

# WARWICKSHIRE

# WIAS

## Industrial Archaeology Society

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### FROM THE CHAIRMAN

The end of a season is always an opportunity for reflection and this is particularly relevant for 2022-2023, with an assessment of the new arrangements adopted for meetings, and the retirement of two long-serving officers of the Society.

As announced earlier, Sue Hammon will be finishing her duties as Membership Secretary, a role she has fulfilled with great efficiency and minimal fuss for many years. It has been very re-assuring to know that membership issues have been in such safe hands. I would like to place on record my own personal thanks and those of the Society for her long commitment to the task.

Looking ahead, gone are the days of a solely in-person or postal communication for membership, with increasingly membership traffic utilising online options. This has caused the committee to consider exactly how the role of Membership Secretary should be defined, and how this might be related to the movement of money handled by the Treasurer. The Society will be kept fully informed over what arrangement are established.

Postal deliveries have now also largely disappeared for this Newsletter, with online publication becoming the norm. Chris Barney has agreed to take overall responsibility as editor, with Mike Hum still assisting with format and layout. The Newsletter is essentially a record of the meetings of the Society, a valuable component of any archive of the Society's work over the years. We are always on the look-out for willing volunteers to write up a meeting, perhaps on a topic that particularly interests you. Are there any frustrated scribes out there?

Many of you will be aware of the roller-coaster ride that has characterised the Society's attempts to cope with the demands of live audiences and the needs of a growing number of online members and supporters. The so-called 'hybrid' option has been tried and rejected by many societies but we

have been very fortunate to have an IT team that does not give up easily! In Victor Lobb and new member David Daniel WIAS has indeed been fortunate to have had two dedicated experts who have overcome a whole host of difficulties, not least an occasionally wayward internet connection in the Halse Pavilion. My sincere thanks go to them both for remaining calm in adversity, with no problem fazing them, particularly when the Chairman was looking very worried indeed!

There are also several other tasks completed by members of the Committee to ensure meetings run smoothly, from the reception table to the provision of refreshments, and I am sure you would wish me to place on record thanks to all those involved. A society is only as strong as the willingness of its members to take on responsibilities.

Having reached a successful formula the committee plans to continue the arrangements into next season, with 7 'hybrid' meetings in September-November; March-June, and three Zoom only meetings in the winter months of December, January and February. The first meeting in September will be the Society's Annual General Meeting, followed by members' contributions, so if you have anything that you might like to bring to a wider audience, please let me know so that I can fit it into the programme. This Newsletter also normally carries the forthcoming programme but this is still in provisional form so it will appear in the next edition, and will, of course, appear on the website in due course.

I am always on the look-out for speakers for the season's programme so please send in any ideas you may have. I have visited several society meetings both locally, further afield, and online, in the hope of finding speakers that might be suitable for WIAS, but the task seems to be getting more difficult, as confirmed by my links with other IA societies. I have been asked by several other IA groups for speakers that have been a success at WIAS, and this

is more difficult that it sounds given the nature of topics covered, the fee charged, and distance to be travelled. Not everyone wants to hear about Warwickshire - although I have given an online talk 'An introduction to Warwickshire's Industrial Heritage' to Gloucestershire Society for Industrial Archaeology and have been booked for a similar venture over in Leicester for the Leicestershire Industrial History Society in the Spring of 2024. All part of the process of spreading the WIAS message!

The other ingredient of the Society's activities over the past season has been Alain Foote's excellent series of visits, and I have had the pleasure of enjoying several of them. It has been really good to meet members in less formal environments such as a stroll along the Stourbridge Canal or amongst the Refuse Collection Vehicles of Dennis Eagle rather than taking the Chairman's seat at WIAS Meetings!

We have all different experiences of the impact of Covid, but I would like to think that WIAS remained a point of contact for many when the Lockdowns occurred, and that we have remained on your radar. One element often mentioned is diminished mobility and a caution about travel and public meetings and we do hope that the winter break with Zoom-only meetings plus the hybrid option for the rest of the season has helped to ease some of these issues. I look forward to welcoming you to WIAS meetings - either online or in person - for season 2023-2024, not forgetting, of course, that June 2024 represents the 35th. Anniversary of the Society - surely a cause for some sort of celebration!

### PROGRAMME

**14 September 2023 (live/hybrid)**  
*Annual General Meeting followed by Members' 'Twenty' Plenty': An opportunity for members to deliver short talks on topics of particular interest to them, lasting up to 20 minutes.*

NEWSLETTER

## Meeting Reports

**March 2023: Twenty's Plenty**

*Members' Evening*

The March meeting was the occasion for the return to the Halse Pavilion and another outing for the hybrid arrangements that had been carefully modified over the winter months by the IT team of Victor Lobb, David Daniel and Peter Riley. The evening was a collection of short talks – with a maximum time of twenty minutes – and the items chosen revealed the diversity of interests and range of experience possessed by our membership.

