WARWICKSHIRE Industrial Archaeology Society

WIAS

NEWSLETTER

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FROM THE CHAIRMAN

By the time you read this Newsletter, we will have launched our Winter Series of Meetings delivered via Zoom only. It is remarkable how the online meeting has now become such an acceptable part of many Societies' programmes, although the in-person meeting remains the favoured option for many. WIAS is unusual in seeking to present the hybrid meeting (in-person with simultaneous delivery online) in our Autumn, Spring and Summer programme, and I would like to emphasise the skills, patience and commitment of David Daniel and Victor Lobb in making these hybrid meetings work. Numbers attending these meetings have remained encouragingly high, and we plan to continue the 7/3 split between hybrid and zoom-only meetings.

Amongst the Christmas post came the latest edition (volume 45 No. 2) of the Association for Industrial Archaeology's Review. This is scholarly publication, with eminent articles covering research of, and investigation into, sites across the UK, and increasingly in recent years, from abroad. The current edition, for example, has an article on 'Archaeological Investigation and Industrial Heritage Study of the Wanshan Mining Site in Guizhou Province, China', together with a shorter notice on 'Industrial Heritage in the Czech Republic'. Alongside, the UK is represented by articles on 'The Offerton Hat Works and Stockport's Felt Hat Industry'; 'Park Glasshouse, Birmingham – A Site of 19th. Century Innovation'; 'White Lead Processing at the Chester Leadworks'; and The History and Archaeology of Hendon Sidings Enterprise Zone, Port of Sunderland'. All these articles are noted for their sophisticated research skills and techniques, for example, the scientific examination of glass waste at the Park Glasshouse site permitting conclusions to be drawn concerning the process of innovation on that site.

Of course, the AIA also publishes the quarterly IA News. This contains current news and information from the world of industrial archaeology in the UK and elsewhere. Regularly featured are reports from members and correspondents, news items, letters, notices of new publications and a diary of forthcoming events. It is this journal that has featured items concerning Warwickshire's industrial heritage and the work of WIAS.

All this reminds one that the industrial archaeology movement is a broad enough church to embrace the finest academic research as well as the work of groups such as WIAS, where intimate local knowledge and experience is such a valuable asset. Indeed key individuals in those societies have taken the lead in the wider movement. The AIA and the Ironbridge Institute have given greater academic rigour and sophistication to the subject, but also always acknowledges the efforts of local societies, and it is within that framework that we look forward to celebrating (with some pride) 35 years of WIAS in the Summer of 2024.

This has caused me to reflect once more on the ways in which Warwickshire's industrial archaeology might be marked out as significantly different from those of other counties, and that a timely reminder of those features might be in order:

• A complex geology offering a range opportunities for exploitation by man for construction materials and power supplies, with several of these industries (e.g. cement, sand and gravel) still functioning, although the last coal mine closed in 2014.

• The area possesses some very early examples of the development of canal and rail transport in England, with some unique features.

• The development of (initially) domestic or workshop industries, particularly ribbon weaving, hat making and watchmaking, with a distinct industrial community in Chapelfields, Coventry associated with the latter.

• A hugely significant role in the development of cycle, motor-cycle, and motor industries (and their ancillary trades), with three major museums devoted to that heritage, together with the Midland Air Museum recognising the area's contribution to the aviation industries.

• The very high concentration of manufacturing industry in Coventry, with a range of industries represented e.g. machine tools, telecommunications, aeronautical engineering, armaments, artificial fibres.

• As well as being a 'railway town', the importance of Rugby in terms of the development of electric power and engineering, with two firms dominating the story – Willans and Robinson and British Thomson Houston (and their subsequent company structures).

• The industrial communities of Nuneaton and Bedworth, based on mining, quarrying and textiles, together with their subsequent post-industrial experience

• The agricultural landscape that covers much of the county and the links that were developed between industry and agriculture, particularly in terms of buildings, vehicles and machinery

• Interesting examples of the provision of power via wind and water, as well as public works such as gasworks and waterworks

Warwickshire has a proud industrial heritage and WIAS has played no small part in gaining a fuller knowledge and understanding of that heritage.

PROGRAMME

11 January 2024 (zoom): Elizabeth Thomson
Brickmaking and the Development of Canals in the Black Country.
8 February (zoom): David Skillen
Starfish, Stripes, Decoys and Dummies. Camouflage and Deception at War.
14 March (live/hybrid): Terry Merrygold
Sir William Lyons: The Great Opportunist.
11 April (live/hybrid): Mark Davies
The Work of the Chance Heritage Trust.
9 May (live/hybrid): David Daniel
Guns and Cars - BSA's Motoring History.
13 June (live/hybrid):
Celebratory Event for 35 Years of WIAS.

Meeting Reports

September 2023: AGM and 'Twenty's Plenty
Members' Evening

Following the 2023 AGM we had three short talks. The first was by **Martin Woolston** whose title was 'A talk on Talks'.

