings, inventories and descriptions, this engine marks the dawn of the Industrial Revolution.

The original engine was erected near Dudley in 1712. It was capable of pumping 170,000 gallons of water a day without recourse to wind, water or animal power. This engine was restored to celebrate the tercentenary.

Location

Black Country Living Museum
Tipton Road
Dudley DY1 4SQ
T 0121 557 9643

www.bclm.co.uk

Midlands

THE NOTTINGHAM CHP COMMUNITY HEATING SCHEME

Background

Nottingham's community heating system was first established in 1972 and serves houses, flats, offices, two major city centre shopping developments, a leisure centre and other industrial and commercial premises.

The two main heat sources for the scheme are a coal-fired power station and an energy-from-waste plant, both of which supply the community heating network and feed electricity into the National Grid.

By burning household waste, the scheme is reducing the volume of waste which has to go to landfill sites by about 90%. The scheme's coal-fired power station is also much more efficient than a conventional coal-fired station, as about 75% of the fuel is converted to either heat or electricity. In a conventional power station only 35–40% of the coal, or other fuel used, is converted into electricity, with the remainder being lost as waste heat.

Citation

The Nottingham Combined Heating and Power Scheme is the first in the UK to produce commercial electricity and hot water for community heating by the efficient incineration of refuse. Reducing refuse to sterile, inert residue and extending the life of landfill sites are additional environmental and economic benefits of the scheme.



Category Inventions
Awarded 1 May 1998

Location

Throughout Nottingham

www.nottinghamcity.gov.uk
www.enviroenergy.co.uk



ABRAHAM DARBY 1777

ABRAHAM DARBY 1777

E M B 1638

E M B



THE OLD FURNACE

Category Sites & Societies
Awarded 10 October 2014

Background

The Old Furnace began life as a typical blast furnace until 1709 when Abraham Darby converted it to use coke instead of charcoal. It is considered by many that this innovation was pivotal in helping to start the global Industrial Revolution.

The interior profile of the furnace is typical of its period, bulging around the middle, below which the boshes taper in again so that the charge descends into a narrower and hotter hearth where the iron was molten.

By the 1720s the furnace was producing large quantities of iron for a wide range of customers. Its main products were cast-iron domestic articles, as well as cylinders for steam engines and pig iron for use by other foundries.

In 1778 Abraham Darby III used the furnace for the construction of the world's first cast-iron bridge, the iconic Iron Bridge, which opened on 1 January 1781.

By the 1820s the Old Furnace was blown out and no longer in use. Over the years the structure was gradually buried under many layers of waste material. There was a proposal for the site to be cleared and the furnace dismantled, but fortunately it was decided to excavate and preserve the remains. Today the Old Furnace is part of the Museum of Iron at Coalbrookdale.

Citation

The Old Furnace
Birthplace of the Industrial Revolution

In 1709 Abraham Darby pioneered the use of coke, rather than charcoal, as a fuel for smelting iron. This innovation marked the beginning of the industrial age and went on to shape the modern world.



IT IS CONSIDERED BY MANY THAT THIS INNOVATION WAS PIVOTAL IN HELPING START THE GLOBAL INDUSTRIAL REVOLUTION.

Location

Museum of Iron
Coach Road
Coalbrookdale
Telford
Shropshire TF8 7DQ
T 01952 433 424

www.ironbridge.org.uk

OTTO & LANGEN ENGINE



Category Engines & Pumps
Awarded 10 July 1996

Background

The Otto & Langen Free Piston Atmospheric Gas Engine, patented in 1866, was the world's first commercially successful internal combustion engine. Today only a small number of these engines survive.

The first engine made by Otto & Langen, introduced at the 1867 Paris Exhibition, was exhibited in the former KHD Werksmuseum in Cologne. However, the second oldest engine, N°379, is located at the Department of Mechanical Engineering at the University of Nottingham.

Made by Crossley Brothers, this ½hp model is the oldest engine still in running order. How this engine came to be at the university is not absolutely certain. However, at a meeting of the University College and Free Library Committee on 23 January 1883, Professor Garnett reported that Mr L Simon had placed a small gas engine at the disposal of the Committee for as long a period as they chose to use it.

Citation

This engine (N°379) c1872 is one of about 1,300 built by Crossley Brothers, Manchester to a Nikolaus August Otto design patented in 1866.

It is an example of the first commercially successful internal combustion engine which was introduced at the 1867 Paris Exhibition.

Location

University of Nottingham
University Park
Nottingham NG7 2RD
T 0115 951 5151

www.nottingham.ac.uk

PAPPLEWICK PUMPING STATION

Background

Papplewick Pumping Station was built by Nottingham Corporation Water Department between 1881 and 1884 to pump water from the Bunter sandstone beds and provide drinking water to Nottingham. Two beam engines, supplied with steam by six Lancashire boilers, were housed in Gothic Revival buildings. Apart from changes to the boiler grates, the equipment remained in its original form until the station was decommissioned in 1969.

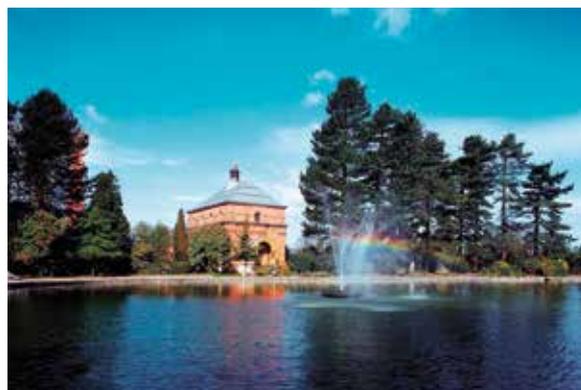
In 1974, a Trust was formed to conserve the site as a static museum. However, the plans soon developed to include the refurbishment and regular steaming of the engines. One of the beam engines was operated in 1975, using the only boiler that was certified to be safe at the time. Since then, the second engine has been reconditioned, and both are steamed several times a year. New visitor facilities were built in 1991, and a major restoration of the structures was completed in 2005.

Citation

A fine example of a Victorian fresh water pumping station.

Drawing from a 200 feet deep well, the two James Watt & Co rotative beam engines could supply Nottingham with three million gallons of water per day.

Built by Marriot Ogle Tarbotton and completed in 1884, it was in constant operation until 1969.



Category Sites & Societies
Awarded 21 December 2013

Location

Papplewick Pumping Station
Rigg Lane, Ravenshead
Nottingham NG15 9AJ
T 0115 963 2938

www.papplewickpumpingstation.co.uk

PERKINS WOLF ENGINE



Category Engines & Pumps
Awarded 28 April 2009

Background

This was the first production engine designed by Charles Chapman. It represented a breakthrough in compactness, weight and rated speed, making the engine suitable for fitment to passenger cars and light trucks of the day.

Arguably, the Perkins Wolf was the first practical diesel engine of its type. The engine featured a patented 'Aeroflow' combustion system, allowing ungoverned speeds in excess of 45bhp at 3,000rpm.

There are two examples of the engine on display in the Perkins Heritage Centre. The oldest known surviving unit is currently being restored to working order.

Citation

Perkins Wolf.
Designer: CW Chapman.

The first high-speed diesel engine. The Wolf with its patented Perkins Aeroflow combustion system could run at 3,000rpm and was available for light truck and passenger car conversions from 1933.

The success of Perkins Engines was founded upon this engine.

Location

Perkins Heritage Centre
Perkins Engines
Frank Perkins Way
Peterborough PE1 5NA

www.peheritage.com

Midlands

ROLLS-ROYCE RB211 ENGINE

Background

The Rolls-Royce RB211 is a family of high-bypass turbofan engines made by Rolls-Royce plc and capable of generating 37,400–60,600lb force (166–270kN) thrust.

Originally developed for the Lockheed L-1011 (TriStar), it entered service in 1972 and was the only engine to power this aircraft type. The RB211 was superseded in the 1990s by the Rolls-Royce Trent family of engines.

Citation

The RB211 is the first, and at present the only, three-shaft, high bypass ratio aero engine in the world to go into production.

Twenty-five years on, it is still setting new standards of reliability and durability.



Category Engines & Pumps
Awarded 3 May 1996

Location

Rolls-Royce Heritage Centre
Wilmore Road
Derby DE24 9BD
T 01332 249 437

www.rolls-royce.com/about/heritage

ROVER SAFETY BICYCLE



Category Inventions
Awarded 12 September 2014

Background

The term 'safety bicycle' became widely used in the 1880s for any alternative to the penny-farthing where the rider's feet were able to reach the ground, making it easier to stop.

The first bicycle to be called a 'safety' was designed by Harry John Lawson in 1876. The pedals powered the rear wheel, although the original design used treadles, with the chain drive not appearing until 1879. Lawson's safety failed to catch on, perhaps due to its increased cost, weight and complexity compared to the penny-farthing.

In 1885, John Kemp Starley launched what is considered to be the first commercially successful safety bicycle, which he named the Rover. It was heavier and more expensive than penny-farthings, but lighter and cheaper than tricycles of the day. In its original form it used indirect steering. Direct steering was adopted in later models that ultimately proved to be a great success.



THE ROVER WAS CONSIDERED TO BE THE FIRST COMMERCIALY SUCCESSFUL SAFETY BICYCLE.

Citation

Rover Safety Bicycle
A Travel Revolution

Recognised as the first modern bicycle, its design is still followed today.

The low riding position and chain-driven rear wheel allowed this bicycle to be enjoyed by all. It also played a role in the liberation of women.

Designed by John Kemp Starley and produced in Coventry in 1888.

Location

Coventry Transport Museum
Millennium Place
Hales Street
Coventry CV1 1JD
T 024 7623 4270

www.transport-museum.com

SMETHWICK ENGINE

Background

Boulton & Watt's Smethwick Engine was originally one of two engines used to pump water back up to the summit level of the Birmingham Canal at Smethwick. The second engine was at the other end of the summit level at Spon Lane.