The evening opened with a presentation by **Stuart Thomas** on a site in Lydney, Gloucestershire and the establishment of a plywood factory during the war years. This had emerged after a talk to WIAS by Ray Wilson of the Gloucestershire Society for Industrial Archaeology, and Stuart's own experiences of contact with the later occupants of the Pine End Works site, up until closure in 2001. Stuart has produced a paper for GSIA on the subject.

This factory made a vital contribution to the war effort with the plywood utilised for the Mosquito aeroplane. Stuart's focus was on the factory and he outlined the (rather stringent) criteria for the choice of location – the ability to produce aircraft plywood 24/7; to be located west of a line from Southampton to the Wash; outside any built-up area; to offer a reasonable supply of labour; to provide access to existing engineering facilities, preferably with an aircraft bias; to be waterside and served by more than two ports capable of discharging vessels of 10,000 tons or more. It was the first UK factory with a reinforced concrete barrel roof (no skylights, incendiary-proof) and he showed an aerial photograph demonstrating the scale of the plant on the 14 acre site. The factory produced large, flat (approx 35 feet long) 3-ply plywood sections, 1.5-2.00mm thick, mainly of Canadian birch. The fuselage was then sent on to various locations to be assembled as Mosquito aeroplanes, including the 1,066 built by the Standard Motor Company, Coventry.

Throughout his talk, the audience could not have failed to share in Stuart's enthusiasm for the subject, nor his regret at the eventual demise of the site, with demolition in recent years.

This was followed by a presentation from **Mike Raine** entitled 'Heavy Lifting in Venice'. This was also a new experience in terms of technology, with Mike delivering his talk online from home, with slides being changed in the Halse Pavilion with the necessary prompt.

Mike has been a regular visitor to Venice over the years, and something that left a distinct impression upon him was the hydraulic crane in the Arsenale. The Arsenale naval dockyard is a little off the tourist route but is accessible during the biennale, the alternating arts and architecture festival held in the city. Mike took us through the history of the Arsenale, and its role in developing and supporting the powerful Venetian navy, earning the description in some quarters as 'the first factory in the world'. The buildings of the Arsenale are as elegant as many better-known locations in Venice, and the hydraulic crane is a notable landmark. Mike linked this with the talk by Alan Hill on hydraulic power, and presented photographs of the crane from every angle. It was built by Armstrong Mitchell on Tyneside, erected in 1883, and is the only surviving example of its type.

The crane rests on a base built of brick and Istrian stone which contains the hydraulic pumping system originally steam driven with its own boiler, but later converted to electric

power. One unusual feature that Mike highlighted was the hydraulic lift cylinder connected to the jib, with a 160 ton capacity. He also provided close-up shots of the crane revealing the extensive use of hot riveting, a technique familiar to workers on the Tyne.

His talk provided another enticement to visit Venice, and it was good to be able to enjoy Mike's presentation without him having to make the journey to the Halse Pavilion.

**Mick Jeffs** is one of the main contributors to a recently published book 'Global Leamington'. It is the latest publication from the Leamington History Group, and looks beyond the familiar stories of the development of the Spa to highlight international connections and the emergence of the multi-cultural community that characterizes the town today. Mick took as his theme some of the products made in Leamington that found their way into international markets. Leaving aside the familiar exports of kitchen ranges by firms such as Flavel, Grove and Radclyffe, he selected the carriages manufactured by Mulliners. There were several members of the Mulliner family involved in this type of business, one branch going on to be supplier of bodywork for Rolls Royce and Daimler, but Henry Mulliner set up in Leamington, with production facilities in the Chapel Street/Packington Place area of the town. They were renowned for their phaetons, and exhibited at Vienna and Paris, with successful export orders to follow.

The firm Henry Griffiths & Son originated in Birmingham and came to Leamington in 1920 (encouraged by generous terms offered by Leamington Borough Council), establishing a factory on the Tachbrook Road. Their factory became a very familiar landmark, and their products developed a strong reputation, both in domestic and overseas markets. The factory closed and has been demolished, the only remnants being the names of roads built on the site – Sapphire Drive and Emerald Way.

After seeking to explain the origins of the unusually-named Kigass, Mick described the development of the firm from its formation in 1924. It has occupied various sites in Leamington before moving to its current home in Montague Road Warwick. It has been involved in auto and aero components for nearly a century, under the guidance of four generations of the Wardman family. Exports have played an important part in the firm's history, and prides itself in the extremely high level of precision of its products.