He started by suggesting that there were three categories of talks:

1. Learned and professional.
2. Amateur meetings for an enthusiastic membership (such as WIAS).
3. General Subjects.

And there were now three forms of delivery: Live, Internet eg Zoom and Hybrid.

Focusing on amateur meetings such as WIAS. Martin listed the duties and responsibilities of the Speaker, the Chair and the Audience. Most of the points made were familiar to the audience, for instance that the speaker should face the audience and not look back at the screen except when using a pointer. It was good, however, to have these points reiterated.

He mentioned some matters specific to recorded or zoom talks such as the need not to move away from the lectern to avoid disappearing off camera, which even experienced speakers need to remember.

Martin concluded by wondering if live talks were in peril and whether zoom talks would oust them – he hoped not.

Our second speaker was **John Willock** who had brought a splendid brass maker's plate. At about 30 inches long it was quite the largest most of us had ever seen. It had been spotted at vast jumble sale at Beaulieu and John described the process of acquiring it and the need to be sure it was genuine.

Investigating the names on the plate John's researches had revealed that the Southwark Foundry and Machine Company was a well estabished business in Philadelphia manufacturing steam engines and particularly blowing engines for working blast furnaces. The company was later aquired by the giant Baldwin Locomotive Works.

Richardsons Westgarth & Co Ltd were one of the largest builders of marine engines in the world, established in Hartlepool in 1846, by 1900 they were employing some 2000 people.

As many will know, the George Watkins Archive with its vast collection of photographs of stationary engines, built up over 40 years, is held by Historic England. By good fortune Watkins had recorded the very engine from which the plate had come; no 236 was constructed in 1903 for the Appleby Frodingham iron works at Scunthorpe. The engine was about 30 feet tall with 42 and 84 inch diameter high and low pressure cylinders and a 60 inch stroke, each coupled to an 84 inch cylinder. It worked at 35 rpm to supply air to the blast furnace. John thought that the 'quarter crank' was probably to do with supplying an even flow of air to the furnace.

The engine operated until the late 1940s but remained in place until 1960 before it was scrapped. The magnificent brass plate is now all that is left.

To round up the evening our Chairman, **Martin Green**, told the stories of three men. Bradley, Roberts and Green may sound like a firm of solicitors, but their common link was town gas.

The image of Warwick Gas Works on the Saltisford Road has been the symbol of WIAS since its inception. Opened in 1822, it is one of the earliest gas works in the world and is maybe the oldest surviving gas works building anywhere. Martin showed us a succession of images and plans of the works, including the 1851 Board of Health Plan, as the site grew through the nineteenth century. Production ceased in 1956 and the buildings decayed. They have recently been converted to apartments.

The two octagonal buildings at either end of the elegant frontage on the main road contained the gas holders until it was realised that in the event of an explosion the flying masonry would cause much more damage than would be caused by the iron gasometers within.

The works were designed and engineered by the first of the trio, Joseph Bradley, who also designed many other gas works including those at Coventry and Northampton. The National Gas Museum at Leicester has a scale model of the Northampton works and we could see features similar to the buildings in Warwick.

Joseph Bradley's connection with Warwick continued; in 1825 he bought a block of land between Rugby and Warwick Place from Bertie Greatheed with the intention of developing it as Bertie Circus with 12 large properties around a central circle. Only two of these were built and the land was sold after Bradley's death in 1830.

The second member of the trio was Thomas Roberts. He was a millwright and foundry owner who built a gas works for Leamington in 1819. He had trouble raising money and the venture did not prosper, losing out to the Saltisford Works at Warwick which supplied gas through a three-mile-long pipe to the New Town which the Warwick Gas Company had built in 1823.

Charles Green, a celebrated balloonist, was the last of the three. Early balloons had been filled with hydrogen but Green realised that coal gas would be much more economical. His first ascent was on the occasion of the coronation of George IV in 1821. This balloon was 50 feet high and 107 feet in circumference and took three hours to fill. He made an ascent from Leamington in 1824 which was said to have attracted 15 to 20 thousand people who saw him disappear into the clouds. A few weeks later he made another ascent when he spontaneously gathered up a 14-year-old girl (actually prearranged) as a passenger. They landed near Lutterworth to the amazement of two labourers who were so shocked that they fainted.

October 2023: Victor Riley
The Riley Story.

For our October meeting we were privileged to have Victor Riley, grandson of William, the founder of the cycle business which was to become Riley cars.

The Riley family have been in Coventry since at least the sixteenth century, first as weavers, then in the silk trade and ribbon manufacture.

After a short-lived boom during the Franco-German war in the 1870s, when imports from Europe were suspended, trade collapsed and William (1851-1944) took good advice and started manufacturing bicycles.