In 1891, after over 100 years of operation, a replacement engine was built and the Smethwick Engine was removed to British Waterways Ocker Hill depot, where it remained until it was acquired by Birmingham City Council.

The engine house itself was demolished in 1897. Its original site and foundations can still be seen on Bridge Street North in Smethwick, just north of the junction with Rolfe Street.

Today, the Smethwick Engine is on display at the Thinktank museum in Birmingham.

Citation

The Smethwick Engine
Boulton & Watt

The World's Oldest Working Steam Engine

Designed by James Watt, the Smethwick Engine was erected in 1779 and pumped water at Smethwick Locks until 1891. It contains many original parts, including the main timber beam, and was the first engine to use the expansive power of steam.



Category Engines & Pumps
Awarded 14 February 2014

Location

Thinktank
Millennium Point
Curzon Street
Birmingham B4 7XG
T 0121 202 2222

www.thinktank.ac

Midlands

WILLANS CENTRAL VALVE STEAM ENGINE



Category Engines & Pumps
Awarded 18 November 2011

Background

The first central valve steam engine was delivered to Crompton & Co in 1885 by Willans & Robinson Ltd. By 1914, when the last engine of this type was manufactured, more than 3,000 engines had been built and delivered throughout the world.

In the central valve engine, a central spindle with multiple piston valves covered and uncovered ports in the hollow piston rod. The central valve was driven from an eccentric fixed between the two connecting rods. An enclosed crankcase was used with splash lubrication. These engines, which ran at speeds in the range of 350–500rpm, proved to be a great success for power generation applications, as the generator could be direct-coupled.

Engine N°3,226 is a three-crank compound 140hp engine built in 1901 and installed in Maple & Co in London. It ran for 57 years before returning to the Willans & Robinson factory in Rugby.

Citation

Central Valve Steam Engine
Willans & Robinson

Built in 1901 at Rugby, this 140hp three-crank compound engine was in service for 57 years.

Willans engines ran at 350 to 500rpm and could be direct-coupled to generators. In 1892 they accounted for 68% of all electricity generated in Britain, dominating this market until the advent of steam turbines.

Location

Alstom Power Training Centre
Willans Works
Newbold Road
Rugby CV21 2NH
T 01788 577 111

www.alstom.com/uk

SOUTH EAST ENGLAND



BLUEBELL RAILWAY



Category Railway
Awarded 22 August 2010

Background

In 1882, the Lewes & East Grinstead Railway opened with six stations. However, these stations were located in sparsely populated areas and were never fully used. By February 1955, it was decided to close the line.

In spring 1959, the Lewes & East Grinstead Railway Preservation Society, the forerunner of today's Bluebell Railway Preservation Society, was formed. Although its original aim was to re-open the whole line, in the interim it was decided to re-open a section of line from Sheffield Park to Bluebell Halt just south of Horsted Keynes, as a steam railway and museum.

The Bluebell Railway Preservation Society completed an initial extension from Horsted Keynes to Kingscote in 1994, which included relaying track through Sharpthorne Tunnel (731yd/668m, the longest on a UK heritage railway). The final northwards push towards East Grinstead, where the line connects with the national rail network, was completed in 2013.

Citation

The first preserved standard-gauge passenger railway in Great Britain, running its first train in August 1960.

The Bluebell Railway has impressive workshop facilities and is committed to preserving and developing the rolling stock, infrastructure, skills and atmosphere of a working steam railway.

Location

The Bluebell Railway
Sheffield Park Station
East Sussex TN22 3QL
T 01825 720 800

www.bluebell-railway.co.uk

THE BOMBE AT BLETCHLEY PARK

Background

The Bombe is an electromechanical device in which a series of drums rotate, successively testing each rotor starting position. Within the drums are brushes (four rows of 26, one for each letter of the alphabet) which move over commutators. The Bombe worked by testing every possible combination of wheel settings until one was reached that matched a 'crib'. The 'crib' used the fact that messages often contained standard words or phrases.

The 'Ultra' intelligence provided by these machines was hugely important, as they were able to decode German Enigma messages, devices which enciphered messages within the Army, Navy and Luftwaffe.

The reconstruction of the Bombe has been carried out by a group of enthusiasts at Bletchley Park, led by John Harper. It took 12 years from the recovery of the drawings from GCHQ in 1995 to reconstruct this replica.

Citation

Rebuilt in 2007 using the original blueprints.

An electromechanical device designed by A Turing, G Welshman and H Keen, used in cracking the German Enigma code during the Second World War. The 200 Bombes built by the British Tabulating Machine Company played a pivotal role in winning the war.



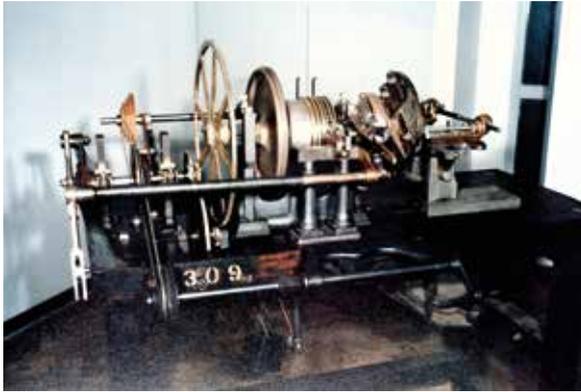
Category Inventions
Awarded 24 March 2009

Location

Bletchley Park
Milton Keynes MK3 6EB
T 01908 640 404

www.bletchleypark.org.uk

BRYAN DONKIN'S ROSE LATHE



Category Inventions
Awarded 3 April 1996

Background

The Rose Lathe was built by Bryan Donkin in 1821 to facilitate a new process developed by Sir William Congreve, known as compound-plate printing. It is a highly significant and an early exemplar of the geometric lathe.

The compound printing process employed highly detailed two-colour printing. This was done using a printing plate splitting into two intricate and interlocking parts, an upper part fitting through appropriately shaped apertures in the lower part. Both parts were engraved with enormously elaborate geometric patterns using this lathe. The combination of intricate design and colour differentiation made the plates practically unforgeable. The patterns could be reproduced only by the person possessing the machine that first generated them.

Bryan Donkin was an important and multi-talented London engineer and ranked alongside Henry Maudslay and Joseph Bramah as the leading London engineers, at a time of enormous change in the way machines of all types were made.

Citation

The intricate patterns engraved by this geometric lathe were used for over a century to protect bank notes and documents from forgery. In tandem with Bryan Donkin's unique pantograph milling machine, the lathe produced high-precision compound metal dies for printing simultaneously in two colours.

Location

Originally Bryan Donkin Archive Trust, Chesterfield.

The engine has now been donated to the Science Museum and is stored in its archives. The engine is not on display.

Science Museum
Exhibition Road
South Kensington
London SW7 2DD
T 0870 870 4868

THE BULL ENGINE

Background

The Bull Engine is named after the Cornish inventor Edward Bull, a friend of Richard Trevithick. It was built by Harvey & Company in 1856, although it did not operate until 1859.

A Bull Engine differs from a traditional Cornish beam engine in that the steam cylinder is inverted over the pump and thus dispenses with the need for a main beam. This design meant that a Bull Engine took up about half the space of a beam engine of similar pumping capacity.

The engine's prime purpose was to deliver water to the Grand Junction Company's high-level reservoirs at Campden Hill in London. The engine operated from 1859 until the end of the Second World War. The shut-down instruction bore the annotation "Subject to alteration as this is a standby unit."

The engine at Kew is the largest known surviving Bull Engine, and the only one in its original engine house.

Citation

The largest engine of its type in existence and the only example still in its original location. The design was developed by Edward Bull in the 1790s and subsequently by Harvey and Company in Cornwall.



Category Engines & Pumps
Awarded 12 May 2008

Location

The London Museum of Water and Steam
Green Dragon Lane
Brentford
Middlesex TW8 0EN
T 020 8568 4757

www.waterandsteam.org.uk

BURSLEDON BRICKWORKS



Category Sites & Societies
Awarded 12 April 2011

Background

Bursledon Brickworks was founded in 1897 by the Ashby family, who were established brickmakers from nearby Chandlers Ford. The original works (known as the southern complex) was extended in 1903 with the addition of the northern complex.

With this extra capacity, Bursledon was able to increase production to over 20 million bricks a year. The Ashby family were renowned innovators and inventors, developing new kilns to enable year-round brick production, automation of many of the manual elements of brick production and processes to produce different surface finishes on the bricks.

The brickworks continued until after the Second World War, when it was amalgamated with the Sussex & Dorking Brick Company, becoming Redlands Limited in 1959 until 1974 when the site was closed.

In the early 1990s, Bursledon was sold to Hampshire Buildings Preservation Trust. Today, the surviving buildings are the main part of the original southern complex.

Citation

The steam driven extrusion plant was installed in 1897 and operated for over 70 years. Restored by the Hampshire Buildings Preservation Trust, this is thought to be the only working example in the country.

Brick making machinery such as this was key to the expansion of our towns and cities.

Location

Bursledon Brickworks Industrial Museum
Coal Park Lane
Swanwick SO31 7HB
T 01489 576 248

www.bursledonbrickworks.org.uk

South East England

CHANNEL TUNNEL AND EUROSTAR

Background

The Channel Tunnel is a 50.5km undersea rail tunnel linking Folkestone, Kent in England with Coquelles, near Calais in northern France, beneath the English Channel at the Strait of Dover. The vehicle shuttle terminals are at Cheriton (part of Folkestone) and Coquelles, and are connected to the British and French motorways.

Eleven tunnel boring machines, working from both the UK and France, cut through chalk to construct two rail tunnels and a service tunnel. At its lowest point, the tunnel is 75m deep.

The tunnel carries high-speed Eurostar passenger trains, Eurotunnel roll-on/roll-off vehicle transporters, and international rail freight trains. Rolling stock used by Eurostar is based on the French TGV and vehicle shuttle wagons.

