

WARWICKSHIRE

Industrial Archaeology Society

WIAS

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FROM THE CHAIRMAN

For those with a willingness to travel to different parts of the country, the three-month period April - May - June 2020 seems a particularly busy one for events and conferences with an industrial heritage theme. The nearest at hand is probably the 51st. South Wales and West of England Regional Industrial Archaeology Conference (quite a mouthful!) to be held on Saturday April 4th. 2020 at the Elim Conference Centre, West Malvern, Worcestershire. The draft programme includes talks on 'The Industrial Archaeology of Croome Park, RAF Defford, and the Museum of Jet Flight'; Stephen Ballard, Canal and Railway Engineer'; 'The Magic of Malvern Water: the Springs of Malvern and the Water Cure'; and 'The Industrial Archaeology of Worcester's Shrub Hill Station'. Further details of this and the other conferences can be found on the AIA Website www.industrial-archaeology.org.

My attention to this cluster of events was drawn by the information supplied in edition 192 of the Association for Industrial Archaeology's Quarterly Newsletter IA NEWS. The excellent publication has blossomed under

the editorship of Chris Barney, one of our members, and he has decided to hand over the reins after September's publication No. 195. Sincere thanks are due to him for his all his effort and innovation during his time as editor, including keeping the Warwickshire flag flying!

Seeing all these conferences, and their programmes, once again raises the prospect of whether WIAS could ever host a Day Conference / Study Week-end on local - Warwickshire, Coventry, Solihull - industrial heritage. Perhaps we could even share the responsibility with adjacent Oxfordshire, with alternate hosts each year. Ambitious? Unrealistic? Probably both, but worth keeping on the agenda for consideration by those taking the Society forward in future years. Speaking of the future, we are always willing to welcome volunteers onto the Committee, perhaps with a view to taking on a position of responsibility at some stage in that future. It is a rewarding experience to be involved in the management of a society run entirely by volunteers. Other opportunities exist for those preferring to carry out research on the industrial heritage of our area, with the possibilities of publication either on the website or in printed form.

The highlight of the Conference season is of course, the AIA Annual Conference, being held this year at Hope University in Liverpool, and hosted by the Merseyside Industrial Heritage Society. This not only looks at Liverpool itself, but takes a wider view of the past industrial activities of Merseyside, and includes visits to Warrington, Runcorn, St. Helens, Ellesmere Port, and the ports and industries of the Flintshire Coast. Add to this an evening visit to the top of Royal Liver Building with panoramic views of the city and docks, a ride on an historic Wallasey tram, and a ferry across the Mersey and the trip will be complete! One of the pleasures of the Conference is to be in the company of so many enthusiasts for the industrial heritage, from the interested amateur to the full-time professional, and full details can be found on the AIA website.

Sadly, I write these notes with the threat of Coronavirus potentially endangering the chances of some of these gatherings taking place. We seem to be moving into uncharted territory. What remains certain is that a virus-free WIAS website will always be worth visiting! Indeed, if we are all confined to barracks, what better way to spend the time than to contribute to that website by writing an article that has been on your mind for ages, or to upload that (unique) collection of photographs, or to relate your own work experiences as a 'satellite' article in the 'Warwickshire Industries' section?

PROGRAMME

12 March 2020: Ian Whittle
The Life and Work of Sir Frank Whittle.

9 April 2020: Paul Rabbitts
Bandstands - History, Decline and Revival.

14 May 2020: Mike Bunn
Fetch the Engines: a History of the Warwickshire Fire Service.

11 June 2020: Peter Hoath
A View of Computing History - 2,000 Years in 60 Minutes.



Member George Illingworth with one of thirty model fire engines he has built from Meccano on display at The London Model Engineering Exhibition recently held at Alexandra Palace.

Photo: Meridienne Exhibitions Ltd.

NEWSLETTER

Meeting Reports

November 2019: Brian Ellis

The Geological Background to Warwickshire's Industrial Activity.