William had five sons, the third, Percy, was described by Victor as an inventive genius. On leaving school Percy built a car, keeping it secret from his father who he knew would disapprove. By 1898 it was complete and Percy wondered how to demonstrate it. His older brother, Victor, suggested driving it to Stratford and back to demonstrate how much speedier this would be compared with bicycle. Percy and Victor did this and averaged 20 mph. Percy then installed an engine into a bicycle but neither of these convinced his father of the future of powered vehicles. William was even less impressed after he was persuaded to try a powered tricycle, lost a wheel and crashed into a sweet shop.

Against their father's wishes, three of the brothers pooled their resources, borrowed £39 from their mother and, in 1903, set up the Riley Engine Company. Initially they made engines for motor cycles.

By then William had converted his bicycle business into one making detachable spoked wheels for numerous other motor manufacturers and had been persuaded that there was a future in motor cars.

in 1906 the brothers built the first Riley 9. This was well received and over the next few years they went on to make a variety of models .

The First World War saw four of the brothers remaining in Coventry, directed to make war material, while the youngest, Cecil, joined up. The company made all sorts of munitions including aero engines and in 1916 they moved into larger premises at Foleshill.

Post war the brothers were all busy; Victor, the oldest, was running Riley (Coventry) Ltd at Foleshill; Alan was running the Midland Motor Body Co; Percy, the Riley Engine Co. Stanley was working with Percy designing chassis and bodies while Cecil, released from the RFC had various roles including the Competition Department.

By the mid 1920s Riley had built a reputation for quality and reliability. Twenty Riley cars took part in the 1925 London to Edinburgh Run; 18 finished winning 16 gold medals and two silver and, at a dinner for drivers and passengers to celebrate the success' it was decided to form a Riley Owners Club with William Riley as President.

In 1924 Percy and his brothers had designed and built a new Riley 9 but pressure of other work had caused it to lie in store until in 1926 when Victor took it to a rally in the Cheddar Gorge. There, it caused a sensation with so much interest that Victor wired his father, William, to call an urgent Board meeting. The Riley 9 was recognized as a great advance in light car design and orders came in such quantity that for a while there was a two year waiting list.

Parry Thomas was developing a racing model until his death while endeavouring to break the world speed record. Reid Railton took over and the Brooklands 9 model won race after race through the early 30s both at Brooklands and TT events, as well as in long distance rallies including the Alpine Rally and the Monte Carlo where, in 1931, they won the light car class.

Victor related a hairy story of one race at Brooklands when the driver became aware that the number plate on the front of the car had worked loose. Rather than pull in to the pits to fix it the mechanic crawled forward on the bonnet with the driver managing to hold the mechanic's ankle with one hand and keep the car racing with his other hand on the wheel. Number plate fixed, the mechanic scrambled back into the cockpit and the car kept its place in the race.

The marque's greatest success was in the 1934 Le Mans 24 hour event when six Rileys were entered, finishing 2nd, 3rd, 5th, 9th, 11th and 13th. The car finishing 13th was driven by our speaker's mother who had been ordered by the team manager not to overtake other members of the team. She believed, that if she had not obeyed, she could have done better.

Over the years 1928 to 1937 Riley were building about 100 Riley 9s per week and a typical price was £300.

In 1936 Rileys considered building BMW cars under licence. Victor visited the plant in Eisenach and was shown around but was puzzled when a section of the factory was kept from him. When he asked, he was told that they would need permission from Herr Hitler before they could take him in there. Realising the significance, he reported back that there would be war soon. How right he was.

However, financial difficulties in the late 30s made Riley accept Lord Nuffield's offer to acquire the Company on the condition that the design and production would stay with the family; Nuffield would be providing a 'financial umbrella.'

1939 saw the outbreak of war and Riley turned their attention to making precision parts for such as Rolls Royce Merlin engines.

They also designed a greatly improved propulsion unit for torpedoes which until then had been so slow that they could be easily evaded.

In the middle of the war Rileys were given permission to work on the design for a post war car which resulted in the elegant and highly successful 1½ and 2½ litre saloons which continued to be produced until 1955. By that time Austin and Morris had amalgamated.

The 1960s and the introduction of 'Badge engineering' destroyed Riley and towards the end of 1969 they ceased to be produced.

Victor had kept the audience enthralled throughout his talk and concluded by telling us about The Riley Cars Archive Heritage Trust which has a unit at the Coventry Canal Basin where they have on display one of the two Riley bicycles known to have survived as well as a replica of Percy Riley's 1898 car. It is staffed by a small group of volunteers and welcomes visitors from Tuesday to Saturday.

November 2023: Chris Clack
Harry Ferguson: Man of Vision.

Chris Clack, a long time employee of Massey Ferguson, kept us enthralled with his knowledge of this remarkable man and the revolutionary developments that he had instigated.