Citation

The Channel Tunnel is one of the most advanced and largest engineering projects of its type. It carries both conventional trains and vehicle shuttles and has reduced the time to cross the Channel to minutes rather than hours.



Category Railway
Awarded 9 June 1997

Location

Channel Tunnel HQ Folkestone
Kent

Eurostar
Waterloo Station
London

(The location of the Eurostar plaque is unknown since services were transferred to St. Pancras International.)

www.eurotunnel.com
www.eurostar.com





CONCORDE 101 G-AXDN

Category Aerospace
Awarded 30 April 2014

Background

Concorde 101 G-AXDN is a pre-production version of Concorde and first flew on 17 December 1971. It was the third of the six aircraft used in the extensive testing programme that preceded Concorde's entry into commercial service.

In April 1974, in the course of a test programme conducted from Tangier, 101 reached Mach 2.23 (1,450mph). In November of the same year it flew from Fairford to Bangor, Maine, in two hours and 56 minutes, a record time for a commercial aeroplane flying across the Atlantic in a westerly direction. It remains the fastest Concorde ever to fly.

Upon its retirement, 101 was gifted to the Duxford Aviation Society. It was parked outside at Duxford for more than 20 years and visible to travellers from both the M11 and the A505. It was eventually moved under cover in Hangar One in 1999, and remained there until January 2005, when that building was closed to enable building work to start on the AirSpace Building.

Today, Concorde is on permanent display in AirSpace at Duxford. It is estimated that more than four million people have walked through this Concorde since it was open to the public in 1978.

Citation

Concorde
BAC – Aerospatiale

Powered by four Rolls-Royce Olympus engines with afterburners, this was the first supersonic transport to enter service and pioneered the use of fly-by-wire in an airliner.

Concorde 101 G-AXDN is the British pre-production version. She reached Mach 2.23 (1,450mph) in April 1974 and holds the speed record for the fleet.



**THE CONCORDE 101 G-AXDN
REMAINS THE FASTEST
CONCORDE EVER TO FLY.**

Location

Imperial War Museum Duxford
Cambridge CB22 4QR
T 01223 835 000

www.iwm.org.uk

CROSSNESS ENGINE HOUSE AND JAMES WATT BEAM ENGINES

Background

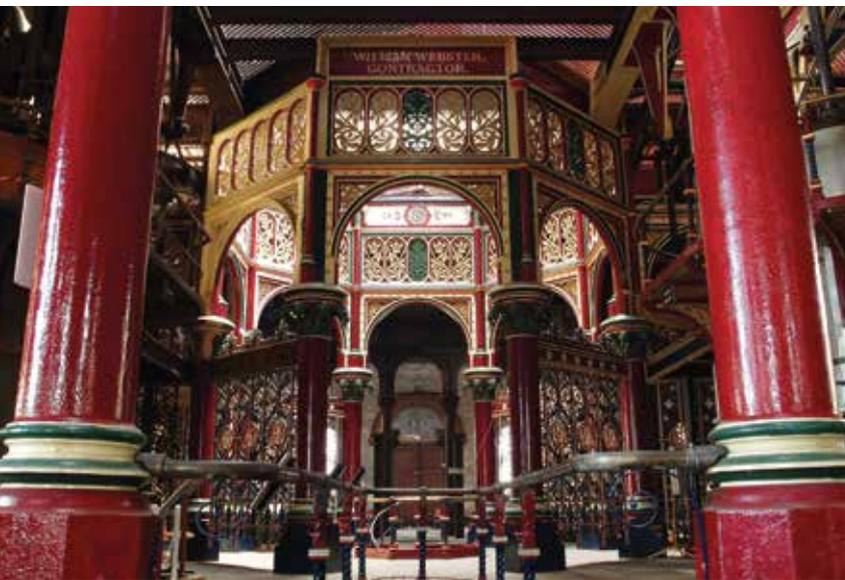
The Crossness engines, and the building that houses them, were an essential part of Sir Joseph Bazalgette's scheme for the safe disposal of London's sewage and are a rare example of Victorian engineering and architecture. In addition, they are unique in being the only surviving complete set of James Watt beam engines still in their original setting.

The engines are the largest rotative beam engines in the world. They represent a phase in the development of engineering incorporating features that demonstrate the changes from reliance on cast iron to the use of steel, and are an important development in engineering technology.

The engines played a vital role in ensuring the success of the interceptor sewerage system, which had a major impact on the health and well-being of Londoners, by eliminating the scourge of cholera and typhoid and improving the cleanliness of London's streets and waterways.

Citation

Presented for its work on the restoration of the 1865 Engine House and the James Watt Rotative Beam Engines, which, with the pumps, were a key part of Joseph Bazalgette's sewage system that rid London of cholera and typhoid.



Category Sites & Societies
Awarded 20 January 2009

Location

Crossness Sewage Treatment Works
Belvedere Road
Abbey Wood
London SE2 9AQ
T 020 8311 3711

www.crossness.org.uk

ELING TIDE MILL



Category Sites & Societies
Awarded 29 August 1986

Background

Eling Tide Mill is a water mill that harnesses the power of the tide to grind wheat into wholemeal flour. It is situated on the edge of Southampton Water, where there has been a mill on the site for over 900 years, although it has been rebuilt several times. The current building is approximately 230 years old.

Eling Tide Mill, although abandoned in the 1940s, had the good fortune to survive until it was restored between 1975 and 1980. Now re-opened, it operates as both a working mill and a museum. It is the only fully working and productive tide mill in the United Kingdom. It is, in fact, one of only two productive tide mills in the world, and the only one producing what it was originally built for.

The mill holds the world record for the longest rotation of the water wheel in one day at 16 hours and seven minutes.

Citation

Restored in 1980 as a working tide mill museum. The only surviving mill in the world harnessing the power of the tide for the regular production of wholemeal flour.

Location

Eling Tide Mill
Eling Lane
Totton
Southampton SO40 9HF
T 023 8086 9575

www.elingexperience.co.uk

THE GREAT WESTERN SOCIETY

Background

In 1961, four train-spotters at Southall decided that they would try to preserve a Great Western 'push-pull' (autotrain) tank engine. Railway preservation was in its infancy, but a letter published some months later in the Railway Magazine precipitated donations towards the project. It became necessary to put the scheme on a proper footing and thus, in 1964, the Great Western Society was established.

As pressure mounted for more steam locomotives to be purchased before they disappeared, the Society was offered the use of the engine shed at Didcot, which had become redundant.

The Society moved in with three locomotives and a number of carriages in 1967. Since then its members have transformed the area into the Didcot Railway Centre, including an extensive recreation of Brunel's broad gauge.

Citation

For its work in preserving and recreating the heritage of the Great Western Railway, allowing future generations to enjoy the work of Brunel, Gooch and Churchward, to participate and to learn engineering skills.



Category Sites & Societies
Awarded 27 September 2008

Location

Didcot Railway Centre
Didcot Parkway Station
Oxfordshire OX11 7NJ
T 01235 817 200

www.didcotrailwaycentre.org.uk

HAWKER SIDDELEY HARRIER



Category Aerospace
Awarded 25 October 1990

Background

Through the 1950s and 1960s, many nations attempted to develop a vertical take-off aircraft. However none was successful enough to go into volume production. The Hawker Harrier was the first practical design, entering RAF service in 1969. The Harrier was an elegantly simple solution to a complex problem, employing just a single engine for both vertical and horizontal flight.

The engine was the Bristol Pegasus, designed by Stanley Hooker in 1958. It was a turbofan with four swivelling nozzles, the front two fed with air from the low-pressure compressor, the rear pair with exhaust from the turbine. For vertical take-off the nozzles pointed downwards. For horizontal flight they pointed to the rear. The prototype Hawker P1127 was designed by Sir Sydney Camm. This was developed into the Harrier, which first flew in 1967. 1969 production units used the Bristol Pegasus 11 engines rated at 21,500 lbs (95kN).

The plaque was rededicated to the RAF museum on 18 October 2012.

Citation

The world's first operational V/STOL aircraft which entered service in 1969.

Developed from the P1127, a concept by the Hawker Aircraft and Bristol Siddeley Engines design teams under the leadership of Sir Sydney Camm and Sir Stanley Hooker.

Location

RAF Museum London
Grahame Park Way
London NW9 5LL
T 020 8205 2266

www.rafmuseum.org.uk

HMS BELFAST

Background

HMS Belfast is the largest surviving armoured warship from the Second World War. Built at Harland & Wolff's Belfast yard, she was launched on St Patrick's Day, 17 March 1938.

Shortly after entering service in 1939, HMS Belfast was mined in the Firth of Forth and severely damaged, entailing repairs at Devonport Shipyard lasting almost three years. She then rejoined the Home Fleet, escorting convoys to Russia and supporting the Allied D-Day landings in Normandy. Later she saw action in the Far East in support of the UN forces in Korea, before retiring from service in 1965. In 1971, she was saved from scrapping by a special trust under a former captain, Rear-Admiral Sir Morgan Morgan-Giles, to become a floating museum. Since 1978 she has been an integral part of the Imperial War Museum.

HMS Belfast is the first ship since HMS Victory to be preserved for the nation.

Citation

Launched in 1938 at Harland & Wolff, the only surviving major Royal Navy warship from WWII. Four 20,000hp steam turbines, a speed of 32 knots, 12 6 inch guns and displacing 11,500 tons; HMS Belfast's success in battle is a tribute to her sound design and the skill and courage of her crew.



Category Maritime
Awarded 1 December 2010

Location

HMS Belfast
The Queen's Walk
London SE1 2JH
T 020 7940 6300

www.iwm.org.uk/visits/hms-belfast

HOLLAND 1 SUBMARINE



Category Maritime
Awarded 4 May 2011

Background

In 1901, the Royal Navy ordered Holland 1, one of a six-submarine batch commissioned. Construction was undertaken at the Vickers yard in Barrow-in-Furness, with the keel being laid down on 4 February 1901. Holland 1 was launched on 2 October 1901 and dived for the first time on 20 March 1902. Her sea trials began in April 1902.

