

WARWICKSHIRE

Industrial Archaeology Society

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FROM THE CHAIRMAN

Looking forward

The June 2014 meeting marks the completion of twenty five years of existence for the Warwickshire Industrial Archaeology Society. This is a cause for celebration and reflection but also one where we need to consider the directions that the society needs to travel – in, dare I say it – the next twenty five years.

This will, of course, not just be an issue for WIAS but for the subject as a whole, and the availability of enthusiastic, committed people to carry on the work, and to take the subject and the society in new directions may become quite a challenge. What will be the focus of the post-steam train generation? Has most of the important work already been completed? Will more recent industrial change be part of the subject or will there be an accepted chronological period to which our studies should be applied?

For the immediate future there is much that the Society can do. As previously announced, from the summer, the WIAS database will be available online and we shall have a real focus of trying to ensure that the information on that database is as comprehensive, up-to-date and accurate as possible. The process has already thrown up some interesting questions surrounding the definition and classification of particular sites, a reflection in part of the difficulties of defining the limits of 'industrial' archaeology. We plan to involve members of the Society in this process and a list of sites for investigation and recording will be available at the June meeting. For my own part, I have found it fascinating to return to sites in various parts of Warwickshire to check details for the database, and to witness the changes that have taken place both to sites and the surrounding environment. It has

also taken me away from some of the responsibilities of being Chairman and given me the opportunity to return to what I like doing most of all. There is nothing better than a bit of exploring, opening a few doors, climbing over the odd fence, perhaps even an occasional trespass, with camera and notebook at the ready!

Increasing the material available on our website is a second, complementary goal to the development of the database. The webmaster works hard to keep material as up-to-date as possible and he is very willing to receive information, photographs and comments that he might be able to publish. The website may be the best destination for those unique photographs that remain stored in a drawer somewhere at home, or for that unpublished article that lies in everyone's head. Far better that these items are available for others to see, read and further explore than to risk losing them. This can also be achieved via publication in the Quarterly Newsletter, so ably edited by Mike Hurn.

We shall continue with our monthly meetings as the main thrust of the work of the Society, and we will seek to provide as varied a programme as possible to serve the diverse interests of our membership. Over the past 25 years we have provided approximately 250 meetings and the responsibility for arranging these meetings has been shared by our first Chairman Toby Cave and myself. Do I hear someone say that they would like to take on the role?

Indeed, the committee is very aware of the need to engage in some 'succession planning' and there may be younger members out there who would wish to gain a taste of the inner workings of WIAS via membership of the committee. Do not be shy in stepping forward.

These are important items for the future, but I hope we may be

permitted the chance to reflect on the achievements and enjoyment of twenty five years of WIAS and this will be the focus of the June meeting.

IMPORTANT NOTICE: Change of venue and start time for June meeting

The next meeting on 12th June 'Twenty five years of WIAS' will be held in the Bridge House Theatre, Warwick School, at 7.15pm. There is parking available near to the theatre at the Western end of the Warwick School site.

As part of that evening we would like to offer the opportunity to members to recall an event, a particular site, a certain individual, a memorable meeting that epitomises WIAS for them. These need to be very short items so that several get the chance to speak, and I need to know in advance. Please contact me by e-mail on wiaschairman@aol.com or speak to me at the May meeting.

PROGRAMME

May 8 2014

Peter Perkins:

The rise and fall of the Northamptonshire boot and shoe industry.

June 12 2014

Members' Evening:

25 Years of WIAS. 1989 - 2014.

September 11 2014

AGM, AIA Cheshire Conference Report and Members' Evening.

October 9 2014

Peter Grenfell:

The Ford Foundry, Leamington Spa.

November 13 2014

Bob Booth (Chairman of the Bournville Society):

'Cadburys and Bournville'.

December 11 2014

Martin Green (Chairman WIAS):
Chairman's Lecture.

NEWSLETTER

Meeting Reports

January 2014: David Fry

Industrial Coventry in Old Postcards.

A record attendance of 80, including 8 visitors, was treated to views of Coventry that were new to most. David Fry, a sociology and psychology teacher used the medium of old postcards to review the history of the city and to trace the demise of its craft industries. Indeed, there is really no medium that allows us better to explore the changes that occurred at the end of the 19th and especially at the beginning of the 20th centuries.

How did such a range and variety of subjects become preserved as postcards? It seems that the Victorian penchant for recording the family stimulated the evolution of the local photographer, usually with a studio for portraiture but then with a growing desire to explore and record the changing world beyond.

Whilst half-plate cameras were considerably bulkier and more unwieldy than today's equipment, they enabled contact prints to be made directly onto postcards for which there was a ready market. The local photographer thus needed to find ever more niche subjects in his neighbourhood. Happily for social historians and industrial archaeologists a hundred years later there resulted a treasure trove of visual material for exploration.

Every one of David's illustrations was worthy of close examination. An unexceptional view of a street with a few figures might confirm a run of artisan's houses with top-shops above, whilst the 'end of the working day' exodus from a factory showed where Lowry may have found his inspiration to record similar scenes.

Apart from recording the world outside, the early postcard was also used for advertising. For example, Geo. Herbert Holt was the only tobacco pipe manufacturer in Warwickshire with premises in Stoke, Coventry and a postcard records his waxed moustache and bowler hat for us.

Similarly, we have the record of the working model of a silk ribbon weaving loom made by one Harry Laxon of Coventry. This image has added importance since no illustrations of domestic weaving have yet been found and so details of the machinery used are otherwise unknown.

Moving to the recording of the Coventry cityscape, David traced the collapse of the silk weaving industry in the 1860s following the removal of tariffs by the Cobden Treaty which allowed in continental imports together with the activities of the Coventry Freeholders Land Society a few years earlier. These events spelled the end of the building of 'top shops' and also limited development in Coventry.

A fascinating set of postcards, mostly dated to the early years of the 20th century, showed both the scale of the photographic activity, it seemed that no street was unworthy of being recorded, and the fortuitous capture of so much visual information of use to us today.

Not only do we have details of streets and houses long lost but there are some isolated survivors that we can recognise. Especially, we have the corner shops and pubs often with a number of people bringing the scene to life.

Of particular note is the wide variety of houses present in any given street. Detached properties are rare but built side by side are two and three storied houses, some with obvious top shops, some substantial villas, some more lowly. References to the large scale contemporary maps confirmed the haphazard development of some Coventry streets.

Evidence of a ribbon weaving factory in Cromwell

Street, Earlsdon shows that more than watch making took place in that district. Also recorded are storm-damaged houses, highlighting the poor standards of building. A view of the Foleshill Road included a building with some fancy brickwork above the top shop windows giving extra height to the workspace, presumably for larger machinery.

Pictures of the larger scale activities of the philanthropic, non-conformists J & J Cash showed how investment and organisation could create employment opportunities out of specialisation.

However, as so often over the years, Coventry's fortunes shifted and watch making came to the rescue as artisan textiles waned. This new activity was centred on Spon End where suitable building land in the triangle bounded by the Old Birmingham Turnpike Road, Craven Street and Mount Street had been made available by an Act of Parliament in 1847.

Again, the postcard records of Allesley Old Road and Craven Street give a vivid picture of the area. There were pubs a plenty and social activities as exemplified by the Lord Street FC, winners of the MDT Cup in 1900, 1902, 1906 and 1907.

The postcards also record more personal and domestic scenes such as a family group in a garden or the substantial house built by a watch master in Moor Street.

As with the consolidation of ribbon weaving by Cash so Rotherham and others developed a watch industry. Illustrations of the factory were now possible and those of production lines (all female labour) at Williamsons, and an end of the shift exodus at Rotherams, were typical.

The pace of industrialisation quickened as Coventry caught up with the factory system and David's final examples showed the great increase in scale brought by the likes of Swift Cycle, Humber and Triumph Cycle. One picture of the new Rudge Whitworth factory showed an early steel framed building.

The Daimler works proved difficult to photograph but advertising pictures of a typical week's output of Daimler motor cars and assembly shops more than compensated.

The aftermath of a fire in 1906 at the Humber Motor Works contrasted neatly with the work's fire brigade. It seems that fire and Humber were no strangers.

One illustration of the pattern making department at Coventry Engineering and Pattern in Godiva Street harked back to earlier craft days, but a succession of pictures of the Courtauld operations showed where the City was heading. Not least with the tallest chimney in England (365 feet high).

No review of Coventry would be complete without a reference to Alfred Herbert, Wickman, Coventry Gauge & Tool and the other precision engineering companies on whom so much other industry depended.

Perhaps the most impressive of Coventry's lost industries was its short-lived heavy ordnance. 15" naval gun barrels straddling a level crossing stay in the memory.

Similarly memorable were the groups of trades unionists, whether posed or parading in support of their aims such as a 1914 Railway strike or the Stoke Heath Rent Strike.

It is, therefore, thanks to a relatively small group of photographers interested in their surroundings, the buildings, the industries and the people that worked in them we can get a greater understanding of Coventry and its inhabitants a 100 years ago.

February 2014: John Brace

The Channel Tunnel Fires.

John Brace entertained another large audience with a wry but insightful review of operating procedures in the Channel Tunnel and examined the events surrounding the three major fires that have occurred in the tunnels since commercial services began in 1994.

Thankfully, there was no examination of the origins of the Anglo-French project with its huge cost overruns for construction and heroic over-estimates for traffic volumes that spelt commercial disaster for the initial investors. However, hubris can be seen in the subsequent events.

There are three parallel tunnels – two outer rail tunnels with a smaller service tunnel running between them. The service tunnel is pressurised to exclude smoke and is entered via air locks. It is narrow and has special double ended wire-guided vehicles. The service and running tunnels are connected by frequent cross passages sealed by heavy fire doors. The service tunnel is a safe haven in the event of a tunnel fire.

The freight shuttles differ from the car services in that the drivers do not remain with their vehicles but use a Club Car, usually placed immediately behind the loco. The original design for the freight wagons was enclosed, so as to contain any fire and had a self-extinguishing sump for liquids. Unfortunately, such wagons proved to be too heavy and the revised design was open-sided, un-roofed and without the sump.

Conventional rail signalling is not used in the tunnel. The driver has both a cab display and two radio links. This duplication can, and has, lead to conflicts. There are fire and smoke detectors throughout the tunnels and on board the locomotives and wagons.

There are permanently crewed and fully equipped first response teams on both sides of the channel. A pressurised fire main runs through the service tunnel to hydrants in the running tunnels. The primary role of the first response teams is to ensure a safe evacuation and appropriate first aid.

There would seem to be plentiful opportunities for Murphy's Law to apply – as the details of the three fires would show to be the case.

In the evening of 18 November 1996 a freight shuttle left France. All was normal save that both crossover doors had been left open – and they could not be closed without an engineer being in attendance. As the train moved off it was seen that one wagon was clearly on fire but the train was into the tunnel before an alarm reached the control room. However, no tunnel detectors were activated until the train was 2 Km into the tunnel followed by 3 further alarms over the next 3 minutes. It was not until 11 minutes after departure and 10 Km into the tunnel that the control centre got a full alarm.

Then followed a catalogue of failures: the rear loco power tripped, control circuits failed progressively, other services continued to run, smoke filled the tunnel preventing the driver from knowing his position to alert the control centre to open the appropriate cross passage door, the telephone circuits failed and the radio circuits deteriorated.

Fortunately, the French first response team found the right cross passage door by working backwards from in front of the stopped train and discovered that when the door was opened it produced a bubble of clear air which enabled the passengers and crew to escape into the service tunnel and to be evacuated. It was 1 ½ hours before fire fighting started

and it took a further 5 hours to extinguish the fire.

The second fire on 21 August 2006 was small and quickly dealt with but much had been learnt from the first event. Most significantly, the phenomenon of the bubble of clear air about an open cross passage door in an otherwise smoke-filled tunnel. This could be used to assist an evacuation provided that the driver could stop with the primary exit immediately opposite a cross passage door and appropriate marker boards were installed. But there are clear difficulties involved, precise positioning of the train, different configurations of locos and club cars and reading the marker in a smoke-filled tunnel to name but a few.

Other changes were made to improve the response to alarms. Notably, looking for signs of fire on departing services, loading restrictions to minimise fire risk adjacent to the club car and the provision of fire hoods for all passengers and crew.

The third fire on 11 September 2008 was potentially the nearest to a major disaster- and repeated all the previous errors. Blighted from the outset by an electrical fault on one of the vans being carried which the driver tried to rectify – he thought successfully - before having to board the club car whose primary emergency exit was 'locked'.

18 minutes into the journey simultaneous fire alarms from both train and tunnel detectors initiated a first response from the controller. On board, those in the club car could see the fire but the train did not stop, the driver's radio contact with the controller had failed. Eventually, the train manager convinced the driver to stop without the controller's permission.

Radio communication with the driver was re-established but smoke prevented him from identifying the number of the cross passage door where the train had stopped. But he could say that he was at PK49 thus allowing, after reference to track layout diagrams, the correct doors to be opened.

At the same time ventilation fans and fire pumps became unserviceable due to power failures and duplicates took hours to configure. The controller was overburdened but fortunately an off-duty controller was in the terminal and he played a vital role in managing the incident.

On board there was confusion in evacuating the club car due to the smoke and the locked door but eventually all passengers (some resourceful persons having broken a window to expedite their exit) and crew reach the safety of the service tunnel.

The power and water failures caused delays for the firefighters which were exacerbated by demarcation issues and it took 16 hours to bring the fire under control by which time all the wagons were burnt out and extensive damage had been caused. Over 700 fire and emergency personnel had been involved.

Subsequent to this near disaster a number of significant measures have been put in place to improve safety. Four 'safe stations', each 870m long and equipped with a sprinkler system, have been built under the channel where a train will stop and any fire can be extinguished. Firemen can now earth the catenary in the tunnel and they have equipment for setting up a fire curtain if necessary. Ventilation fans will be brought into use earlier and a permanent standby controller will always be on hand.

All in all, a sobering reminder that 'the best laid plans of mice and men...etc'.

March 2014: John Frearson

Jonathan Dumbleton Pinfold and the Brickmakers of Rugby.

John Frearson is not an industrial archaeologist, or so he says, but he is a most diligent researcher and historian who brings a working lifetime in the concrete and cement industries to bear on his chosen subjects. These are many, and his examination of Jonathan Dumbleton Pinfold and the Brickmakers of Rugby demonstrated his methods to the full.

Detailed examinations of census data, OS maps of all vintages, trade directories, newspapers, County records, probates and wills and contemporary photographs were all used to show the development of Rugby's brick making activities during the late 18th and 19th centuries and the role played latterly by Pinfold.

The story stemmed from a photograph by E H Speight, a Rugby photographer, of a portable (wheeled) steam engine. Just decipherable cast into the wheel hubs was the legend 'J D Pinfold – Rugby'.

Investigations into that name revealed the extent of early brickmaking in Rugby. The earliest record is 1793 and linked to the building of the Union Canal. Brickmaking was a local on-site craft for the canal and many other building projects including industrial premises, churches and domestic housing as the town developed. The earliest local directory, Pigott's *Rugby Directory* of 1828, makes no mention of brick makers, although there were builders included who were later also listed as brick makers. The 1841 Census named 15 'brick makers'.

Plotting the early brick works on a modern map unsurprisingly showed them clustered near to the canal in the area of the Dunchurch, Barby and Hillmorton Roads. Convenient for incoming fuel and outgoing finished products. Reference to the large scale 1850 OS map reveals the details of many 'Brick Yards' and Brick Kilns'. The bricks were fired in clamps and some clays were self-fuelling by virtue of the inclusions of coal and other ignitable materials.

A common theme running through these early operations was the vertical integration of contractor, builder and brickmaker. It is probably no coincidence that the Rugby, St Cross Hospital was built next to the old Barby Road brick yards.

The individual brickmakers, as shown by the census returns, moved homes as the brick works moved to the new construction sites as the town expanded.

Along the Dunchurch Road were a number of such works and by 1851 a part at least was known as Haswell's Brickfield where one Francis Dring, who was at 'Parnell's Brickyard' in 1841 was now shown at Haswell's Brick Kiln Cottage, Dunchurch Road. When the 1887 OS map was published, the brickfields in Dunchurch Road were gone and the area had become allotments.

Looking at the Hillmorton area, the Satchell family was prominent. The earliest reference is the probate inventory of Henry Satchell, Innholder of Hillmorton for materials 'in the kiln'. A descendant, William Satchell was a brickmaker in Hillmorton 'for many years before 1864' and was well known for Hillmorton Red Bricks plus many other products.

By 1894 his son, John Satchell had retired and moved to 2 Bilton Road but still had the brickworks at Hillmorton 'in his own hands'. He had served on the Rugby Urban District Council and also as a County Councillor. Satchell built himself a handsome retirement home, Bayfield, in Clifton Road using what looks to have been Satchell's Red Bricks. An interesting record was recently unearthed during renovations at Bayfield, a plank of wood inscribed '...this house was built by Mr W G Satchell, for himself, on the occasion of his retiring from business. The following is a list of the names of the men employed on the job from the

start...'. Today, the Hillmorton brick works site is an Aldi supermarket.

Similar histories can be traced for other families including Rathbone, Lucas and Banks. The last having a colourful career. A Cheshire journalist who married a Hillmorton woman possessing some family land where '...there was clay and sand beneath...'. However, poor management and an expensive lifestyle resulted in bankruptcy. In the Bilton area, the Wakefield family followed the same pattern of success and failure.

Technical developments also occurred, notably through the efforts of J Heritage on the Lawford Road with a patented process for perforated bricks that were lighter, stronger and cheaper. Mechanisation was coming into play. This led to an expansion of the trade and a confusing pattern of conveyancing of land and works for bricks and lime.

One Henry Haddon, seems to have sold up a large Lawford Road works to satisfy creditors and relocated to Malvern to prosper as an architect. His son was a successful engineer in the Indian Civil Service whose wife had a purported affair with Albert, Duke of Clarence, eldest son of the future Edward VII. After Albert's death Mrs Haddon, now divorced, claimed him as the father of her son, Clarence. The claim was dismissed but in the 1920s Clarence published a book 'My Uncle George V' and was charged with demanding money and extortion after writing to the King. At his trial it was proved that he had been born two years before his mother's affair. Bound over for three years he breached his conditions and was jailed for a year.

Another Bilton dynasty, John Parnell & Sons, provides the link to Jonathan Dumbleton Pinfold, engineer, by selling him a parcel of land near to the Rugby and Leamington Railway, '...part whereof was lately used as a brickyard...'.

Pinfold was born in 1825 in Middleton Cheney, Oxfordshire, the son of a travelling journeyman miller. After his apprenticeship he went to London to gain experience, married and returned to Rugby as a '...Millwright and Engineer Master employing 1 man and 1 boy...'. Sadly, no photograph or portrait of Pinfold has yet been found.

However, there is no shortage of material recording his commercial success since he used agricultural shows and trade exhibitions extensively to promote his products, principally machinery. We find him first in 1862 at the Warwickshire Agricultural Show: '...Mr J D Pinfold, Rugby, exhibited Wright's patent Brick and Pipe making machine, worked by steam power. ...'. Then follows a succession of handbills, patent applications for brickmaking machinery and grist mills, company and exhibition catalogues and even a writ for patent infringement.

With much of the equipment needing independent power, self-contained steam engines were an important part of Pinfold's product range and an illustration from 1876 shows a portable steam engine identical to that used to introduce the talk.

Which brought us nearly full circle. In 1880 Pinfold floated his business as The Rugby Brick and Tile Manufacturing Company Ltd. Sadly, in 1888 a bankruptcy notice was served on him by a brickmaker in Kilburn. The creditors were paid off in full. Pinfold remarried after his first wife's death, his second wife being a daughter of the millwright to whom he had been apprenticed in Oxfordshire. He died in 1910.

Finally, a review of the development by Bromwich, Foster and Dicksee of the businesses that became The Rugby Brick Company showed the usefulness of the wealth of detail contained in the old Aerofilms Collection to examine industrial sites from earlier years.

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Lyndon Fraser Cave-Browne-Cave
Toby Cave 1923 - 2014

Toby Cave was a remarkable man – architect, teacher, author, conservationist, historian, enthusiast for the industrial heritage, as well as being a very committed family man and an inspiration to so many with whom he came into contact.

It is not my role to cover all aspects of Toby's contribution to our lives, but to concentrate on his role within the Warwickshire Industrial Archaeology Society. However, I do feel I need to mention that before he came to Warwickshire in the 1950s, he was a fire-fighter on the Liver Building in the Second World War in the face of German attacks on the Liverpool Docks, became actively involved in the post-war reconstruction of Prague, and was a founder member of a modern art gallery in Nottingham. There was always much to learn about Toby.

I cannot quite remember when I first met him, but I suspect it was in an educational context, with me as student and Toby as teacher. Our shared interest in the industrial heritage soon became apparent and from this developed the idea of forming the Warwickshire Industrial Archaeology Society.

Toby played a pivotal role in the formation of WIAS, being its first Chairman, and subsequently its first President. In the early years, he gave talks to the group, and also organised speakers for meetings, a role that he subsequently passed on to me. Even after he had relinquished the responsibility, I would still receive the occasional hand-written letter which contained details of a potential speaker, drawn from his multitude of contacts.

What was immediately apparent was that Toby's knowledge was both

wide and deep, with certainty about where everything could be checked if doubt arose. What amazed me was his capacity to find the relevant newspaper cutting, journal or book from the mass of literature that was contained – just about – within the four walls of 24 Portland Street.

I would often pick him up to take him to meetings, and the car journey was always packed with interest as Toby led the conversation on any number of issues. A casual chat en route to a WIAS meeting often produced another of those hand-written letters with details of chapter and verse where I might follow up the topic concerned.

What surprised many was that a man so dedicated to conservation, and so knowledgeable about traditional buildings, should also be so interested in those more mundane building materials of cement and concrete. His membership of a number of organisations dedicated to conservation, and his determination to save the Warwickshire that he knew and loved, (together with his published works on Warwickshire Villages, Smaller Country Houses and two volumes on Leamington Spa), must also be placed alongside his work, for example, on the Model Village associated with Southam Cement Works, and his continuing research into the brickmakers of Warwickshire.

When he moved to Sherborne because of ill-health the flow of information – and newspaper cuttings – did not cease and it is remarkable that he was still working so effectively beyond his 90th birthday. We have lost a remarkable man, and the Committee are actively considering how best to create a lasting memorial to honour his contribution to the Warwickshire Industrial Archaeology Society.

WIAS Secretary: Dennis Crips

Our long-serving secretary Dennis Crips has decided to relinquish this post after many years of dedicated service. Dennis has executed this role with great efficiency, and the carefully prepared minutes of all our committee meetings are testimony to this. He has also been much involved in projects such as creating a constitution for the society and in the development of the database project. In addition, he contributed much to debates within committee

and would remind us all of the need to look at the role of the Society within a broader context.

On behalf of the committee and the Society as a whole, I would like to pass on sincere thanks to Dennis for all his hard work as Secretary of WIAS, and we all look forward to seeing him and his wife Maureen at future meetings, together with some lively contributions from the floor at question time.

We do not have a new secretary in place as yet, and if anyone would be interested in taking on this role, please contact myself or Dennis. The one aspect of the post that we really need to cover is the notification and recording of minutes of committee meetings (four per annum), and if you feel this could be for you, do not be shy in stepping forward!

Martin Green

PROGRAMME

September 11 2014

AGM, AIA Cheshire Conference Report and Members' Evening.

October 9 2014

Peter Grenfell:

The Ford Foundry, Leamington Spa.

November 13 2014

Bob Booth (Chairman of the Bournville Society):

'Cadburys and Bournville'.

December 11 2014

Martin Green:

Nooks & Crannies of Warwickshire's Industrial Heritage.

January 8 2015

Richard Thomasson:

The BAE 146: the last UK-designed civil aircraft.

February 12 2015

Christiaan van Schaardenburgh:
Coventry Shadow Factories.

March 12 2015

Jeff Burgess:

Leamington's Water Supply.

April 9 2015

Jim Andrew:

Housing the Great Exhibition - The Crystal Palace of 1851.

May 14 2015

Sue Tungate:

Matthew Boulton and the Soho Mint: Copper to Customer.

June 11 2015

Members' Evening:

Industrial Archaeology and Agriculture - Strange Bedfellows?

NEWSLETTER

Meeting Reports

April 2014: Malcolm Nixon

A New Light on an Old Industry: The Industrial Archaeology of the Worcestershire Potter.

Dr Malcolm Nixon recently retired from a long career in Conservation Architecture specialising in buildings preservation. He has had a lifelong interest in the pottery industry, surveying his first bottle kiln in 1966. Since his retirement he has been working with the Royal Worcester Museum. He has his roots in Warwickshire, which did have a pottery industry centred on Nuneaton, but this was his first talk in the County. His presentation used many old maps and photographs plus narrative detail from archives and old minute books to create a vivid impression of life in former times.

According to Malcolm, historians' views of the pottery industry as a whole are changing and perhaps some of this attitude can be read over into other industries with whose origins we are more familiar.

The Napoleonic Wars and general state of flux in Europe during the late 18th and early 19th centuries had made the traditional 'Grand Tour' impossible. Consequently, attention was turned to the delights and wonders to be found nearer to home as the 'New Pandemonium' ushered in the industrial revolution.

Wealthy patrons scrambled around the Blue John caverns in the Derbyshire Peaks and explored the wild countryside but of greater importance to the burgeoning manufacturing class was their interest in furnaces and factories. This interest was well exploited, and notably so, by Matthew Boulton and his friend Josiah Wedgwood both of whom lavishly entertained potential customers at Etruria and Soho whilst fearing possible industrial espionage. Other potteries were popular destinations, especially those in Worcester with its links to Staffordshire. Michael Faraday of electricity fame was one celebrity visitor to Worcester.

An especially useful find for historians has been a 'Guide Book' *The Process of Making China* with twelve plates illustrating much of the production methods used. Visitors were above all interested in how things were made and examples of new technology were greatly sought after. No wonder Wedgwood had concerns for his intellectual property. Another prime source of information has been rediscovered minute books and other paperwork. These have much extended knowledge of the early operations in factories that no longer exist. For example, we know that one James Hadleigh broke away and founded the Shrub Hill China Works but there is nothing else known about the business.

Similarly, Bellevue Potteries on Mucklow Hill is unknown apart from the name and location. Clearly there is evidence of a vibrant pottery industry in and around Worcester of which nothing is now known. And not only in Worcester. In the 1770s a cream ware factory to rival Wedgwood's Etruria was built in Kidderminster but it failed and is now shrouded in mystery.

Turning to techniques, what can be deduced from the available evidence? An underlying fact is the antipathy to progress shown by many pottery owners; for example, the failure to introduce machinery for plate making. An invaluable source of information is a report from 1850 in *'The Penny Magazine'* following a visit to Worcester. There are excellent illustrated descriptions that show little change in techniques in over a century; child labour still powered the potter's wheel in a deeply conservative industry.

Working conditions continued to be terrible and those employed had a built-in ability to die early. An examination of the now available minute books shows much evidence of illness but also that little or no action was taken to ameliorate conditions. All categories of workers were affected by pneumoconiosis, paint poisoning and other

preventable incidents. Josiah Wedgwood might be regarded as our greatest potter but his reputed remark 'I want to make machines of men' shows some lack of humanity, or perhaps, simply reflects the attitudes of the age.

Another example of the management style was that of Chamberlain & Sons who also owned a pub and exerted a measure of wage control by paying the men's wages in the bar, thus ensuring some immediate recirculation! It may be possible to do some excavation work on this site in the next few years.