Harry Ferguson was born in 1884, one of eleven children from a farming family in County Down, Ulster. After leaving school he soon found that he did not enjoy manual work, particularly following horses and steering a plough and at 18 he joined his brother in a car repair business.

The first sign of his extraordinary practical genius was when, with his brother, and inspired by the new technology of powered flight, he designed and built the first aeroplane to be made in Ireland and in 1909 he became the first man in Ireland to achieve powered flight.

In 1911 Ferguson was in business selling cars and tractors and soon realised the advantage of mounting implements directly onto the tractor rather than towing them behind as trailers. He designed and put into production a plough, which he named the Eros, that could be mounted directly onto a Model T Ford car with an early form of three point linkage.

The principal disadvantage and cause of many accidents in towing rather than directly mounting a plough on to a tractor was that if the plough struck a substantial obstacle such as a rock or a root the tractor could rear up or even turn over backwards. Drivers had even been killed by this. A limited counter to this lay in extending the main mudguards back and down sufficient to prevent the tractor completely overturning.

Mounting the plough directly on to the tractor effectively prevented overturning as if the plough struck an obstacle compressive force was transferred to the top link and hence forcing the front wheels down while the back wheels would spin. The driver could then back off, lift the implement clear of the obstacle, move on and lower it to continue.

Another important advantage of directly mounted ploughs was that they could be worked right into the corners of fields, which was impossible with either horse drawn ploughs or trailed implements. This was particularly important in small fields which were the norm in much of Ireland and large parts of England. A further advantage was in improving traction by effectively increasing the weight of the tractor.

During the 20s and 30s Ferguson made further improvements to the system, notably ‘draught control’, a hydraulic arrangement which kept the plough at constant depth on uneven ground. In 1936 his company went into partnership with the David Brown Company to build tractors with these devices.

Harry Ferguson’s mission in life was to make farming more productive and to feed the world more effectively. As he said in 1943, “Agriculture should have been the first industry to be modernized, not the last.”

In 1938 he took a Ferguson Brown tractor to Dearborn and demonstrated his system to Henry Ford, the largest car maker in the world. Ford agreed to incorporate his ideas in his tractors and on the strength of a handshake they went into partnership. This lasted through the Second World War and until Henry Ford’s death. However, his grandson, Henry Ford II, ended the agreement in 1947 but continued to use some of the patented features. Ferguson sued the company and the case lasted for four years before it was settled out of court for nine million dollars.

In 1946 Sir John Black of the Standard Motor Company agreed with Ferguson to manufacture tractors at the shadow factory at Banner Lane on the outskirts of Coventry. Standard Motors had been making Bristol Hercules engines there for heavy bombers but with the end of the war the factory was redundant. The Standard Company began to produce the TE tractors, the iconic ‘little grey Fergies’. Two hundred were made in 1946 and 20,000 in 1947. 90% were for export, desperately needed to help pay for war time debts. In all, over half a million were made during the next ten years.

Harry Ferguson Ltd amalgamated with the Canadian firm, Massey Harris in 1953 to become Massey Harris Ferguson, later just Massey Ferguson and they took over the lease of Banner Lane in 1956. The factory continued to build tractors until 2002.

While most if not all of the WIAS audience probably knew that Harry Ferguson and tractors went together but many of us knew less of Ferguson’s connection with four wheel drive.

In the 1930s Freddie Dixon, a successful racer of mororcycles and cars, concerned by the number of accidents, designed a car with four wheel drive and four wheel steering but the war started before it could be properly developed.

Post war, in partnership with the racing driver Tony Rolt, as Dixon-Rolt Developments, they built a prototype. This car was the first to have seat belts and a collapsible steering column, it was ten years ahead of Saab or Volvo, but manufacturers were not interested.

To develop it further Dixon and Rolt approached Ferguson to see if he would invest in the project. Ferguson used part of his money from Ford to buy the company and renamed it Harry Ferguson Research Ltd. Various prototype road cars were built including two estate cars and a saloon but no manufacturers would take up the system.

The problem with four wheel drive was that besides a differential on the back axle and another between the front wheels a third one was needed between the back wheels and the front wheels.

This third unit needed to be normally unlocked except when wheelspin occurred when it needed to lock. The problem was ultimately solved by the development of a viscous coupling. This system, the Ferguson Formula, is now used on nearly all four wheel drive vehicles including Audi and Land Rover.

In 1959 work started on an experimental Grand Prix car, the P99, which was to have considerable success. Unfortunately, Harry Ferguson died before it was complete. It was suggested that the strain of the four year court case with Fords had damaged his health.

Harry’s son-in-law, Tony Sheldon, became the new Chairman with Tony Rolt continuing as Technical Director. In 1994 Ferguson Research Ltd was finally taken over by Ricardo Plc, based in Leamington.