Brian Ellis's talk had its roots in the remarks made by the Chairman at our 2018 AGM (see Newsletter No. 64) when he proposed that it would be useful to have a guide to the various industries that made up Warwickshire's contribution to the industrial past and took the extractive industries as an example. There was no simple guide that might be the foundation of future research. What geological features have produced the rock so valued by the roadstone industry? What are the various features of the clays that make them suitable for different types of brick? What are the differences between river and glacial sand and gravel? Why has Warwickshire become such a centre for the cement industry? What were the characteristics of Warwickshire coal?

Martin suggested that these were easy questions for an expert to answer and in Brian, a leading member of the Warwickshire Geological Conservation Group, we certainly had an expert to review the role of geology in Warwickshire's extractive industries.

WGCG was founded in 1990 to raise awareness of, and to conserve the many rock exposures dotted around the county. It has published a series of pamphlets and town trails but perhaps its most visible work is the geology wall at the Brandon Marsh home of the Warwickshire Wildlife Trust which was used as a guide throughout the presentation.

The tectonic plates of the earth's crust move over a 250-million-year cycle; 650 million years ago Warwickshire was located 60° South near to today's Falkland Islands. The plate movements account for the variety of rocks found in the county.

The oldest are located north of Nuneaton in the Hartshill Country Park in the Nuneaton/Hartshill Ridge and form the basis for the roadstone industry and its spectacular quarries. These sandstones and diorites were formed following the break-up of a supercontinent and the creation of a major ocean wherein were laid down the sandstones and shales. These harden through age, compression and the constant folding process during tectonic drift. The hard diorites come from the intrusion of hot igneous rocks into the softer rocks and the combination has the desirable qualities of low water absorption, impact, abrasion and skid resistance needed by the aggregates industry but also render them unsuitable for buildings. Extracted, crushed and graded Warwickshire's roadstone provided much of the material used in building the midlands motorway network.

Coal is formed in a very different environment. Tropical swamps populated by tree ferns and early coniferous forests were found when Warwickshire was part of an equatorial delta. Think the Amazon delta today. Swampy islands, lakes and forests that were constantly changing and sinking leaving layers of rotting vegetation to be compressed into what we call the coal series; peat/lignite/bituminous/anthracite. The economic value depends on its position in the series. Unfortunately, Warwickshire's coals fall at the poor end. The predominance of steam and domestic coals coupled to shrinking markets doomed the local pits. However, there is still plenty left should things change. Coventry colliery should have produced smokeless fuels

but the 'Homefire Plant' was not a commercial success with disease and compensation costs contributing factors.

Cement is a better story for Warwickshire. Heating limestone (calcium carbonate) mixed with silicates, found in clays, to around 1450° C forms calcium oxide or quicklime. Our local deposits of blue and white lias provided this raw material. The rocks were formed under a tropical sea and are found in a narrow strip between Rugby and Southam and are evident in the landscape as hills. The blue and white lias found in the same quarry, albeit in layers of different thicknesses, provided the ideal raw material. The white lias is now largely exhausted and chalk slurry is now imported into Rugby as a substitute. Only one working blue lias quarry remains at Southam so there is a potential problem for ongoing cement production in the county with implications for future investments. There is no demand limit but the era of an advantageous geology has passed. White lias did have a use as a building material and for lime production before the cement industry began.

The most important extractive industry in Warwickshire today is that of sand and gravel. These are the products of depositions in rivers during various phases of the ice age and post-glacial events. We have three types in the county. At Bubbenhall there are inter-glacial deposits, in Meriden, Berkswell and the Blyth valley we see over-deepened river valleys with subsequent infilling, and the Avon valley has post-glacial terraces. The materials found in these locations are very variable and thus have different end uses. The industry is continually looking for new deposits, such as those near to Hampton Lucy, to develop, sometimes to local objections.

Probably the most ubiquitous industry utilising the natural geology is that of brick and tile manufacture. The clays, which are the basis for bricks and tiles, are the products of the weathering and redistribution of rocks and are widespread throughout Warwickshire. In the pre-industrial era there was widespread domestic and artisan manufacture to meet local demands. Early maps show many local brick pits and kilns. Later industrial-scale manufacture was more controlled.