In 1913, Holland 1 was decommissioned and sold to TW Ward Ltd for £410. However, while being towed to the scrap yard, Holland 1 sank about 1½ miles off Eddystone Lighthouse.

After 70 years underwater, the wreck was located and raised from the seabed in November 1982. Following a decade of being displayed at the Royal Navy Submarine Museum, a full restoration programme was undertaken. In 2001, on her centenary, a new purpose-built climate-controlled building was opened. Holland 1 is listed as part of the National Historic Fleet Core Collection.

Citation

Holland 1
Designer: John Philip Holland

Built by Vickers Maxim at Barrow-in-Furness and launched in 1901, this pioneer submarine was powered by a 160hp petrol engine and had a surface speed of 8 knots. A 70hp electric motor gave a submerged speed of 7 knots.

Holland 1 was the Royal Navy's first operational submarine.

Location

Royal Navy
Submarine Museum
Haslar Jetty Road
Gosport
Hampshire PO12 2AS
T 023 9251 0354

www.submarine-museum.co.uk

JUBILEE LINE EXTENSION



Category Railway
Awarded 19 November 2002

Background

The Jubilee Line Extension is the extension of London Underground's Jubilee Line from Green Park to Stratford. Before the extension was built, the Jubilee Line terminated at Charing Cross. An eastward extension of the Jubilee Line was first proposed in the 1970s and a modified route was constructed during the 1990s. It opened just before Christmas 1999.

The extension is an example of London Underground's continuous process of innovation.

Some prime examples include:

1. Platform-edge doors, contributing to passenger safety and reducing air velocities on platforms.
2. Lighting levels far in excess of national standards.
3. Comprehensive security camera surveillance.
4. Full stair-free access for all extension stations.

Citation

In recognition of the numerous features contributing to passenger safety and access on the Jubilee Line Extension, exemplifying the continuous innovation in London's Underground system from its inception in 1863.

Location

Plaque location
Canary Wharf Underground Station
Canary Wharf
London E14 4QS

www.tfl.gov.uk/tube

South East England

KEMPTON GREAT ENGINES

Background

In 1897 the Kempton site was established by the New River Company. It built two holding reservoirs, supplying 12 slow sand bed filters, installed two Lilleshall triple-expansion pumping engines to lift water to the reservoirs, and three engines to pump the purified drinking water around north London. In 1902 the company was acquired by the Metropolitan Water Board, which ordered the construction of a new engine house and two Worthington Simpson triple-expansion engines, completed in 1928.

Each engine generated 1,008 hydraulic hp and pumped 19 million gallons per day against a 230ft head. At 62ft high, they are the largest of their type built in the UK. Two steam turbine pump sets were installed in 1933 to meet peak loads and to cover shut-down periods of the triples.

The entire site switched to electric pumps, located in the old Lilleshall house, in 1980, and the triples and turbines were shut down and abandoned.

Citation

Designed by the Metropolitan Water Board under the direction of Henry Stilgoe. These two triple expansion engines were manufactured by Worthington-Simpson at Newark-on-Trent and commissioned in 1928. They provided clean water to the people of London for 50 years.

Engine N°6 (known as The Sir William Prescott) is the largest working steam engine in the world.



Category Engines & Pumps
Awarded 14 May 2010

Location

Kempton Park Water Treatment Works
Snakey Lane
Feltham
Middlesex TW13 6XH
T 01932 765 328

www.kemptonsteam.org

KEW BRIDGE PUMPING STATION



Category Sites & Societies
Awarded 10 July 1997

Background

The Kew Bridge Pumping Station was originally opened in 1838 by the Grand Junction Waterworks Company, following a decision to close an earlier pumping station at Chelsea due to poor water quality. It remained in operation until the Kew Bridge Steam Museum was established in 1975.

Today, the site remains an internationally recognised museum of steam pumping engines and as a reminder of the many pumping stations spread throughout the UK. In 1999, the Department for Culture, Media and Sport described Kew Bridge as “the most important historic site of the water supply industry in Britain”.

The museum houses the world's largest collection of Cornish beam engines, including the largest working beam engine, which has a cylinder diameter of 90 inch and was used to pump water to London for 98 years. There are also several other large working Cornish beam engines, a triple-expansion engine and several rotative steam engines.



KEW BRIDGE PUMPING STATION HAS BEEN DESCRIBED AS THE MOST IMPORTANT HISTORIC SITE OF THE WATER SUPPLY INDUSTRY IN BRITAIN.

Citation

Unique in its approach to the preservation of water pumping equipment, in particular the original installations of five famous Cornish beam engines.

Location

The London Museum of Water and Steam
Green Dragon Lane
Brentford
Middlesex TW8 0EN
T 020 8568 4757

www.waterandsteam.org.uk

KIRKALDY MATERIALS TESTING MACHINE

Background

David Kirkaldy was a Scottish engineer who began working in a shipyard at a time when many new materials were being used. He realised that it was vital to understand the properties of these materials, and so designed and built a machine that could test steel components to destruction.

In its time, the materials testing machine helped investigate engineering failures such as the Tay Bridge disaster (1879), and crashes of Comet aeroplanes (1950s). It also tested the steel components for many major construction projects, including the Hammersmith suspension bridge and the Sydney Harbour bridge.

The business continued until 1974. Today the site hosts a museum where the main testing machine is still in working order.

Citation

Built in 1865 to David Kirkaldy's design.

This machine established the present-day system of materials testing and specifications of mechanical properties for engineering materials.



Category Inventions
Awarded 28 April 1987

Location

99 Southwark Street
London SE1 0JF
(Check website for opening times)
T 01322 332 195

www.testingmuseum.org.uk

South East England

LACEY GREEN WINDMILL



Category Sites & Societies
Awarded 14 July 2013

Background

Although records indicate that there has been a windmill at Lacey Green for hundreds of years, the current structure was probably rebuilt and modernised in the early 19th century, and remained in use until around 1915.

Initial efforts to repair and save the windmill were made after its closure but, over the coming decades, Lacey Green continued to deteriorate. By the late 1960s, the whole body had twisted and tilted and was close to collapse.

A full restoration programme began in 1971, taking ten years to stabilise and restore the main structure of the mill and the cap. Once that was completed, work started on the interior with its four floors of historic wooden machinery. Four common sails were fitted together with a fantail to drive the gearing that automatically turns the cap and ensure the main sails are always facing into the wind.

Although restored to full working order, it would be impossible to run the windmill while visitors were inside due to the cramped conditions and unguarded machines. However, it remains a most interesting place to visit due to the completeness of its very early machinery.

Citation

The oldest surviving Smock Windmill in the United Kingdom with wooden machinery dating from around 1650.

Restored from dereliction to working order between 1971 and 1986 by volunteer members of The Chiltern Society.

Location

Lacey Green Windmill
Windmill Farm
Pink Road, Lacey Green
Princes Risborough HP27 0PG
T 01844 275 871

www.laceygreenwindmill.org.uk

MAUDSLAY ROPE-FORMING MACHINE

Background

Rope has been made at Chatham Dockyard since 1618, when the first ropery buildings were erected.

In the age of sail, the Navy constantly needed great quantities of rope, as each ship required about 20 miles (32km) of rope for its rigging alone. The Ropery at Chatham was rebuilt mostly between 1785 and 1791 and took on its present appearance in 1812, when the upper floor was added.

The earliest mechanical rope-making machine to survive in Britain is the forming-machine, still in use at Chatham, made by Henry Maudslay in 1811.

Citation

Designed and manufactured in 1811 by Henry Maudslay (1711–1831). It was used to re-rope HMS Victory and is still in use today.



Category Inventions
Awarded 2 April 1986

Location

Chatham Historic Dockyard
The Historic Dockyard
Chatham
Kent ME4 4TE
T 01634 823 800

www.thedockyard.co.uk

OLD BESS



Category Engines & Pumps
Awarded 16 September 2009

Background

Built in 1777, and working until 1848, Old Bess was the second engine constructed by James Watt at Matthew Boulton's Soho Manufactory in Birmingham. As the manufactory was built to use water power, Old Bess, a low-lift 'returning' engine, was used to pump water from the bottom of a water wheel to its top. As the water was continuously recycled over the wheel, reliance on external water sources was minimised.

The engine resembled the Newcomen beam engines in appearance, with the piston rod and pump rod connected to the opposite ends of a heavy walking beam. The huge double-acting cylinder was 33 inch in diameter and permitted a 7ft stroke. The valves were operated by a 'plug frame', which was raised and lowered by the beam.

Unfortunately, the engine never performed that well and both Watt and Boulton agreed in 1781 that Old Bess was probably one of the worst engines they had built.

Citation

Old Bess Engine.
Power for the Industrial Revolution.

In recognition of James Watt's improvements to the steam engine. 'Old Bess' was built by Boulton and Watt in 1777 and used to power their Soho Manufactory until 1848. This engine was the precursor of much of the power-generating plant on show in the Museum and is the oldest surviving of Watt's engines.

Location

Science Museum
Exhibition Road
South Kensington
London SW7 2DD
T 0870 870 4868

www.sciencemuseum.org.uk

POST OFFICE UNDERGROUND RAILWAY

Background

To avoid London's congested streets, the Post Office decided to travel underneath them. Construction of the Post Office Underground Railway (later known as Mail Rail) began in 1914. Work was delayed by the outbreak of the First World War, but the unfinished tunnels were used to protect national art treasures from the Zeppelin air raids.

The completed railway had 23 miles of 2ft gauge track running through tunnels 70ft below the ground. The line ran from Paddington Station in the west to Whitechapel delivery office in the east. The electric trains carried no drivers – only mail – and were controlled by levers in switch cabins at each station.

The use of Mail Rail has ceased as it is no longer operationally viable. Nevertheless, it was a remarkable engineering achievement of which the postal service can be justifiably proud.