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FROM THE CHAIRMAN

Throughout the time that WIAS has been in operation, the monthly meeting has been at the heart of the activities of the Society. Each meeting, of course, often brings a flurry of interest and contributions from members and others who have something to add to the topic covered in the meeting. This was my own experience after the June 2023 meeting on NCJoseph and The Aluminium Works, Stratford upon Avon.

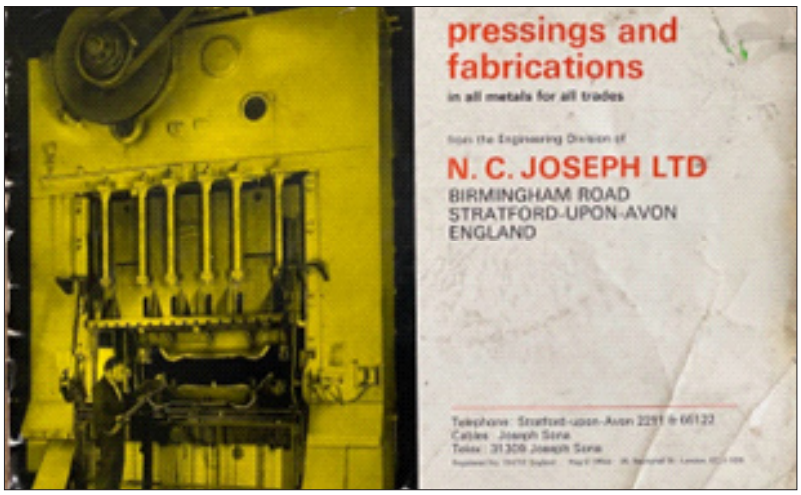
The project had a strong Joseph family interest and there was much talk of whether we should try and produce a publication on the subject for the benefit of the family (and others). Given that so much family information was unearthed, Brian Joseph (grandson of Barney Joseph, one of the founders of the company) decided to progress this idea and took the initiative to produce a book for private circulation.

Coincidentally, an article appeared in the Stratford Herald suggesting a possible re-union of former Joseph employees, an initiative led by Peter Vale-Humphreys. Contacts were made and a re-union was organised and over 40 former employees attended, including 95-year old Ray Handy who had joined the company in 1942. After outlining to the meeting some of the material that Brian and I had discovered about the company, there was an opportunity for individuals to tell their own stories, led by Ray Handy. Several brought along memorabilia, including catalogues and a wonderful collection of photographs of the works in action.

It was a memorable occasion and the camaraderie that had developed via many years of working at Josephs was a pleasure to witness. This inevitably led to a desire to record some of these stories and so we are embarking on an oral history project to try and give a fuller description of the experience of working at the company, and, perhaps – one day – a book for wider distribution may be produced.

This was followed a fortnight later by a talk given to Stratford Rotary Club and it came as quite a surprise to me that very few of those present had any knowledge of the Joseph firm and its importance to the industrial history of the town. All the premises are now demolished, so no industrial archaeology remains as such, but the industrial heritage is embodied in the products made, the surviving photographs, the memorabilia collected and the personal memories of those who worked there. It is an important story that needed to be told.

So if there is anything in a WIAS meeting that particularly arouses your interest, or is something to which you could add your own knowledge and/or experience, please get in touch. There are probably members of WIAS out there who will share your interest and might even wish to embark on some research together. You never know where it might lead ...



Ray Handy, Brian Joseph & Peter Vale-Humphries at the re-union.

PROGRAMME

14 March (live/hybrid): Terry Merrygold
Sir William Lyons: The Great Opportunist.

11 April (live/hybrid): Mark Davies
The Work of the Chance Heritage Trust.

9 May (live/hybrid): David Daniel
Guns and Cars - BSA's Motoring History.

13 June (live/hybrid):
Celebratory Event for 35 Years of WIAS.

All meetings are on the second Thursday of the month and start at 7.30 pm.

Live/hybrid meetings meetings are held in the
Warwick Prep School Hall CV34 6PL
with a simultaneous delivery online via zoom.

Meeting Reports

December 2023 (zoom): Alan Hill
Milestones in Marine Steam Technology.

For our December meeting, the first of this season's zoom only meetings, we had a fact packed account of the evolution of marine steam power.

Alan began by stating how the advent of steam ships brought continents closer, noting that in 1800 a sailing ship could cross the Atlantic in four to eight weeks whereas by 1850 a steam ship could reliably make the voyage in just two.

The first practical steam powered boat was the *Charlotte Dundas*, designed by William Symington, built in 1803 and powered by a modification of a beam engine. Four years later Robert Fulton built the *Clermont* which is considered the first successful commercial steam powered vessel. With an engine by Boulton and Watt and paddle wheels on each side she operated on the Hudson River in New York.