Chamberlain's archive also provides an example of the draconian 'rules & regulations' imposed on workers with fines for the most minor offences such as whistling. Sometimes this fund was put to good use; Royal Worcester used it to take apprentices to the Great Exhibition and for excursions to Llandudno. However, the myth of the caring, compassionate employer seems to be just that.

Looking at the surviving examples of architecture in Worcester it seems that the City followed the prevailing fashion. There are problems with excavating in many places and this, coupled with the changing uses of land and buildings over time, causes some confusion. However, the employment of the same architects in both Stafford and Worcester makes for similar buildings. An old 'Aerofilms' photograph of the Royal Worcester works during a 'potters fortnight' holiday gives an unusually pollution-free picture of the site.

An examination of the people working in the potteries provided many insights into contemporary life. Squalor was commonplace and one pithy comment was 'you could guarantee a beetle race as soon as it got dark'.

As today, many women were employed as 'paintresses'. Arnold Bennett's description of those in Stoke as 'loud-tongued and aggressive' may be equally true in Worcester as there was frequent migration of workers between the two cities. However, whilst painters often suffered from lead, arsenic and cadmium poisoning, they also benefitted from training at the Worcester or Stoke Art Colleges that then led to employment.

Worcester was also a centre for glove-making and plotting 'glovers' and 'potters' from census data onto old town maps produces clear enclaves for each trade. An interesting case history was that of one woman shown in the minute books of Royal Worcester as having been employed for 65 years and receiving support as a widow but in a census she was shown as a glover! Was she moonlighting at two jobs or was there a census error?

Finally, archaeology has produced evidence for technological advances. Discoveries of over-fired wasters and shoddy buildings as well as pioneering attempts at underglaze transfer printing and encaustic tiles are but a few examples. Also unearthed has been a 'seven-fire-mouth' biscuit oven, one of the few so far excavated. The use of a cheese-cutter wire and a large lorry to bring down a bottle oven was an interesting aside.

The clean air acts have greatly affected both Stoke and Worcester and today it is difficult to imagine what life in those communities was really like. Or for the rest of Worcester because the works were predominantly located to the South West of the city whence come the prevailing winds!

The social history of the two pottery communities 70 miles apart needs much more research, and could be a very rewarding subject. There is a common denominator in the people, but what did they really do to exploit their resources of coal, clay and bloody-mindedness? Not forgetting the funding that came up the Severn from Bristol.

May 2014: Peter Perkins

The Rise and Fall of the Northamptonshire Boot and Shoe Industry.

For forty years Peter Perkins worked for SATRA, The Shoe and Allied Trades Research Association and has been both Secretary and Chairman of the Northamptonshire Industrial Archaeology Group. Who better then to tell the story of 'The Land of the Shoemakers' as the 1878 *Murray's Handbook for Travellers* describes Northampton with its streets haunted by leather aprons and grimy faces.

Before the 16th century, the woollen industry was the source of wealth in Northamptonshire, but as weaving declined, the boot & shoe and leather trades emerged and it is with these that the prosperity of the county would forever after be linked.

As in many other parts of Britain, shoemaking was a cottage industry; but there were factors that increased its importance in Northamptonshire. The pastoral economy provided hides or skins and the oak woodlands provided the bark for tanning them. There was also a good supply of water for washing the hides. Additionally, its central location was important.

By the time of the Civil War the boot & shoe industry in the county was sufficiently organised that groups of makers could compete for orders from the army. An order was obtained in 1642 by Thomas Pendleton of Northampton (fulfilled by 13 shoemakers) for 4,000 pairs of shoes & 600 pairs of boots for the army bound for Ireland.

Large orders could only be met by good organisation and in this respect, the wholesale manufacturer was pivotal. He would have had a small warehouse, where uppers, soles and other components were cut and sent to outworkers for making into shoes and return to the warehouse for payment. Until around 1850 all boot and shoemaking was entirely manual, but within a decade, machinery started to influence the industry.

The principles of shoemaking were explained with a wealth of illustrations and the progression from the early 'turnshoe' system (a leather upper stitched in the form of a bag, turned inside out and attached to a sole) to the lasted, hand welted process became clear. In the latter, the upper is stretched over a wood or metal former (the last) and attached to an innersole. The outsole is then attached to the upper with the aid of a leather welt. This method forms the basis of modern welted footwear.

We learnt a new vocabulary of 'clicking', cutting the upper leather or sole around a brass bound pattern; 'closing', stitching together the upper leather pieces; 'lasting', stretching the upper leather over the former or last and fixing it to the insole and finally stitching a leather welt to the lasted upper and the insole before attaching the sole by stitching it to the welt. The welt simply allows the sole to be stitched on without stitching inside the shoe which would be quite difficult. Finishing covers a range of operations including scouring and inking the sole edge, buffing, lacing and cleaning. Some shoemakers used a cheaper riveted construction. The shoe is lasted as before but the sole is attached using rivets - simply nails or tacks - being hammered in and clenched over on the metal last. Later as machinery began to be introduced, simpler machine-stitched methods of attaching the sole were introduced.

Turning to machinery, shoemaking in Britain had the reputation as a trade to which machinery could never apply. Due to variability in leather it was thought impossible to perfect suitable machines. Nevertheless, there had been

some attempts at development of machinery during the Napoleonic wars, when Marc Brunel filed a patent for a machine to fasten soles to uppers by means of driving nails. The machine was apparently used for mass production of army boots; but after the wars it was forgotten.

In the 1850s shoe machinery developments, especially sewing machines, started to appear in America. However there was resistance to its introduction in England and a series of strikes caused resentment and some highly skilled workers moved to other parts of country.

How did these machinery developments influence the shoe industry in Northamptonshire? Whilst some outworking continued, large factories were built to house the new mechanised production, typically three storeys and a basement. In the basement was leather storage and heavy presses for cutting soles; on the ground floor was lasting, making (sole and heel attaching) and riveting; on the first floor was finishing and the outworkers' waiting room and on the second floor, often with roof lighting, was clicking and closing. Power came from steam or oil engines, with all the attendant fire risks.

Fortunately, a large number of these buildings remain, or have been recorded, and plenty of examples were shown, together with a nostalgic roster of manufacturers. Not only the exteriors but many examples of working practices were also shown.

As might be expected, there is a long list of allied industries: tanning, insoles, stiffeners, lasts, tacks and cardboard boxes to name but a few.

The growing fashion for sports and leisure meant people turned against welted leather footwear in favour of leisure designs. Such shoes had more complex constructions with subsequently higher costs which drove production to low labour cost countries such as Portugal and especially China. Despite attempts in the UK to automate design and production the competition from imports continued and no amount of technology could stop the decline of the UK industry.

Paradoxically, the failure to use new technology and new machinery has turned to Northamptonshire's advantage. Men's welted footwear is difficult to produce and people are prepared to pay a premium for it. So today exports are increasing! Church's Shoes announced earlier this year they are taking over a former tram and bus depot to give additional production capacity. So, in contrast to some other industries there does seem to be a future for traditional footwear manufacture in Northamptonshire using machinery and techniques that the Victorian shoemakers would recognise.

Finally, to the issues of heritage and conservation. An English Heritage survey identified over 450 buildings associated with shoe trade (excluding garden workshops). Some are still in industrial use and internally remain relatively unchanged. Many of the 3-storey factories have been converted into apartments, where radical change has taken place internally. In 2011 a conservation area was created north and east of the town centre called the boot & shoe quarter. It contains over 100 former shoe factories and 3 or 4 are still in operation. The aim is to conserve the Victorian streetscape and try to preserve the factory buildings whilst ensuring their ongoing use. Northampton Museum is known worldwide for its enormous collection of shoes - not just Northamptonshire and machinery and a new, expanded museum is to be built.

June 2014: Members' Evening

25 Years of WIAS. 1989 - 2014.

A perfect June evening and the excellent facilities of the Bridge House Theatre provided the best possible setting for members, wives and friends to celebrate the first 25 years of WIAS.

Welcoming drinks and canapés, plus a magnificent Anniversary 'Gas Works' Cake by Jan Coulls served in the interval, were enjoyed by everyone.

After moving into the theatre Martin Green opened the proceedings with a moving tribute to the late Toby Cave and his contribution to the success of WIAS since its inception.

Peter Coulls then reviewed the Industrial Heritage of Warwick which was liberally illustrated by pictures from the collection of Derek Billings. Thanks to such pictures we can see the wide variety of local manufacturers and their products, often in settings that remain in existence today. Vehicles of many types and applications jostled with buildings, canals and railways. Warwick has been much more than a quiet Market Town in the Midlands.

Peter, together with Alain Foote and John Willock has been spending many hours in the County Record Office helping in the huge task of organising the archive of Rugby-based Willans & Robinson, a leading steam engine builder at the turn of the twentieth century (see Newsletter No. 38 on the website for more details), that had been handed over to the Record Office. This significant archive, consisting of photographs, glass plate negatives, engine index books, drawings, commercial documents, Board minutes, company publications and much more - invaluable primary sources for historians and industrial archaeologists alike - is now being preserved.

To further help this work WIAS has made a donation to The Record Office of £250 and a cheque was handed over to Sam Collenette, the Archive and Historic Environment Manager. She briefly described the work of the 80 year old Record Office and especially the full scope of the W & R Archive. There are 90,000 negatives, many of which are glass. John and Peter have so far catalogued 17,000 of them and Alan and John have also catalogued 1,000 plans. A part-time conservator has also been employed thanks to grants and a contribution from the I.Mech.E.

Martin Green then reviewed the Society's activities, especially in relation to museums, world heritage sites and other organisations such as English Heritage. In particular he considered the place of Industrial Archaeology within the study of economic and social history. As would be expected from someone with his academic background, and his commitment to the preservation of our industrial heritage, his views were both pertinent and timely.

Martin was followed by the personal recollections of three longstanding members.

Roger Cragg reminded us of the remarkable structure of the Marton Bridge close to Leamington. When built this was the longest wrought iron truss bridge in the world. However, its designers soon developed doubts as to its load carrying capability and gave it a supporting structure that

remains to this day.

John Selby, another founder member recalled a walk with Peter Chater on the Oxford canal near to the abandoned Fenny Compton brick kiln. This visit inspired a sustained piece of research into the brickworks and a resultant paper. Amongst John's illustrations was one of contractors at work on the site in 1837.

Peter Chater, also a founder member, has the unique distinction of never having missed a meeting save the one when the Leam broke its banks totally disrupting traffic. Peter has organised many summer walks, notably, along the local canals and produced accompanying leaflets. He gave us some reminiscences of his lifetime's work on the railways.

Roger Cragg made a presentation on behalf of the Society to Martin and Judy Green in recognition of the immense contribution that Martin has made over 25 years as founder, secretary, programme organiser and chairman and the support that Judy has provided. The Society is much indebted to them.

After a break Martin looked at the future of the Society. Of particular importance, both because it will provide information to visitors to the area and be a record of Warwickshire's industrial heritage as it exists today, is the development of our database.

Martin illustrated this with 25 examples representing the 25 years of the Society and covering the County from the Mancetter Quarry to Wellesbourne water mill via Coventry top shops. The Nelson Club at Stockton to Chesterton windmill. Bridges at Compton Verney, Walton Hall and Hampton Lucy. Hatton locks to Stratford's canal basin and warehouses. Cash's, Courtaulds, Toye Kenning & Spencer and Atherstone Hats. Alcester needle making and de Normanville's roof for Leamington's swimming pool.

Warwickshire has a rich industrial heritage. Much no longer exists but much remains to be recorded. It is to be hoped the WIAS through its members will be instrumental in that regard.



Presenting the Society's cheque to support the work of the Warwick County Record Office.

From l to r: Martin Green, Alain Foote, Peter Coulls, Sam Collenette and John Willock.

WARWICKSHIRE

Industrial Archaeology Society

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FROM THE CHAIRMAN

Setting the limits

With the Society successfully launching the WIAS database during 2014, it is perhaps an occasion to examine some of the challenges of that task and to give some direction to the next stage. Acting as a contributor has been a very interesting experience, and, on more than one occasion, has really tested the interpretation of the nature and limits of industrial archaeology.

This is not another navel-gazing session about 'what is industrial archaeology?', but some practical thoughts on whether certain sites should or should not be included. The fundamental basis of the survey of sites was to focus on what actually remains today, and there has never been a more effective way of reminding oneself of what has disappeared!

This is most evident in the disappearance of huge chunks of industrial heritage of some of the industries of Coventry. So often, in the place of these once proud manufacturing sites we discover the occasional plaque or isolated building, with the majority given over to housing or retail-park. Interestingly, one of the lasting features is often the company Sports and Social Club building, and the sports field associated with them, albeit a shadow of their former glory. Interesting features, but are they industrial archaeology?

The industrial archaeology of the motor industry is difficult to record, but there are even more issues to discuss over the impact of the motor car upon our landscape, and whether these merit inclusion. Ring roads, car parks, motorway service stations and the country garage are familiar ingredients to us all, but are they industrial archaeology?

At one stage Coventry had the highest proportion of its workforce engaged in manufacturing of any city in the UK, but the service sector now dominates. Retailing is one of those service industries and, despite the decline of high street

shopping, many fine examples of historic buildings devoted to retail still exist in the county, often with architectural merit. Several interesting buildings of the Nuneaton Co-operative Society remain in the Nuneaton and Bedworth area, but are they industrial archaeology?

There are also buildings with important structural features that merit investigation by the industrial archaeologist. Alpha House in Coventry, a residential tower block, built in 1962, was one of the first examples of 'jackblock' construction in the UK, with each floor constructed at ground level and then jacked up to the full storey height. It is one of the last remaining examples of such a system in the UK. An interesting building, but is it industrial archaeology?

Architectural merit plus the use of particular (often local) constructional materials represents a powerful case for inclusion. Examples are to be found throughout the county. The Old Bank in Stratford upon Avon is a fine example of Victorian Gothic architecture, built in 1883 for the Birmingham Banking Co to the design of Harris, Martin and Harris of Birmingham. With the town's Shakespearian connections, the bank commissioned a fine Byzantine-style mosaic of Shakespeare over the main entrance, and the set of 15 terracotta panels at first-floor level depicting scenes from Shakespeare's plays. The sculptor was Samuel Barfield of Leicester. An interesting building, but is it industrial archaeology?

The Temperance Hotel and Coffee Tavern in Warwick provides an even stronger case for inclusion. It is a fine red brick building built in 1880, with terracotta panels depicting flowers in the Arts and Crafts style, together with COFFEE TAVERN lettering. It was commissioned by Dale of George Nelson, Dale & Co, gelatine manufacturers of Warwick. The architect was Frederick H Moore of Warwick, who also designed the Nelson Club for the company. Is this industrial

connection firm enough to merit the Coffee Tavern's inclusion?

A similar case might be made for the residences of Warwickshire's industrialists. Success in business was often marked by the purchase – or the building – of a house of substance to reflect that success. George Singer's Coundon Court in Coventry might be a case in point – but is the industrial link too tenuous? This, of course, is very different from the situation where a company might provide housing for its workers. The inclusion of housing by Kaye & Co., cement manufacturers, at the Model Village, Southam certainly does merit a listing on the database.

Decisions on these – and other examples – must rest with the database committee. Given the paucity of sites remaining in many industries, the argument for inclusion can be strong. In these circumstances, any contribution will be positively assessed by the committee, and, where possible, will enter the database. As always – if in doubt – please present the site.

PROGRAMME

December 11 2014

Jeff Burgess:
Leamington's Water Supply.

January 8 2015

Richard Thomasson:
The BAE 146: the last UK-designed civil aircraft.

February 12 2015

Christiaan van Schaardenburgh:
Coventry Shadow Factories.

March 12 2015

Martin Green:
Nooks & Crannies of Warwickshire's Industrial Heritage.

April 9 2015

Jim Andrew:
Housing the Great Exhibition - The Crystal Palace of 1851.

May 14 2015

Sue Tungate:
Matthew Boulton and the Soho Mint: Copper to Customer.

June 11 2015

Members' Evening:
Industrial Archaeology and Agriculture - Strange Bedfellows?

NEWSLETTER

Meeting Reports

September 2014

AGM, AIA Cheshire Conference Report and Members' Evening

In the absence of Martin Green, Peter Coulls chaired the AGM of the Society and gave Martin's report for 2013/14, the 25th anniversary year.

In a year marked by the death of Toby Cave, whose memory will be honoured on a permanent basis, much had been accomplished. Well attended monthly meetings with a wide variety of speakers, the establishment of a database of IA sites in Warwickshire, a comprehensive and well used web-site and plenty of opportunities to develop further are at the heart of the Society.

The treasurer, Victor Lobb, presented a strong financial position with good stewardship arrangements in place. He also outlined the position, following the Society being recognised by HMRC as having Charitable Status, for members to use Gift Aid which would increase the value of their subscriptions to the Society.

A number of topics were discussed, including donations to save the Wedgwood Collection (members to act individually), the use of 'social media' to enhance the appeal of the Society and the possible change of the Society's logo in view of the redevelopment of the old gas works site.

After the formal meeting four members made presentations that again demonstrated the breadth of interests and expertise that are within WIAS.

Brian Redknapp, formerly Senior Engineer in the Coventry City Engineering Department and the first engineer to tackle the city's inner ring road design, celebrated its 40th anniversary with an old promotional video that showed its origins and especially featured Peter Galliford. His eponymous construction company, then a small local business and minute compared to the national contractors, won an increasing number of tenders on the project and was set on its course to become the great concern it is today.

Brian defended the decision to use grade separation rather than roundabouts as brave, and a daunting risk at the time, which had been justified by the low accident rate that has ensued. He also explained that the present work around the access to Coventry Station had been anticipated long ago; the inexorable rise in traffic volumes would require changes to the road layout and at the same time the unpopular pedestrian subways leading to the city centre will be replaced by a more user-friendly bridge.

Chris Barney, hot-foot from the AIA Conference in Chester, gave a whistle stop tour of a selection of the industrial sites laid on for the delegates to visit. Starting, appropriately, at the mainline station and the hotel (for first class passengers, others down the street) still advertising its coaching inn heritage and thence to the Steam Mill (powered by the 8th engine from Boulton & Watt) alongside the Shropshire Union Canal which then flowed 50 feet below the Roman Walls to Taylor's Dockyard still maintaining narrow boats.

Further afield, North Cheshire has major chemical process plants and many notable bridges and viaducts. Site work has begun on a new £600 million Mersey Gateway Project to connect Widness and Runcorn. Fiddlers Ferry power station was visited, it consumes 800 tons of coal an hour at full output with supplies now coming from Russia, Indonesia and several other non UK sources. The rebuilt Anderton Boat Lift linking the River Weaver and the Trent and Mersey Canal has substituted 70 foot hydraulic rams

at £1million each for the original cable and counterweight system to raise and lower the caissons.

Older industries were represented by copper mining on the Derbyshire border and silk mills in Macclesfield. Paradise Mill was closed in 1981 but its hand operated jacquard looms have been preserved and the Mill plus nearby Museum are recommended for a visit. Finally, Cheshire's very active salt industry's origins were explored via Murgatroyd's Brine Pump and the Lion Salt Works (the last traditional producer, closed in 1986) with its planned visitor centre.

Martin Woolston, resplendent in a Rolls-Royce Heritage Trust uniform, outlined the work of the team of volunteers at Anstey in restoring the engines and ancillary equipment belonging to the Trust. Other teams undertake similar work at Derby and elsewhere to ensure that the rich engineering heritage of Rolls-Royce and others is not lost for future generations.

His current project is the restoration of a Rotax starter motor used on aircraft gas turbines such as the Armstrong Siddeley Mamba and Sapphire. This motor used a cordite explosive charge to drive a small turbine which in turn span the main engine up to a speed that allowed the compressor to operate and the engine to fire up.

Early jet engines had a propensity to flame out and, possibly to allow a restart in flight, this particular starter had two chambers for explosive charges. Alternatively, perhaps both were needed for the initial start-up. This dilemma illustrates the difficulties faced by the restorers in the absence of drawings, manuals or other information for the equipment. Clearly, from the component parts on display, this starter motor was a complex piece of engineering and when finished will add to our knowledge of the early days of the jet engine.

Finally, John Barclay gave a glimpse of wartime Lancaster bomber production in Warwickshire with 'the Shirley Secret' that lay behind Ernö Goldfinger's 1955 headquarters building for Carrs Paper Works.

Using a wealth of contemporary photographs we first explored the work being undertaken 10 miles away at the Longbridge shadow factory. Here largely female labour was producing various sub-assemblies for the bomber; front turrets, bomb-aimer positions, cockpits and fuselage centre sections. Conspicuously absent were any rear fuselage assemblies.

These were being produced at Carrs Paper Works in Shirley. A unique collection of photographs taken from a one-off retirement presentation album showed, (again mainly women) producing the rear fuselage complete with rear and mid-upper turrets. The completed sub-assemblies were transported by road to Elmdon for final assembly and testing before delivery to squadrons.

Much recent attention has been given to the visit to the UK of the Canadian Lancaster which has been flying in company with that of the Battle of Britain Memorial Flight. The Lincolnshire Aviation Heritage Centre at East Kirkby has a third surviving Lancaster that has running engines and does taxi runs (air has been seen under the tail wheel on occasions). There is the mouth-watering prospect of this ex-French Air Force machine becoming airworthy and a trio of Lancasters in the air.

There are poor records and details of many of the wartime shadow factories but our knowledge should be increased at the February 2015 meeting when Coventry's shadow factories will feature.

Members' Contributions

Peter Chater:

Hatton Bank and Bank Engine. Memories of the 1940s



Hatton Bank is situated between Warwick and Hatton on the former GWR main line. The distance between the two stations is four miles. Over this distance the track rises about 140 feet. A lot of this gradient is at one in one hundred.

With banking assistance from Warwick, freight or mineral trains can be loaded about one half heavier all the way from London to Birmingham.

The 61xx locomotive shown above would be similar to the engines that were used as the Warwick bank engine.

The engines mostly used were the 41xxs, 51xxs and 81xxs of 2 6 2 wheel formation with driving wheels of 5' 8" diameter.

These engines were built for mixed traffic purposes and quite suitable for this work. They were classified D. They carried 1900 gallons of water and about three and half tons of coal.

Normally the engine was available 24 hours a day. It was brought off Leamington Loco Shed at 5.45 am. and returned at noon for coal and the relief of enginemen. Returning again at 9.00 pm. for same purpose. It was returned to its shed when the fresh loco arrived at Warwick.

At Warwick a water column and ash pit were located at the Bay platform for servicing purposes.

Method of working

A train would run through Warwick station and the driver would stop clear of the Down Bay points.

The signalman would set the road for the bank engine to buffer up to the rear of the standing train. It was not coupled up.

The guard would hand the bank engine driver the tally of his train and then return to his van. The bank engine driver would whistle up two crows and one (a crow is one long, then three short and one long whistle). This could be heard all over Warwick. The train driver on hearing this would reply in the same manner and both engines would start off together.

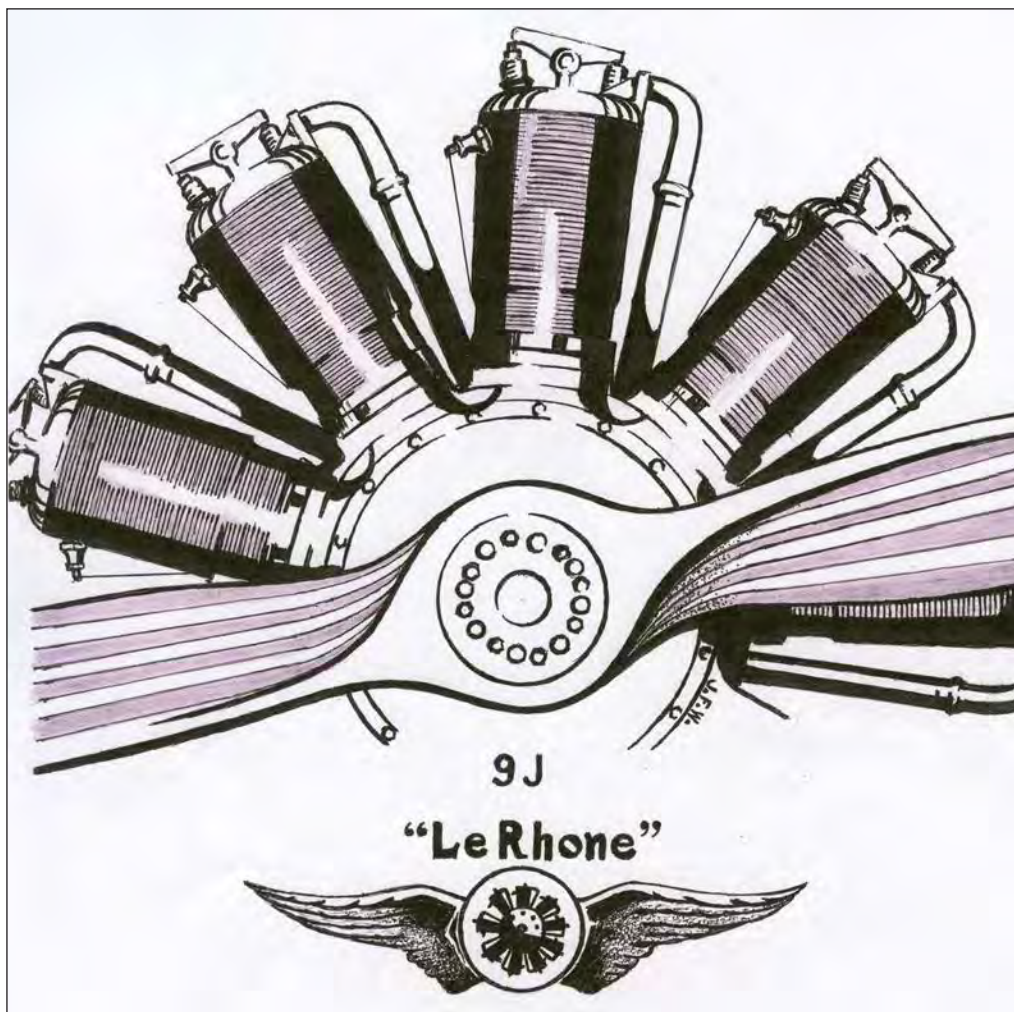
The bank engine driver would look out for signals. If the train was going towards Birmingham the banker would propel it through to Hatton North Signal Box. If towards Stratford on Avon, it would be stopped at the South Box.

The banker was returned to Warwick to do the same again.

Members' Contributions

John Willock:

Willans & Robinson at War; An Update on the Archive in the County Record Office.



As Alain Foote, Peter Coulls and I have started to delve more deeply into the Willans and Robinson (W&R) archive we have become aware of the diversity of its products, particularly during the First World War. Military contracts show widely differing requirements for war *matériel*, from shrapnel shells to aero engines, tank tracks to submarine conning towers.

Of particular interest were instructions for W&R to machine cast iron cylinder liners and cylinder heads for the French designed 80 and 110 hp Le Rhône rotary aero-engines used in many allied aircraft, especially fighters and scouts, including the renowned Sopwith Pup and Camel, Nieuport 11 and Avro 504K. W.H. Allen & Co of Bedford was the British licensee for Le Rhône and it is possible that W&R supplied finished parts to them directly. The Rhône was noted for its particularly smooth running qualities, due mainly to its unusual use of slipper-ended connecting rods and thrust blocks, retained in a series of concentric annular tracks. This obviated imbalance arising from piston acceleration that occurred between cylinders when conventional master and articulated rod type assemblies were used, as was the case in all other types of rotary aero-engines.