Citation

Opened 5 December 1927. The first automatic electric railway and the only postal railway in the world, providing a unique solution to the problem of transporting large volumes of mail across a capital city.



Category Railway
Awarded 28 October 1987

Location

Plaque presented to:
Mount Pleasant Post Office
151 Mount Pleasant Road
London N17 6TQ
T 020 7239 2570

www.postalheritage.org.uk/page/mailrail

PRINCESS OF WALES CONSERVATORY



Category Structures
Awarded 2 May 1991

Background

The Princess of Wales Conservatory, with a floor space of 4,490m² under a single multi-span roof, was built to replace 26 individual houses. Within the new house, ten different environmental zones provide the opportunity to improve the cultivation and display conditions for Kew's collection of tropical herbaceous plants.

Two major zones encompass the wet and dry tropics, with smaller areas holding species with specialised environmental requirements. Many innovative design and engineering features are incorporated into the building, with a fundamental requirement being energy conservation.

The house has been built without side walls, with most of its space below ground level. Its volume is low in relation to its floor area, so temperatures can be altered more rapidly. The conditions within each zone are continually monitored by a computer which adjusts the heating, misting, ventilation and lighting systems accordingly to ensure maximum efficiency in use of fuel and water.

Citation

Designed by PSA Projects and opened on 28 July 1987 as the world's most advanced energy-efficient conservatory.

It incorporates ten different climatic zones, created and maintained by a fully integrated computer-controlled system.

Location

Royal Botanic Gardens
Kew
Richmond
Surrey TW9 3AB
T 020 8332 5655

www.kew.org

ROYAL ARSENAL WOOLWICH



Category Sites & Societies
Awarded 2 June 2011

Background

The Royal Arsenal, formerly known as the Woolwich Warren, was founded as an ordnance depot in 1671. By the time it was renamed, at the request of King George III, the Royal Arsenal had become a major military centre with the Woolwich Dockyard, Royal Military Academy and Royal Artillery HQ all within close proximity.

In its time, the Royal Arsenal became a renowned centre of excellence in mechanical engineering. Notable engineers who worked at the site include Sir Samuel Bentham, Sir Marc Isambard Brunel, Henry Maudslay and Sir John Anderson, the first Chief Mechanical Engineer at the Royal Arsenal and Vice President of the Institution of Mechanical Engineers in 1868.

At its peak, the Royal Arsenal employed more than 80,000 people and covered an area of 1,300 acres. However, by 1967 the Royal Arsenal had ceased production, with all military involvement ending in 1991.



IN ITS TIME, THE ROYAL ARSENAL BECAME A RENOWNED CENTRE OF EXCELLENCE IN MECHANICAL ENGINEERING.

Citation

The Royal Arsenal
1671 to 1967

The Royal Arsenal produced much of the armaments required by this country during the growth of the British Empire and through two World Wars. Many important mechanical innovations were developed by the first Chief Mechanical Engineer, Sir John Anderson (1814–1886), Vice President of the Institution of Mechanical Engineers.

Location

Firepower – The Royal Artillery Museum
Royal Arsenal
Woolwich SE18 6ST
T 020 8312 7103

www.firepower.org.uk

SIR HARRY RICARDO'S FIRST ENGINE

Background

Sir Harry Ricardo was born in London in 1885. He was educated at Rugby and at Trinity College, Cambridge.

He was renowned for his research into the problem of knock in engines. In addition he improved on the engines that were used in the first tanks, oversaw the research into the physics of internal combustion that led to the use of octane ratings, was instrumental in development of the sleeve-valve engine design, and invented the diesel pre-combustion chamber that made high-speed diesel engines possible.

Over the years, he was responsible for significant development in the design of piston engines for a number of applications; derivatives of his original designs are still in production.

He was elected Fellow of the Royal Society in 1929, President of the Institution of Mechanical Engineers in 1944, and knighted in 1949 in recognition of his services to the internal combustion engine industry.

Citation

This four-stroke stratified charge engine, designed by Sir Harry at the age of 17, was built in 1903 and used for pumping water at his family home.

Its success encouraged Sir Harry to a lifetime of engine design and development. President of IMechE in 1944, his thoughts and inventions still contribute to the success of Ricardo today.



Category Engines & Pumps
Awarded 30 June 2010

Location

Ricardo Visitors Centre
Shoreham Technical Centre
Shoreham by Sea
West Sussex BN43 5FG

www.ricardo.com

SR.N5 HOVERCRAFT



Category Maritime
Awarded 13 September 2013

Background

The Saunders-Roe SR.N5 was the first production-built hovercraft in the world, starting sea trials in April 1964. Each craft was 12m in length, fitted with a Rolls-Royce Gnome turbine for lift and propulsion, and could travel at a speed of 70 knots.

In total, 14 SR.N5s were built. Four SR.N5s entered service with the Inter-Service Hovercraft Trials Unit at RNAS Lee-on-Solent for trials and operational missions. Given the military aircraft serial numbers XT492, XT493, XT657 and XW246, these were deployed in the UK, Malaysia, Thailand, Aden, Libya and Belgium. Single SR.N5s were also used by the Sultanate of Brunei and the Canadian Coast Guard.

Seven SR.N5 hovercrafts were also built by Bell Aerosystems under licence in the United States, under the name Bell SK.5. Three of these craft were used by the US Navy in Vietnam in the late 1960s.

Citation

A new way of travelling. Built in 1963 and powered by a 900hp Bristol Siddeley Gnome gas turbine, Saunders-Roe Nautical 5 was the first production hovercraft.

This particular craft was used to demonstrate SR.N5 worldwide and train all the pilots for the Inter-Service Hovercraft Trials Unit based at Lee-on-Solent.

This is the last example in original condition.

Location

Hovercraft Museum
HMS Daedalus
Chark Lane
Lee-on-Solent
PO13 9NY
T 02392 552 090

www.hovercraft-museum.org

THAMES BARRIER



Category Structures
Awarded 14 June 1991

Background

Built across a 523m-wide stretch of the river, the Thames Barrier divides the river into four 60m and two 31m navigable spans, and four smaller non-navigable channels between nine concrete piers and two abutments.

All the gates are hollow and made of steel up to 50mm thick. The gates fill with water when submerged and empty as they emerge from the river. As well as the four central and two outer gates, an additional four radial gates by the riverbanks can be lowered. These gate openings, unlike the main six, are non-navigable.

Before 1990, the number of barrier closures was one to two per year on average. Since 1990, the number of barrier closures has increased to an average of about four per year. In 2003 the barrier was closed on 14 consecutive tides.

The barrier is now operated by the Environment Agency.

Citation

Officially opened in 1984, it is the world's largest navigable flood barrier and incorporated novel and unique engineering design and operation of equipment.

It is vital and effective in London's flood defences as well as being one of the capital's aesthetically pleasing major structures.

Project sponsored by the Greater London Council. Consulting engineers Rendel Palmer and Tritton. Operated by the National Rivers Authority.

Location

Thames Barrier Information Centre
1 Unity Way
Woolwich
London SE18 5NJ
T 020 8305 4188

www.gov.uk/the-thames-barrier

THAMES WATER RING MAIN

Background

The Thames Water Ring Main – formerly known as the London Water Ring Main – was completed in 1994 and forms a complete ring around the major water supply zones in London.

As a key element in London's water supply infrastructure, the Ring Main consists of approximately 80km of concrete pipeline (mostly 2.54m diameter) which transfers over 1,300 million litres of potable water each day from water treatment works in the Thames River and River Lee catchments to the distribution network in London.

The tunnel is directly connected to the treatment works in Hampton, Ashford Common, Walton and Kempton, and allows water to travel in either direction. This means that if any section of the Ring Main is taken out of service, supplies can still be delivered to each area.

Citation

This is a unique water distribution system with a pressurised closed tunnel ring of drinking water, gravity fed from several treatment works.



Category Structures
Awarded 13 July 1994

Location

Throughout London. The Award was presented to Thames Water at its Islington offices.
T 0845 9200 800

www.thameswater.co.uk

TOWER BRIDGE



Category Structures
Awarded 28 April 1987

Background

Tower Bridge's design is based on an idea of a bascule bridge devised by Sir John Wolfe Barry and submitted to the bridge's selection committee by architect Horace Jones in 1878. Construction finally began on the bridge in 1886 and took eight years to complete, with the opening on 30 June 1894 by the Prince of Wales.

The original raising mechanism was powered by pressurised water stored in several hydraulic accumulators. The water, at a pressure of 750psi, was pumped into the accumulators by two 360hp stationary steam engines. The system was designed and installed by Sir WG Armstrong Mitchell & Company from Newcastle. During the Second World War, a 150hp cross-compound engine built by Vickers-Armstrongs was also installed as a precaution against enemy action.

Much of the original operating systems, including the third engine, were replaced in 1974 by a new electro-hydraulic drive system, designed by BHA Cromwell.

Citation

Built to the design of Sir John Wolfe Barry. The whole mechanical construction is unique in the world and the acme of steam and hydraulic power of the Victorian era.

Location

Tower Bridge
Tower Bridge Road
London SE1 2UP
T 020 7403 3761

www.towerbridge.org.uk

VOLK'S ELECTRIC RAILWAY

Background

In 1883 Magnus Volk opened a short 2ft gauge electric railway running 402m between Swimming Arch and Chain Pier in Brighton.

A 50V DC electrical supply to the small car was provided using the two running rails. In 1884 the supply was increased to 160V DC and a power plant was installed at Paston Place. In 1886 an offset third rail was added to minimise current leakage, and the gauge was reset to its current 2ft 8.5 inch.

Although, over the years, the length of the railway has changed, it remains the oldest operating electric railway in the world. The most recent alterations occurred in the late 1990s when the Black Rock end of the line was shortened by 91m to permit a storm water storage scheme to be built.

In 1940, Brighton Corporation took control of the line. However, in 1995 the Volk's Electric Railway Association was formed to help the operator (now Brighton & Hove City Council) promote and operate the line. Today, seven electric cars and one diesel locomotive are in operation, with an additional two electric cars on static display elsewhere.