The geology of the 'clay minerals' and the chemical characteristics of sheet silicates have significance for the ceramic industries and affect the colour of bricks, especially where there is an iron constituent. The geological formation, principally the Mercia Mudstones (the most widespread formation in the county), influenced the location of brick pits. Another important clay is 'Etruria Marl', a flood plain deposit of considerable uniformity and purity suitable for the manufacture of high strength and low water absorption heavy clay ware, including high-quality facing and engineering bricks, pavers and roofing and floor tiles. Its high but variable iron content allows the production of a wide range of fired colours. The Kingsbury Brickworks is on this outcrop and is being extended by its Austrian owners. Sadly, much of Warwickshire's extractive industries are also now in foreign ownership.

Closing on a more cheerful note, a retired engineer recently digging out a fishing lake in an area of Wolston Clay made the chance discovery of a deposit of puddling clay and so may enjoy more than relaxing with rod and line in the future.

December 2019: Ian Pogson

The Life and Engineering Achievements of Dr. Frederick Lanchester.

Frederick Lanchester, born 1868, was a polymath and engineer who made important contributions to automotive engineering and to aerodynamics. He co-invented the development of operational research. Bordering on genius he is revered by many as Britain's Leonardo da Vinci. His name, and many personal artefacts are preserved at Coventry University, the successor to the Lanchester Polytechnic named in his memory. The University's Lanchester library was opened in 2000. Like much of Lanchester's own work, apparently regardless of convention, its distinctive appearance comes from the building's energy efficient specifications, making use of light wells and exhaust stacks to draw air through the building, providing natural ventilation.

Ian Pogson is an automotive engineer, a Lanchester fan and a trustee of the Lanchester Trust. The Trust was set up in 2010 to promote the innovative work of the three Lanchester brothers, Fred, Frank and George. This work is amplified by the Lanchester interactive archive based in the Lanchester Library and readily accessible online at lanchesterinteractive.org. Chris Clark, chairman of the Trust has published three books on Lanchester from which Ian frequently quoted during his talk.

The Lanchesters were a talented family headed by an architect and surveyor married to a teacher of maths and latin who produced 8 successful children. Apart from Fred, Frank and George who founded the motor business, they included a prominent suffragette, a Hollywood actress, another architect, an artist and an auctioneer's clerk.

Fred, the visionary genius, Frank, an ambassador for the company and the industry, together with George, a designer and artist formed the Lanchester Company in 1899 to enter the burgeoning motor industry. Fred and his brothers had built their first 5 horsepower car in 1895. Its specification was remarkable in many ways and included: pneumatic Dunlop tyres, the first car so equipped. Ackerman, or caster steering. A chain driven rear axle with half-shafts. The first rear differential with 4 bevel gears. Lanchester's own wick carburetor and a patented sparkplug or ignitor. The engine had balanced, lightened connecting-rods, counter-rotating balanced crankshafts, the first magneto and the first oil scraper piston ring. The torsionally rigid, steel tube chassis was another first.

His wide-ranging interests in vehicles and engines as well as in other fields are evident in the following highlights of his career. His first all-wheel drive patent in 1904. The patented torsional vibration damper in 1910. The patented disc brake invention in 1902. Pioneering work in turbocharging and fuel injection with patents in 1902 and 1923. The first all-British motorboat in 1894. He published papers and books detailing the first scientific principles of flight and theorised about the principles of colour photography before it was a reality with patents in 1895.

He also wrote on ophthalmology. He queried Einstein's results on Relativity and put the differences down to translations. He devised the military strategies that underpin business management courses still taught today. "*Aircraft in Warfare*" in 1916 was way ahead of its time and its '*Lanchester's Power Laws*' were later used in the USA and Japan for business strategies and operational research after WW2.

He was much interested in flight and presented a paper in 1894 to the Birmingham Natural History and Philosophical

Society entitled '*The soaring of birds and the possibilities of mechanical flight*' based on years of experiments with flying models. He produced designs for a heavier than air machine in 1897 some four years before the Wright Brothers efforts.