Finally, Mick brought us right up to date with an illustration of the number of firms involved in the Computer Games industry in Leamington, highlighted by a display at the Leamington Art Gallery entitled 'Silicon Spa'. This set Mick wondering what the interest of industrial archaeologists might be in the future – cast-off examples of early Spectrum and Commodore computers, perhaps?

Several members of WIAS have enjoyed the benefits of an apprenticeship, and **George Sayell** took us back to 1961 and his English Electric apprenticeship experience. The particular example he concentrated upon was a period at Crossness where he assisted in the installation of English Electric diesel engines. After explaining the role of Crossness as the termination of Bazelgette's southern outfall sewer before release in to the Thames Estuary, he went on to describe his personal experience on the site. His fellow employees seemed wedded to the task at hand,

working long hours, and rarely returning home. Health and Safety precautions were almost non-existent, and some of the tasks required of a young apprentice were quite challenging. It tested George to the full, but he rose to the task, realising the importance of the project.

He became familiar with all elements of the site, and he realised that the old Crossness cast iron engines had become seriously neglected, despite their historical importance. It was this experience that first aroused George's interest in industrial archaeology, and no-one in the audience could have been left without fully understanding George's passion for engineering.

**Chris Barney** began his talk on 'Motive power in the Agriculture Industry' with examples of what he was not going to talk about. These included the modern monster tractor ("they always seem too big for the job"), through earlier versions, back to Traction Engines, and even to horse-drawn farm machinery. His focus was to be on oxen.

He analysed the relative merits of oxen over horses – cheaper to buy, equip and feed; required less care and attention; less liable to injury; well suited to the simple task of pulling heavy loads; and had some value as meat once they reached old-age. Admittedly, they did need time in the day to rest, and much patience was required in the training of an ox, particularly in engineering a turn.

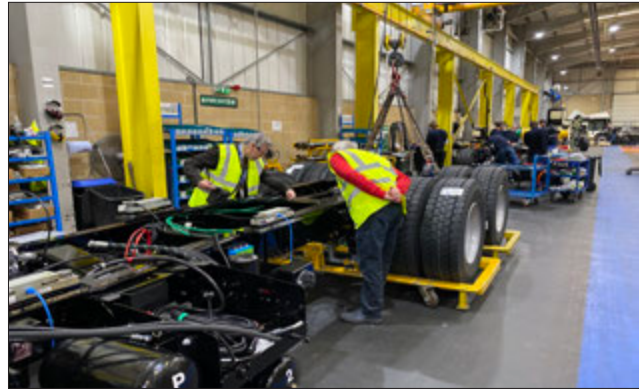
In the end, the greater versatility of the horse, the smaller size of fields following enclosure, and the advent of steam ploughing saw the end of the oxen era, but Chris showed some excellent examples of oxen at work, including hauling bales of wool in Australia, with which he had a distant family connection. Most surprising was a 1797 painting - presumably legitimate – recording the hauling of a windmill uphill for 2 miles by 86 oxen!

Chairman **Martin Green** concluded the evening with a visit to the Liverpool Docks, and after a brief look at the well-known Royal Albert Docks, took the story further north up the Mersey to a group of docks built slightly later. These included Stanley, Collingwood, Salisbury and Bramley-Wood docks. The main focus was on Stanley Dock with its access inland to the Leeds and Liverpool Canal and outward via the Collingwood and Salisbury Docks to the Mersey. Renowned civil engineer Jesse Hartley built the north and south warehouses in Stanley Dock in 1848, but these were to be dwarfed by the Tobacco Warehouse built in 1901, designed by A.G.Lyster. Half the dock had to be filled in to accommodate what was the largest brick warehouse in the world, with its 14 storeys, 30,000 panes of glass and 27 million bricks.

The area was suffering from relative decline but has recently undergone considerable change under conservation initiatives, with the conversion of the north warehouse to The Titanic Hotel, and the ongoing conversion of the Tobacco Warehouse into luxury apartments. More dramatic has been the decision to allow Everton Football Club to fill in the Bramley Moore Dock for its new state of the art football stadium. Progress on the scheme has been rapid, but sadly contributed the decision by Unesco to remove World Heritage Status from the Liverpool Docks. Despite these changes, Martin argued strongly that Liverpool still remained a fascinating city to visit for its dock, transport and industrial heritage.

## Society Visits

Amongst the excellent series of visits organised by Alain Foote, were those to Dennis Eagle in Warwick on 22 March with 15 members and on 19 April to Stourbridge when 10 members enjoyed the Stourbridge Glass Guided Tour and a walk along the canal.



**February 2023: Alan Hill***Water as a mechanical Agent.*

**W**ater has been the single most useful source of energy known to man. Such was the introduction from Alan Hill to an absorbing presentation. Alan, with a background in industry and academia and a long interest in Industrial Archaeology, was an excellent guide.