Citation

The world's oldest operating electric railway, opened 4 August 1883.

Constructed by pioneering electrical engineer Magnus Volk, the line still follows much of the original route.

Continued operation of this railway is a tribute to his life and work.



Category Railway
Awarded 13 July 2013

Location

Volk's Electric Railway
285 Madeira Drive
Brighton BN2 1EN
T 01273 292 718

www.volkselectricrailway.co.uk





THE VICKERS WELLINGTON BOMBER

Category Aerospace
Awarded 19 September 2007

Background

The Vickers Wellington was a British twin-engine, long-range medium bomber designed in the mid-1930s at Brooklands in Weybridge, Surrey, by Vickers-Armstrongs' Chief Designer, RK Pierson. It was widely used as a night-time bomber in the early years of the Second World War, before being displaced as a bomber by the larger four-engined 'heavies' such as the Avro Lancaster.

The Wellington was the only British bomber to be produced for the entire duration of the war. It was popularly known as the Wimpy after J Wellington Wimpy from the Popeye cartoons, and a Wellington 'B for Bertie' had a starring role in the 1942 propaganda film *One of Our Aircraft Is Missing*.

The Wellington was one of two bombers named after Arthur Wellesley, 1st Duke of Wellington, the other being the Vickers Wellesley. The Wellington on display at the Brooklands Museum is a Mark 1A and has two Bristol Pegasus XV111 radial 1,000hp (750kW) engines.

Citation

The Wellington, with its unique geodetic structure designed by Sir Barnes Wallis, was the most technically advanced of the new generation of RAF bombers developed in the mid-1930s. It served throughout the Second World War and pioneered many features used in later designs.

“”

THE WELLINGTON WAS THE ONLY BRITISH BOMBER TO BE PRODUCED FOR THE ENTIRE DURATION OF THE WAR.

Location

Brooklands Museum
Brooklands Road
Weybridge
Surrey KT13 0QN (KT13 0SL for SatNav)
T 01932 857 381

www.brooklandsmuseum.com



**REST OF
WORLD**

ARMSTRONG DISAPPEARING GUN



Category Inventions
Awarded 24 January 2014

Background

The disappearing gun was developed during the later part of the 19th century to give greater protection to the gun crew, especially in the coast artillery role. On firing, the gun carriage enabled the gun to rotate backwards and down into a protected pit where it could be reloaded out of the view and line of fire of the enemy. The disappearing gun used the force of its own recoil to move it down behind the parapet into its protective pit, and a hydro pneumatic system or counterweights were used to store the energy needed to return the gun to its firing position.

The Armstrong Disappearing Gun at Taiaroa Head was manufactured by WG Armstrong & Co at Elswick, near Newcastle upon Tyne, in 1886, becoming operational at its present site in 1889. The Gun was only ever fired in practice during its lifetime, and was decommissioned at the end of World War Two. Today, this Armstrong Gun is the only complete surviving example of its type remaining in the World, taking pride of place within the Otago Peninsula Nature Reserve.

Citation

6 inch Armstrong Disappearing Gun.
Taiaroa Head, New Zealand

Guarding Otago Harbour, this breech loading gun was operational from 1889 to 1919 and pressed into service again from 1941 to 1943. Mounted on a hydro-pneumatic carriage it could fire a 100lb shell out to 8,000 yards.

It was restored to working order by volunteers from the Antique Arms Association and Otago Peninsula Trust.

Location

Fort Taiaroa and the Royal Albatross Centre
1260 Harington Point Road
RD2 Dunedin
New Zealand
T +64 3 478 0499

www.albatross.org.nz

Rest of World

BOULTON & WATT ENGINE

Background

The Boulton & Watt steam engine, preserved at the Powerhouse Museum in Sydney, was built in 1785 and is one of the first rotative steam engines ever built, and the oldest surviving example in the world. The engine was ordered by Samuel Whitbread in 1784 for his London brewery. It was installed in 1785 and remained in service for 102 years.

The engine made its way to the Powerhouse Museum through Archibald Liversidge, an academic at the University of Sydney. The engine was dismantled and shipped to Sydney on the sailing ship Patriarch.

After several years in storage, the engine was erected in its own engine house at the museum's old Harris Street premises. In the 1980s the Technology Restoration Society was formed to raise funds for the engine's restoration. The engine, restored to steaming condition, was installed in the new Powerhouse Museum in 1988.

Citation

The oldest rotative steam engine in the world.

Built in 1785, it powered Whitbread's London Brewery until 1887. James Watt demonstrated this engine to King George III when he visited the brewery in 1787.

This engine marks the start of mass industrialisation and the exponential increase in our use of fossil fuel.



Category Engines & Pumps
Awarded 20 December 2011

Location

Powerhouse Museum
500 Harris Street
Ultimo
Sydney
Australia
T +61 (02) 9217 0111

www.powerhousemuseum.com





BT19 RACING CAR

Category Automotive
Awarded 16 March 2014

Background

The Brabham BT19 F1 racing car was designed by Ron Tauranac for the British Brabham team. It was used by Australian driver Jack Brabham to win his third World Championship in 1966, becoming the first car bearing its driver's name to win a World Championship race.

The car was initially conceived in 1965 for a 1.5 litre Coventry Climax engine. However, when the Fédération Internationale de l'Automobile doubled the engine capacity limit to 3 litres in 1966, Australian company Repco developed a new V8 engine for Brabham. With no time left to develop a new car for the engine, the existing BT19 chassis was modified for the job.

After its success at the 1966 World Championships, the car was effectively retired from serious competition. Jack Brabham also retired from professional racing and moved back to Australia in 1970. He retained ownership of the car until 1976, when it passed into the hands of Repco, which undertook its restoration. Since then the car has made appearances at events around the world, including the Australian Grand Prix and the Goodwood Revival. Today it is on display at the Victorian Historic Racing Register clubrooms.

Sir Jack, who was appointed a Knight Bachelor in 1979, passed away on 19 May 2014, shortly after the presentation of this award.

Citation

Repco Brabham BT19 Racing Car

Sir Jack Brabham AO OBE, Ron Tauranac AO & Phil Irving OBE

Winner of the 1966 Formula One Drivers' and Constructors' Championships, to date the only car to do so bearing the same constructor's and driver's name.

The BT19 with its 310bhp Repco V8 engine was a novel, effective, reliable race car that gave Jack Brabham his third Formula One championship.



THE BT19 WAS THE FIRST CAR BEARING ITS DRIVER'S NAME TO WIN A WORLD CHAMPIONSHIP RACE.

Location

Victorian Historic Racing Register
30-32 Lexton Road
Box Hill
Victoria
Australia

www.vhrr.com

CHARLES A PARSONS N°5 GENERATOR

Background

Charles Parsons was born in Ireland in 1854 and educated at Trinity College, Dublin and Cambridge. His work on steam turbines revolutionised marine propulsion as well as the generation of electricity.

Until the late 19th century, electricity generators were driven by reciprocating steam engines which were large, heavy and could not run at very high speeds. In contrast the steam turbine could run at extremely high speeds and with higher efficiency. This high speed allowed a much greater power output from a generator of a given size. This, coupled with the higher efficiency of the steam turbine, gave reduced costs and enabled the large-scale production and use of electricity that we see today.

The N°5 turbo generator was one of Parsons' early prototypes. Compared to his first model (now in the Science Museum), the number of blades on N°5 was increased and the speed reduced from 18,000rpm to 12,000rpm.

Citation

This was one of the first commercial machines based on the 1884 patent by Charles A Parsons for a steam turbine and used a dynamo as load. Output 65 amps, 100 volts at a speed of 12,000rpm. Presented to Trinity College, Dublin by Gerald Stone, BAI, 1911.



Category Inventions
Awarded 26 June 1984

Location

Parsons Building
Trinity College Dublin
College Green
Dublin 2
Ireland

www.tcd.ie/visitors/sciencesafari/trail/8/

HUMPHREY PUMP



Category Engines & Pumps
Awarded 20 December 2011

Background

The Humphrey Pump was designed and built by Herbert Albert Humphrey MIMechE.

The main advantage of the pump, other than fuel efficiency, was its great mechanical simplicity. It therefore could readily handle difficult conditions, such as muddy or sandy water, yet required minimal maintenance. The main negative features were the need for gaseous fuels and that it could only readily operate from water sources where the water level did not change.

Few Humphrey Pumps were ever built and deployed. Today, only two Humphrey Pump installations remain in the world – Cobdogla in Australia and Chingford in England.

The Humphrey Pump at Cobdogla was installed in 1927 and served the town until it was decommissioned in 1965. It was restored by E&WS in 1985 to mark the 150th Jubilee of South Australia and it is the only working Humphrey Pump left in the world.

Citation

A four-stroke engine with no pistons or crankshaft, Humphrey's ingenious invention patented in 1906 acts directly upon the water it pumps.

This gas-fuelled example, built by William Beardmore & Co, served Cobdogla from 1927 until 1965.

Restored in 1985, it is the only working Humphrey Pump in the world.

Location

Cobdogla Irrigation & Steam Museum
Trussell Terrace
Cobdogla S.A. 5346
Australia
T +61 (08) 8588 2289

www.murrayriver.com.au/cobdogla/events

LOCOMOTIVE N°1

Background

Locomotive N°1 was one of four locomotives that arrived by sea from the manufacturer, Robert Stephenson & Company in Newcastle upon Tyne, in January 1855 for the Sydney Railway Company. The design for Locomotive N°1 was a 0-4-2 mixed traffic variation of a 0-6-0 fast goods locomotive that had been supplied to the London & North Western Railway in 1854.

A common misconception is that Locomotive N°1 hauled the first train on the New South Wales Railway in 1855. In fact, Locomotive N°1 was in need of maintenance that day and its identical sister, Locomotive N°3, worked the first passenger train from Sydney, followed by the official train hauled by Locomotive N°2.