Other contracts relate to the complete manufacture by W&R of the French /Swiss Salmson (Canton-Unne System) radial; as well as the supply of components and special tools.

W&R had considerable experience in the manufacture of the water-cooled Salmson under licence from the British agents, Dudbridge Iron Works of Stroud. In fact W&R was the primary producer in this country, holding the sole British Empire manufacturing rights for this rather complicated engine. The ability to machine precision components for the Salmson engine undoubtedly helped with the Rhône contracts. Unlike the Rhône, the Salmson was not a premier power plant, being far too cumbersome with its cooling radiators, for lighter aircraft use. It, nevertheless, powered at least fourteen different types of production and prototype allied aircraft. Only one example of a Salmson engine exists in the UK, a W&R manufactured Model M9, exhibited in the Science Museum.

We have also examined a large number of wartime orders from the Admiralty, for the supply of winch engines, parts and castings, including the provision of the necessary jigs, fixtures and tools for their manufacture. These particular contracts, occasionally marked "Urgent", were split between a number of companies, including Napier, Belliss and Morcom, Mirrlees Watson & Co and Armstrong Whitworth. Initially, it was thought that the winch engines were required for ship-borne use, possibly for minesweeping. However, a number of them seem to have been selected for truck mounting, posing something of a puzzle. Although uncertain, it is

possible that the truck-mounted winch engines were for use with observation balloons, possibly on the Western Front. We have been unable to locate any drawings and specifications for these engines and associated winches. Until more evidence becomes available we cannot be sure of their exact form and intended use.

Observation balloons were used by both sides in the conflict and were vital in the artillery battles, spotting and reporting the fall of shot, as well as providing general battlefield intelligence. Filled with hydrogen, observation balloons were prime targets and highly vulnerable to attack from marauding aircraft using incendiary ammunition.

If threatened it was necessary to winch the balloon down very quickly. This could be accomplished in minute or so. Even so, the average life expectancy of a balloon on the Western Front in 1918 was only about two weeks. All too frequently they were shot down in flames, with the observer having to resort to his fairly unreliable parachute to descend to earth! Thus the high speed winch and its associated engine was a vital piece of war equipment.

W&R were also requested, via the Ministry of Munitions, Department of Mechanical Warfare, to manufacture large quantities of what are called "Tractor Links" in the contracts. Although not actually specified as such, these almost certainly refer to caterpillar track links for the revolutionary new weapon, the tank. The contracts involved the production of thousands of link stampings, their associated ferrules and the assembly of same.

In 1915 Harry Ricardo formed "Engine Patents Ltd" and was requested by the Royal Naval Air Service to appraise and modify the Daimler sleeve valve engine, then being used in the first British tanks. The original engines were

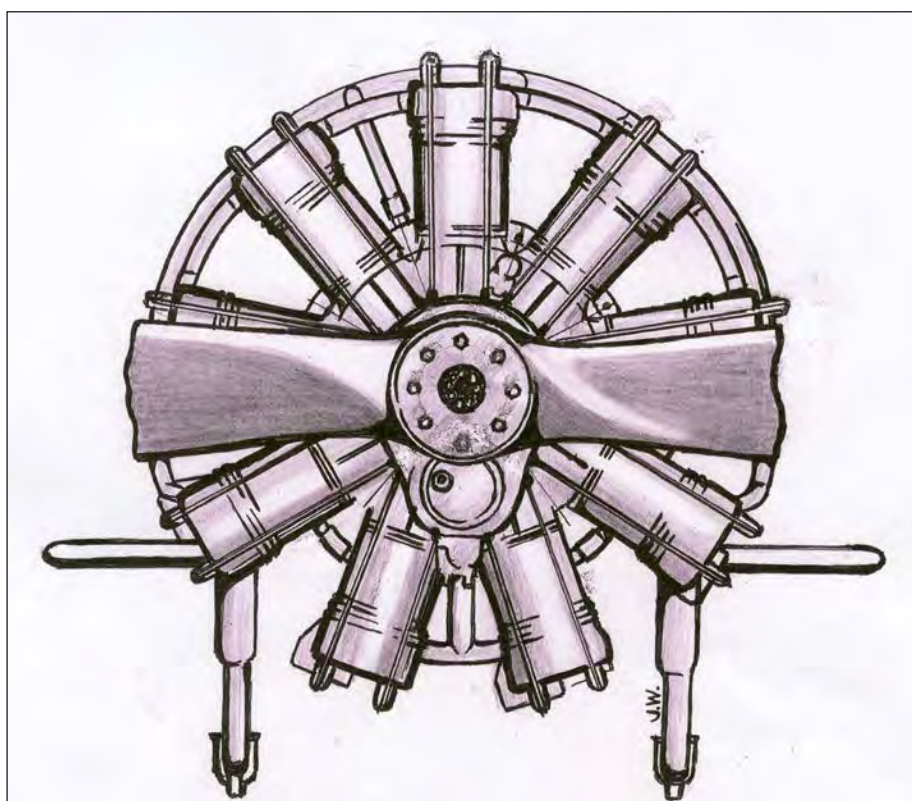
unreliable, underpowered and emitted large quantities of oily exhaust smoke, a good target marker. To overcome some of these limitations, Ricardo designed a totally new 150 hp engine which resulted in large orders for which W&R supplied patterns and castings.

A contract dating from 1917 yielded information on a stationary diesel engine supplied to the Agua Santa Nitrate Railway Company in Chile to supplement its power requirements for the mining and processing of nitrates. As nitrates are a constituent part of explosives, it can be reasonably surmised that the British military was interested in increasing the output of this vital war material from its South American source. Further research is required into this interesting piece of military history.

The company was also involved with the production of submarine conning towers, code named "Lighthouses". Other naval orders included boiler ash expellers, the erection of two sets of marine turbines with reduction gear for a destroyer being built in 1918 by Hawthorne Leslie & Co, Newcastle-upon-Tyne, and several diesel engines for the submarines service. Diesel engines for the Admiralty seem to have been ordered under the coded pseudonyms of "Oilers" and "Bearers" in order to disguise their intended purpose!

All the above examples illustrate the manufacturing expertise of Willans and Robinson on a complex and disparate range of military products during WW1. Quite an interesting departure from their rather better known line of Central Valve Engines, Steam Turbines and Condensers!

The writer would like to thank the Warwickshire County Record Office for their co-operation in the preparation of this article.



Members' Contributions

Alwyn Sparrow:

The Cape Road Goods Yard, Warwick.

Originally opened in 1892, it's now over fifty years since this site closed, with the petroleum depot lasting only a few more years. Very little remains.

I remember this yard in its latter days as a busy place, located off Cape Road adjacent to the road bridge. Apart from general freight, the main goods were domestic coke, coal & bulk petroleum. Parcel traffic was dealt with from the Leamington Goods yard.

The Regent Oil company had a depot within the yard serving road tankers. Warwick Gas Works was also accessed through the yard to their own siding on the other side of Cape road.

The yard access was controlled by a four lever ground frame housed in a small cabin which was electrically released from Warwick Station signal box.

I also remember the three wheel Scammell Mechanical Horse lorry working out of the yard with deliveries. There was a fixed crane for unloading the rail wagons which was listed as having a six ton lifting capacity.

The main activity I recall was the coal merchants who frequented the yard each working day. Arthur Hunt and Vic Dillow were a couple of well known merchants. They often had their own private wagons.

The Wagon Repairs Limited hanging wall map came from Arthur Hunt so he may well have owned his rail vehicles at some time.

I possess the weighbridge ticket book for the period 9th September 1940 to 4th October 1940, during which time two hundred tickets were issued for loads of coke & coal. Interestingly, some of which were destined for Budbrooke Barracks.

The site today & surviving artefacts

The yard today is an industrial site which was developed in the 1970s. Some images of items including the base of the crane, which survives to this day, are shown here.



The surviving crane base



The yard weighbridge invoice book



The ground frame name plate



Arthur Hunt's Wagon Repairs Limited wall map

Meeting Reports

October 2014: Peter Grenfell

The Ford Foundry, Leamington Spa

A large audience – including several former Ford employees – attended the October meeting to hear Peter Grenfell talk on his years at the Ford Foundry, Leamington Spa, 1974-1996. When Peter arrived at Ford it was a second-hand, Second World War foundry, and yet by the time he left it was one of the most up-to-date foundries in Europe, perhaps even the world.

From the outset, Peter made it clear that his focus would be on what actually happened inside the foundry, and this necessarily included a fair degree of technical detail. This report cannot possibly do justice to that detail, and we hope that – in time – the Society may be able publish a fuller document that will satisfy both the interested enthusiast and the technical expert.

Peter divided his talk into several sections. Looking first at the nature of foundry working; then the history of the site prior to the arrival of Ford; followed by the state of the foundry on Peter's arrival in 1974. The latter part of his talk concentrated on the three key developments in the 20 plus years he had been there: the electric melt; the DISA flaskless mould lines; and the two major flaked lines.

Peter explained that the essential function of a foundry is simple - it takes scrap metal, heats it (to about 1500°C) so that it becomes liquid, pours this into moulds, which are subsequently allowed to cool and the product extracted. Iron is melted in cupolas. Steel was made by taking cupola melted base iron and passing it through Tropenas converters (similar to Bessemer's invention, except that the air is blown in the back and across the surface of the metal).

The mould lines were continuously moving iron pallets, with steel boxes ('flasks') in which the moulds were made. The task of making accurate moulds, to carefully pour metal into them, allow them to cool, and extract the castings on a continuous basis is very difficult indeed. The sand also needs to be re-used, so rubber conveyer belts added to the mayhem, ferrying the sand back to be mixed to the right consistency before returning to the moulding machines in a noisy, dusty operation.

In the fettling shop the castings have to be cleaned by shot blasting to remove all burnt sand. The edges are trimmed and the feeder stubs removed on a large grinding machine. In the core shop the moulds that had required cores would have these removed.

A particular feature of the Ford foundry was that it also had a machine shop, not ideally placed in the middle of the foundry, and which was later transferred to the Queensway estate.

With a background in electrical engineering, the move to Ford from a quiet electronics lab was quite a shock to the young engineer. The Plant Manager demonstrated the nimblest of footwork in showing Peter this gigantic, noisy, dusty plant with molten iron running around on the floor and sparks flying everywhere, with people seemingly sure of exactly what they had to do, usually with no protection at all. What a modern Health and Safety Inspector might have made of it defies belief!

The earliest occupant of the rail-side site was the iron-founder Radclyffe & Co in 1881, subsequently joined by the Imperial Stove Company, and in 1902 the site came into the ownership of Flavel's, the well-known Leamington stove manufacturer. Their occupancy lasted until 1939,

and Ford purchased the site in 1940. They installed a steel making facility which consisted of two cupolas, three converters, an overhead crane, and an arc furnace with a mechanised mould line. They were then able to make Bren gun carrier track links in steel, and several other war-related components, including bomb casings.

With the return to peacetime production, emphasis shifted to agricultural machinery, before developing the ability to produce a large range of parts for Ford vehicles ranging from brake drums and discs and flywheels to lorry and tractor parts. It was generally recognised that any Ford car driving around would have at least five parts made in Leamington Spa!

The first of the significant developments was the new Electric Melt opened in 1975. It consisted of three furnaces each of 9MW electrical power and 30 tonnes capacity. They were mains frequency coreless induction furnaces (transformers, with the metal as a single turn secondary, for electrical engineers). Space does not permit a detailed explanation of these, but it represented a more efficient, cleaner and quieter method of heating the metal. A fourth melter was added in 1979, thereby ending cupola melting.

The second development was the introduction of the DISA plant in 1982. DISA Dansk is a firm near Copenhagen that developed moulding lines that did not use steel boxes but used only sand. The block of sand is created in a special chamber, with the two halves of the pattern plate on the outside. A mould was made every ten seconds, it took three seconds to move the line, so that left only seven seconds for the accurate pouring of the metal! The steady hand of man was replaced by auto-pourers. So, potentially, one could sit back and watch perfect moulds appear on their own. The whole plant was monitored by a computer (something of a novelty for 1984).

The last major project was the replacement of the old lines with new bigger conventional flaked lines, No.6 (1988) and No.7 (1989). The latter line made SG iron, iron with a small amount of magnesium added, which made it more ductile like steel (important for certain car components), but the addition of magnesium was a tricky process and Ford developed their own individual method, now widely used in the foundry industry.

Peter left Ford in 1996, and a new DISA machine was subsequently added, together with an updating of the fettling shop. However, rumours began to emerge of the potential closure of the foundry as it no longer fitted the Ford model for production facilities. Some blamed the unions, but closure began to seem inevitable, and the last pour took place on 13th July 2007.

Peter gave a fascinating account of the real world experience of life in a foundry, and quite clearly loved the demands of the job. He responded enthusiastically to a range of questions after the meeting, and it was good to share the knowledge with other former Ford employees in the room.

To end the evening, the Chairman showed some photographs of the derelict Ford site and its eventual demolition, together with a reference to the Foundry Wood Project which is keen to keep alive the heritage of the Ford Foundry and the associated railway.

November 2014: Bob Booth (Chairman of the Bournville Society)
Cadburys and Bournville

Bob Booth, chairman of the Bournville Society and a member for 28 years, entertained a large attendance, which included 18 visitors, with the history and development of Bournville by the Cadbury family into the forerunner for the 'Garden Cities' that were to come.

Over the years we have heard much about the Quaker contribution to the Industrial Revolution, but this has been largely biased towards the 'Industrial'. The social history aspects have not been so well covered. Bob amply redressed the balance with his wide-ranging review of Bournville, the estate and its services together with some insights into the employment practices and the amenities provided by an enlightened and paternalistic family ownership.

From the opening pictures of a group of the building staff in 1922 and the tallest Maypole in the country there was little doubt that those who lived and worked at Bournville could count themselves fortunate. Especially when compared with conditions only a few miles away.

Frequently in the presentation, illustrations from the early years of the 20th century were followed by a contemporary view of the same building or landscape. The passing years have not done many favours. The former sense of spaciousness and ease has been lost although it is still much better than in other nearby neighbourhoods.

The Quaker Cadburys chose Bournville as the site for their new enterprise because of its proximity to the canals and the developing rail network. Early buildings included housing for a fire brigade; cocoa beans can spontaneously combust! There has been a rumour that Leamington or Warwick were considered as possible locations but no evidence has been uncovered in support.

The Cadbury family name is first found in Devon, Somerset and Dorset in the 16th Century. In 1794 one Richard Cadbury was the first to settle in Birmingham as a draper. His son, John, was sent to Leeds to learn the tea retail business and in 1824 he began as a coffee and cocoa nibs roaster and dealer of tea, in Bull Street, Birmingham. An abstainer, he had interests in the temperance and abolition of slavery movements. In 1831 he took a warehouse in Crooked Lane Birmingham, married and had three sons Richard, George and Henry. In 1847 he moved to Bridge Street, Birmingham with a business selling cocoa as a pure health and homeopathic drink. A contemporary engraving of the Bridge Street factory shows a substantial operation.

At that time, as now, raw cocoa beans came in bulk from African growers. The early attempts to produce a palatable drink were not very successful and, apparently, tasted badly due to adulteration. Cadbury persisted and with the Quaker belief that quality spoke for itself developed a 'cocoa essence' that was widely advertised and sold well. The advertising material was notable for its early use of colour.

Simultaneously with the development of the Bournville factory the Cadbury Quaker paternalism blossomed with the creation of the Bournville Estate and its rapid development. Some 144 acres were rapidly filled with housing and recreational facilities. This development was vested in the Bournville Village Trust set up in 1900 and separate from the factory. Later on, the Trust developed other similar ventures.

From the outset, only half of the housing was set aside for Cadbury employees but stringent criteria were, and are,

applied to all applications for a tenancy. However, works transport was provided to supplement the local bus and train services.

Employment at Bournville peaked at around 10,000 of which some 8,000 were female. 'Girls', who never worked nights, left employment on marriage but with a bible as a parting gift.

Much of the character of Bournville, its houses, its amenities and not least its recreational spaces is due to the work of the architect William Harvey, who was much influenced by Voysey and thus created an 'arts and crafts' community. Notable buildings apart from the domestic housing include a 48 bell carillon (now with a visitor centre), the largest sports pavilion in the country in the midst of 90 acres of sports fields (now sadly reduced to 40 after more house building), schools, a Quaker Meeting House, Church of England, Roman Catholic and Serbian Orthodox churches.

Considerable attention was paid to landscaping and the creation of substantial pools for boating and fishing. A large outdoor Lido fed by natural springs is no longer in use but may well be rebuilt. Indoor swimming baths, separate ones for men and women, were also built and everyone had to learn to swim. The architectural historian Pevsner noted the girl's baths which sadly is now used as a storage facility.

A slight downside to the Quaker benevolence was the absence of a cinema, a chip shop and, unsurprisingly, a pub.

Amongst the illustrations were some watercolours by E. Wallcousins of various buildings that had been used as postcards. The dining block was particularly impressive and remains so today. Its basement provided changing rooms, youth club rooms, a library, doctors' and dentists' surgeries and a Concert Hall seating 1050. A fountain and statue was given by the workers in 1933 to commemorate the firm's centenary. It was also interesting to see some of the bomb damage suffered in the 1940s and how the buildings had been restored to their original designs.

Elsewhere on the estate can be found buildings built as convalescence homes and for holiday accommodation together with a number of Cadbury family homes now used for various community purposes including a residential Quaker Centre. Not to be forgotten were infant and junior schools, the School of Art and the Day Continuation School, originally intended for young Cadbury employees.

Apart from the architecture, a recently discovered illustrated booklet shines light on Cadbury's industrial activities and shows the company as being in the forefront of administrative technology, and with its apprentices being so well regarded that they were often poached by other employers such as the Austin Motor Company.

Moving to the present day, Bournville continues to develop and its new housing will include state-of-the-art eco features and by 2017 there will be purpose built retirement facilities.

Today's Cadbury employees, even under the new American ownership, continue to work in 'the factory in a garden'. And, it is, perhaps, no surprise that Ebenezer Howard took forward the Cadbury ideals into his own Garden Cities – 'neither town nor country but with the benefits of both'.

WARWICKSHIRE

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FROM THE CHAIRMAN

It was very encouraging to receive two responses to the questions raised in my last Chairman's Notes concerning the problems of setting the limits to industrial archaeology.

The first is from Brian Ellis, who, as well as being a supporter of and a speaker at, WIAS meetings, is much involved in the Warwickshire Geological Conservation Group, as well as a professional geographer with a long interest in landscape interpretation. The second was from Roger Cragg, a long serving committee member and regular speaker at WIAS, who explores the reasoning behind the inclusion of Alpha House, Coventry in the database.

Brian Ellis observes: 'I was interested to see that you had included two buildings in your Newsletter Notes, viz the Old Bank in Stratford and the Coffee Tavern in Warwick. Both are included in two (recently published) WGCG leaflets about Geology and Building Materials in those towns. They are included specifically because they reflect local mudstone geology being utilised in local industries, particularly in the production of terracotta used in the decorative work. One of the characteristics of archaeology is its dependence on the preservation of artefacts and these tiles are indeed artefact evidence of a vanished industry, but preserved, not in the ground, but in the building. And this justification is over and above any question of the architectural merit of the buildings in which they occur.'

A similar argument could be made for buildings which contain local named bricks. In the case of Cherry Orchard Brickworks the only remaining artefact evidence of that industry is in the bricks in the buildings. So if you are looking for justification for inclusion in the database of such features as industrial archaeology I would argue that, as a means of identifying and preserving artefacts, these buildings and similar features merit inclusion. The case is particularly strong in the buildings you mention in Nuneaton where the link, local outcrop of Etruria Marl,

the related quarries, the consequent brick and tile works and the bricks and especially terracotta, is strong and documented.

The defunct industrial sites raise different issues about inclusion on the grounds of "is it industrial archaeology?". The case for a location's inclusion is a bit more attenuated. I think the key here is archaeology's concern with 'place' – evidence of past activity at a particular place. One justification for a database is that it records evidence of a past activity at a particular location. If an industrial archaeology database is the only (or principal) place where that evidence is preserved then there is a justification for inclusion. There is a reasonable record of the history of the car industry in Coventry but historians are not so concerned with specific locations, but rather with firms. The folk memory of there being a car factory at X will soon fade – my Coventry grandchildren are not aware of what preceded Sainsburys on the A45 (well they are now I have told them!). So there may be a 'social obligation' on Industrial Archaeologists to ensure that there is a record kept.

You may also need to broaden what counts as evidence. You cited the presence of firm's sports clubs and grounds. But you might consider place names as evidence – Dolomite Avenue, Herald Avenue on the site of the Standard/Triumph/Rover plant and Humber Road. A less obvious bit of evidence is the extent to which the footprint on the defunct use is reflected in the boundaries of the replacement use. This is very clearly the case in the Business and Retail park which has replaced the old Standard plant, and in the small housing estate which replaced the Renold Chain works in Coventry.'

Roger Cragg notes that: 'Alpha House (SP 352798) was the first multi-storey building in the world to be built by the 'jack block' system. It is a 17 storey residential tower block of 96 flats. There is a central core containing the lifts, stairs, refuse disposal chutes and other services.'

The principle of the jack block

system is that the roof slab and the uppermost section of the core is cast at ground level. When the concrete has achieved sufficient strength, usually after about three days, the whole structure is jacked up by hydraulic jacks until it has reached one storey in height. For Alpha House 40 jacks each of 220 ton capacity were used. The next floor is then added below and the process repeated, thus the building slowly rises from the ground. It was possible to cast one floor every 9 days.

When the last (lowest) floor was being lifted into place the whole weight of the building, about 7,600 tons, had to be raised. Whilst the lower floors are still being cast, it is then possible for the finishing trades to be at work on the completed upper floors. The building was completed in 1963 and is still in full use today after 51 years.. The system was developed by Felix Adler of Richard Costain (Construction) Ltd. and the Coventry City Architect was Arthur Ling.

The Panel for Historical Engineering Works of the Institution of Civil Engineers considers a number of independent criteria when assessing the historical importance of an engineering structure. One of these criteria is to determine if the structure demonstrates a development in construction techniques or the use of new materials etc. I would suggest that from an engineering viewpoint the construction technique which was used for the first time at Alpha House clearly qualifies this building as having considerable historical engineering merit. Indeed, it has been registered as a Historical Engineering Work (no. 2652) by the Institution.'

PROGRAMME

April 9 2015

Jim Andrew:

Housing the Great Exhibition - The Crystal Palace of 1851.

May 14 2015

Sue Tungate:

Matthew Boulton and the Soho Mint: Copper to Customer.

June 11 2015

Members' Evening:

Industrial Archaeology and Agriculture - Strange Bedfellows?

NEWSLETTER

Meeting Reports

December 2014: Jeff Burgess

Leamington's Water Supply.

Thirty years involvement with the Water Industry was the background to Jeff Burgess's review of Leamington's Water Supply. Another large audience, including several visitors, learned many facts about 'the history beneath our feet' in a liberally illustrated talk.

Starting with the ironwork in our roads and pavements; stopcock boxes, sluice valve boxes and the like, we followed the development of the provision of water to the citizens of Leamington from private enterprise via municipal operations, nationalisation and full circle to the present utility companies.

The pavement ironwork illustrates the successive organisations which, over the years, have been responsible for the water supply. In the case of Leamington, we have represented in ironwork: Leamington Board of Health, Leamington Corporation Waterworks, South Warwickshire Water Board, Severn Trent Water Authority and Severn Trent Water Company.

Prior to 1831 there was no public water supply. Larger houses had their own wells, others may have relied upon a communal well or spring or a well in the garden; all too often located too near to the privy.

In the early 1800s, the farmer at Newbold Comyn Farm, situated at the end of Holly Walk, was one Thomas Oldham. He also was the proprietor of the mill on the River Leam after which The Mill Gardens are named. The Mill was located near to the junction of Mill Road and Leam Terrace, close to the 'Elephant Wash', protruding out into what is now the river bed. Traces of the foundations can be seen through the water from Mill Bridge.

In 1832 Oldham promoted his own water supply system and provided a number of houses in the old town with piped water. In 1833 he extended the mains into the new town north of the river. The source of Oldham's water is uncertain. Some reports give it as a spring at the mill, some as a spring half a mile upstream on the north side of the river, some as a culvert laid through the water meadows upstream of the mill. Whatever its source, water was pumped to a brick-lined, open, reservoir on Campion Hills for a gravity fed supply.

This supply continued until the mill was demolished in 1889. It would appear that Oldham's waterworks had no legal standing; it was not a water undertaking in the proper sense. Nevertheless, Oldham continued to supply water and to extend his mains in the streets. Indeed the Commissioners for the town contracted to buy water from him for street watering purposes.

The Paving, Lighting and Improvement Commissioners were established by an Act of Parliament dated 1825. Some of their duties are evident from the title and others included sewerage and water supply. Street watering was important, particularly in the summer, to keep down the dust. In 1847 The Commissioners contracted with Oldham to supply street watering water at a cost of three shillings and three pence per thousand gallons; a very high price. Potable water supplies seem to have taken second place as far as The Commissioners were concerned, even though it was well known that many of the shallow wells, on which most people depended, were contaminated.

However, The Commissioners did seek the advice of Thomas Hawkesley, a notable civil engineer who had

built Nottingham's Trent Bridge Waterworks. His report recommended the sinking of a well into the sandstone at Emscote, but he did say that the river water would be perfectly satisfactory if properly treated, and would be cheaper.

The well at Emscote was never dug, but the Commissioners purchased the distribution pipes and reservoir from Oldham and contracted for the supply of water and steam power. Two guineas a day was agreed for the purchase of power, and one shilling per day for up to 300,000 gallons – a far cry from the three shillings and three pence per 1,000 gallons for street watering. The mains and reservoir were in the hands of The Commissioners by January 1851.

Amid continuing complaints about water quality in the town, in 1858 the Commissioners built two 500,000 gallon circular covered brick reservoirs on the Campion Hills which were in continuous use until 1976. Evocative pictures showed their cathedral like structure which still exists – any ideas for conversion?

The next character to appear was Alderman Henry Bright, whose memorial is the obelisk in Hamilton Terrace near to the Town Hall and which records 'to whose untiring exertions this town is indebted for its supply of pure water'.

Following medical advice, Bright abandoned the river as a water source and sank a 120 foot well at the junction of St Paul's Road and Campion Terrace which was brought into operation in 1879 producing 1.5 million gallons a day.

Two horizontal steam engines, named after members of the Committee, provided pumping power and a most atmospheric video clip evoked all the drama of such an engine house. So much so that an encore was demanded!

By 1885 a rising population and a reduction in the rest water level in the well required an additional supply. A steam driven pump was installed at the Pump Rooms to draw river water for street watering. Raw water mains were laid alongside the existing treated water ones and Leamington became one of the few towns in the country to have a dual system. Using untreated river water for street watering reduced the demand for potable water from the well.

Soon more drinking water was needed and a second deep well (dug with some difficulty when a seam of running sand was encountered) and service reservoir were built in Lillington at the junction of South View Road and Cubbington Road and came on stream in 1900. The original pump house was demolished in the 1990's and the service reservoir was taken out of service at the same time. Most of the site is now housing but the well is still in production.