In 1812 Henry Bell built the *Comet* to operate on the Clyde which she did successfully but all these vessels were operated on canals or calm waters and needed fresh water to feed their boilers. Nevertheless, the potential advantages of steam were clear and several ships were built exploring the new technology. The American built *PS Savannah* crossed the Atlantic in 1819 in 27 1/2 days, using her engines for 85 hours.

It needed the imagination and drive of Brunel to take the next big step. The *SS Great Britain*, at the time the largest ship ever built, was originally planned to have paddle wheels either side but Brunel was persuaded by observing the *SS Archimedes* to abandon the paddle wheel and fit a screw propellor. The engine which was intended to drive the paddle wheels was too slow for a propellor and to gear it up Brunel devised a 3 to 1 giant chain drive which also brought the shaft down to an appropriate level for a propellor.

Early experiments with propellors had shown that, contrary to expectations, a full turn or more of the screw (based on the Archimedes screw pump) was less efficient than simple blades like a windmill. However, early propellors were unreliable with cast iron breaking and fabricated versions shedding blades before the modern phosphor bronze propeller was developed. Wisely most ships still had masts and sails to use when the wind was fair or the engine inoperable.

Alan described how the British Navy took some time to be convinced of the superiority of the screw propellor. In 1845, they set up a trial between two similar ships the *Rattler* and the *Alecto*, the former with a propellor and the *Alecto* with paddle wheels. The *Rattler* won convincingly, towing the *Alecto* backwards at walking pace.

Furthermore, in rough seas with the ship rolling there was a great strain on the shafting as one wheel or the other lifted out of the water and a paddle provided a perfect target for enemy fire. Paddle ships were not entirely superseded as they were very manouverable and continued to be favoured for such as harbour tugs.

Although the steam engine was clearly an important development and represented the future, sailing ships were also developing during the nineteenth century. By the 1870s the tea clippers could achieve 20 knots whereas it wasn't until the 1890s that the average steam ship could do the same.

Not only did the engines and boilers of steam ships take up much of the potential cargo space but storing the coal took even more. The great rivers and lakes of North America provided a better opportunity for development than the open and stormy oceans.

Nevertheless, new forms of engines were designed to keep the centre of gravity as low as possible. One of the most successful was the side lever engine which can be described as an upside-down beam engine. Working pressures were increasing from just 15 to 30 psi which was the limit for the box type boiler and the introduction of more efficient compound engines from the 1850s with high and low pressure cylinders necessitated cylindrical boilers with pressures up to 60 psi. These, of which the archetype was known as the Scotch boiler, were lighter and cheaper than the box type with their plethora of internal stays.

The main difficulty lay in salt water. Clearly ships could not carry sufficient fresh water so some form of condenser was needed to recycle the boiler feed. Very sophisticated condensers using seawater as a coolant were devised to overcome this. Tallow used for sealing and lubrication was another problem not really solved until mineral oils became available.

Other developments included white metal bearings and Siemens Martin steel in 1863 which was more consistent than Bessemer steel.

By 1875 there were 2000 vessels with compound engines and in the 1890s triple and even quadruple expansion engines were built necessitating superheaters and working at pressure up to 100 psi. Alan showed us pictures of truly massive engines.

Alan's next 'milestone' was Charles Parsons' invention of the steam turbine in 1884. Realising the potential for marine use Parsons had built the *Turbinia* which achieved 34 Knots in trials. It had three turbines each driving a shaft with three propellors. Parsons had problems with cavitation but nevertheless *Turbinia* stole the show at the 1897 Diamond Jubilee fleet review steaming at high speed up and down the ranks of anchored navy ships.

Initially the turbines were no more efficient but they took a lot less space compared to the massive compound engines and we were shown an impressive slide comparing a turbine set with a compound reciprocating engine of equivalent horsepower. Now rather than gearing up the engine output it was necessary to reduce the speed and massive sets of reduction gears became standard.

Coal as fuel had been normal since the first steam powered vessel. However, it required much work to take it aboard and store it as well as hard physical labour in stoking the boilers. Just cleaning down after bunkering as much as 6000 tons was a major undertaking. Once oil had been discovered ship owners were quick to see the advantages, smaller crews were needed and refueling was not only cleaner but much quicker. By the beginning of World War I the British navy had completely converted.

This account of the developments of marine steam development through the nineteenth and into the twentieth century largely by British engineers was illustrated by numerous splendid slides many portraying the huge and handsome engines to delight the audience.

January 2024 (zoom): Elizabeth Thomson
Brickmaking and the Development of Canals in the Black Country 1760 - 1870.

Elizabeth started by defining the Black Country as the four boroughs of Wolverhampton, Walsall, Sandwell and Dudley which by the late 18th century included some 90 miles of canals.

The canals are the best surviving evidence of industrial development of the two centuries since 1760 though some of the canals have been filled-in since the 1960s a great deal remains.