Locomotive N°1 was withdrawn from service on 15 March 1877 due to an accident that bent its main frame. Locomotive N°2 remained in service until 1879.

Citation

The oldest surviving steam locomotive in Australia.

Built by Robert Stephenson & Co in 1854, this is the only locomotive designed by James McConnell, one of the founders of the Institution of Mechanical Engineers, to have been preserved.

Locomotive N°1 symbolises the transformation of social, industrial and commercial life in New South Wales through British railway technology.



Category Railway
Awarded 20 December 2011

Location

Powerhouse Museum
500 Harris Street
Ultimo, Sydney
Australia
T +61 (02) 9217 0111

www.powerhousemuseum.com

Rest of World

MS YAVARI



Category Maritime
Awarded 14 March 2012

Background

In 1861, the Peruvian Government ordered a 300-ton gunboat/cargo vessel from Great Britain for use on Lake Titicaca. This order was subsequently changed to two 150-ton ships: the Yavari and the Yapura. Both were designed at the James Watt Foundry in Birmingham and built by Thames Ironworks & Shipbuilding.

In 2,760 individual parts, the two ships were built in their entirety, disassembled, packed and shipped to Arica, arriving 15 October 1862. The crates travelled by train to Tacna, where they were unpacked and carried by mules and porters to Lake Titicaca over a six-year period. The Yavari was reassembled and launched on 25 December 1870. In 1895 the ship was enlarged and a new engine was installed. Additional changes were made in the 1950s to convert the Yavari into a tanker.

In 1987, the Yavari was rescued by Meriel Larkin, who helped restore the ship and opened it to the public.

Citation

MS Yavari: The world's oldest iron kit-built ship.

Designed by James Watt & Co and built in 1862 by the Thames Ironworks & Shipbuilding Co, she was assembled on the shores of Lake Titicaca, Peru and launched in 1870.

Now powered by a 1914 4-cylinder Bolinder hot bulb semi-diesel engine producing 320bhp at 225rpm, *MS Yavari* is an enduring symbol of the ingenuity and global reach of British engineering.

Location

Puno Bay
Lake Titicaca
Peru
T +51 5136 9329

www.yavari.org

LISTED STATUS AWARDS



BANCROFT MILL



Category Sites & Societies
Awarded January 2014

Background

If there was one type of steam engine that could be described as the standard later mill engine, it was the Horizontal Cross-Compound. They were built in all sizes from 12hp (Robey) up to 4,000hp (Hick Hargeaves) and they powered every type of mill and process. The engine surviving at the Bancroft Mill site is typical of the genre. Built by William Roberts & Sons of Nelson in 1920, it developed 600ihp at 68rpm and powered the weaving shed of James Nutter, the 13th and last mill to be built in Barnoldswick.

The engine displays all the features of a sophisticated late horizontal engine with Corliss valve cylinders of 17 inch diameter (high pressure cylinder) and 34 inch diameter (low pressure cylinder) with a 48 inch stroke. Running on steam at 160psi, and controlled by a Lumbs governor, the engine drove the mill through cotton ropes from its 30 ton flywheel.

The engine and mill ran without interruption for 58 years, producing high-quality cotton cloth until December 1978 when the last orders were woven out and the mill closed. In its heyday 200,000 yards of cloth could be produced in a week.

Following its closure, the mill buildings and machinery were sold and demolished but, at the 11th hour, proposals were put forward to preserve the engine in its house, boilers, boiler houses, and the chimney. In 1980 the Bancroft Mill Engine Trust was formed allowing the public to visit and see the superb William Roberts engine running under steam at its design speed.

Location

Bancroft Mill
Gillians Lane
Barnoldswick
BB18 5QR
T 01943 602 118

www.bancroftmill.org.uk

Listed Status

COLEHAM PUMPING STATION

Background

The Coleham Pumping Station was built at the end of the 19th century as part of a major upgrade to the sewerage system of Shrewsbury. Two steam-driven beam engines, built by Renshaw of Stoke-on-Trent, were completed in 1897–1898 with a new engine house, resembling a Victorian chapel in style, constructed in 1900. The mayoress of Shrewsbury officially opened the pumping station in 1901.

The station operated successfully for many years until the decision was taken to replace the steam-powered pumps with new electric pumps in 1970. In 1974, ownership of the pumping station, including the building, engines and grounds, was transferred to Shrewsbury and Atcham Borough Council.

The Shrewsbury Steam Trust was founded in 1992 with the aim of restoring the two steam engines and the two coal-fired Cornish boilers that provided the steam. The first boiler was commissioned in 2002 and the second in 2004, allowing the Society to hold 'steam-up' days at the pumping station.

Both steam engines are often seen running together on the several open days that are held at the museum each year.



Category Sites & Societies
Awarded March 2014

Location

Coleham Pumping Station
Longden Coleham
Shrewsbury SY3 7DN

www.colehampumpingstation.co.uk

HINDLEY STEAM ENGINE

Background

This Hindley steam engine, built by Hindleys of Bourton, Dorset in 1866, was installed at the Gillingham Brickworks where it drove a pug mill until 1934. When the brickworks closed in 1968, the engine was acquired and subsequently donated to the Sherborne Steam & Waterwheel Centre in 2006.

The Sherborne Steam & Waterwheel Centre is based at the Castleton Pumping Station which was inaugurated in 1869 to help reduce deaths in the locality from waterborne disease. In 1876 a Hindley steam engine and boiler were installed to boost the waterwheel's output. With the arrival of electric borehole pumps in the mid 20th century, the engines and boilers were scrapped. The waterwheel and wheelpit remained as they were considered too costly to remove. These were refurbished 2008.

The Hindley steam engine at the Sherborne Steam and Waterwheel Centre is no doubt similar to the original engine installed in 1876 although details of the original tender give different strokes. It is a good example of the simple, robust, small steam engine built by local manufacturers and used in every sort of application.



Category Engines & Pumps
Awarded December 2012

Location

Sherborne Steam & Waterwheel Centre
Castleton Pumping Station
Osborne Road
Sherborne
Dorset DT9 3RX
T 01963 250 206

www.castletonwaterwheelmuseum.org.uk

HOLGATE WINDMILL



Category Sites & Societies
Awarded September 2013

Background

Holgate tower windmill was built in 1770 of brick stones by its first owner and miller, George Waud. The mill was originally fitted with five roller reefing sails, although these were later replaced by double patent sails. In 1841, the mill was described as having three pairs of French Burr millstones, two dressing machines and five patent sails. A fourth pair of stones had been added by 1858.

In 1859 a new granary was built, and a steam engine installed to make the mill more profitable. An extra floor was also built to raise the mill to its present height. However, by 1933 all milling at Holgate had ceased.

Over the years, extensive restoration work has been undertaken to preserve and restore Holgate windmill to its original condition. By 2011, five new sails were fitted, with shutters added the following year. In April 2012, powered by the wind, the sails turned for the first time since 1930. The official opening of the now restored mill took place on 23 June 2012.

Today, Holgate Windmill stands as a fine example of a late 19th century five-sailed tower windmill that can be visited by the public and is regularly in operation.

Location

Holgate Windmill
43 Windmill Rise
York YO26 4TX
T 01904 799 295

www.holgatewindmill.org

THE 'MARSHALL' ENGINE

Background

The Langford pumping station, built by the Southend Water company in the early 1920's, is now home to the Museum of Power. The station was designed to provide drinking water to Southend-on-Sea.

The station originally contained two steam-driven inverted vertical triple expansion engines (named Francis and Brassey) which were manufactured and installed by the Lilleshall Company Ltd, each with a pumping capacity of between 4m and 4.4 million gallons per day. The engine house was built to house a third engine that was installed in 1931 and named 'Marshall'. It is the sole survivor of the three with Francis and Brassey being scrapped in 1964 when the station closed.

'Marshall' has three cylinders at 20 inch, 35 inch and 56 inch. The stroke is 42 inch with each piston rod being 5 inch in diameter. The steam cylinders are double acting and are fitted with drop valves for both steam and exhaust. The inlet valves on the high pressure cylinder are controlled by the governor, which maintains the engine at approximately 32 revolutions per minute.



Category Engines & Pumps
Awarded December 2012

Location

Museum of Power
Hatfield Road
Langford
Maldon
Essex CM9 6QA
T 01621 843 183

www.museumofpower.org.uk

PRICKWILLOW ENGINE MUSEUM



Category Sites & Societies
Awarded August 2014

Background

Prickwillow has been home to a pumping station since 1831. The station's role was to pump water from a part of the Cambridgeshire Fens that lies below sea level up into the River Lark, a tributary of the Great Ouse.

In 1924 the Middle Fen and Mere Internal Drainage Board upgraded the station with the installation of the Mirrlees Bickerton & Day engine and its Gynnes pump. The engine itself is a five-cylinder 250bhp air-blast injection unit running at 250rpm. The Mirrlees is almost identical to the original engine designed by Dr Rudolf Diesel and built by MAN at the end of the 19th century. Mirrlees Bickerton & Day bought the UK rights to this design.

The Mirrlees operated as the main duty engine until 1957, when the village was connected to the National Grid and its duties were taken over by an electric pump. The Mirrlees continued operating as a stand-by unit until 1980, when a crack in the suction stop prevented its continued use as an operational pump set.

In 1982, the Prickwillow Engine Trust was formed to preserve and maintain the engine in its original setting. The museum is staffed entirely by volunteers with the exception of a part-time curatorial advice and education officer, who has developed and operates a module for primary school visits. As an organisation that has always operated within the voluntary sector, Prickwillow Engine Museum presents an efficient but adaptable and user-friendly face to the public, that is much appreciated by its visitors.