Demand continued to outstrip supply, especially during WW2 but, thanks to the development of submersible electric pumps, additional small boreholes were drilled and the Leamington Brewery well was added to the town's water sources.

In 1957 a further 2 million gallon reservoir was added to the Campion Hills facility together with a water treatment plant. This was supplemented in 1960 with the Willes Meadow reservoir (21 million gallons) and pumping station. Today, these resources are now supplemented by the massive 5,000 million gallon reservoir at Draycote and much enlarged treatment facilities for river water.

It is clear that Leamington's water supplies are in good hands. It has been an interesting journey from Mr Oldham to Severn Trent. Full circle and still British owned.

January 2015: Richard Thomasson

The BAe146: The Last UK-designed Civil Aircraft.

Richard Thomasson again combined his deep technical knowledge with a gift for anecdote to bring the story of Britain's last airliner vividly to a large audience. He also spoke with the authority of one who had been closely involved with the aircraft over many years in a number of senior positions.

Librally illustrated with many original photographs, the talk began by documenting the pedigree of the 146th design to come from the drawing offices of de Havilland and its successors. These included the Tiger Moth, on which thousands of RAF pilots first flew, through the inter-war years beauties like the stressed-skin, moulded plywood Albatross to the similarly constructed Mosquito, for four years WW2's fastest aeroplane, and the first operational single-seat jet fighter, the Vampire. Unforgettable, for both good and tragic reasons, was the Comet, the world's first jet airliner. Further military machines included the mighty Sea Vixen but more apposite were the first business jet, the 125, and the Trident airliner.

By now part of Hawker Siddeley, the HS 146 was born of a design concept for a V/STOL (vertical/short take-off and landing) aircraft to operate from city centre airports and small, remote third world airfields. It was not an easy birth, in fact nearly a still birth, with one photograph of a group of workers lobbying Parliament with a coffin bearing the legend 'Don't bury the 146'. A staunch supporter was Tony Benn and in 1971 the 146 was launched.

Richard's successive roles as Project Manager, Bids & Proposals Manager and Commercial Manager for the 146 provided him with a possibly unique collection of photographs ranging from a drawing office without a computer in sight (but plenty of draughtsmen's boards) to the extensive in-house facilities at Hatfield for foundry and press work used mainly for producing tooling. The Commercial Manager's office looked especially Spartan!

An excellent technical review of the 146 highlighted the innovative flying controls needed to meet its specification, the advanced chemical bonding processes that gave both great strength and anti-corrosion properties and duplicated electrical and hydraulic services driven by the four engines. The last was not fool proof – one pilot on landing cut the two inner engines which provided the main hydraulic pressure and on reaching the terminal found himself without brakes and was only stopped by hitting the air bridge!

One particularly striking slide showed the breakdown and sourcing of the major parts of the aircraft. Not only the five UK locations of the Hawker Siddeley Group were involved but also Shorts, SAAB and not least Avco Lycoming in the USA who provided the engines after Rolls Royce decided not to produce a suitable power plant.

Another interesting series of illustrations covering the production and erection of the first aircraft showed the high tail fins lost amongst the roof trusses of the assembly hall and the ingenious way an aircraft was tipped tail down to allow it to be moved out of the hall.

Three prototypes were built, now under the auspices of British Aerospace but still designated 146, and the first flight was made on 3 September 1981.

The first order came from Argentina and others followed from both the UK (DanAir, Air UK and Branson) and overseas (Air Wisconsin, Air Nova, Air Pac and Thai

Airways). The Royal Flight eventually operated three aircraft. Clearly the 146 had a niche market with the smaller, specialised operators offering feeder services to larger hubs.

It also soon gained a fine reputation as a pilot's aeroplane thanks to its excellent manoeuvrability and handling characteristics whilst maintenance crews praised its well thought through systems. For example, a fuel pump could be changed without draining down the whole system.

Various cabin configurations were offered around a basic six abreast, centre aisle plan. Initially limited to 100 seats, a lengthened 300 series increased this to 120 seats.

The original design concept had produced a singularly quiet aeroplane. Popularly known as the 'whisper jet' it was particularly useful for night operations and this soon led to the introduction of a freighter variant that was popular with parcel delivery operators such as TNT. The RAF used a few but the lack of a ramp limited its service suitability.

The development of London City Airport on the old King George V Docks site allowed the 146 to use all its capabilities to the full. Not least its very robust landing gear as demonstrated in a hair raising video clip of a cross wind landing which brought gasps from the audience.

From near misses to real accidents is sometimes uncomfortably close. Mercifully, the 146 has an excellent safety record and the first total loss was not due to any mechanical failure but to a former employee gaining access to the flight deck and killing the pilots. In contrast, the three engine ferry capability of the aircraft was demonstrated when an inboard engine went bang and after its removal at a remote airstrip the aircraft was flown safely back to its US base, not without some caustic comments from the authorities. One pilot ran out of runway, ending up on a beach whilst another, as mentioned earlier, ran out of brakes and hit the terminal air bridge.

In the late 1980s the flight deck was given an upgrade and makeover with new avionics and in the early 1990s production was moved to Manchester. At the same time, a number of design studies were undertaken for versions with larger wings and twin engines, but nothing came of them.

Richard's final association with the aircraft was unusual to say the least. Project 'Water Bomber' was the request from a Canadian owner who wanted to install a 3,000 gallon tank for firefighting fluid that needed to be emptied in some ten seconds and refilled in an eleven minute turn around. A small but specialised team successfully engineered the conversion and some spectacular video shots showed the water bomber in action.

There are around half of the 400 146s built still flying, including the prototype, now converted into a special purpose meteorological aircraft. The 146 is a popular aircraft for luxurious interior conversions for corporate transport where its attributes of low noise and small airfield requirements can be used to advantage.

In a wide ranging discussion session, the issue of preservation of examples of Britain's commercial aviation past was highlighted. Examples left in the Mojave Desert were deemed no substitute for accessible ones in the UK but sadly there seems to be no solution in the short term.

As the last slide said: 'BAe 146 Britain's Best Airliner?' After this review it has to be a contender.

February 2015: Christiaan van Schaardenburgh *Coventry Shadow Factories.*

Another large attendance of 105 including 19 visitors learnt much during the evening from the speaker's depth of knowledge of Britain's Shadow Factory Scheme and its contribution to the country's survival in the early years of WW2.

Chris van Schaardenburgh has been the Curator of Vehicles at the Coventry Transport Museum but is about to move to the Tank Museum. He has an engineering background and has worked at the National Space Museum in Washington, DC. He had curated a recent exhibition at the Transport Museum on 'The Shadow Scheme' or 'What did the Motor Industry do in the War' and this formed the basis for his talk which was liberally illustrated with scenes of contemporary activities.

The Shadow Scheme was a fundamental component of the UK's rearmament programme from 1936 onwards. Shadow did not mean secret, indeed the programme was well known and German visitors were by no means uncommon. The programme was designed to expand production capacity principally for aircraft and aero engines, vehicles and ordnance. It was based initially on the resources of the motor industry given its experience and skills in high volume production methods. Shadow meant following the practices of the parent company. The majority of the shadow factories built were government funded and owned. An early protagonist of the programme was Roy Fedden of Bristol following visits he made to Germany and thus becoming aware of the scale of Germany's rearmament programme, coupled to his contacts with the Rootes Group in Coventry.

Whilst dispersal of manufacturing facilities was one consideration, proximity to the parent also brought benefits. A number of the Coventry shadow plants were close to their parents i.e. Humber and Daimler, whilst Rootes were responsible for a plant at Speke on Merseyside.

One of the largest shadow plants was at Castle Bromwich for Spitfire production. Originally operated by Nuffield it was an initial failure until Lord Beaverbrook (Minister for Aircraft Production) called Lord Nuffield's bluff and assumed Ministerial responsibility for the operation. In Coventry, the Rootes plant at Ryton was built to produce Bristol aero engines, Banner Lane and Anstey for Standard Motors, the latter to assemble the Mosquito fighter/bomber and nearby Lode Lane for Rover for Bristol engines.

One interesting illustration was a poster created for the CTM Exhibition that showed the great spread of the shadow factories operated by the motor industry in Coventry, Birmingham, Luton, Leyland, London and Oxford.

One particular aspect of the shadow programme caused considerable anguish to the Trades Unions and the traditions of a skilled labour force. In order to meet the greatly increased demands for output, many of the shadow factories' operations were de-skilled and were organised around an un- or semi-skilled workforce. This required a new approach to both machinery and working practices that needed understanding by all parties. Furthermore, an increasing proportion of the workforce was female bringing other issues into play.

Some plants were fully vertically integrated from raw material input to finished product with foundry and press shop facilities whilst others were sub-contract component specialists.

In retrospect, the organisational efforts from both government and industry must have been immense but the growing realisation of the threats being posed to the country surely provided a most potent incentive to succeed.

The volume of matériel produced from the Coventry

factories was stupendous and made up much of the output of the British Motor Industry. Between September 1939 and October 1945 this totalled:

Tank Transporters 1,317, Trucks 153,036,
Ambulances 14,543, Heavy Cars 46,689,
Tractors 36,820, Light Cars and Vans 93,419,
Motorcycles 421,039, Trailers 151,070.

Plus over 7,500 armoured carriers and cars, scout cars and armoured command vehicles.

Perhaps even more impressive were the figures for aircraft delivered from Coventry through the shadow factory scheme:

Fairy Battle 1,029, Hawker Hurricane 300,
Short Stirling 620, Avro Lancaster 330,
Handley Page Halifax 1,780, Airspeed Horsa 365,
Bristol Blenheim 3,422, Bristol Beaufighter 260,
Airspeed Oxford 750, DH Mosquito 1,066,
DH Tiger Moth 3,432.

Plus thousands of Bristol and Rolls-Royce aero engines and many other aircraft sub-assemblies and components.

The Castle Bromwich factory produced 11,553 Spitfires and 300 Lancasters as well as operating a large repair facility for both planes and vehicles.

The Rover Company was involved in the early stages of productionising the new Whittle jet engine before the project was passed to Rolls-Royce for completion. This work had a post-war spin-off in the Rover 'Jet' car when there was much interest on both sides of the Atlantic in developing small turbine engines for road use although nothing reached commercial realisation.

Another interesting diversion from vehicles and planes was the production at Carbodies of midget submarines although their numbers and deployment was not disclosed. Amongst the many illustrations were some of Whitley bombers made in Coventry being refurbished at the SS (Jaguar) plant and a production line of women welding jerry cans with not an overall in sight and bare legs with elegant shoes showing under the bench. Also highlighted were lightweight jeeps and inflatable decoy lorries.

Family life with 4 ½ million in the services and 4 million involved in war work clearly suffered. There were many movement, relocation and accommodation issues to be resolved as well as labour relations. A 55 hour week was the norm with good pay at around £8 a week. Many hostels with good canteen facilities were built in Coventry together with welfare services, nurseries and crèches. Music while you work and ENSA provided entertainment in the factories.

An important part of the preparation for the CMT exhibition had been an oral history project, the results of which those members who bought the DVD will have enjoyed. Clearly morale was excellent and helped by VIP visitors who included the Queen, Churchill and Bevin.

The Coventry Blitz and other air raids had a surprisingly small effect on production. Much disruption certainly but, as in Germany, it was found that machine tools are difficult to destroy and buildings can be made useable surprisingly quickly.

What was the post war legacy of the shadow scheme? Some extensive factories became available to the Motor and Aircraft Industries but there were few new designs for cars nor commercial aircraft despite the potential demand, especially for the former. Errors in government policy for post war expansion led to regional dispersal policies falsely based on the success of the shadow schemes.

This talk made much clearer the very intricate links between the many manufacturers involved and that the story of Coventry's Shadow Factories could well be entitled 'Who made What Where?'

WARWICKSHIRE

Industrial Archaeology Society

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FROM THE CHAIRMAN

As part of the Association for Industrial Archaeology's annual regional conference (in Sussex for 2015), a gazetteer is produced outlining the main ingredients of that particular region's industrial archaeology and describing the sites that are available for viewing. It struck me that as the WIAS database has grown, we have a list of sites already in place, and that it would be good to try and respond to the first question – what characterises the industrial archaeology of Warwickshire, Coventry and Solihull? A few suggestions might be ...

1. A complex geology offering a range of opportunities for exploitation by man for construction materials and power supplies, with several of these industries still functioning (mainly roadstone quarrying, sand and gravel extraction, and the production of cement), although the last coal mine closed in 2014. The landscape of these extractive industries tends to be a changing rather than a fixed element, as redundant sites are absorbed into the modern environment.

2. As with many counties, wind and water power are well represented, with the unique Chesterton windmill and the working Charlecote watermill. These have always received a great deal – some might argue disproportionate – amount of attention.

3. The area possesses some very early examples of the development of canal and rail transport in England, with some unique features such as those associated with the Stratford upon Avon Canal. Civil engineering is well represented, and given the location in the English Midlands, our area has continued to be a crossing point for many transport routes, as well as possessing a large international airport, and an ideal opportunity for the development of logistics operations.

4. The development of (initially) workshop industries, especially ribbon weaving, hat making and

watchmaking, with a distinct industrial community in Chapelfields, Coventry is associated with the latter.

5. A hugely significant role in the development of cycle, motor-cycle, and motor industries (and their ancillary trades), with two major museums devoted to that heritage, together with a Midland Air Museum and a National Motor Cycle Museum. The Land Rover plant at Solihull, and the revived Aston Martin production facilities at Gaydon continue that motor industry legacy.

6. 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.

7. 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).

8. The industrial communities of Nuneaton and Bedworth, based on mining, quarrying and textiles, together with the challenges of dealing with the subsequent post-industrial experience.

9. 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. There are many examples of industrial activity being specifically geared to providing for agriculture, with the Massey Ferguson tractor plant a prime example.

There may be other ingredients that you feel I have undervalued or ignored. Please feel free to suggest those to me at wiaschairman@aol.com.

I should hasten to point out engaging in this experiment certainly does not mean that we would wish to host an AIA Conference, but rather that we could be on the way to producing a gazetteer. This would be a major project, but it would be the logical next step. The need for input to the database is as

important as ever, and with the onset of the summer, perhaps you could be tempted to explore sites not yet identified by others.

Support for the Association for Industrial Archaeology

The AIA is our national body and has had a significant impact on raising the profile of industrial archaeology and industrial heritage at every level. WIAS is a member, but subscriptions from individuals are equally welcome. The annual conference in Sussex is a chance to meet like-minded enthusiasts and to explore a region in depth – often visiting sites not normally open to the public. Details of the AIA can be found at www.industrial-archaeology.org

Facebook

For someone who had poured scorn onto the value of Facebook, the decision for WIAS to be involved, and for me to be the person responsible for monitoring entries, was a great deal more than a giant leap! Consuming vast quantities of humble pie, can I record that the role has given me much pleasure and I hope visitors to the page have found some of the posts of interest. Please feel free to make your own contributions.

PROGRAMME

September 10 2015

AGM

including Report on the AIA Conference in Sussex. followed by Martin Green:

Company housing and company towns: Warwickshire and beyond.

October 8 2015

John Berkeley:

From Fleas to Phantoms: a museum in the making.

November 12 2015

Dr. Steven Parissien:

English railway stations.

December 10 2015

Roger Cragg:

Bringing Birmingham's Water: The Elan Valley Aqueduct.

NEWSLETTER

Meeting Reports

March 2015: Martin Green:

Nooks and Crannies of the Industrial Archaeology of Warwickshire, Coventry and Solihull

Introduced by Peter Coulls, Martin overcame the evident after effects of an uncomfortable cycle accident (four cracked ribs, a broken camera and the indignity of a speed limit contravention) to give a clear challenge to the Society. Namely, how should we tackle the difficulties of defining Industrial Archaeology in terms of the extant remains of now past industries?

There are several activities that sit comfortably under the umbrella of industrial archaeology and raise little debate over their inclusion – extractive industries, processing and manufacture, power and utilities, and transport and communications – and we are happy to explore the associated buildings, structures, machinery, sites, landscapes and townscapes. Beyond that, life becomes a little more difficult and Martin explored a few areas that might create some controversy over potential inclusion.

The products of past industrial activity are obviously of great interest to us all, and this applies particularly to the transport industry. Steam specialists, classic car connoisseurs and bus boffins abound. This was illustrated by pictures from the Austin Healey rally held in Warwick in 2009. The real industrial archaeology, however, is the remains of the Healey factory that still exists on the Cape in Warwick, which, incidentally, has become the home for a firm specialising in the restoration of Austin Healey cars.

Cycle firms were of great importance to the industrial history of Coventry and many examples of their products can be found in the Coventry Transport Museum. Interestingly, one firm does still produce cycles in Warwickshire – Pashley cycles of Stratford upon Avon – a firm with a fascinating history from its Birmingham origins in 1926. The firm is now housed in a modern industrial unit – a fascinating history but little industrial archaeology, perhaps?

The use of local materials in significant buildings in the county is another theme that merits discussion. The widespread use of brick and terracotta through the county has generated many impressive buildings – the Old Bank in Stratford and the Coffee Tavern in Warwick (previously the Dale Temperance Hotel) being two fine examples. The latter is of particular interest because it was developed by Thomas Bellamy Dale of the Nelson Dale Gelatine Manufacturers of Warwick. A local industrialist using funds to provide facilities for the town – does this represent industrial archaeology?

Brian Ellis has defended the inclusion of such buildings in Newsletter 54. Martin then went on to ask what was the place of a collection of (named) Warwickshire bricks – a useful supplementary feature of industrial history – or a rather quirky habit that requires treatment!?

Significant constructional features also merit consideration – whether in industrial buildings or not. The (recently renovated) 17-storey Alpha House in Coventry has already been strongly advocated by Roger Cragg on the grounds that it was the first multi-storey building in the world to be built by the ‘jack-block’ system. (See Newsletter 54). The (De Normanville designed) roof to the Leamington Spa Swimming Baths (now the Library) is an example in similar vein.

Warwickshire has a complex geological structure and there are many elements of this that have been – and

continue to be – exploited. How much of the resultant landscape is industrial archaeology? Often all that can be seen is a flooded pool, a wooded hollow, or a dip in the ground with no associated buildings in sight. A further issue lies with the continually changing nature of this landscape. For example, often part of the permission for extraction of sand and gravel requires restoration or conversion of the final landscape – perhaps back to agricultural use, or conversion to nature reserve, fishing lake, or golf course.

At what stage should the record of the extraction be taken? Could a golf course on a former pit justify inclusion? Martin mentioned the importance of the Tame Valley Wetlands Landscape Partnership in this respect, and the potential contribution that industrial archaeologists could make to this project.

Retail and wholesale markets are essential ingredients in the passage of products (and services) from producer to consumer. Market halls and traditional outdoor markets were an important feature of the commercial landscape. Many of these have gone – for example, the Rugby Livestock Market which is now only remembered by the street names such as Gavel Drive and Charolais Close. The Co-operative Movement was one of the most important retail developments in England from the mid-19th century and buildings associated with that movement are still in evidence, e.g. the 1920s buildings in Nuneaton and Bedworth. In the latter part of the twentieth century, the shopping centre has become an increasingly dominant feature of the retail scene, and the post-war development of Coventry, and the creation of the circular Retail Market, would certainly merit consideration for inclusion.

The real question is where exactly the line should be drawn – after all, we are not trying to create a history of shopping in the county – and it is very difficult to set the boundaries once a particular retail outlet is included.

The same might be said for public houses – even those that carry obviously industrial names – The Old Black Bank in Bedworth, The Hatters’ Arms in Warton, The Wheeltapper in Rugby, The Humber in Coventry. The public house was often an important part of an industrial community, but we need to look to other elements in that community to identify the industrial heritage. Housing is a prime example, and the coal mining communities of the north of the county provide the best examples – Piccadilly, Camp Hill, Bermuda Village.

Integral to the spirit of these industrial communities was often the Sports and Social Club associated with the firm or industry. In many cases, these facilities are all that remain of a once proud industrial heritage, for example at Massey Ferguson. Moreover, many of these clubs are under financial pressure in the modern world e.g. the enforced closure and demolition of the Coventry Colliery Club in Keresley; the sad state of the former Courtaulds Cricket Ground; and the bid to save Copeswood Grange (the social club of GEC Coventry).

Martin did not pretend that he could provide all the answers to the questions he posed. All we can do is seek to identify what remains on the ground today and supplement this with a continued enthusiasm for the history of the firms and industries involved.



Ansley Hall Colliery Pithead Baths



Griff No. 4 Granite Quarry, Nuneaton



Austin Healey Rally in Warwick Market Square



Haselor Cider Mill



Miners' Housing at Bermuda Village



Nuneaton Co-operative Society, Whittleford



Copeswood Grange, GEC Social Club, Coventry



Sand & Gravel Landscape, Bubbenhall

Members' Contributions

Martin Green:

Some Industrial Heritage Sites in Solihull.

We have for some time defined our area of interest as Warwickshire, Coventry and Solihull, but have never really done justice to the industrial heritage of Solihull. Our chosen area conflicts with current administrative boundaries but relates more closely to pre-1974 Warwickshire and makes more sense in terms of industrial history. Having said that, Solihull's economic pull has always been towards Birmingham, with easy rail and road access to the city, although there have developed a number of industrial sites within Solihull itself that merit our attention.

Some of these are well known – e.g. Birmingham Airport and the Land Rover plant – others less familiar. These notes look briefly at three of the latter, and they formed the final part of the Chairman's Nooks and Crannies talk.

The industrial estate has become a familiar feature of our townscapes, and Solihull became an attractive location for the establishment of such estates, often attracting firms to move out from the (increasingly congested) city of Birmingham. The Cranmore Boulevard Estate – off Stratford road, Shirley – is one such estate and firms such as Carr's Paper and Chemico took up the option of establishing themselves there.

One particularly interesting building is the 1955 Office Block for Carr's Paper designed by renowned architect Erno Goldfinger. Why such an eminent architect should trouble himself with such a relatively modest project is something of a mystery, but the building remains – recently restored as the headquarters of CIPP (Chartered Institute of Payroll Professionals). It received recognition in a (failed) attempt at listing as “the work of a major twentieth century architect ... the first building in Goldfinger's mature phase ... with a clean and crisp design, and a rhythm created by the regularity of its grid construction expressed through the concrete frame and piloti”.

Another building of architectural interest is the former Lucas Research Centre (later TRW) also on the Stratford Road, Shirley. This is not only an interesting building as seen from the outside, but also has landscaping by renowned landscape architect Sylvia Crowe, and murals inside the entrance foyer by George Mitchell.

Deliveries of Carr's Paper Products required suitably grand delivery vans and lorries and there was the perfect choice available locally – specialist coach builders Wilsdon of Park Road Solihull (close to St. Alphege Church). Having occupied a town centre site for many years, the decision was taken in the 1950s to move to new large premises on the Lode Lane Industrial Estate. Though the firm has now closed, the site remains and is currently owned by the Renewal Christian Centre.

These examples show that there is much still to be discovered about the industrial heritage of Solihull and any contributions to the database would be greatly appreciated.



The Original Terminal Building, Birmingham Airport



Goldfinger House, Cranmore Boulevard Estate, Shirley



Lucas TRW Building, Stratford Road, Shirley



Wilsdon & Co., Lode Lane, Solihull. Now the Renewal Christian Centre

Members' Contributions

Alan Griffin:

A Brief History of Southam Windmill.

When the Domesday survey was made in 1086, two mills were recorded in Southam. Both of these would have been watermills since wind-powered mills were unknown until the early 13th century. The mills at this period of history were owned by the Lord of the Manor which in the case of the manor of Southam was the Prior of the Benedictine monastery of Coventry.

The first mention of a windmill in Southam is a reference to Windmill Hill in 1382. Southam windmill is recorded in 1410 and an enclosure of Southam commons in 1625 makes further mention of 'Myll Hill' in Southam's West Field, one of the old open fields in which the medieval villagers cultivated their own strips of land. It was recorded that this mill was burned down in 1740 and in 1741 Joseph Hill of Southam, a flaxdresser, erected at his own expense a new mill on this site. Joseph Hill sold the mill to Christopher Mason of Southam who purchased the freehold in 1756.

This mill was then burnt down sometime between 1794 and 1807 and in 1807 a new mill was built on the same site. In his will, proved in 1813, Christopher Mason left the mill to his son William who in 1832 sold both the mill and 'a recently erected cottage adjoining' to Edward Kelham of Southam, miller. It was later sold to Edmund Mitchell, a Leamington architect, and subsequently to Samuel Haynes of Southam, miller.

During Samuel Haynes's occupation the mill building again burnt down in September 1849 and a very full report on the fire appeared in the Leamington Spa Courier newspaper on 22 September 1849. It was an unfortunate fact of life that windmills were particularly vulnerable to fire. The fine flour dust in most mills could form a very combustible and sometimes an explosive mixture and the mill stones could themselves generate great heat through friction if they were run at excessive speed. The earlier mills were built mainly of wood and it wasn't an infrequent event for mills to run out of control, sometimes leading to the complete destruction of the mill and the death of the miller. The mill destroyed in the fire of 1849 was again rebuilt and is seen in the photograph opposite in about 1905.

George Bird, who operated the water mill at Stoneythorpe, purchased the Southam windmill in 1863 and operated the mill with his sons Charles and Frank who carried on the milling following their father's death in 1909. At some date during the Bird family's ownership of the mill, a bakehouse was built on to the cottage and bread baking on a commercial scale was commenced. There is also some evidence, in the form of a tall brick chimney, that the mill was steam driven for a period during the nineteenth century. The chimney appears in some of the early photographs but was demolished in the 1970s. The two elderly Bird brothers ran the business up until their deaths in the mid-1940s when they were both in their late seventies.

In 1947 my late father William (Bill) Griffin purchased the property and the buildings on it. My father had been trained as a baker and his primary reason for purchasing the property was to own the bakery business with little thought given to any commercial operation of the mill.



The Mill in about 1905 with members of the Bird family by the mill door.

Each of the individual panels on the sails pivoted on cast iron hinges.

When he bought it, the windmill sails had been removed having reportedly been badly damaged in a gale. The mill stones and the gearing and hoppers were still in situ and serviceable and the mill was at that date driven by a Ruston & Hornsby oil engine housed in an engine-house adjacent to the mill.

My father milled flour a few times with the original stones driven by the oil engine but then installed a small hammer mill, also driven by the oil engine and subsequently by a Fordson Major tractor with a drive belt fitted. This combination was used for several years in the 1950's for milling cattle food, what my father referred to as 'gristing'. The Ruston & Hornsby engine was subsequently sold for scrap.

My father carried on the baking using the coal-fired oven until the introduction, by Suttons of Coventry, of the pre-packed, sliced loaf put most small local bakers, my father included, out of business almost overnight.

The mill equipment was removed over the years and the mill building became unsafe. The locally made clay bricks used to build the 1850s mill were very poor and began to crumble and as a consequence disintegrate. The walls were no longer weatherproof and absorbed rainwater. This led eventually to the beam ends supporting the floors suffering wet rot and rendered the structure unsafe.

The mill was truncated and cement rendered as something of a last resort but demolition was the only realistic option and the mill was pulled down in 1979. Today, only the base of the building now remains.