The first of these was Brindley's line from The Staffs and Worcester to the centre of Birmingham which needed 21 locks to climb up to Wolverhampton. Each lock called for 100 thousand bricks Thus with the bridges, canal walls and paving many millions of bricks and were required and there was a constant need to find suitable clay. A typical bridge took 25 thousand bricks and some 370 accommodation bridges were built, although only 17 original bridges remain today. It has been calculated that the canal walls for 80 miles of canal needed 47 million bricks. Altogether a prodigious number were wanted.

Although much of the Birmingham canal system went through clay soil not all of it was suitable for brickmaking or for puddling the bed of the canal. We were shown a quotation which illustrated this -- "Baker, the brickmaker then made several holes in the setting out but found no clay worth getting."

Elizabeth moved on to describe how the construction of the canals was organised with the engineer, Brindley, in the case of the Birmingham Canal, delegating responsibility to a Clerk of Works, or as they would be known later, the Resident Engineer, for the day to day organisation including appointing contractors for the actual construction. In addition, there were administrators working under the canal committee dealing with the necessary paperwork.

Contemporary sources which Elizabeth had used for her PhD included historic maps, canal company records, newspaper advertisements and particularly the extensive notebooks of John Green who was the Clerk of Works on the Staffs and Worcester Canal appointed by James Brindley to work under John Baker, a member of the canal company committee.

An example of a newspaper advertisement shown was for "a brickmaker that can make five hundred thousand, or a million bricks." Other contracts were for cutting and excavating the canal, puddling the bed, constructing the locks and making the gates. Although in the earlier phases of canal construction while the excavation and lining of the canal was by contract the construction of the locks and bridges was often by direct labour under the canal company itself.

Brickmaking was manual and always seasonal. The clay was dug or 'won' before the beginning of November, worked before the 1st of February. This involved softening the clay by treading it out in pits either by human feet or with animals and removing any stones or other rubbish. The bricks needed to be formed before March 1 and then they were allowed to be dry before being fired in kilns or clamps. It was illegal to fire bricks outside this period although this was commonly ignored. Building with the bricks needed to be between April and September as good weather was essential to allow the lime mortar to set. Of every 20 thousand bricks made some one thousand would be rejected as unsuitable and constant quality control was needed.

The whole process of canal construction was heavily dependent on the weather. Even transporting bricks to where they were needed was difficult on muddy tracks and if possible, this could be done by boat as soon as a length of canal was complete. A typical lock needed some 13 boatloads of bricks.

The canal acts gave the canal companies the right to enter and occupy "any land except parks, orchards and gardens." But they had to make good any land which had been used for brickmaking including leveling it off and removing all clamps and kilns.

Besides the great quantities of clay required for bricks and puddling, huge quantities of coal were needed to fire the bricks. Fortunately for most of the Birmingham canals coal could be mined close by and any section of the canal which was completed could be used to convey it to the brickworks which were often sited close to the canal line to make this convenient.

In addition to the canal structures there were many buildings to be constructed, also requiring bricks, for example, lock keepers' cottages and although many of these have been lost, we were shown a picture of a good example, listed Grade 2, on the Walsall Canal. Other contemporary examples of brick buildings we were shown were a fine bonded warehouse at Stourbridge and the butter and cheese warehouse at Wolverhampton.

From the 1850s blue bricks were made. These were produced from Etruria marl, fired to a much higher temperature than common bricks so that they vitrified. They were used in the Netherton tunnel and J R Walker, the engineer, required them to be tested. The crushing strength varied from 14 to 31 tons.

At about the same time brickmakers began to stamp their product with the name of the company and this encourages modern brick collectors. Later our chairman admitted that he was one!

Information about the brickmakers themselves was limited. The seasonal nature of the job made it attractive to itinerant workers. An early source was 'The London Tradesman' published in 1747. "The Brick-Makers Business is by some not reckoned a very reputable employment; especially to be Journeymen, if they can properly be so called."

From the 1840s factory inspectors' reports give some information. Often whole families would work at the trade with children as young as four being employed. We were shown a photograph of Nellie Coleman making a brick when she was 64. Conditions had barely changed between 1920 and the 1980s.

Elizabeth had been contacted by an individual whose grandmother, Sarah Jane Pratt, had been a brickmaker in Dudley at the Cricket Field Brickworks and we were shown a photograph of her. As part of the Forging Ahead development at the Black Country Living Museum, which Elizabeth was involved in, they were building a replica brickworks based on the Cricket Field brickworks and intended to use the example of Sarah Pratt to depict the work there.

The final slide showed a brick stamped 'Utopia', this had been made by the Aldridge Brick and Tile Co. these bricks can be found all over the West Midlands and were made after WWI when there was hope for a better world, a utopia.

February 2024 (zoom): David Skillen
Starfish, Stripes, Decoys and Dummies. Camouflage and Deception at War.