Returning to Fred's earlier career, it is remarkable that he failed to obtain any formal qualifications despite gaining scholarships to several institutions. His first employment in 1888 was as a Patent Office draughtsman for £3 a week. About this time he registered a patent for an isometrograph, a draughtsman's instrument for hatching, shading and other geometrical design work.

He soon moved on to join the Forward Gas Engine Company in Birmingham where he became works manager and invented and patented a pendulum governor to control engine speed and subsequently a pendulum accelerometer for recording the acceleration and braking of vehicles. He simultaneously rented a nearby workshop for conducting his own experiments with engines. This work led to a series of patents, some of which he sold to other engine builders.

An early engine was installed in a boat built in his garden and this was followed by the 1895 car described above and the formation of the Lanchester Engine Company in Birmingham to manufacture cars for sale to the public. This company went bankrupt in 1904 but was reformed as the Lanchester Motor Company. Lanchester, disillusioned, resigned from the company in 1910 but remained as a consultant and technical adviser whilst his brothers continued to run the business.

Lanchester now became a technical consultant to the Daimler Company in Coventry where he was involved in a number of engine development programmes including the Daimler-Knight double-sleeve valve engine as well as work on early petrol-electric vehicles and tanks.

Lanchester continued to work with Daimler until the Wall Street crash in 1929. At the same time the Lanchester Motor Company was bought by BSA, the owners of Daimler and moved to Coventry. The Lanchester cars had enjoyed a good reputation, regarded by some as a rival to Rolls-Royce. Daimler continued to produce cars under the Lanchester name until 1956.

Lanchester, throughout his life, had many interests, both in engineering and outside. A far from exhaustive list would include the work of the Lanchester Laboratories into sound reproduction, radio, telephones, microphones and speakers. His wartime work on armoured vehicles and weapons. The design, development and manufacture of machine tools such as gear hobbing machinery. The use of jig-built components for ease of manufacture and subsequent servicing. Coil-sprung independent suspension in 1908 and in 1927 the first, true, direct-coupled hybrid car, rather than one with electric motors on wheel hubs. The encouragement of students of all disciplines "*glad to be of service to a man who has good stuff in him*". Fred was also an accomplished singer and piano-player.

It is sad to reflect that Fred's technical genius was not matched by commercial acumen and that none of his business associates seemed able to deliver him financial security. He died in straitened circumstances in his Birmingham home in 1946. Fortunately, The Lanchester Trust is ensuring that his achievements will not be forgotten.

January 2020: David Skillen

Giants in the Sky - the Zeppelin in WW1.

David Skillen bills himself, correctly, as an entertaining and informative public speaker. He also seems to have the knack choosing apposite titles for his talks. *Giants in the Sky* succeeded on all counts.

Opening on a sombre note with gravestones marking the resting places of the crews of four Zeppelins destroyed during WW1 David noted the qualities and skills of the captains and their crews.

First, however, he looked at the early days of lighter than air machines and the eponymous Count Ferdinand von Zeppelin. Zeppelin, who had visited America as a military observer during the Civil War, is recorded as witnessing an observation balloon flight during the siege of Fredriksburg.

After retiring from the military Zeppelin began to develop his ideas for lighter than air rigid airships and obtained a patent in 1895.

The primitive early ships were built near Friedrichshafen on Lake Constance. All followed the same basic concept of a skeleton formed from duralumin tubes covered with a fabric outer cover. Inside were bags, lined with goldbeater's skin, filled with hydrogen. Each bag needed the membranes from 50,000 cows for the goldbeater's skin! Outside the hull were located gondolas containing engines driving propellers and separately a control car for the crew. At the rear were rudders and elevators to control the ship.

LZ-1 first flew in 1900. The costs of development threatened closure, but funding from a national lottery enabled work to continue and by 1910 passenger carrying flights were being made by Deutsche Luftschiffahrts-AG (DELAG), effectively the world's first airline. By mid-1914, DELAG had carried over 10,000 fare-paying passengers on over 1,500 flights.