Windmill Deeds

There are 35 surviving deeds relating to the windmill and these cover the period 1741 - 1907. They were deposited in the Warwickshire Record Office in 1989 by my father and are catalogued at CR2713. This is a summary of the catalogue entry:- Deeds of Southam Windmill beginning with a lease dated 28 May 1741 by Pudsey Jesson of Langley Hall Esq. to Joseph Hill of Southam, flaxdresser, of a parcel of land in the open field of Southam upon which a windmill formerly stood until recently burnt down, and upon which Joseph Hill is building a new windmill at his own costs. The mill was sold to Christopher Mason of Southam, miller, in 1756, who bought the freehold of the site (described as in West Field, Southam) in 1761 (nos. 2 and 4). Christopher Mason left the mill to his son William by his will, proved in 1813 (no.12). William Mason sold the mill with a recently erected cottage adjoining to Edward Kelham of Southam, miller, in 1832 (no.17) and it was later sold to Edmund Mitchell of Leamington Priors, architect, in 1849 (no. 24), Samuel Thomas Haynes of Southam, miller, in 1862 (no. 26) and to George Bird of Stoneythorpe, miller in 1863 (no. 31). The latest deed is a reconveyance of the windmill etc. to George Bird following repayment of a mortgage (no. 35)

Other Documented History

In 1979 Wilfred Seaby a noted windmill historian published the results of his two-year survey of all the windmills in Warwickshire in a book *Warwickshire Windmills*. Copies of this are held in the reference sections of libraries in mid-Warwickshire and in the Warwickshire County Record Office, the references to Southam windmill are on page 22. It can be deduced from Seaby's research that his references to the earlier Southam windmills back to the 14th century refer to a building on the same site as the remains of the last mill demolished some six hundred years later.



The Mill circa 1953 before being truncated leaving only the three lower floors.

There was for a period another windmill in Southam also on the Welsh Road but on the eastern section of the road leading to Priors Marston. This was a small, brick-built tower mill which was in existence by 1822 but burnt down in 1863 (Seaby).



The Mill as purchased in 1948, minus the sails which were either blown down or taken off in 1947.

The tall chimney with the dovecot is a remnant of steam working. The small building to the left of the mill was known as 'the engine house'.

The other small building directly in front of the mill housed the Ruston & Hornsby oil engine which drove the millstones by means of a belt through a small door at the base of the mill.

Meeting Reports

April 2015: Jim Andrew

Housing the Great Exhibition - The Crystal Palace of 1851.

If the Society's meetings become much more popular we shall need to build another Crystal Palace to accommodate everyone. Some 90 members and guests were introduced to a welter of facts and statistics about the original, many of which seemed frankly incredible to those accustomed to today's standards.

How could the largest single building yet built have been brought from concept to conclusion in only eleven months? Jim Andrew, who talked to us about the Smethwick Engine in May 2009 (Newsletter 35), has long been fascinated by the Crystal Palace, stemming from his time at Imperial College. His work with Birmingham's Museum of Science and Technology and the Millennium Point Project has given him an added perspective.

First, however, there is a need to reassess the Victorians, at least the early ones when Prince Albert was able to exert his influence as a technocrat and visionary with the need to establish a reputation for himself. He was fortunate to operate in a 'can do' society that enjoyed immense resources having led the Industrial Revolution fifty years earlier.

The Royal Society for the Encouragement of Arts, Manufactures and Commerce was founded in 1754 as the Society for the Encouragement of Arts, Manufacture and Commerce. It was the vehicle that Albert needed. He, as President of the RSA, together with Henry Cole (the future Director of the V & A Museum), noted the increasing attendances at the Society's exhibitions and the popularity of such events in Europe. How about something bigger and better in London in 1851?

About January 1849 a group that included John Scott Russell and Robert Stephenson led by Albert and Cole began to plan. By June ideas for a large international exhibition were well advanced and a Royal Commission was established on 3 January 1850. A call went out for architects and others to draw up a scheme for an exhibition building of about 19 acres within a budget and a finishing date to allow opening on 1st May 1851. It was to be sited in Hyde Park without major damage to the Royal Park and to be removed after the exhibition closed in October 1851. 245 designs were submitted but all were rejected by June.

Enter Joseph Paxton, gardener extraordinaire to the Duke of Devonshire and creator of an enormous greenhouse at Chatsworth. Paxton, visiting the new House of Commons on 7 June, heard of the Great Exhibition problems and sketched out on a blotter his ideas for the iron-framed, glass-clad building soon to be dubbed 'The Crystal Palace'.

With only eleven months to opening and clearly much concern over lead times from potential exhibitors from home and abroad, the Committee had little choice. Paxton was asked to prepare drawings in two weeks; a bit tight or to get rid of him? Working drawings were submitted on 20 June with an estimate which was within budget. The Committee dithered for three weeks but on 15 July Paxton's scheme was given the go ahead. The site was handed over on 30 July 1850 with the Exhibition still to open on 1 May 1851!

An idea of the scale of Paxton's proposed building was vividly demonstrated by superimposing its plan onto a map of Warwick. 2,000 feet long, it stretched from the Shire Hall to St Nicholas Church.

Clearly a successful outcome to the project, assuming that Paxton's design was practical, would depend utterly on the contractors entrusted with its creation. Here the story

moves to the West Midlands; Fox, Henderson & Co with works and foundry operations and Chance Brothers the glass maker, both located in Smethwick and surrounded by a host of potential sub-contractors, were appointed.

Here Jim's presentation moved to a fascinating series of contemporary illustrations detailing the processes and methods used to construct the building. Modular design and pre-fabrication were the essential pre-requisites to success but planning clearly played a very significant role. For example, the palings used to fence the twenty nine acre site were sized for subsequent use as floorboards in the finished building.

The logistics demanded for what was, surely, the first example of 'just in time' production would merit a PhD thesis: twenty miles of wooden guttering, machined and painted; glazing bars for the 290,000 panes (4ft x 10 ins) of 2mm glass; the iron frame elements, 6,000 girders (24/48/72 ft), 900 columns (doubling as downpipes), 1,600 junction castings totalling 4,500 tons (3,800 cast, 700 wrought).

Whilst much of the woodwork was produced on site in temporary facilities it seems that all the ironwork was produced in the Midlands as was the glass. It has not been possible to establish how the glass was produced but plate glass can be ruled out in view of the timescale involved.

Who would have wanted to be the transport manager responsible for arranging the shipment of so much fragile material? Or the production manager who needed to send components that would fit without overmuch fettling on site for which there was no time to spare.

Nor was structural safety forgotten, another telling illustration was of a great company of soldiers marching in quickstep across a test section of the longitudinal girders. Presumably the girders passed the test, which must have reassured many of the 6,039,195 attendees over the 5 ½ months the exhibition was open.

One problem that was brilliantly addressed in Paxton's giant green house was the preservation of three large specimen lime trees within a timber framed transept.

Other criteria helped Paxton to meet the construction deadline. Since the building was to be a temporary structure only minimal foundations were required and there was no need to be concerned about potential corrosion issues. Nor was heating or artificial light required but happily some minimal conveniences for visitors were provided.

The framework was completed on 11 December 1850. Most probably some glazing was already in place but the ingenuity shown in this respect, with trolleys carrying gangs of workmen, allowed 18,000 glass panels a week to be installed. It seems unlikely that any sealant was used.

Fortunately, we have some contemporary pictures, (Calotypes) of the building, which, together with other illustrations of the interiors, allow us to sense its impact on Victorian England.

As intended, the building was taken down and rebuilt some 30% larger in Sydenham in South London and used as a public amenity space. It was destroyed by fire in 1936.

The legacy of the Great Exhibition has been immense. The profits of £186,437 or some £75 million today were largely used to buy the land in South Kensington on which were built The Albert Hall and the nearby Great Museums. Not forgetting the Albert Memorial commemorating the man who made it happen, not least because he needed to make his mark in the country of his adoption.

May 2015: Sue Tungate

Matthew Boulton and the Soho Mint: Copper to Customer.

Over the years we have had several speakers revealing different aspects of Matthew Boulton's life and achievements. None have spoken with the authority of Sue Tungate on the history of the Soho Mint, Boulton's third great contribution to the Industrial Revolution.

Sue was a science teacher for many years and after retirement has taken a PhD at the University of Birmingham on the coins, medals and tokens of Matthew Boulton's Mints. Who better then to show us the path from 'Copper to Customer'?

Why did Boulton get involved in minting? The reasons are not always clear but a brief review of his career set against the growth of Birmingham helped to give perspective. Developing from his father's business, by the 1770s Boulton had established two world leading industries. The Soho Manufactory for the mass production of 'Toys' and the steam engine through partnership with James Watt. Boulton was a man who lived on the edge of bankruptcy and largely funded his early enterprises from the dowries of his two wives, who were sisters.

The first large market for steam power was Cornish copper and tin mining. Much more efficient than the Newcomen engines they displaced, Boulton & Watt's engines were paid for out of the savings in coal consumed. All coal used in Cornwall had to be shipped in, usually from South Wales. Some 27 tons of coal were needed to extract one ton of copper.

The Cornish industry was hard hit by the development of Parys Mountain on Anglesey in 1768 and by the mid-1780s the price of copper had fallen considerably. An added problem for the Cornish mines was that all the ore they produced was smelted in Swansea and the smelters held the mining adventurers to ransom. Boulton & Watt were caught in the middle and had to reduce the premiums they were charging or, alternatively, take interests in the mines.

These events, together with Boulton's restless energy, the need for an income stream and a real social problem, triggered his third great enterprise; seeking to solve a crisis in the Nation's coinage and at the same time bring financial stability to his own businesses. Some 80 to 90% of the copper coinage then in circulation was forged giving rise to great concern for wages adulteration amongst the lower paid. Gold and silver coinage was not affected, but also was not used for the Nation's wage packets. Reform of the regal coinage was urgent but the Royal Mint in London was singularly ill-equipped to strike large volumes of copper coins.

Boulton and his team had considerable experience of designing and producing round objects, often with features in relief on the faces, buttons, medals and medallions such as those for Cook's second voyage and coins for Sumatra and the East India Company (over 10 million struck in 2 years). He also had a reliable, controllable and consistent power source. These elements came together in the Soho Mint, built alongside the Manufactory in 1788 and extended over the next decade.

Amongst Boulton's innovations were the precise rolling of copper strip and then blanking discs to a specific weight. This, together with very accurate dies and the development of a rising collar to contain the outer rim on striking resulted in a finished coin that was difficult to forge or clip. Perhaps his greatest contribution was to develop a steam-powered mechanism to replace the traditional inefficient

hand-powered screw press. From the outset, Boulton paid great attention to the artistic design and the subsequent die engraving process. For this he employed the best craftsmen available in England and from the Continent.

The Soho Mint produced coins, tokens and medals, all made in a similar way but with distinct functions; coins are authorised by the government as money, tokens were a local substitute for coins and medals celebrate events, personalities and achievement, especially in war.

Boulton's relations with influential members of the Government were good, but the same cannot be said for those with the Royal Mint where he was seen as a threat, despite his insistence that his interests lay in the mass production of a better copper coinage than the Royal Mint was able to handle. Ironically, Boulton's successors were later to equip a revamped Royal Mint with state-of-the-art machinery.

However, in the early days Boulton had sunk a great deal of capital in a patented plant to mass produce copper coins, but no contract from the government was forthcoming. Something had to be found to utilise this idle machinery and generate some return.

Boulton turned to producing tokens for many UK cities and institutions and coinage for overseas customers. The range and volumes for these were considerable, for example 14 million coins to Monneron in Paris and 25 million to the East India Company.

The madness of George III further delayed the government contract, whose head should be shown on the coinage? But in 1797 the first Regal Coinage Contract was signed for 2d, 1d, 1/2d and 1/4d coins. 44,969,204 1d and 722,972 2d 'Cartwheel' coins were struck. Boulton had also contracted to distribute these coins throughout the country. The coins were shipped in casks, typically weighing 170 kg each, via trusted agents over the canal system.

Once under way, production volumes increased rapidly. In 1799 42,480,000 1/2d and 4,225,428 1/4d coins (575 tons of copper) were struck, followed in 1806 by 4,833,788 1/4d and 87,893,526 1/2d. Surprise was expressed at the precision of these figures but they are evidently accurate.

Whilst the original coins contained copper to the approximate face value, fluctuations in the copper price later made this impracticable (£90/ton in 1779 falling to £73 in 1788 and rising to £169 in 1805).

Exports continued to be buoyant (Canada, Ghana, Bahamas, Bermuda, Sierra Leone as well as the East India Company). Technology was also exported with Mints set up in Russia, Denmark, Calcutta and Mexico plus re-equipping the Royal Mint in a contract for £16,990 signed in 1806 but not completed until after Boulton's death in 1809.

The many illustrations used throughout the talk highlighted the breadth of the activity. 14 different languages in several alphabets, memorable commemorative pieces of battles (14,000 Trafalgar Medals in gold to tin) and revolutions (Louis XVI and Marie Antoinette), a Royal Marriage with the wrong date and a handshake in Sierra Leone 15 years before the abolition of the slave trade.

The Soho Mint not only revolutionised coining technology but produced many works of art in themselves. Boulton had made it possible to generate enduring images on a mass scale and to distribute them around the world. A further and lasting tribute to his genius.

WARWICKSHIRE

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PUBLISHED QUARTERLY

FROM THE CHAIRMAN

The limits to industrial archaeology are a frequently debated topic – not least on these pages – and this issue of the Newsletter includes two elements that might be regarded as marginal candidates for inclusion – agriculture and housing.

The industrial revolution occurred in a society dominated by agriculture, and many of the new advances in materials, technology and power were applied to agriculture, and it was not long before England's agricultural engineering companies were a feature of the local and national economy.

In order to fully understand the links between industry and agriculture, it is perhaps useful to establish a framework for analysis. There are various ways in which this might be achieved but a simple classification might be:

Power on the farm.

Tools, machinery and vehicles.

Buildings.

Water supply and drainage.

Fertilizer production and application.

Impact of technology and transport changes on market access.

Companies and individuals.

The processing of agricultural products is another significant area and there are many elements to this: milling and the processing of cereals, maltings, brewing and cider making, dairies and cheese-making, vegetable processing, canned fruit and vegetables, meat processing, animal and pet food, and gelatine.

Given these frameworks, analysis of Warwickshire's agricultural history becomes a simpler task, but also reveals the extent and diversity of the links to industrial activity. The members' evening in June attempted to explore aspects of this and the report on that meeting is overleaf.

A second element that might be considered 'marginal' to industrial archaeology is the provision of company housing. As Chris Barney commented to me after the meeting on company housing ... "virtually all housing is ultimately housing for workers" ... and so it sometimes becomes difficult to make clear-cut

divisions on company involvement.

A new company moves to an area that is deficient in necessary housing, and a private (or council) developer seizes the initiative to fill that gap. Is this company housing?

In fact, most of us would not include such developments but would reserve it to situations where companies were directly involved. Beyond this, of course, come all the other benefits apart from housing that companies might provide for their workers. Including: refreshment facilities, bath house and washrooms, social club, dance hall, institute, library, reading room, sport and recreational facilities, parks, playgrounds, open spaces, allotments, schools and adult learning, religious buildings, provision for retirement and almshouses.

Interestingly, it is often these that are the last remnant of a firm or industry when the production facilities have long gone. Are they industrial archaeology?

Central to this discussion is the motive that lay behind provision of housing by companies. It is likely that more than one motive would be present – provision of housing might be a necessity; provision often made good financial sense and contributed to business efficiency; provision promoted good industrial relations; and finally paternalistic/philanthropic sentiments might be present, including, of course, the special contributions made by The Quakers.

Analysis of motivation permits us to set out a classification of types of housing:

Houses provided on a temporary basis to meet an immediate need. By definition, this accommodation is no longer in place, but sometimes remained longer than anticipated.

Houses in which industrial activity took place alongside the provision of accommodation, e.g. weavers' cottages; watchmakers' premises. Prime examples exist in Coventry.

Houses associated with transport, built to accommodate staff at their place of work, e.g. station master, lock-keeper etc.

Houses provided by a landowner

such as estate and farm workers' cottages, which we would probably exclude from the list given the limited links to industry.

Housing associated with mining and quarrying, and the processing of the extracted products. Location is the result of an accident of geology rather than prior settlement patterns, with the special example of colliery housing and welfare evident in the north of our county.

Houses provided by firms specifically for their workers, but with no obligation to provide welfare services. These were sometimes built in combination with local authorities, and the extent of welfare involvement depended on a range of factors such as the scale of development or the availability of existing services.

The planned industrial village (whether as an expansion of existing settlements or on new territory), with associated welfare facilities. This could be a gradual evolution, or much more of a planned outcome.

Given this framework, examples of all these types of housing can be discovered throughout Warwickshire, although, of course, we have nothing on the scale of company towns such as Bournville and Port Sunlight. Some photographic examples from Warwickshire can be found later in this Newsletter.

PROGRAMME

January 14 2016

Gary Collins & Donata Santorini, Archivists:

The Willans Project - What Did It Achieve?

February 11 2016

Dr Barrie Trinder:

Industry in Banbury: an Overview 1700-1960.

March 10 2016

Mike Gould:

Rover - the Marque Doomed to Die.

April 14 2016

Peter Lee:

Nuneaton's Mills and Factories.

May 12 2016

Anthony Coulls:

The London Water and Steam Museum.

June 9 2016

Members' Evening.

NEWSLETTER

Meeting Reports

June 2015: Members' Evening

Industrial Archaeology and Agriculture - Strange Bedfellows.

Martin Green began the Members' evening by providing a survey of the potential links between agriculture and industrial archaeology and then went on to illustrate these links by reference to examples from our area. What was immediately apparent was that agriculture has always had a strong presence in the economy of Warwickshire, exemplified by the choice of Stoneleigh for the headquarters of the Royal Agriculture Society of England (and for many years the site of the Royal Show) and the research facilities established at Wellesbourne, now part of Warwick University.

Our area is also home to two vehicles that have made a huge difference to agricultural productivity throughout the UK and further afield – the Land Rover and Massey Ferguson tractors. The former, of course, continues to operate from its Solihull headquarters but the Banner Lane site of the tractor factory is now covered by a housing estate and the MF social club remains as the principal reminder of a once-proud Coventry industry. There are many versions of the MF tractor still in use, and groups such as 'Friends of Ferguson Heritage' and 'The Warwick Vintage Tractor and Machinery Society' continue to keep the memories alive. We were shown many examples of tractors at work in ploughing contests still held locally.

Agricultural engineering has been an important industry in Warwickshire, and Martin looked back at the Troth and Hillson plough manufactured on a small scale at the Swan Foundry, Langleigh in the nineteenth century and beyond, and a much more recent development of the Dowdeswell plough developed by Roger Dowdeswell in the 1970s at the Blue Lias Works at Stockton. At one time the firm employed 300 people and had 40% of the UK plough market. More recently, times had become very hard, and, sadly, the firm has now had to close.

Steam power on the farm was illustrated by reference to one firm on the county boundary – Bomford and Evershed at Salford Priors - and one just over the border in Banbury - Barwell and Stewart (where there is a current vigorous campaign to save the remaining buildings of the canalside site). Bomford and Evershed have continued to adapt and are now part of the Alamo Group, specializing in hedge trimming and mowing machinery. Many firms were involved with the manufacture of buildings for agriculture, including the ubiquitous iron-framed barn, and many still carry the manufacturer's name e.g. Glover of Warwick, Matterson, Huxley and Watson of Coventry. However, what the catalogues of these firms indicate is the enormous range of items that they supplied to agriculture, a point emphasised later by Peter Coulls. One such agricultural engineering firm was Thwaites, established in Cubbington in the 1930s by Basil Thwaites. A fascinating collection of black and white photographs were provided by **Jerry Cleal** and he was able to provide expert commentary on these images. Most were concerned with the various types of lifting gear that were developed by Thwaites, muck spreading machinery and some nostalgic pictures of life on the farm. Thwaites continues to operate on the Cubbington site, specialising in dumper trucks, and could easily be a topic for further research.

John Frearson again showed that his meticulous research into local sources can produce a fascinating story. His exploration of Rugby's brick makers (March

2014) is now complemented by a review of a curious attempt in the mid-1800s to pipe waste from a Rugby sewage works to irrigate and fertilise a wide area of farmland.

Rugby was the first town in the country to establish a local Board of Health to deal with disposal of sewage and the like and after some prodding work began in 1850. However, a series of reports in local papers, notably the *Leicestershire Mercury*, show that by mid-1852 not much progress had been made, but by 1853 a lease was granted to Mr G H Walker of Newbold Grange to allow the use of certain of his land for the discharge of sewerage and some works had been established. Indeed by 1854 Walker had so far improved his works that he used all the liquid manure flowing into his tank and could dispose of double the quantity if he could obtain it.

Old plans superimposed on new showed the extent of the pipe network from the old sewage works towards Newbold on Avon. Large areas of farmland were irrigated and manured so that 12 crops of grass were obtained. In all, some 1,800 pipes were laid totalling 5,400 yards.

The old and subsequent sewage works are shown on the OS maps from 1886 but of the pipelines no trace remains.

An interesting overview of a sewage disposal and irrigation project in Rugby that probably deserved better success. But succeeding owners of the land do not seem to have had the vision of the originators and had problems with river contamination that may have curtailed the development.

Peter Coulls used Spennell's Annual Directories for 1880 to 1899 to demonstrate the wide variety of manufacturing activities that took place in Warwick and Leamington, principally to meet the local demand for equipment and maintenance.

Understandably, steam power in the form of stationary and portable engines figured prominently; Joseph Mitton in Saltisford and Roberts & Son in St John's Foundry (The Warwick Engine) also offered pug mills, saw benches, winding engines and pumps.

Smiths and wheelwrights such as Henry Savage in High Street, Leamington advertised alongside Jas W Mann, General Furnishing and Agricultural Ironmonger in Warwick.

Corn Mill engineers Lampitt & Son in Warwick sported 'Her Majesty's Royal Letters Patent' at the head of an impressive page of flour and corn milling machinery, water wheels and buildings. A one stop shop.

Marquees, tents and rick cloths, wagon and cart covers, horse and boat cloths were all provided by George Griffin in Smith Street, Warwick.

Wm. Glover & Sons of Eagle Works in Warwick began to spread their wings by buying out Lampitt at the Packmore works, thus expanding their wagon, cart and farm building business. This later extended to include steam, gas and oil engines and associated machinery and shafting.

Other services advertised included; Maltsters and Corn Dealers, Auctioneers and Boot & Shoe making and repairing, Harness Makers and Veterinary Services offering every description of medicine and remedies for horses, cattle, dogs, &c. whilst W A Walker at The Cottage, Warwick could provide a range of poultry coops and runs.

Clearly, Warwick and Leamington were well provided for with a wide range of services.



Above: The Name plate from a Troth and Hillson Langley plough.

Right: The extent of the Rugby sewage pipeline.

Left: A Barrows and Stewart steam engine at a rally at Bloxham.

Rugby Sewage Pipeline [northern sector]



Staying on the straight and narrow - a ploughing contest.



A Hill & Smith (Brierley Hill) barn at Camp Hill Farm, Henley-in-Arden

SPENNER'S WARWICK DIRECTORY. ALMANAC AND DIRECTORY.

WM. GLOVER & SONS,
(Late LAMPET & SONS, LIMITED),
EAGLE WORKS AND PACKMORE WORKS,
WARWICK.

Engineers and Millwrights.

MANUFACTURERS OF ALL KINDS OF
FLOUR & CORN MILL MACHINERY.

Improved Centrifugal Flour Dressing Machinery.
WATER WHEELS OF EVERY DESCRIPTION.
Brick-making Machinery of all kinds.

THE
"Little Giant"
DOUBLE TURBINE

Guaranteed to be one of the best and most effective Turbines ever made.

One of these Turbines can be seen at work in Warwick giving off 87 Horse power.

Designs and Specifications of every kind of Machinery, Buildings, etc., free on application to
WM. GLOVER & SONS,
Engineers, WARWICK.

REPAIRS to old Engines, New Fire Boxes, Tubes, &c.

An advertisement from a Spennell's Directory.



An interested audience for a demonstration of Thwaites lifting machinery.



The (now demolished) site of Glover's works on the Coventry Road, Warwick.

Members' Contributions

Alain Foote:

Visit to Ironbridge Power Station; 28 April 2015.

Thanks to John Willock, a number of WIAS members were able to visit Ironbridge 'B' Power Station at the end of April this year, a few months before it was due to close. This is, therefore, an appropriate opportunity to describe the history of the power stations at Ironbridge and the links with Warwickshire.

The planning of the first power station at Ironbridge was started around 1925 when the West Midlands Joint Electricity Authority was formed, embracing around 1,000 square miles of Staffordshire, Shropshire and Worcestershire from Tamworth to the Welsh Border. As originally planned the station was to have five generating sets of 25MW each. This was later changed to four 50MW sets. The first contract was let in May 1929 to create a power station with one 50MW set with space for a second unit. The main structure took shape in 1930 with the official opening ceremony of the first unit taking place on 13 October 1932.

The steam turbine and generator were supplied by British Thomson-Houston (BT-H) of Rugby. The steam turbine was a two cylinder 1500 r.p.m. unit, serial no. R1509, dispatched on 14 June 1931 from Rugby. It was designed to operate on steam at 375 psi and 750° F. Due to the narrowness of the local roads and the restricted railway loading gauge, the generator stator had to be fabricated at Ironbridge rather than at Rugby.

The second unit (No. R1781) was installed during the winter of 1935-6, with the third and fourth units (Nos. R1946 & R2008) in 1938-9. By then a total of ten boilers had been installed. The Turbine Hall with the four units installed is shown opposite.

The units at Ironbridge 'A' operated through the Second World War and into the 1950s. By the early 1960s, the Central Electricity Generating Board (CEGB) was looking for sites for new larger power stations and Ironbridge was identified as being suitable for accommodating a new station with two 500MW units. The project was given the go ahead on 1 April 1963 with the aim of creating an output of 1000MW, five times that of the 'A' station on just twice the land area!

Initial site clearance began on 17 June 1963. The new station needed four cooling towers to reduce the heat rejected to the River Severn. This time, the turbines (serial nos. 5970 & 5971) and generators, were ordered from Associated Electrical Industries (AEI) at Trafford Park. The units were 5-cylinder 3000 r.p.m. reheat units designed to operate at steam conditions of 2300 psi, 1050° F with reheat steam conditions of 565 psi at 1050° F. One of the turbine generator units on its concrete foundation is shown opposite.

Great care was taken with the design of the buildings and cooling towers to minimise the impact on the landscape, including using a red/pink tint in the concrete for the towers. The design of the first two towers had to be changed following the cooling tower collapses at Ferrybridge on 1 November 1965, with their thickness increased from five to seven inches. A picture of the towers taken during our visit is shown above and the additional supports needed



Ironbridge B Cooling Towers showing the additional supports needed for thickened concrete.

to accommodate the thicker concrete needed, are clearly shown.

Unit 1 was first synchronised to the grid on 11 June 1969 with the second unit coming on stream on 27 February 1970.

When operating on coal, the two boilers at Ironbridge 'B' consumed 10,000 tons of coal a day, which was supplied by Merry-Go-Round trains of 32-ton wagons. In 2013 the boilers at Ironbridge 'B' were converted to run on biomass (namely wood chips). This restricts the output of the units to 300MW each, however on 4 February 2014, unit 1 suffered a last stage blade failure during run up. This caused a large imbalance resulting in damage to the generator hydrogen seals and oil pipes which, in turn fuelled a large fire. As the station will close at the end of 2015, it has been decided that the unit is beyond economical repair, so only unit 2 was running when we visited. The logistics of handling the wood chips presents many challenges for E.On!