Location

Prickwillow Engine Museum
Main Street
Prickwillow
Ely CB7 4UN
T 01353 688360

www.prickwillow-engine-museum.co.uk

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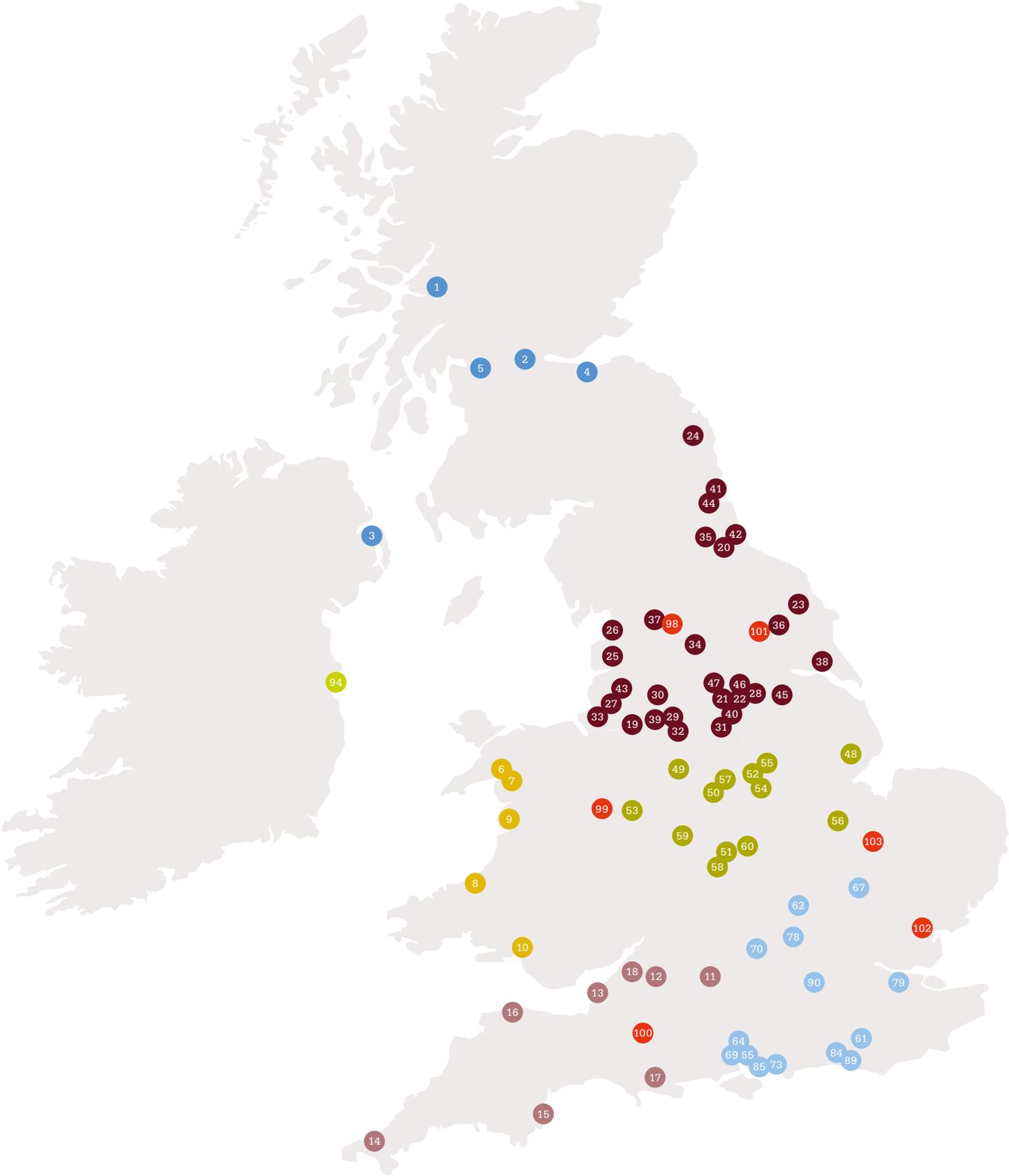
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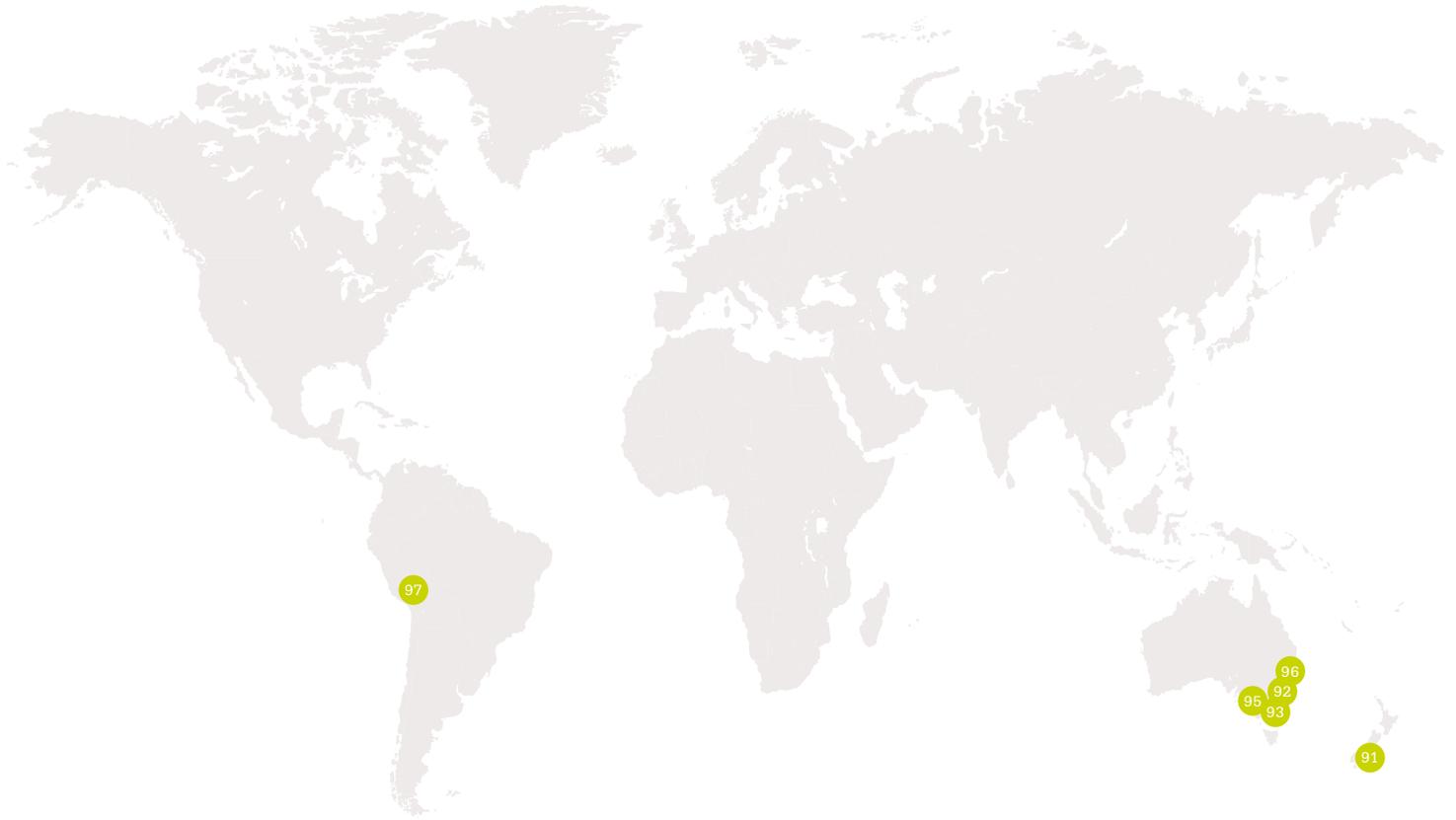
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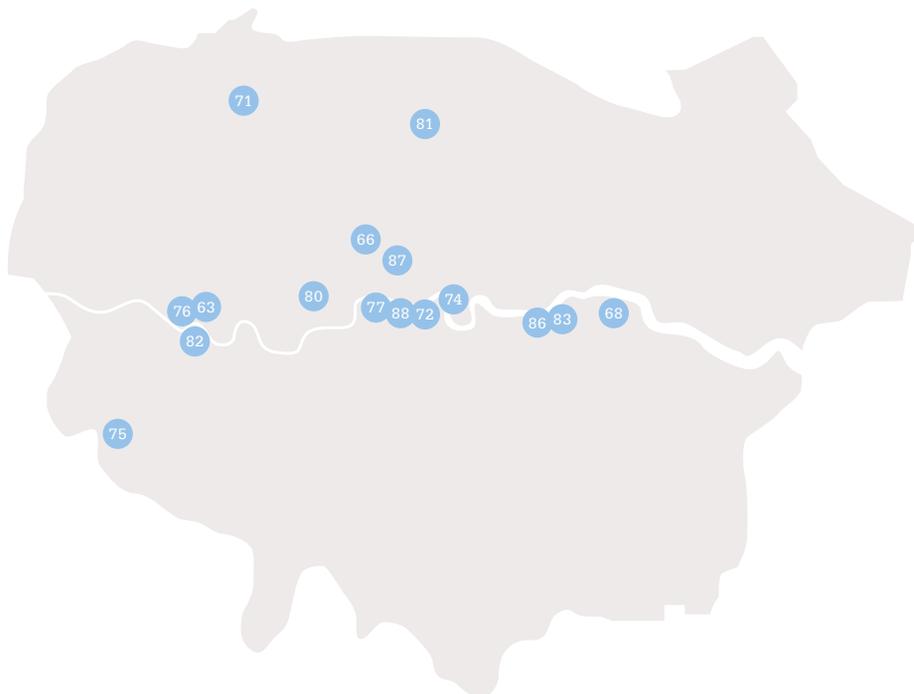
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Cover image

The front cover features the Old Furnace at Coalbrookdale, considered by many to be the birthplace of the Industrial Revolution.

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**Institution of
Mechanical Engineers**

1 Birdcage Walk
Westminster
London SW1H 9JJ

T +44 (0)20 7304 6862
F +44 (0)20 7222 8553

heritage@imeche.org
www.imeche.org/eha