Camouflage and Deception from the Trojan Horse to Desert Storm was how David subtitled his talk. He started by challenging us to spot the sniper hidden in a rocky hole and I imagine that nobody watching his slide could do that until he focused in. He then showed us a Potoo bird looking exactly like a piece of tree and trompe l'oeil from Chatsworth of violin hanging on a door, a most convincing painting. The American magicians, Pen and Teller came next and David recommended that we seek out their well-known vanishing chicken trick. All this to emphasise that deception comes in many forms

David's first example from history was the Trojan Horse, around 1180 BC, which the Greeks used to fool the Trojans that they had abandoned their siege when they had done no such thing. A big jump took us to the American Civil War when the Confederate General John B Magruder with just 10 thousand troops fooled the Union General McClellan, with a force of 120 thousand, that he had many more by marching his troops in and out of view several times and lighting numerous camp fires. The cautious McClellan withdrew. The super tall hats of soldiers; shakoes and bearskins, were intended, and no doubt succeeded, in frightening their opponents that they were much bigger men than they were. On the other hand, did bright red uniforms make them easier targets?

In World War I fake dead trees were used to hide observers when placed in 'no man's land'; one must shudder at the terror of an observer hidden inside. On a lighter note, we had a slide of a fake cactus tree being used to hide a phone mast, very effectively.

Returning to WWI there were examples of deceptive paint used to make aircraft less visible. Q-ships were devised to counter U-boats. These were small merchant ships with hidden guns. U-boats would not think they were worth using an expensive torpedo to destroy but would surface and expect to sink them with gunfire. The Q-ship would drop its disguise and use its own heavier guns to destroy the U-boat. They were quite successful but expensive.

The artist Norman Wilkinson devised a system of 'dazzle painting' which was extensively used to confuse a U boat commander as to which way a ship was heading and its speed in the same way as a zebra uses its stripes to confuse a predator. Today, prototype cars are often painted with complicated black and white patterns to confuse their shape to interested competitors.

Some of the pillboxes built to resist invasion in 1940 were camouflaged by making them look like innocent buildings. One slide showed a most convincing derelict Scottish bothy with fake stone walls , a chimney and a black panel to represent a doorway. The actual entrance was on the other side. Efforts were made to disguise airfields by painting fake winding roads on the runways. In the neighbourhood of possible and vulnerable targets extensive decoys were created using lights to confuse incoming raiders and artificial fires which could be lit at very short notice to represent bomb damage and mislead enemy bombers. Whole artificial buildings were constructed and painted to mislead.

Before the decisive Battle of Alamein in 1942 all sorts of fake distractions were made. Tents were created to cover field guns and make them look like lorries and canvas covered folding frames fitted over tanks which again made them appear to be lorries. It was realised that the best colour for reconnaissance aircraft which did their best work early in the morning and at dusk, when the shadows were long, was pink! Night flying aircraft were best in light grey not black.

Perhaps the most famous of all the distractions was 'The man who never was' codenamed 'Operation Mincemeat' The body of a drowned man was released where he would be washed up on a Spanish beach. He had been given a totally false but convincing identity as Captain William Martin RM and was carrying a brief case with fake papers that indicated that the Allied forces intended to invade Greece when they were actually going to invade Sicily. German officials in Spain, which was nominally neutral, were fooled by this and several German divisions were transferred to Greece reducing the garrison in Sicily.

Next David turned to what was perhaps the most important and effective deception of the whole war, which emphasised his point that it was vital to know what the enemy are thinking. Hitler was well aware that the allies would be invading across the Channel. However, he was sure that they would be landing near Calais, opposite Kent, whereas in fact they were planning to land on the Normandy beaches, 150 miles further West. To maintain the German's belief a fake army was created in Kent with artificial tanks assembled, not forgetting artificial tank tracks in the fields. They even made full size rubber tanks that could be inflated. Large numbers of fake radio message were transmitted, knowing that the Germans would be able to break the code. A double agent known as Garbo who had built up a convincing story of forces assembling in Kent told the Germans, as the landings began in Normandy, that they were just a diversion and that the real invasion would be in the Pas de Calais. So, convinced of this, the Germans kept their 15th army ready for an assault near Calais for a fortnight after the actual landings rather than reinforcing their 7th army in Normandy.

In Vietnam the Americans added a fake nose to their superior fighters which made them look like and behave like bombers which the North Vietnamese attacked, a mistake that lost them half their own planes in a few minutes. In Iraq the trick of dressing tanks to make them look like lorries was used again.

Needless to say, the art of deception continues and David gave many examples. In the natural world there are fish that appear to be swimming backwards and fish, particularly sharks, are shaded from dark to light to help conceal them. Spy planes are designed to be invisible to radar. Manchester United tried a grey strip to distract their opponents and house agents use slightly smaller furniture to make rooms look bigger.

David gave us much food for thought. From the Trojan Horse to Desert Storm the world of camouflage is much larger than we had realised.