Ironbridge 'A' Power Station was finally shutdown on 19 January 1978. Plans to preserve the plant as a Museum of Electricity failed due to the high cost of maintenance, even though the Ironbridge Gorge Museum was offered the site for a token £1. Demolition commenced in April 1982 and was completed the following year. It is assumed that demolition of the 'B' station will commence after closure at the end of this year.

Thanks again to John Willock for arranging this visit.

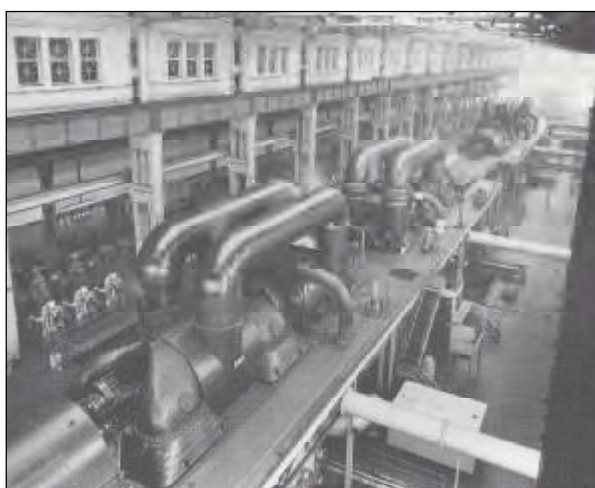
Members' Contributions

Peter Chater:

The Alcester Railway.



One of the Turbine Generators on its Concrete Foundation at Ironbridge B.



Ironbridge A Turbine Hall with 4 Turbines installed.



Ironbridge B Cooling Towers on our Visit.



In 1876 a railway line was opened between Bearley and Alcester. The section between Great Alne and Alcester was subsequently closed, leaving the four remaining miles of track open between Bearley and Great Alne.

This is one of the local lines I knew as a locomotive fireman in the 1940s.

On Fridays only, a little train of two or three wagons, plus the brake van, was formed at Bearley. Between 10.00 and 11.00 am. we, (driver, myself, guard and a porter from Bearley) would start the journey after obtaining a staff for the single line between Bearley East Signal Box and the North Signal Box. This was exchanged for another staff (one engine in steam) for us to occupy the single line to Great Alne. No other train would be allowed on this line until the staff had been returned.

This line, only being used once a week for this one train, had little maintenance. Only small locomotives were allowed. Brambles overhung, grass and weeds were over the track, pheasants and partridges would scurry out of the way. Although the journey was taken at a very leisurely pace, farm animals in the fields would look alarmed and race from the line side. On approaching Great Alne there was a level crossing (Spencer's Crossing). Here was a narrow lane leading to Spencer's mill. The gate had to be closed to road traffic for us to pass through. This operation was performed by the porter. We then proceeded the few hundred yards to Great Alne station and yard.

The porter operated the ground frame. We took the empty wagons from the sidings and put the fresh ones in position and then formed a little train for return journey. With the train left secure, it was then time for us all to walk the short distance to the Mother Huff Cap inn for refreshments, attracted by the convivial atmosphere and the unfailingly friendly landlady.

My mate, never renowned for his hospitality, always seemed willing to buy another round of drinks before we returned, fully replenished, to the station and made the journey back. Water was often taken for the engine from the Edstone aqueduct before proceeding to Bearley North Signal Box where the staff was given up. We were then given a staff to enter the short section of line to Bearley East Box. Excursion over.



Former miners' housing in Camp Hill, Nuneaton, due for demolition.



Craven Street in the watchmaking district of Chapelfields, with topshops to the rear.



Bermuda Village, Nuneaton, former housing for workers at Griff Clara Colliery.



Nelson Way, Bilton, Rugby, provided by English Electric for its workers.



Model Village, Southam, built by the nearby Kaye's Cement Works.



Housing in Saltaire, part of the company town created by Titus Salt.



The Nelson Club, Stockton, provided by the Nelson Cement Company.



One example of the high quality of the housing provided by Lord Lever in Port Sunlight.

Meeting Reports

September 2015: AGM followed by Martin Green:

Company Housing and Company Towns: Warwickshire and Beyond.

The meeting opened with the formalities of the Society's AGM.

As Martin Green made clear in his Chairman's Report, the Society, when judged against all the usual yardsticks – membership, attendances at meetings and visitors – is in excellent shape. Many similar local Societies are envious of our position.

However, it would be dangerous to rest on our laurels and there is a need to move forward wherever possible. The focus of the Society is its programme of monthly meetings and that going forward to June 2016 (see page 1 for details) should provide interest for all members.

The Society uses other media, both to keep members informed and to interest an outside audience. Notably an excellent website, now supplemented by Facebook, an interactive database of Warwickshire IA sites now reaching 300 entries, a quarterly Newsletter records the meetings and provides an opportunity for members to publish individual contributions, whilst the book stall sales at meetings quadrupled.

Financially, the Society is secure. The Treasurer reported that we have a small surplus, as in previous years, after covering expenses and maintaining our support of suitable local causes such as the work on the Willans & Robinson and Healey archives at the County Record Office.

After being unchanged for many years the room hire charge will increase by 18% in 2016 to £780 but subscriptions will effectively be reduced as the meeting unanimously passed a resolution that: *approved the recommendation of the Committee that, to support the Society's application for Gift Aid reimbursement, and with effect from 1 September 2016:*

i) *Annual membership fees shall be £16 for individual membership and £20 for joint membership;*

ii) *The previous practice of members contributing £1.00 to attend each meeting will cease;*

iii) *Guests will continue to be invited to make a voluntary donation for attending meetings of the Society.*

The Committee is to keep this matter under review and report to future AGMs.

The Committee was re-elected unchanged and the Chairman closed the formal proceedings with thanks to its members, to the bookstall and refreshment providers and especially to the membership.

After the formalities, Chris Barney, who had come straight from Sussex University, with its principal buildings by Sir Basil Spence, reported on this year's AIA Conference. Many good speakers and interesting subjects, which had included 'the Worth of the Industrial Heritage to the National Economy', made for an interesting and topical Conference. The L T C Rolt Memorial Lecture on Rolt's lesser known associations with cars and motors will be published shortly and should make interesting reading.

The well organised excursions (in an owner-driven vintage Green Line bus) provided Chris with plenty of photo-opportunities which allowed us to enjoy the varied industrial archaeology of Sussex.

A Jill & Jack windmill relocated to the Downs and the Volks electric railway that ran along Brighton's seafront, with a car rescued from Southend's pier, to a concreted water catchment area at Stanmere House were just the beginning. At Tangmere with its Battle of Britain history was Neville Dukes' world air speed record breaking Hawker Hunter

and the remains of a Hurricane, recovered 75 years after its vertical dive into Woodhouse Road in Hove.

A beam pump engine at Petworth House and the artefact store at the Weald & Downland Open Air Museum led to a swing bridge on the Chichester Canal possibly by John Rennie and a triple expansion Tangye engine in a water company building.

More modern but with a welded steel frame was the iconic de la Warr Pavilion in Bexhill close by a Victorian bathing machine. Clearly, there is more to AIA membership than the magazine and the 2016 conference to be held in Telford will have a wealth of IA to explore.

After the break, Martin Green spoke about Company Housing and Company Welfare in Warwickshire and beyond. This large subject, Martin suggested, required an analytical framework such as that provided in the Chairman's Notes in this issue. After explaining this framework he went on to illustrate it with specific examples, a small number of which are included here and in the photographs opposite.

In Warwickshire, two extractive industries – coal and cement – have left their mark on the landscape not only in terms of physical change but also in the houses and other facilities provided for workers. In the cement industry, housing in Rugby, Stockton and Southam were all provided by cement firms. Indeed, Nelson's provision of housing, Village Hall and Working Men's Club in Stockton is probably the best example of a 'company village' in our area. The nearby 'model village' in Southam – courtesy of Kaye's Cement – is also an interesting example which used the 'Calway System' of construction on its first 40 houses.

The (evocatively named) mining communities of Bermuda and Piccadilly both retain examples of housing built for miners, and the later Camp Hill estate in Nuneaton was an example of post-war housing geared to attracting workers to the local mining industry. Apart from a few examples (e.g. Queen Elisabeth Road) this area has been subject to considerable re-development in recent years.

With regard to workshop housing, the topshops of Coventry and the unique example of Cash's factory are reminders of the city's weaving heritage. Elsewhere in the city, the Chapelfields watchmaking district is an example of private developers (including some with watchmaking interests) providing housing designed for use by (small) firms engaged in the many processes of watch manufacture. It is an important example of the concentration of so many manufacturing establishments within a residential area, with efforts made in the layout of the streets to retain that residential character.

Martin concluded his talk with illustrations from some of the more famous company villages and towns – New Lanark, Saltaire, Bournville and Port Sunlight – together with some thoughts on the philanthropic nature of some of these developments. He left his last words to Jervis Babb, president of Lever Bros. in New York in the 1950s, who described soap magnate Lord Lever as "a man with extraordinary ability to spot wealth-creating opportunities. He realized these could best be developed with the co-operation of sturdy, self-reliant working people, living in dignity and comfort. To him, providing good working and living conditions and sharing the wealth he was helping to create were simply good business".

October 2015: John Berkeley

From Fleas to Phantoms: a Museum in the Making.

Member John Berkeley is a man of many parts. He has combined a distinguished career in industry (being awarded an OBE for services to training) with the foundation of The Midland Aircraft Preservation Society and the Midland Air Museum. More recently he chaired the precision engineering company Brandauer and his December 2011 talk *'From Pens to Particle Physics'* was memorable; as have been his contributions at many other meetings.

From Fleas to Phantoms began with a review of aviation in Warwickshire from its earliest days that was a revelation to many; both for its early start and for its great variety. From pre WW1 into the interwar years, Warwickshire was home to all aspects of aviation; airframes, engines, airfields and flying clubs.

The first part was social history with a difference; aviators ranged from aristocrats to bus drivers, often flying home-built machines as self-taught, unlicensed pilots. The second, dealing with preservation and museums was equally fascinating and notable as a demonstration of what a dedicated and determined team can accomplish.

The story began with one Alfred Pericles Maxfield 'Birmingham's first flying man' who made flights from Castle Bromwich Golf Links in October 1909. Others followed and with a series of illustrations culled from many sources John produced a vivid picture of a rapidly developing scene.

Coventry embraced the fledgling aero industry as enthusiastically as it had weaving, watches, bicycles and cars. Humber took a license from Blériot, The Coventry Ordnance Works anticipated war and airfields and aero clubs proliferated. The Nuneaton Air Field on Attleborough Fields Farm hosted a two day 'Air Fête' in July 1912 and boasted a hanger twice the size of Hendon's largest.

WW1 brought massive expansion and more aircraft were ordered from Coventry manufacturers than from anywhere else in England. Siddeley Deasey, Daimler, Standard and others all flourished. As well as airframes Coventry built engines; Humber and Daimler built W O Bentley's outstanding BR1 and BR2 rotaries, our old friends Willans and Robinson built Salmson engines, whilst at Longbridge, Austin produced 1,900 SE5A aircraft and engines.

After the war Herbert Austin turned his attention to the private flyer and offered the Austin Whippet but was ahead of his time. Hopes were high at the 1920 Olympia Aero Show but only five machines were built. The Longbridge airfield at Cofton Hackett was unusual in its circular layout with four radial runways intersecting at the centre. Scope for pilot confusion! In those early years 49 civilian airfields and landing grounds were located in Warwickshire plus a further 10 for military purposes.

The general public's interest in aviation was fuelled by pioneer Alan (later Sir) Cobham and his air shows with their displays and joy-rides and by newspaper sponsorship for competitions. Alan Cobham pressed for an airfield at Stratford upon Avon to provide such entertainment alongside the traditional Mop Fairs and enjoyed a roaring trade.

A whole talk could have been used to cover the history of Warwickshire's flying clubs. Mainly male establishments but with a few notable women including Miss Joan Parsons of Leamington whose record breaking flight to Cape Town was cruelly halted only 300 miles from the finish.

No coverage of the amateur flying scene could be complete without a reference to the 'Flying Flea'. Conceived by a Frenchman, Henri Mignet, as the Model T Ford of the air

and promoted through a 'how-to build and fly it' book. *If you can nail up a packing case you can build it and teach yourself to fly in a month* were typical exhortations. The 'Pou du Ciel' captured the public's imagination and members of the Birmingham Flea Club built some 17 examples, only 10 were completed but none flew seriously although some did become airborne! Eventually banned by the Air Ministry for safety reasons one example was illegally flown.

After the interval, John turned to preservation where he has unparalleled personal experience and enthusiasm. It began in his teens and shows no signs of diminishing.

Vast numbers of light aircraft were scrapped before and after WW2 but a few people sought to preserve an aviation heritage. One such, an employee of Armstrong Whitworth, acquired an SE5A which was hidden/restored/ hung in the rafters somewhere and now flies regularly at Old Warden as part of the Shuttleworth Collection.

Local aircraft, notably the AW experimental Tailless machines, if they had not crashed, were displayed and then broken up or were just left to rot. Three Coventry lads known as 'The Shuttleworth Veterans' used to cycle to Old Warden to help in the early post-war years.

So was born an idea and on 12 March 1967 when an advertisement was placed in the classified columns of the Coventry Evening Telegraph calling for like-minded enthusiasts. 50 turned up at the inaugural meeting of what became the 'Midland Aircraft Preservation Society' whose first project was the restoration of a wooden four-bladed propeller.

The first aircraft acquired was a Parnell Pixie 3 in August 1967 followed by a Flying Flea first flown in 1936. Easily transported, the Flea proved a useful exhibit at various shows attended by MAPS.

Lack of facilities and resources were inevitable in the early days, and as a result possible projects, such as the Hawker Hunter that had stood outside Solihull School and which needed a new home, could not be taken on. A breakthrough came at the Stoneleigh Town and Country Festival in 1972 with an offer of suitable storage facilities, at least for ten months of the year.

John's remarkable collection of photographs covering the subsequent developments were even more evocative than those in the first half, especially those of the 'might-have-beens'. Another important element in the story was learning how to dismantle, transport and then reassemble the old aircraft that became available. It seems that the skills and makeshift tooling plus sponsorship from local businesses and transport were forthcoming and so the collection grew.

After 25 years it comprised some 70 aircraft, or substantial sections thereof, and the need for a permanent home had become pressing as Stoneleigh was no longer a long term option. Fortunately, in 1974 Coventry City Council approved the use of the present site at Baginton and so the Midland Air Museum became a reality. John's anecdotal history, liberally illustrated, of its growth, especially the dealings with Governments and donors will be long remembered.

Perhaps most of all, the discovery in 1975 of a Whittle Jet Engine in a scrap yard being viewed in disbelief by John, who then negotiated funding from Birmingham City Council for what is now 'The Frank Whittle Jet Heritage Centre'.

Much done but so much more to do, might well be the motto of the dedicated group determined to preserve the aviation heritage of Warwickshire and beyond and to whom all success is due.

We look forward to the next 25 years of MAM.

WARWICKSHIRE

Industrial Archaeology Society

NUMBER 57 February 2016

PUBLISHED QUARTERLY

FROM THE CHAIRMAN

An invitation to speak at the Warwick Society at the start of the year focussed my mind on the particular features that might characterise the industrial history and industrial archaeology of Warwick. Certainly, very few of the visitors to the town will have these themes at the forefront of their minds, but Warwick does have some unexpected features and offers potential for further study. It still has an industrial presence e.g. Dennis Eagle on the Heathcote estate and Kigass Aero Components on Montague Road, but also it has, indeed, lost some important manufacturers in the town such as Benfords and Pottertons.

The county town of Warwick, the administrative and legal centre for the county, has the castle at its heart, and both these ingredients have an important influence on the economic and social development of the town. Within the castle there is an important site – the Castle Mill – with a fascinating collection of water power, gas engine and electricity features that merit more than the cursory glance given by the vast number of visitors that pass through the castle gates. Those brave enough the scale the ramparts will benefit from magnificent views of the Mill, the Weir and the old Castle Bridge, with its successor in the distance. Further upstream, Guy's Cliffe (Saxon) Mill is another popular venue with some remnants of the mill's former activity in evidence.

As might be expected, the town carries many examples of street furniture, often bearing the names of local ironfounders (particularly Roberts and Glover), plus the notable Victorian postboxes at East and Westgates, and the unusual telegraph cable markers dotted around the town (researched by one of our members, John Brace). The market square still holds a weekly market, with the old Market Hall now converted for museum uses.

Warwick has always been attractive to visitors, and facilities have been developed to match, such as transport services and hotel provision. Could early developments to serve the tourist industry ever be included in a definition of 'industrial archaeology' – I suspect not.

The coming of the canal (in two sections – Warwick & Birmingham and Warwick & Napton 1800) and the railway (Great Western Railway 1852) impacted significantly on the development of Warwick, with a considerable influence on industrial location. The Saltisford Arm must have been a scene of much activity, but this has now been submerged beneath retail, commercial and residential facilities. I have often speculated over what might have happened had that development been proposed in more recent times – could Warwick ever have had a canal basin (with a scale of development to match) which would have enabled visitors by boat to reach the heart of the town?

One feature, of course, is still standing proudly in situ in the Saltisford. This is the last remaining building of the 1822 Warwick Gasworks, recently refurbished, and the adopted emblem of the Warwickshire Industrial Archaeology Society.

The canal sweeps to the north of the town, and then swings to the south of Leamington en route to Napton and beyond. As in many locations throughout the country, the canal was an attractive site for industrial premises, with the carriage of coal and heavy materials considerably eased. One such site is the Cape area in Warwick. This has long been a location for industrial activity, and still maintains an industrial presence, although, of course, the canalside is no longer relevant. Slightly further eastwards we have, of course, the most notable example of industrial archaeology in the town – the remaining buildings

of the George Nelson Dale Gelatine works, together with evidence of the 'Nelson Village'.

There is a triangular area bordered by Cape Road, Millers Road and the canal that has seen much industrial activity over time, although, inevitably, many changes have taken place in recent years. Few of the buildings have architectural merit, often utilitarian in design, but they have contributed much to the industrial history of the town. This area strikes me as one that would merit research. What firms operated there? What did they make? Do any physical remains exist? Once again, we are faced with the 'premises, products, processes' dilemma – the shell of a building may exist, there may be evidence of some of the products that emerged, but knowledge of the processes of manufacture may be difficult to discover. Perhaps the best known example is the original Healey works in Lock Lane, now re-born as a site for renovation of Austin Healey cars.

I am reminded of one of the excellent books written by Robin Leach on Kenilworth. In his '*Kenilworth's Engineering Age*' he has researched areas of the town that are little known by visitors, but made up much of Kenilworth's manufacturing activity. A similar volume for Warwick would add much to our knowledge of the industrial history of the county town.

PROGRAMME

February 11 2016

Dr Barrie Trinder:

Industry in Banbury: an Overview 1700-1960.

March 10 2016

Mike Gould:

Rover - the Marque Doomed to Die.

April 14 2016

Peter Lee:

Nuneaton's Mills and Factories.

May 12 2016

Anthony Coulls:

The London Water and Steam Museum.

June 9 2016

Members' Evening.

NEWSLETTER

Meeting Reports

November 2015: Dr Stephen Parissien
English Railway Stations.

Report by Colin Brookes

The Pyne Room was filled to capacity with a hundred members and friends expecting a treat for those of us of a certain age, and we certainly were not disappointed but enthralled by a first class presentation by an eminent speaker at the top of his game. Dr Steven Parissien is perhaps better known for his sterling work at Compton Verney where he has been Director since 2009. Railway history is just another string to his bow which covers very wide interests indeed. He has written ten books to date, the latest of which is on the subject in question.

We were invited to look at 'lots of British Stations' illustrated by pictures of the development of the Railway Station from 1825. Beginning with Stockton Station on the Stockton and Darlington, the first public railway, which originally was just a private house where you purchased your ticket.

In 1830 the Liverpool and Manchester railway opened with a grand station in Manchester, which survives today. It had no platforms as freight was more important to the railway, people travelled in wagons. Nowadays at the nearby museum you can take a ride in historic wagon carriages in authentic conditions.

We moved on to another survivor closer to home, that of Birmingham's second railway station Curzon Street, built for the London and Birmingham Railway in 1838. Stephen used the superb illustrations by Bourne (1837) of Curzon Street Station designed by Phillip Hardwick, who was also responsible for the Euston Arch at the London end. Sadly the Arch, and much of the station, including the great hall which had the largest unsupported ceiling in the country, was demolished in 1961 despite a huge campaign at the time to save it.

Then to the south-west and Bristol Temple Meads Station built for the Great Western Railway. Interestingly, Bristol Temple Meads was built by Wyatt and again survives, but only just, it has to be said. The Great Western Hotel at Temple Meads showed that Phillip Hardwick was still trying to perpetuate the 'Arch' theme as he had at Euston. Hardwick contended that 'The Doric arch was well adapted to the national character, which it dutifully served'. Brunel was, we learned, his own boss who liked to do everything himself rather than delegate. He was also responsible for Paddington Station in 1852.

Staying in London, we looked at Cubbitt's design for Kings Cross Station. Originally the roof structure was in laminated wood to save weight; it was later replaced by iron and steel. Continuing with the arch/gateway theme, we hopped across the pond to see Pennsylvania Grand Station, built as an impressive gateway into America and a monumental entrance to the country. Much as the Brandenburg Gate in Berlin did for Germany. Indeed the Railway was here to stay!

Back to London where we moved on to St Pancras Station built by the Midland Railway in 1868 in stunning Victorian Gothic by Gilbert Scott and incorporating the hotel in 1873. Again, a survivor which was almost lost to the world but was thankfully saved through the efforts of, amongst many others, John Betjeman. Scott was a disciple of John Ruskin. All the materials came from the Midlands, especially the Skidmore Ironwork, whilst the vaults were

made exactly to the inch to accommodate Burton Beer Barrels. Yet another innovation at St Pancras was the Clock Tower. The photographs of the restored staircases illustrated how much has been achieved and, whilst there is little doubt that everyone admired the results and appreciated how wonderful it all now is, perhaps few of us could afford to stay there!

It was good to see what most would say was an expert audience being carried along with the whole experience. As one picture followed another in rapid fashion, on every occasion when the audience was asked to name the location of the station, not once did anybody fail to answer immediately and correctly!

We recognised, almost in chorus, the Royal waiting rooms at Windsor Station, its neighbouring Slough Station (1880 rebuild) followed by Leamington Station (GWR 1939) which produced a huge round of applause! Then back to Birmingham and GWR Snow Hill, which unfortunately was demolished in 1969, followed by the Hotel, and Shed in 1979, but at least the Station is now back in use again.

Another trip across the pond to Cincinnati introduced us to its Grand Central Station (1934) and then back to London for Waterloo Station including an excellent illustration of the War Memorial.

The list came thick and fast and it was a struggle to keep up with them. Indeed, it might be an underestimate that some 120 to 150 separate railway stations had a mention, and more importantly with at least one, sometimes more, pictures in a feast of excellent photography.

We moved, finally, towards what should be termed successes; stations that were demolished but then rebuilt afterwards. Of course, that is where the lines were left open or newly re-laid. It is true to say that the railways are now being used to a greater extent that was previously the case. Pershore is a good example here, but France seems to be better at finding new uses for old stations. Bath Park Station is one instance and Manchester Central another, where the building is safe but the railway it served has long gone. Nearby, Kenilworth Station is also being rebuilt.

It is a shame that we lost so much. However, it can perhaps be regarded as part of our future, rather than part of our past. Hopefully, in England we are entering a new age.

Dr Parissien was warmly thanked and the audience, as always, enjoyed excellent refreshments. Speaking of which, do visit Compton Verney at an early opportunity, the refreshments there can be vouched for too!



Name this Warwickshire station. No prize, just the honour!

December 2015: Roger Cragg

Bringing Birmingham's Water: The Elan Valley Aqueduct.

Roger Cragg has spoken to the Society on a wide variety of civil engineering subjects and the story of the Elan Valley Aqueduct and the supply of clean water to Birmingham encompassed many of them. Moreover, it gave the audience an insight into one of Victorian England's great but unsung achievements.

Until the early 16th century Birmingham had a population of about 1,000 but then grew steadily to some 75,000 by 1800. Attempts to improve the supply of water made little progress until 1826 when Parliament granted powers setting up the 'Company of Proprietors of Birmingham Waterworks'. Subsequent Acts authorised the building of pumping stations, reservoirs and the sinking of deep wells but by 1891 it was obvious that the growth of the City was outstripping the supply of clean water.

In a previous report to the Corporation of Birmingham Robert Rawlinson had criticised the water supply to Birmingham. In 1871 he recommended the rivers Elan and Claerwen in central Wales as the best future sources of water for the City.

The Corporation consulted James Mansergh with a view to developing new sources and he concluded that it would not be possible to obtain the necessary increased supply from local sources and again recommended taking water from the Elan and Claerwen catchments. He also considered that it would be possible to convey the water to Birmingham by gravitation from the proposed reservoirs. Mansergh had been the Engineer for the Mid-Wales Railway and thus familiar with the terrain. The works would comprise the construction of a series of reservoirs, an aqueduct to convey the water to Birmingham and a filtration and distribution works at Frankley in south-west Birmingham.

Before examining the aqueduct Roger gave a quick overview of the Elan Valley reservoirs. Four dams were constructed, one normally submerged whose purpose is to maintain the water at the level necessary to ensure gravitational flow to Frankley and so avoid pumping. During the great drought of 1984 the reservoirs were practically empty and the submerged dam was exposed, a very rare event. The three main dams were the highest built in the country at that time. Later an additional reservoir was added.

Roger then turned to the design and construction of the aqueduct, initially considering the project as originally built. The aqueduct was designed for an ultimate flow of 75 million gallons per day and is 73 miles 658 yards long, giving a hydraulic gradient of 1 in 2,320. Following experience with the Vyrnwy Reservoir (which supplies Liverpool) it was decided to install screens and rough filters at the Elan Valley end to reduce the likelihood of silting in the very flat gradient of the aqueduct. In addition, the water was dosed with chalk to reduce its action on the lead used in some of the pipe joints.

The route of the aqueduct is an almost direct line between the reservoirs and Frankley in an approximately east-north-east direction. It passes through Radnorshire, Herefordshire and Worcestershire before entering West Midlands. The water takes 36 hours to travel from the reservoirs to Frankley.

The aqueduct is comprised of several main sections. Where the water level is at or above the hydraulic gradient the water flows in a closed channel at atmospheric pressure. Some of these sections are in cut and cover, others in tunnel. In sections where the water is below the hydraulic gradient it flows in pressure pipelines. At the lowest point of the aqueduct, the crossing of the River Severn just north

of Bewdley, the pressure is 250 psi. There are numerous river crossings, six railway crossings and a crossing over the Staffordshire & Worcestershire Canal. The pressure pipe sections initially had two 42 inch diameter pipes with a provision for later pipes to be added as the demand increased. There are 36 miles 1,248 yards of conduit and 36 miles 1,170 yards of pressure pipeline.

Roger then looked in detail at the various forms of construction and at some of the more notable structures on the route.

The general form of the conduit sections in which the water flows at atmospheric pressure is a trapezoidal section with curved sides, floor and roof. Generally the conduits have internal dimensions 7 ft 2 in base, 8 ft 2 in top, and sides 6 ft 6 in high. The sections were built with brick invert and side walls and a concrete roof. The whole was then surrounded with concrete.

There are 15 tunnels with a total length of 12 miles 1,556 yards with a ruling gradient of 1:3000. Many difficulties were encountered, not least where the depth of the tunnel raised the water pressure requiring considerable reinforcement.