A number of experimental ships were built and several suffered damage or were wrecked, usually on landing or when tethered to the ground. Some exploded when hydrogen ignited. This was an ever-present danger until helium could be substituted but this was not until after the zeppelin era had passed.

David used contemporary photographs to show the development of the zeppelins and their construction. Particularly interesting were a couple of paintings showing the crew on the flight deck, one of which included a machine-gunner looking for an attacker. The clothing of the crew members looked appropriate for polar explorers.

An idea of the size of the later airships was given in a slide that showed the Hindenburg airship of 1936 to the same scale as the liner Titanic. The airship is only a few feet shorter. Another sense of scale is given by the two enormous sheds built at Cardington in Bedfordshire to house Britain's airships.

For many people 'Zeppelin' means the air raids along the east coast and especially on London during WW1 that caused much anxiety but little real damage or loss of life amongst the population.

However, the first wartime involvement was over the North Sea on reconnaissance for the navy. Count Zeppelin had returned to military service and had held discussions with Grand Admiral Tirpitz (he of the forked beard) and von Strasser the head of the Naval Air Service about their deployment.

The Royal Navy's response was to create its first aircraft

carriers by mounting platforms on suitable ships or barges. Hazardous for the pilots and a steep learning curve; albeit successful, as bombing raids on the zeppelin sheds destroyed 3 airships. However, this gave von Strasser the excuse to get the Kaiser's permission to bomb England in retaliation. The first raid on Kings Lynn and Great Yarmouth was a primitive affair and hampered by navigational errors.

The first zeppelin destroyed in the air was downed over Belgium by bombs dropped on it by R A J Warneford. The zeppelin crashed onto a convent and two nuns were killed. Warneford was awarded the Victoria Cross but was killed in a flying accident two weeks later.

Further sporadic raids caused little real damage but much consternation amongst the population at large. In October 1915 a zeppelin commanded by Heinrich Mathy, regarded as probably the best zeppelin captain, carrying the largest bomb yet at 300kg, reached London and caused widespread damage amounting to one sixth of the total inflicted by bombing raids during the war. One memorable illustration showed two little girls flanking an unexploded bomb and another showed panic in Trafalgar Square with zeppelins overhead. A recruiting poster proclaimed that '*it was far better to face the bullets than to be killed at home by a bomb*'.

Anti-zeppelin measures were introduced, policemen on pushbikes could give warnings and anti-aircraft guns mounted on lorries formed a mobile defence system. Not all crashed zeppelins caught fire and code books that were rescued were of great assistance to the admiralty code breakers of Room 40.

Meanwhile, Germany was building larger ships, but the British were using incendiary and explosive ammunition, some produced by Brock, the firework maker. This ammunition enabled W Leefe Robinson to down a zeppelin in flames over North London for which he too received the VC. The crew of the zeppelin were buried with full military honours by the RFC.

The zeppelins became increasingly vulnerable to British aircraft and AA fire and losses, including the most experienced captains, mounted. In an attempt to counter the losses Germany introduced the 'height climber' craft with a ceiling that exceeded that of their attackers. However, conditions for the crews were terrible and bombing accuracy worse than ever. Germany also introduced new heavy bomber aircraft that were potentially more effective.

A notable zeppelin flight in 1917 was the 95 hour passage to resupply German forces in South East Africa. The mission was unsuccessful but did demonstrate the endurance capabilities of the craft. Von Strasser, who had persisted with zeppelins, was killed when the ship that he was flying in was shot down.

In 1919 the remaining zeppelin fleet was scuttled but subsequently much larger ships were built both in Germany and England for long distance passenger traffic. The current thinking being that aeroplanes would never be suitable for trans-atlantic service. Germany did introduce a timetabled service to the USA and South America. It was very costly and uncomfortable (unheated) but otherwise luxurious.

After the horrific destruction of the Hindenburg at Lakehurst NJ in 1936 all airship development ceased. Simultaneously, the aeroplane began to show its true potential for passenger transport.