Illustrations of waterwheels are found in Roman mosaics and there are earlier examples in China. Milling corn or other cereals was the dominant use and cascades of up to eight wheels are known in Roman Spain. Harnessing water in this way remained the most important source of power until the 19<sup>th</sup> century. The arrival of steam introduced the first rival but even in 1830 the two were equal; thereafter, steam forged ahead.

Some spectacular examples of waterwheels have survived. On the Isle of Man, the great Lady Isabella Wheel at Laxey with its remarkable push/pull rod mechanism operating the mine pumps is the largest ever built. An alternative to increasing the diameter is to increase the width of the wheel as on the Kennet and Avon canal at the Claverton Pumping Station near Bath and by the French at Marly sur Seine.

Harnessing tidal power is a perennial issue. Tidal mills have been quite widespread and a half mile long barrage in Brittany was for a long time the world's largest.

Returning to the Isle of Man a water turbine supplanted the great Laxey wheel giving greater efficiency and power.

Water power has generated electricity since the 1870s and North Wales was one of the earliest places and included pioneering pumped storage schemes. Today, hydro-electricity provides some 20% of the world's primary electricity.

Water-balanced engines use gravity to lift materials in a number of situations from coal mines to quarries and in other industrial situations. Funicular railways, often take seaside visitors to local observation points from Scarborough to Hastings via Aberystwyth, Lynton-Lynmouth and Saltburn.

Water pressure or hydraulic engines used a column of water to power a pump before the introduction of Boulton and Watt's steam engines whose mechanism they foreshadowed. Trevithick was an advocate of these robust and widely used machines.

The hydraulic ram engine, named after its hammering noise which recalled two rams butting, was simple, robust and fully automatic. A large ram engine could lift water to 1,000 feet and they were popular in country houses and remote districts and are still widely used in developing countries.

Joseph Bramah and William Armstrong were the great protagonists of hydraulics for industrial applications. Bramah in 1802 envisaged using water to operate machinery creating high pressures by small movements. Effectively, hydraulic leverage as in a hydraulic press.

Armstrong's invention of the hydraulic 'devil' or 'jigger' converted linear to rotary motion and led to the

first hydraulic crane in 1846. Using domestic water mains pressure at 30/40 psi (today 10 psi) these cranes helped the 19<sup>th</sup> century expansion of docks around the UK.

The huge lock gates at Grimsby docks weighed 75 tons and were operated by manual capstans. To meet the need for more power, Armstrong built a 200' hydraulic tower (resembling a campanile) with a steam engine to pump water into the tank at the top. This pressure opened the gates in 2 minutes.

Poor foundation conditions meant that such towers could not always be built, and this led to Armstrong's development of the hydraulic accumulator. Such a device giving 700/800 psi would have needed a water tower some 1,600' tall.

These developments, starting in Kingston upon Hull, fueled the rapid expansion of hydraulic power. London soon had some 30 large hydraulic pumping stations between Tower Bridge and Blackwall Point. Usually operating at 700/800 psi but Liverpool and Glasgow experimented with higher pressures of 1,200 psi.

Tower Bridge was, perhaps, the most iconic example of a hydraulic machine.

Distributed power from a central source was a logical development and the London Hydraulic Power Company operated 184 miles of hydraulic mains around the capital. Powered by 5 pumping stations plus accumulators it was for some 50 years a major source of power for passenger lifts, cranes and hoists, theatre machinery in Drury Lane, a cabaret platform at the Savoy and much more, notably, the 750 ton central platform at Earls Court in 1930. Elsewhere, Kirkaldy's Testing and Experimental Works used 6,700 psi in a tensile testing machine.

This distributed hydraulic power was unfamiliar to many and resulted in much discussion including its vulnerability during the blitz, answer, not much. How were users charged? By a metering system, and what was the subsequent use of the network after its closure in 1977? It was unused until Mercury Communications (now C & W) used it as ducts for the first cable TV network.

Other applications of hydraulics are found in swing bridges and lock gates. The Anderton Boat Lift and Newcastle Swing Bridge are good examples. A coffin lift at a crematorium and powering a pipe organ are others.

The great forces exercisable through hydraulics were used to finally launch Brunel's Great Eastern at Millwall, incidentally also launching Birmingham's Richard Tangye's hydraulic jacks' business. The great box sections of the Britannia and Conway bridges were lifted into place and the Eiffel Tower's four legs are levelled by hydraulic jacks.

Armstrong's leading position in the technology found many applications in his warships, notably for powering the great turrets, their guns and ammunition handling.

Whilst many in the audience were aware of plenty of examples of the use of water as a mechanical agent it was not until Alan Hill showed the overall range and utility of the medium that its true usefulness to such a wide range of applications could be fully appreciated.