There are 11 syphon sections in which the water pressure varies from 25 to 250 psi. Cast-iron pipes 42 inches diameter and 1 to 1½ inches thick were used for pressures up to 175 psi and welded steel pipes for higher pressures and some river and railway crossings.

There are 26 river crossings of varying designs where the flow is in syphon. Normally the pipes span between masonry abutments but in the case of 5 river crossings and one railway crossing bridges were used to carry the pipelines. For three river crossings the pipes were laid under the river bed. There were six railway crossings, in all but one the aqueduct was laid under the railway tracks. Some of the more visible structures on the aqueduct were reviewed in an extensive series of illustrations that highlighted the salient points of design and construction.

The aqueduct terminates on the west side of Frankley Reservoir. On the east side are sand filter beds and after treatment the water passes into a covered pure water tank before being distributed to the supply area. Nearly all the supply is by gravity but steam driven pumping equipment raised water into supply reservoirs at Warley and Northfield.

The construction of the aqueduct and reservoirs started in 1893 and the aqueduct first carried water on the 21 July 1904.

Six main Contractors were involved in the construction of the reservoirs, the aqueduct and the Frankley works and the costs totalled £4,428,565. Royally opened by King Edward VII and Queen Alexandra on 21 July 1904, the project was officially handed over in October 1906.

Today, the water supply is under the management of Severn Trent Water whilst the Elan Valley reservoirs are owned by Welsh Water.

There are some significant proposed works associated with the aqueduct to alleviate maintenance problems. The reservoir at Frankley contains about 5 day's supply of water and if the aqueduct is shut down it takes one day to drain and a further day to re-fill leaving only three days for maintenance. To allow greater flexibility it is proposed to tap new sources of supply which should allow more down time for the aqueduct, possibly up to 50 days per year. The Birmingham Resilience Project will cost £242m.

The Elan Valley scheme was a prodigious undertaking and a far sighted decision by the Birmingham authorities. It still remains, after 110 years of operation, the major supply of water to Birmingham.

January 2016: Gary Collins & Donata Santorini:

The Willans Project - What Did It Achieve?

Willans & Robinson is a familiar name to many members after several presentations and contributions (see Newsletters 38, 45, 52 and 53). However, Gary Collins and Donata Santorini, using the perspective of the professional archivist and conservator, substantially extended our knowledge which was further developed in a vigorous discussion session.

The Warwickshire County Record Office is well aware of the importance of the Willans & Robinson archive for which they now have responsibility. And of its value for promoting their activities to the public as demonstrated by the display banners for 'Boaters and Bright Sparks; images from the Willans Works engineering collection' shown alongside a few samples of the archive material.

Gary Collins, the Project Cataloguing Archivist, began with a review of the two year project to catalogue and conserve the engineering records of W & R and the principle sources of funding; the National Cataloguing Grant Scheme and the National Manuscripts Conservation Trust. Not forgetting our own contribution in June 2014.

Whilst Gary's presentation covered some familiar ground it was notable for the use of many new photographs which gave a greater insight into the W & R product range, its customers and its works activities. For example, the steam launch *Sprite*, originally built in 1884 for the military campaign to lift the siege of Khartoum, but actually used as a works launch at Thames Ditton. Robinson also used it during Queen Victoria's Diamond Jubilee review on the Solent in 1897.

Briefly tracing the company's history after the move to Rugby and the succession of mergers and takeovers leading to Centenary celebrations in 1997, we moved to considering the types of records held in the archive. These covered the period from the 1880s to the early 21st Century and give the background to the development of the business, and not least the difficulties it encountered.

The records include files of minutes and correspondence plus other material involving: shareholder communications; details of patents and contracts; workforce matters, apprentices, social, welfare, staff magazines; property information, deeds and plans; production drawings; and public relations, publications, events and visits.

We also learned more about the impact on the local community of one of Rugby's major employers. The housing it built (both permanent and temporary) with streets named after senior managers and the acquisitions of local mansions for various purposes.

Recreational facilities and social events were important contributions made to employee welfare that belong to the past, as were extensive apprenticeship schemes.

The archive also holds records relating to other products made within the English Electric Group. Products as diverse as fridges and the Canberra jet bomber, also railway locomotives, industrial motors, diesel engines, measuring instruments, marine turbines, mine hoists, transformers, trolleybus equipment and televisions.

There was an active in-house photographic department and an important part of the archive is the collection of glass plate and film negatives. Identifying and classifying these has occupied the WIAS members who are helping in the preservation work for many hours. The work of these and the other volunteers has been and is greatly appreciated. The final catalogue and the numbering of documents was due to be completed in August 2015 but this was delayed until early 2016, mostly because Alstom made two further donations of material during the course of the project and this material needed to be integrated, during the life of the

project, with the two original donations made in 2006 and 2007. There are about 80 metres of shelving for the Willans Works collection and the boxes, files etc. would take up about 160 metres if laid out end to end.

Another important aspect of the project has been outreach, taking the story to a wider audience and answering enquiries. Typical activities include: a talk to the Willans Retirement Association, a blog, writing articles for other publications and providing material for the 'Our Warwickshire' website.

Links have also been made with other projects and organisations holding related material e.g. the National Railway Museum (GEC Traction), the Bodleian Library at Oxford (Marconi) and Museum of Science & Industry in Manchester (British Westinghouse/Metropolitan Vickers) and Lincolnshire Archives (Ruston Engineering works).

Further liaison with Rugby Art Gallery & Museum is ongoing and one particular project will be an oral history. If any member has a suitable contact or wants to be involved then the Record Office would love to hear from them.

Donata Santorini, a conservation expert who had earlier worked on the Soho Foundry archive, took up the story with an eye-opening description of the painstaking and time consuming work needed to preserve many of the items in the archive. She concentrated on the early architectural plans and engineering drawings as well as the photographic negatives.

Amongst the challenges presented was the sheer scale of the collection, over a thousand drawings and tracings, 5,000 glass plate and 6,000 film negatives. The condition of much of the material, especially the drawings, caused great concern. Paper tightly rolled and stored in tubes can be tricky and drawings packed into boxes smaller than themselves have damaging folds. Discolouration and distortion were common but fortunately mould was not often found.

Prioritising the work was essential. It can take 4 days to conserve a single drawing and the available facilities can only deal with one sheet at a time. Out of 292 drawings, 89 were graded high priority and 173 secondary. Priority being given to material of significant historical value.

The conservation treatment could involve up to six stages; dry cleaning (80%), flattening (45%), encapsulating (40%), repair (35%) and finally rolling with a support tube (5%).

Conserving a typical paper drawing meant mechanically removing any textile backing, wet treatment to remove a paper backing and to reduce acidity and discolouration then new lining with Japanese paper. Sometimes it was also necessary to remove pressure sensitive tape and reduce the discolouration and tackiness by the use of acetone.

A series of before and after illustrations showed the remarkable results that have been achieved. Equally important were the examples of how carefully the restored material has been repacked to ensure its future viability. Equally time-consuming has been the work on the photographic archive, the jigsaw of a broken glass plate negative would daunt many a restorer. The task of identifying, cataloguing and repackaging the negatives in special sleeves has largely been done by the WIAS volunteers, Peter Coulls, John Willock and Alain Foote.

Topics in a lively discussion session included the future accessibility of today's digital records (probably it will be impossible – needs urgent action), the value of industrial as compared to general archaeology, ideal storage conditions (WCRO has such facilities) and the value of the Willans archive to future historians.

Perhaps the last word should come from a Spanish professor who has called the Willans material 'a World Class Archive'.

WARWICKSHIRE

Industrial Archaeology Society

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PUBLISHED QUARTERLY

FROM THE CHAIRMAN

As the 2015-2016 season draws to a close, it is perhaps appropriate to review some of the activities of the society over the past twelve months, including some of the decisions taken by the WIAS committee.

We are very much a meeting-based Society, with much effort and energy put in to our monthly gatherings by a small but dedicated team that seeks to ensure a varied programme, the efficient functioning of the meetings themselves, and the provision of opportunities for members to contribute – both by presentations and by comments and questions to visiting speakers at these meetings.

Beyond the basic aim of covering costs and having a source of funds to deal with any unexpected eventualities, the Society aims to make a small surplus which can be used, for example, to support local initiatives in preserving the industrial heritage, such as the Willans project and the Healey Archive. This is a continuing ambition, although the potential level of support is necessarily quite modest. Issues are also raised when exploring potential support for many worthwhile projects outside our area (such as The Chance Glass Works Heritage Trust in the Black Country).

For the 2016-2017 season, a new system of subscriptions is to be implemented, as agreed at the AGM in September 2015.

Subscription rates will change from September 2016 to an annual membership subscription of £16.00 (single) and £20.00 (joint) and members will then not be asked to contribute £1.00 when attending meetings.

Members will be asked to 'tick' an attendance sheet so that we can monitor the numbers attending meetings and to meet safety requirements.

Visitors to our meetings will continue to be invited to contribute £2.50.

Please contact Victor Lobb on (01926) 512136 if you are eligible to complete an HMRC 'Gift Aid' declaration and have not already done so (or you have forgotten if you have done so!).

Your committee will monitor the situation very carefully to see whether the new system produces a net benefit to the Society.

After an initial flourish, the level of input into the database has inevitably slowed, but this should not deter members from making entries. Full details of how to do this is on the website www.warwickshireias.org.

The question of publications is another issue to which the committee has devoted much attention. At a recent committee meeting it was agreed that we would not produce an AIA-style Gazetteer, largely on the grounds that much of the information is already available on the database, plus uncertainty over the potential market. More support was given to the idea of a fuller account of (for example) the 30 or 50 most important industrial heritage sites in Warwickshire, Coventry and Solihull.

Another ingredient in the debate is the level of support that the Society might give to publication projects brought to the attention of the committee. These may be pieces of research carried out by individuals that will need the support of the Society in order to achieve publication as an occasional paper, and the nature of that support – financial; editorial; printing – may differ according to circumstance. There may be possibilities of securing funding/assistance from outside sources. We need to find out what these are, and whether WIAS publications would qualify. There may also be possibilities of

joint publishing venture with other societies. These issues are very much on the committee's agenda.

One of the most significant developments over the past year has been the revival of a programme of visits by the Society to important industrial heritage sites. This has been masterminded by Alain Foote, and shown below is what is available over the summer of 2016.

The programme of meetings for 2016-2017 is virtually settled and those for the remainder of 2016 are also shown below.

I do hope that we can rely on your continued attendance at these meetings. The greatest strength of the Warwickshire Industrial Archaeology Society is the knowledge, enthusiasm and support of its membership.

PROGRAMME

June 9 2016

Members' Evening.

VISIT June 19 2016

Ditherington Flax Mill & Coleham Pumping Station.

VISIT July 8 2016

Cementing Relations Exhibition, Southam and Nelson's Wharf, Stockton.

VISIT July 21 2016

Braunston Canal Guided Tour.

September 8 2016

AGM followed by Tim Clark:

The Parkes, Brookhouse and

Crompton Mill at Warwick.

VISIT September 12 2016

Toye Kenning & Spencer, Bedworth.

October 13 2016

Yvonne Jones:

Japanned Papier Mâché and Tinware.

November 10 2016

Chris Barney:

The Work of The Association for Industrial Archaeology followed by a Report on the AIA Conference 2016.

December 8 2016

Alain Foote:

The Kempton Great Engines.

NEWSLETTER

Meeting Reports

February 2016: Dr Barrie Trinder

Industry in Banbury: an Overview 1700 to the 1960s.

Barrie Trinder gave another large audience his very personal view of 'Industry in Banbury' with a wide-ranging look at the changes in and around this archetypal English market town from 1700 to the 1960s.

Whilst talks on industrial archaeology can easily fall into the trap of being a travelogue or mere description, this speaker's lifetime knowledge of the town, its people and its industries brought its well, and lesser, known parts vividly to life.

The historian of Banbury is well served by its excellent town and parish records from the beginning of the 18th century. As a result, there is a wealth of information available, both personal and occupational, which allows detailed analysis of social developments over the period under consideration.

A map of 1838 focussed our attention on the town and showed how its development from the 13th century resulted in a compact, prosperous centre and market area surrounded by poorer, outlying communities to the East and West across the River Cherwell. This river supplied power to several corn mills whilst a tributary, the Cuttle Brook, provided process water but no power for dyeing and tanning works to the North East of the town.

Banbury's subsequent evolution falls into five periods. From 1700 to 1780 the conventional town trades developed; food, clothing, blacksmithing, brick and tile making, mill and wheel-wrighting. Over the next 70 years the canals helped brewing, foundries and specialist textile manufacture to flourish. The succeeding half century saw the further development of foundries and especially the rise of the railways. From 1880 until 1930 the heavier manufacturing businesses such as foundries declined but were, to some extent, replaced by a variety of consumer goods. The town's fortunes improved markedly from 1930 with expansion of the railways and notably with the arrival of the Northern Aluminium Company in 1931. Member Roger Hartree has published a full account of the 'Ally' and spoke to the Society in February 2010 (Newsletter 37).

The political and cultural background to this evolution runs from a strongly puritanical, parliament supporting period through deference to reformation and innovation before stagnation until the revival brought by aluminium and marshalling yards.

Essentially, Banbury remained a market town with many of the expected characteristics. Today, there is still evidence of old burgage plots, outbuildings that have been rebuilt many times, warehouses and other infrastructure along the Oxford canal that reached the town from Coventry in 1778 and then went on to Oxford in 1790. This led to the importation of goods from adjacent sources (boots and shoes from Northamptonshire) and especially coal. Local fuel sources were limited by the treeless heathland around Banbury. Coal from the Warwickshire coalfield had only been deliverable overland during the summer as roads soon became impassable in winter. A newspaper comments, on the opening of the canal on 4 April 1778, that the first freight delivered was 200 chaldrons of coals.

In the 1790s Banbury was the Metropolis for the carriers' carts. A growing network saw produce and passengers from the outlying districts coming into the town and commissioned goods leaving on the return trip. In 1851 Banbury was the third largest such centre in the Midlands with 189 carriers recorded making 427 journeys a week into the town.

A survey of the town's commerce showed the expected

activities including corn milling with substantial granaries, widespread small maltings (none of which survive) usually separated from the breweries, bakeries (Banbury Cakes a speciality), tanning and currying which disappear during the 19th century, rope-making (the rope walk survives), brick and tile works (including the Tip-Top mouse trap) and brewing. Of the last, Hunt Edmonds survived into the 1960s as an independent business. A painting by Maurice Draper brought the old buildings into sharp focus.

A more unusual industry was plush weaving. Plush, a long cut pile fabric, varying from very light to very heavy had popular applications from Japanese kimonos to heavy duty upholstery and uniforms. Complicated to weave, this meant a closed shop with one son only being allowed to follow his father. In the mid-1800s many plush weavers migrated to Coventry where they dominated the small local industry, albeit dwarfed by the ribbon weavers.

Of much greater importance to Banbury's fortunes was the growth of a foundry industry. The Lampitt family were established wheelwrights who founded the Vulcan Foundry. Although employing only 30 people at most they enjoyed a reputation for high engineering standards and a product range that included steam engines, one of which was supplied to the Hunt Edmonds brewery.

We learnt from the journal of the artist Thomas Butler Gunn, who worked for many years in America, how James Gardner drew on his own experiences in America to develop an agricultural machinery business in the town. This business became Samuelson & Co who in turn had connections with McCormick in the USA. The Samuelson tramway was built in 1870 to link the works with the main-line railway. Another engineer was Burrows & Carmichael who specialised in steam engines, often for ploughing.

The Banbury Co-Op combined retailing with horse cloth manufacture and Henry Stone, who had a box manufactory, is recorded as having married into the Cash family from Coventry. Paxman's butter and other dairy produce enjoyed a good reputation.

Moving into the 20th century, we saw varied evidence of the growth of the railway with many railwaymen being recorded in census data. Steam engine enthusiasts in the audience enjoyed many examples of local and national traffic passing through Banbury and utilising the extensive marshalling yards that had been developed.

Two lesser known but important activities were the National Filling Factory No. 9, a shell filling facility in WW1, the site of which can be visited today by arrangement, and the Oxfordshire Ironstone Company which distributed iron ore widely.

The arrival of the Northern Aluminium Company in 1931 led to substantial employment as its rolled, extruded and powdered aluminium products found increasing demand, especially from aircraft manufacturers in the rearmament programmes of the late 1930s. NAC became Banbury's largest employer for some time but sadly, changes in ownership and competition eventually led to its closure. For a time a large Automotive Products operation offset the decline but that in turn has now closed. An aluminium bridge built by NAC apprentices remains as a reminder of the past.

In the 1960s Birds and Maxwell House brought employment and today huge distribution warehouses flanking the M40 benefit from Banbury's central position.

As Barrie so well showed us, Banbury is indeed the archetypal English market town that has passed through many transitions since 1700.

March 2016: Mike Gould

Rover - the Marque Doomed to Die.

Mike Gould used his thirty years of experience with Land Rover to give an insider's view of the Rover Company's history. It was a 'warts and all' approach and his insights into the personalities, especially those operating during the final years, were particularly interesting as were the anecdotes that peppered his iconoclastic presentation.

Many in the large audience had experience of some part of the motor industry and were, doubtless, reminded of events or people from the past; and of how quickly recent history can be forgotten. Although it is the industrial conflicts that bedevilled the midland's motor plants that tend to linger longer in the memory.

The sub-title 'the marque doomed to die' set the scene. And the final question in a vigorous session after the talk could well have been its introduction; what caused the demise of the British Motor Industry and what could have been done to prevent it? Time only allowed a few comments, and certainly no conclusions, but the example of the Rover story did throw a little light on the subject.

We were gently introduced to the origins of the company which, like so many others, grew out of Coventry's skills in light, precision engineering driven by entrepreneurs who combined technical skills with commercial acumen. In the case of Rover, the Starleys were followed by the Wilks brothers, Spencer and Maurice, who joined the company from Hillman in the late 1920s.

This was a tough time as recession followed the post-war boom but after the racy 1927 Meteor 20 (the Rover works were named 'Meteor') and the small 1931 Scarab coupe, the company moved up-market with the P1 Rover Fourteen, fondly remembered as the first of the 'Doctor's' cars; solid, dependable but not flamboyant.

Rover was appointed by the Air Ministry to run Shadow Factory No. 2 in Solihull. Built in 1938 and completed in 1939 for the production of the Bristol Hercules air-cooled radial engine that powered a variety of fighters and bombers. A model of the camouflaged factory was shown and even today traces of the war-time camouflage can be seen on certain buildings.

Rover suffered with the rest of Coventry in the infamous moonlight sonata blitz of November 1940 when the old city-centre factory was destroyed with some loss of life.

Rover's involvement with aero engines took a startling turn in 1940 when the Air Ministry approached them as a firm with production experience and suitable plant to work with Power Jets to undertake the development and manufacture of Frank Whittle's revolutionary jet engine. In the event, the relationship soured and Rolls Royce took over. Rover, however, retained an interest in the gas turbine engine for potential vehicle applications.

After the war Rover leased the Meteor Works in Solihull from the Air Ministry and with commendable foresight acquired substantial areas of adjoining farmland for future expansion.

Hitherto, Rover had built solid, well-engineered, dependable up-market cars but thanks to the Wilks' brothers holidays on Anglesey, where they used an old army Jeep for transport, the concept of the 'Land Rover' as a jeep replacement was born in lines drawn in the sand of Red Wharf Bay. The first example was on show 6 months after its conception but its development came through production.

Exports were key in those post-war years and the tough, go anywhere, do anything Land Rover was much in demand.

Rover steadily expanded its passenger car range whilst at the same time evolving the Land Rover to widen its appeal. Styling changes did lead to production headaches such as door sealing problems that were never fully resolved.

Perhaps Rover's greatest technical experiment was with the gas turbine powered 'jet car'. Never to see commercial success this nevertheless generated much press coverage for the firm, not least with the Rover-BRM racing car memorable for its whisper-quiet appearances at the Le Mans 24 hour race.

That Rover was unafraid of technical innovation was again demonstrated with the P6 or Rover 2000 launched in 1963. An innovative concept with an engine bay and front suspension configured for a possible turbine engine, a new 4-cylinder engine, a new gearbox with a new factory at Pengam in South Wales and a new assembly hall at Solihull. Was this fantastic or folly?

Were the acquisitions of Alvis and the GM 3.5 litre all alloy V8 engine in the mid 1960s further steps down the slippery slope? Nonetheless, there were promising hints of jam tomorrow with the P8 saloon, the mid-engined sporty P6BS and the 100 inch Station Wagon. Only the last survived the absorption of Rover into Leyland in 1966 and became the now iconic Range Rover.

After this, and the subsequent mergers that resulted in BL, Rover cars struggled as the meat in the sandwich between Triumph and Jaguar but did manage to introduce some interesting cars. Notably the SD1, a great car beloved of managers and police forces, but poorly built and unreliable.

In 1978, BL established Land Rover Limited as a separate subsidiary. It took over Range Rover production whilst the volume car operations, having tackled their labour problems, sought a future in collaborative deals with other manufacturers. Honda was the third choice partner after rebuffs from Chrysler/Simca and Renault and new models resulted.

Meanwhile, at Solihull Land and Range Rover production began to rise under new management. Notably, the combative Tony Gilroy who had ambitions for a management buy-out but in 1986 was turned down at Cabinet level.

At this time the rather sad remains of the British Motor Industry were renamed the Rover Group. Perhaps in recognition of the quality behind the name. In 1988 another government sponsored move saw BAe acquire the Rover Group with an £700m dowry but was forced to keep it for five years. There was no real investment during this period and property and other assets were sold off. The link with Honda continued and resulted in the Rover 200 and 800 cars followed by a proliferation of other models.

The project crash landed in 1994 and BMW bought the Group hoping to cash in on 'Britishness' with leather and walnut interiors. However, by 1999 in the 'Twilight of the Gods' BMW offloaded 'the English Patient' selling Land Rover to Ford (where it joined Jaguar) for 3Bn Euros.

The rump of Rover went to the Phoenix Four where it was plundered before being given the coup de grâce by Labour's Mandelson and Hewitt after suppliers refused to deliver.

However, in another twist to the story, Ford sold Land Rover and Jaguar to the Indian Tata conglomerate and today JLR seems to be thriving. The marque doomed to die?

April 2016: Peter Lee:

Nuneaton's Mills and Factories.

Peter Lee, or 'Mr Nuneaton' has spoken to the Society on three previous occasions on different aspects of Nuneaton's industrial past.

Past is the operative word, of Nuneaton's formerly extensive engineering activities as with the extractive industries, nothing remains extant. However, Peter's seemingly inexhaustible succession of evocative illustrations were constant reminders of what had been.

Nuneaton's strategic position at the centre of the trunk road and mainline railway systems of England boded well and plentiful natural resources resulted in the two largest brickworks in the country plus other collieries being sited there.

A list of 'Made in Nuneaton' products and companies was a catalogue of industrial heritage and is worth quoting at length for it dramatically shows the changes in our industrial affairs over the past half century or so.

Alfred Connor, cardboard boxes; Premier Stone, concrete goods; Union Wool & Leather, leather; Rollason & Jones, elastic webbing; Clarksons, small & machine tools; Courtaulds, rayon & synthetic fibres; Robinsons, underwear; Moorhouses, jams; H Slingsby, silk goods; Listers, velvet & plush; Nuneaton Flour Mills, flour & animal feed; Stanley, Haunchwood & Ansley Hall, bricks, tiles & clay pipes; Sterling Metals & Nuneaton Engineering, iron & aluminium castings; Midland Sheet Metal, car bodies & sheet metal work; Biddles, heating & air conditioning; Hart & Levy, fine tailoring & military uniforms; Tanseys, needles; Judkins, Jeas & Man-Abells, roadstone & railway ballast; Finn, boots & shoes; Intalok, spring seating & mattresses; Haunchwood, Ansley Hall, Nuneaton & Stockingford Collieries; A W Phillips, tennis balls & sports goods and Hall & Phillips, Hats.

Most of the jobs found there have gone, never to be replaced. Today, only 48% of the working population can find jobs in Nuneaton & Bedworth. There are only half the number of businesses per head of population in the Borough than all surrounding municipal areas.

After this thought-provoking opening Peter examined Nuneaton's industrial past in some depth. An early industry was flour milling, with a number of substantial mills, and brewing where considerable over capacity (output not input) was evident by the 1880s.

An earlier comment from 1764 noted that 'Nuneaton is a good well-built town, with a free school, and a manufacture of wool cloth.' The town also possessed a fine Market Cross which incorporated a weaving shop.

Silk followed wool and by the 1850s some two thirds of the population was involved. Usually with low-productivity, one person looms housed in top-shops above the weaver's house. This weaving tradition led to one of the country's largest manufacturers of regalia – H Slingsby & Son. Masonic and civic regalia was supplemented with the great banners favoured by the burgeoning Trades Union movement and proudly paraded at meetings behind the brass band. Slingsby was eventually taken over by Franklin of Coventry.

A W Phillips manufactured tennis balls (authorised by the LTA) and footballs. The company remains, but now products are sourced from China. Another niche product was snuff, now relocated to Leicester.

Trent Valley Mills produced silk adjacent to the railway, the factory turned to hat manufacture in the 1860s and was later burnt down. Other offshoots of the silk trade included: Rufus Jones & Co., (taken over in 1873 by Lester & Harris Ltd) producers of elastic webbing for the shoe industry, clothing, gentleman's braces, ladies undergarments, gas masks and army uniforms.

Anker Mills housed cotton and woollen manufacturers including: The Nuneaton Cotton Spinning & Weaving (1861-1886) and Fielding & Johnsons, who later moved to Attleborough. The mill was once home to two steam engines, Annie and Elizabeth which were later replaced by electric motors.

In the 1860s a leather industry flourished alongside the wool and this in turn led to Lister & Co developing velvet and plush manufacturing with a deserved reputation for hard wearing fabrics which included a Coronation blue velvet for 6,000 seats at Westminster Abbey.

Hall & Phillips opened a hat factory in a disused ribbon factory in 1868 which flourished, and whose products included the largest fez in the world. Again, the mill was lost to a fire. Hats led to tailoring and clothes manufacture; working conditions at The Reliable Clothing Company looked crowded but were typical for the period. One competent girl could make 2,500 button-holes a day.

In the twentieth century, Courtaulds came to Nuneaton with a new factory whose clock tower housed a timepiece by the manufacturers of Big Ben and serviced by a dedicated 'clock man'. Another series of photographs gave a comprehensive picture of life there with full employment, social facilities and a works fire brigade should the need arise.

A variety of other businesses included cardboard boxes, shoes, military uniforms, hosiery and tennis racquet manufacturers. Further photographs gave insights into these employers. A surprising number passed out of the founders control, sometimes moving elsewhere, and subsequently failing.

Nuneaton's engineering activities were widespread, from small family affairs to national names. H P Carter with the 'Colonial Motor Cycle' and Birch & Co with the 'Foleshill' and 'George Eliot' cycles followed the Coventry lead. Birch, incidentally, moved to New Zealand in 1905 where he built the first local motor car, and never returned to England. Hall & West were a good example of the general engineers and boiler makers to be found in every sizeable town. Stanley Bros developed colliery equipment whilst Nuneaton Engineering were iron founders – and the foundry building is one of the few survivors from that time. Oram, a dyer was bombed out in 1941 and the Tansey needle works became the NCB laboratories.

Chilvers Coton began as a foundry but later specialised in sheet metal work. Notably prototype car bodies and the one-off Armstrong Siddeley rail car project. Intalok were major suppliers of seat springs for cars as well as mattresses. Biddle supplied heating and air conditioning equipment world-wide. Clarkson, with a well-respected name for machine tools, was absorbed into Thorn EMI and closed.

Perhaps the best known name amongst the town's engineers was Sterling Metals who were, at the end, with some 3,000 men, the largest employer. Specialising in light alloy castings the company had close pre-war links with its German counterparts. Its activities were, therefore, well known and precipitated the move from Coventry before the outbreak of hostilities. The pictures of Sterling Metals were, perhaps, the most interesting of the evening for those in the audience with a motor industry background and a poignant reminder of what had been. Identifying castings and processes became competitive! The company's social activities, sports teams and workplace amenities contrasted vividly with the working conditions in its mid-twentieth century foundries.

Peter's final slide (out of 243) showing a factory yard, deserted but for a lone black cat, and captioned '*would the last member of staff put the lights out*' aptly summed up Nuneaton's contribution to the history of the Midlands.

WARWICKSHIRE

Industrial Archaeology Society

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FROM THE CHAIRMAN

There is always satisfaction in being able to publish the Society's annual programme of meetings, and the programme for 2016-2017 is no exception. Putting together the programme is never easy, so when the final piece of the jigsaw is eventually put in place your Chairman breathes a heavy sigh of relief!

We aim to provide a mix of topics, some local, others regional or national, which cover the themes of industrial history and industrial archaeology, although we are, of course, not averse to including elements of economic and social history. These meetings are the very essence of our Society and achieve levels of attendance that are the envy of other similar organisations. Long may this continue.

The first part of the November Meeting will be a presentation by Chris Barney on the work of the Association for Industrial Archaeology (AIA), to which WIAS is affiliated. Chris is one of our members, sits on the AIA Council, and is editor of IA News, the Quarterly Newsletter of the Association. Chris felt it was important that members should know what role the AIA performs, the work that it has carried out, and the importance of the continuing agenda of concerns about our industrial heritage. It may even persuade some to join the AIA to support the valuable work that it carries out.

The second part of the meeting will be a presentation by the Chairman to show that industrial heritage can appear in a range of (sometimes unexpected) locations. This follows a week after the return from a trip to the Deep South of the United States of America so what may appear is largely unknown as I write these notes. I am slightly

concerned that the locals may be more interested in the imminent Presidential Election than showing English tourists examples of the region's industrial heritage!!

The AIA has for many years held an Annual Conference at different places around the British Isles, and Telford was this year's chosen location, although the range of visits extended beyond the Shropshire border. Unfortunately, I was not able to attend, but was very grateful to John Selby for providing a copy of the Tour Notes which accompany the various visits that take place over the Conference. This reminded me that - as well as all those hours sitting at the computer, or in Libraries and Record Offices - there really is no substitute for actually going and visiting the site in question.

This matter was reinforced by a continuing desire to ensure that our database is up to date and accurate, a task which requires periodic re-visiting of sites, firstly to check that it is still there, and secondly to identify any recent changes to the state of the site. It is surprising how quickly an empty building can deteriorate, even without the assistance of vandals and graffiti artists. Checking sites may also involve a new photograph (using the latest digital technology) to record those changes. So there is always plenty to do!

To this end, the visits organised by Alain Foote have been an important added ingredient to the Society's activities, and we hope we can build more of these into our annual programme. Those attending have derived great benefit and enjoyment from the visits, and we hope to show photographs - and even the occasional video - of aspects of these trips at our monthly meetings. If you have a potential visit in mind, or would like to see a particular site, do let us know and hopefully we

can put arrangements in place.

The new membership system is in operation, and we hope that as many as possible will join the Society. These funds are largely used to cover the cost of room hire and speakers' fees, and we do not actively seek to make a surplus. However, any funds that do become available can be used for supporting projects involving care for the industrial heritage in Warwickshire, Coventry and Solihull, and we hope that potential members may take this into consideration when deciding whether to join the Society.

PROGRAMME

October 13 2016

Yvonne Jones:

An Art of Great Importance to Commerce: the Midland's Japanned Tin and Papier Mâché Industry of the 18th & 19th Centuries.

November 10 2016

Chris Barney:

The Work of The Association for Industrial Archaeology followed by a Report on the AIA Conference 2016 plus Martin Green 'Travels with my Camera.'

December 8 2016

Alain Foote:

The Kempton Great Engines.

12 January 2017

Peter Crowley:

A Working Life at Alvis and Beyond.

9 February 2017

Paul Baker:

The Lost Railway: Lapworth to Henley in Arden.

9 March 2017

John Frearson:

Nelson's and Kaye's: two Warwickshire Cement Companies.

13 April 2017

Richard Williams:

The Immense historical significance of the Cast Iron Cooking Pot.

11 May 2017

Chairman's Evening:

an Evening of Short Presentations Co-ordinated by Martin Green.

8 June 2017

David Hulse:

Thomas Newcomen and the Engine that Changed the World.

NEWSLETTER

Meeting Reports

May 2016: Anthony Coulls:

The London Water and Steam Museum.

Anthony Coulls has entertained us on a number of previous occasions with accounts of preservation activities from Sierra Leone to the North of England. The tale of the London Museum of Water & Steam, where he has been a trustee for the past 2 ½ years, is a worthy addition to his repertoire.

Formerly the Kew Bridge Steam Museum, housed in the old Kew Bridge Pumping Station and now substantially refurbished with the help of Lottery grants and other funding, the new museum has made a unique collection of machinery accessible to a much wider audience.

The Grand Junction Water Works Company was formed in 1811 to extract water from the canal to meet the growing demand for public use. By 1820, increased demand meant that the canal source was inadequate, which, together with growing pollution, led to a move to Chelsea where the Thames could be used as a source. By 1838 the Thames at Chelsea had become too heavily polluted to be safe and so a move upstream to Kew was made and the pumping station was built there.

By the mid-1860s further expansion required the installation of five steam-powered beam engines and pumps and the building of a classically inspired standpipe tower. The catchment area extended to Paddington and Chelsea. The quality of clean water for London was, and remains, an on-going issue.

In 1902 the Metropolitan Water Board was formed to manage the expansion of London's water supply, including control of the Kew works. In 1934 four Allen gas engines were installed to supplement the existing power units and in 1944 a further four electric pumps were added.

At this time the steam-powered beam engines were taken out of service but were protected from being scrapped by being considered museum pieces. Given the circumstances of war-time needs this seems to have been a most far-sighted decision by someone unknown. The boilers, however, were removed. During the last twenty years of the previous century various changes were made to the pumping equipment.

After this review of the operations at Kew Anthony turned to the present day preservation activities. These are, in fact, longstanding. The Kew Bridge Steam Museum Trust was founded in 1975 and charged with the preservation of one of only two sites where steam, gas and electric power are all available for examination in their working location.

The original engine house contains the oldest engine, a Boulton & Watt machine that was moved there from Chelsea and a subsequent 'Bull' engine of a different design that was more space efficient. Also on the site is the Grand Junction Canal engine house.

An interesting technical aside was the elegant way in which one of the beams had been strengthened with steel tubes. A beam failure would have been a costly disruption to London's life.

Today, the problems of keeping museum engines in a running condition requires much work that goes on unseen. There are many safety issues that have to be taken into account as well as those of finding suitably qualified staff.

Partly as a consequence of these factors, two of the engines, a 90" and a 100", are unrestored and non-runners. However, a working model of a steam powered beam

pump allows visitors to get a clear idea of what it did and how it worked.

Much has been done to develop the land around the site. The old boiler house is used to display the collection of steam pumping engines with plenty of supportive displays. The demonstration boiler by John Thompson of Wolverhampton is not original but came from a nearby hospital.

The local rodent population is controlled by three cats named, appropriately, Boulton, Watt and Maudsley.

One engine remains in the diesel house and other ancillary buildings house various local crafts.

In 2014 the newly named London Museum of Water and Steam was officially opened with the aim of telling the story of London's water supply.

In the second boiler house displays cover the history of domestic water usage with a remarkable collection of appliances; water heaters, washing and mangling machines, sanitary ware and pipework.

Thames Water (who else) have sponsored a timeline display of London's water supply. This emphasises the social aspects of the story and the long history of testing and safety, including the ground-breaking work of John Snow and the Broad Street pump – the source of an infamous cholera outbreak in a London slum.

Also featured is the 'Water Aid' programme to bring safe drinking water to communities in the developing world.

What goes in must come out and, appropriately, attention is also given to the history of London's sewers, although this is not as fully covered as the supply side.

Even the tea room contains displays. Many parents will no doubt be floored by questions from offspring about some of the historic equipment on view. But for the industrial archaeologist it probably scores more highly than the average National Trust tea room for interest. The displays include a small pump and a Benham engine and pump in a well.

Moving outside, a demonstration beam engine, pump and standpipe tower has been installed to allow visitors to understand the technologies involved. Even a waterwheel has been included in the displays but not one from London, it was found in Dorset.

No presentation by Anthony would be complete without reference to railways and true to form there is a narrow gauge railway system on the site which runs trips at weekends on a short stretch of track.

Pleasant gardens are enhanced, many would say, by the presence of the beam from a 'Cornish' engine which dwarfs the benches alongside.

The museum also conducts a variety of outreach activities and can call upon such things a trenching engine drawn by heavy horses to demonstrate how drainage once was laid.

As with any museum, the way out passes through a well-stocked shop preceded by a picture gallery.

Once again, Anthony gave us an eloquent, fluent and informed presentation combining a light touch and a depth of knowledge all the more impressive given that the subject was not his principle area of interest.

It was indeed fortunate that an advertisement in 'Old Glory' seeking trustees for the new museum caught his eye and sparked his involvement and the opportunity, in his words, 'to give something back to IA and conservation'.

June 2016: Members' Evening

Martin Woolston opened the evening with an engineer's view of the restoration of a 1916 Maudsley subsidy lorry, class A, 3 ton payload under the auspices of the Coventry Transport Museum.

Martin briefly traced Maudsley's development from marine steam engines via steam omnibuses in London to Coventry's Parkside to make internal combustion engines. Maudsley then joined the city's growing car industry with a reputation for high quality products with innovative features such as apertures in the crankcase to allow the removal of pistons and connecting rods/big ends without dismantling the engine, very useful when these items were not as reliable as today.

In 1911/12 the government issued a specification for the subsidy lorry to meet military transport requirements which emphasised standardisation of controls and ease of servicing and maintenance under wartime conditions.

The effective use of original drawings explained how Maudsley met these challenges and a set of contemporary photographs vividly showed the extreme conditions that were encountered on active service in France.

The restoration project lorry had started its service life with an RFC Squadron in Scotland. After the war much surplus equipment was sold off but the market for civilian trucks was depressed and the Maudsley was heavy and unpopular. Our example passed the inter and post-war years converted into a 'motor home', latterly accommodating a family of five.

Very few examples of the subsidy lorry survive and when the unique vehicle came up for auction the museum paid £10,000 for a complete chassis with the intention of recreating an omnibus. However, this would have been very expensive and beyond the museum's limited resources and in 2006 it was decided to recreate the original military vehicle.

Turning to the practicalities of restoration, Martin was able to bring his technical expertise to the project. This was soon tested. The engine had been returned from a specialist restorer (costing some £12,000, double the estimate) and it would not start. The valve timing was out and working from first principles Martin resolved the issue.

Apart from the engine, the restoration amounted to a complete strip down and rebuild that occupied the restoration team for many months.

The chassis side members (5" RSJs) needed straightening and strengthening, solid-tyred steel wheels needed new rubber, an 'auto-vac' fuel system was fitted, new gears had to be cut for the gearbox, new bodywork had to be created from photographs and a plethora of detailed parts designed and fabricated.

Budgetary constraints were always present and the costs of sub-contractors frightening. Furthermore, small, one-off jobs invariably go to the back of the queue, further delaying the work. A good example of the challenges facing the team were some badly corroded outrigger brackets on the chassis. Originally castings, producing identical parts would have been prohibitively expensive. However, by ingenious design and finishing fabricated steel replicas were created at a fraction of the cost.

Martin concluded with a couple of video clips recording significant stages in the restoration which is a tribute to the Warwickshire Industrial Archaeology Society Newsletter: Number 59

dedicated team who carried it out.

John Selby recounted the events of 23 December 1837 when The Dun Cow in Dunchurch was the scene of an all-night party to celebrate the completion of the Kilsby Tunnel on the London & Birmingham Railway.

The Tunnel was needed because Northampton 'nimby's' blocked the original route around the Kilsby ridge. It was designed and engineered by Robert Stephenson and at 4,200 feet is one of the longest in Britain. It took longer to build, and cost more than had been anticipated. Not least because the tunnel roof collapsed and the tunnel flooded when quicksand was encountered. Pumping out the water took eight months with 13 pumping engines working continuously. The length of time it took to build the tunnel delayed the opening of the London and Birmingham Railway. It took three years, and the cost overrun was 285%.

No wonder that the engineering team celebrated the satisfactory conclusion of the work. As well as Robert Stephenson, participants included his father George, who had been consulted over the problems, and Tom Gooch. It was recorded that Robert retired at 2 am, George at 4 am but the rest continued until 8 am! Engineers have stamina.

The evocative drawings by J C Bourne of work in the tunnel and a ventilation shaft shown by John were available for detailed examination after the presentation.

In March 1982, a group representing the IMechE, some in Victorian costume, celebrated the 175th anniversary of the historic dinner at the Dun Cow and presented a plaque, which can still be seen outside the building.

Peter Chater stretched the definition of IA but greatly entertained with a collection of photographs sent him by a friend. Starting with a group of Russian soldiers, presumably in WW1 we saw a kaleidoscope of life in Europe and the USA over the first half of the 20th century. A random selection includes: a machine gun used as a seesaw, a gas station in the deep south of the US, a four-stack liner, a 2-seat cycle outside the White House, an Avro Box Kite (probably) and a Fairy Swordfish, the Hindenburg on fire, US troops on a huge railway gun at the end of WW2, skyscraper workers, a beached boat and a swing boat, an accordion player and a Paris street view.

Richard Williams explored the history of a cast iron cooking pot from the perspective of a metallurgist. Possibly some 300 years old the pot passed from a private collection to the Ironbridge Gorge Museum in 1956. It is now the subject of a research project and will be the theme of a presentation next year (13 April 2017). An analysis of the iron, white or grey and a review of patents for moulding thin-walled vessels enabled the pot to be attributed to Abraham Darby whose use of coke to smelt the iron in his ground-breaking furnace at Coalbrookdale provided further evidence.

Martin Green concluded a most interesting evening with some thoughts on the possible effects of Brexit on museums. The Museum's Association seem concerned at the possible effect it may have on research and project funding and cultural regeneration. More positively, The Banbury Steam Buildings have been saved from the proposed redevelopment and there is evidence of the imaginative reuse of old structures in Europe with the conversion in Amsterdam of a dockside crane into a boutique hotel.

September 2016: AGM followed by Tim Clark:

The Parkes, Brookhouse and Crompton Mill at Warwick

After the business of the Society's AGM had been despatched with commendable swiftness, Tim Clark explored a Warwick business of which few members were aware.

In 1797 a worsted (wool) spinning mill was established in Warwick by four entrepreneurs, William and John Parkes, Joseph Brookhouse and Woodhouse Crompton, at Saltisford where Sainsburys is now.

The political and industrial background to the venture was challenging to say the least, as the 1790s saw war, bank failures, credit crises, and food shortages. However, industry offered good financial returns compared to the alternatives. Consols were safe but low yielding, land was better yielding but in short supply, and the canal boom enticed investment with prospects of great returns if successful, but was risky and only open to the smaller investor. Benjamin Smart started a cotton spinning mill at Rock Mills in 1792, and Joseph and John Parker a cotton weaving factory in the town in 1797, but Tim concentrated on the Parkes Brookhouse and Crompton worsted mill.

A number of questions arise. Why worsted? Why Warwick? Who were Parkes, Brookhouse and Crompton? And, not least, why so large?

Most English towns had a domestic worsted market but it was cottage-based, usually coordinated by a local draper. The work was widely distributed, capital intensive, subject to interruptions for other tasks such as harvests and with a long timescale, up to twelve months from shearing to finished cloth.

Who were our four protagonists? The Parkes were a family of wealthy nailers from Netherton in the Black Country, but John Parkes senior moved to Warwick and set up a drapery business. His eldest son William inherited this business when his father died in 1783, quickly taking his brother John into partnership. He acquired further land, including the future factory site and Marble House where he lived.

Joseph Brookhouse was born in Leicester. An apprentice wool comber, he tried to adapt Richard Arkwright's cotton spinning machine to wool. At first he failed, and ended up in prison for debt, but two local businessmen saw the potential and paid no less than £2,500 to obtain his release. Brookhouse eventually succeeded in making a working wool spinning machine, and the three of them established a worsted spinning business in Market Harborough, to avoid the Leicester machine breakers. However, the machinery was destroyed and Brookhouse's effigy burnt by the mob. Brookhouse fled first to Birmingham, then to Bromsgrove, and then moved to Warwick to help found the worsted spinning business there. It is uncertain how Parkes and Brookhouse met but both were Dissenters and may have been introduced through John Parkes' wife's family, the Twamleys.

Woodhouse Crompton (no connection with Samuel Crompton of Bolton of spinning mule fame) came from a wealthy landed family with estates in Lincolnshire and Yorkshire but also in Wolverton (near Warwick) and Rowley Regis, which neighbours Netherton where the Parkes family came from. It is likely that Crompton was a supplier of fleeces to the Parkes drapery business, and, like the Parkes and Brookhouse, the family were Dissenters.

Crompton's role was as investor, but significant finance was also obtained from Robert Ladbroke, the son of a former Lord Mayor of London, a banker, and who had been MP for Warwick. The Ladbroke family were the firm's major bankers throughout its life.

The project was not lacking in ambition. The mill built in

Warwick extended to six storeys with ten bays and was 93 feet long. It employed at least 500 people, which was large even by the standards of the Manchester cotton mills at the time. Power was initially provided by a 20 HP Boulton & Watt steam engine. Adjacent buildings housed combing, dyeing, drying and warehouse operations to give vertically integrated manufacturing. It opened in 1797.

Where were the customers for such an enterprise? Two major outlets were the Leicester hosiery industry (it has been suggested that most of the woollen yarn used in it came from Warwick) and the Kidderminster carpet industry.

A letter from PBC found in the Boulton and Watt Archives requested '*sight of your laws for the regulation of the Sick Club of the Soho Manufactory – it is our wish to establish a similar institution.*'. If they did, it meant that they operated a scheme whereby male employees could agree to having part of their wages paid into a fund, in return for which they would obtain benefits if ill, injured, or if they died in service. The business quickly prospered; in 1800 warehouses were established in Hinckley and Leicester and shortly afterwards the engine had its power boosted to 26 HP.

In 1809 Humphrey Davy was asked by John Parkes to assist him in finding a way to bleach woollen yarn to make it '*perfectly white, like cotton*'. He was offered a share of the profits if successful and urged to keep it a secret. The results of the experiment are unknown but seems to have been unsuccessful at least initially.

William Parkes died in 1806, to be succeeded as a partner by his son William. Crompton died in 1807; Brookhouse retired in 1816; and William Parkes junior left the partnership in 1817. From then on, the business was run by John Parkes and two of his sons, John and Josiah. Relations between William junior and his uncle and cousins were clearly not good, and in 1822 he sued them for misuse of partnership funds, alleging that as a result he was being called upon to meet guarantees that otherwise would have been met by the partners.

In 1820 MPs on a House of Commons committee investigating the effects of smoke from steam engines on health visited the Warwick mill, presumably due to lobbying by Josiah Parkes who had developed a patented process to reduce emissions by secondary combustion. This led to the first legislation in the UK to deal with pollution, the Steam Engine Furnaces Act of 1821. Implicitly, the way to comply with the legislation was to install Parkes' Patent Smoke Consumer!

But the business was in financial difficulties. It closed in 1821, the partners were declared bankrupt in May 1822, and the factory auctioned in September that year. What went wrong? A reduction in demand from the military after the Napoleonic Wars would not have helped, but the main factors were the high level of debt and the loss of the Leicester market after their agents set up in competition. The bank sold the site in 1826 to a builder, resulting on a loss to it of some £25,000. The outbuildings were sold off, and the factory itself became the Warwick and Leamington Brewery.

Members might care to compare this history with that of the Stone Pipe Company of Guiting Power (see John Willock's paper in 2013). Both were innovative, highly technical, activities that flourished at times of great international disruption but failed due to fundamental flaws. Stone pipes through the choice of faulty raw materials and the worsted mill through trusting the bulk of its business to a single agent and market. The past still has lessons for today.

WARWICKSHIRE

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FROM THE CHAIRMAN

'Here, there and everywhere'

As investigation of, and concern for, the industrial heritage has progressed over time, it has become clear that items of interest can be discovered in less likely locations. One example of this has been the surge of interest in the technology and industrial heritage contained within our country houses. As well as the architecture, art, furnishing, gardens and landscapes of these houses, they also contain examples of water supply, heating, internal communication and lighting developed as a result of technical innovation during the 19th century and beyond. Located far from urban centres and possible links to central sources of supply, they needed to develop systems of their own.

The remaining examples of such developments have been a focus of recent work by Professor Marilyn Palmer MBE and Dr. Ian West at the University of Leicester, celebrated by their publication of *'Country House Technology'*. In parallel, 'Heritage of Industry' has been running a series of regional tours – *'Country House Comfort and Convenience'* – to explore these items on site. Forthcoming 2017 tours include The Welsh Borders 24th-27th April; The South West 26th-29th June; Northern Ireland 7th-11th August; and The North East and Scottish Borders 4th-8th September. Full details from www.heritageofindustry.co.uk

Heritage of Industry also runs tours abroad, and several members of WIAS have participated in these tours. For most of us, however, we are often not able to make such a specific choice, and trips abroad tend to be with family and friends. Attempting to persuade others of the potential attraction of industrial sites, and to allocate time from a busy holiday schedule to such

visits has its difficulties, but there is usually something for everyone to enjoy.

A case in point is a recent trip to the Deep South of the United States of America, and I was able to give a presentation to WIAS as part of the November meeting. The visit came very close to the 2016 Election and so it was a fascinating time to be in this part of the world, and to observe the past – and current – economic, social and political make-up of the region. Enthusiasts for the origins of country, blues, jazz and rock-n-roll had plenty to keep them occupied as well, but the area also generated a surprising amount for those with an interest in the industrial heritage.

Cotton, of course, was the lifeblood of the Deep South and is intimately linked with the economic and social history of the region as well as the history of slavery, racial conflict, the Civil War, and the Civil Rights Movement (so effectively displayed in the Civil Rights Museum in Memphis). Remembering all those lessons received (and delivered) on the English industrial revolution, the starting point was often the arrival of cotton in Liverpool and (inevitably) the emphasis was on technological change and mill development in Lancashire and elsewhere in the UK. What the visit to the Deep South taught me was that this, in a sense, was just the tail-end of the story. What lay behind was not only the nature of the production of raw cotton, but the hugely important trading system that linked the UK, West Africa and the Deep South itself – occurring at a time when sail was the motive power, and the written or spoken word was the only means of communication. There are many aspects of this trade that are difficult for us to accept, but the lasting impact on the production of cotton in America is still to be seen.

I had never seen a field of cotton before, and I greeted my first

viewing – just off Highway 61 'The Blues Highway' – with almost boyish enthusiasm. I spoke to local farmers about the harvesting process, and they were similarly rather surprised by my obvious excitement. Further research revealed that one of the plantations – Frogmore, near Natchez – had been established as a museum. Fortunately this was on our route and we were fascinated to hear the history of that plantation, but also to witness the application of steam technology to the ginning process, with an 1880s Robert S. Munger gin that utilised steam power for suction purposes.

This was supplemented by a visit to the Memphis Cotton Exchange (now a museum) illustrating the development of the trading systems based on the telegraph and observation of (and a trip on) the Mississippi paddle steamer, now laden with tourists, but previously (often) overladen with bales of cotton.

Cotton was only one aspect of the trip but I hope it reveals that wherever we go there are items of interest for the industrial archaeologist, and I am pleased to report that when pressure of time meant that we had to choose between Elvis Presley's Graceland and The Memphis Cotton Exchange, the latter won the vote!

PROGRAMME

9 February 2017

Paul Baker:

The Lost Railway: Lapworth to Henley in Arden.

9 March 2017

John Frearson:

Nelson's and Kaye's: two Warwickshire Cement Companies.

13 April 2017

Richard Williams:

The Immense historical significance of the Cast Iron Cooking Pot.

11 May 2017

Chairman's Evening:

an Evening of Short Presentations Co-ordinated by Martin Green.

8 June 2017

David Hulse:

Thomas Newcomen and the Engine that Changed the World.

NEWSLETTER

Meeting Reports

October 2016: Yvonne Jones:

An Art of Great Importance to Commerce: the Midland's Japanned Tin and Papier Mâché Industry of the 18th and 19th Centuries.

Report by Martin Green

The society was extremely fortunate to have Yvonne Jones – the leading expert in this field – to talk on the subject of Japanning at the October meeting. As well as delivering a fascinating history with excellent illustrations, she also brought physical examples of the work of Japanners, and the copy of her magnificent book on the subject 'Japanned Papier mâché and tinware 1740-1940'. In the preface to that book, she writes "Some years ago, whilst cataloguing and managing the collection of japanned papier mâché and tinware at Wolverhampton Art Galleries and Museums, it became clear how few publications were there to help me. New to the subject and with none of the existing literature answering all my questions, the only way forward was for me to find out for myself, with no notion of the scale of the task, or, indeed, where the research might lead."

She need not have worried - her presentation revealed that the research had led to the development of unrivalled knowledge of this Midlands industry, and members greatly enjoyed the opportunity to learn about this little-known (mainly) Midland trade.

Japanning was the process of varnishing and decorating tin-plated iron and papier mâché (and a selection of other products as well). To achieve the hard lustrous surface which so characterises japanned ware, each layer of varnish had to be gently baked and stove-dried before the next was added. It had to be undertaken in workshops that were free from dust, smoke and moisture, and the hot, odorous atmosphere was a challenge to the uninitiated. There were, of course, various differences in the layers applied, beginning with the ground layers applied in the blacking shop, through to the final layers of (various types of) decoration. The latter might include tortoiseshell effects, pearl decoration, painted decoration, printed decoration, gilding or bronzing, as well as the necessary varnishing and finishing to conclude the process.

Japanning is in some respects a misleading term, as it often referred to techniques utilised in the production of goods made in China and India as well as Japan, later to be copied by industrialists in the UK, including Wales, the Midlands and London. The ancient skill of lacquering is a long and complex procedure, requiring layer upon layer of natural varnish for true Chinese or Japanese lacquer, whilst the Indians developed their own resin lacquer. Mrs Jones illustrated the supreme quality of these imports with pictures of The Mazarin Chest, Japan, c 1640 and a Bureau-cabinet of black-lacquered wood with gold lacquer decoration made in Canton, southern China in c 1730, both are in the Victoria and Albert Museum.

In the 1720s, workers at The Pontypool Ironworks seem to have been the first to develop a lacquering process that might bear comparison with Oriental imports, and some of the earliest Japanned ware is, therefore, from Pontypool - and is much prized by collectors. The first Midlands manufacturer to follow Pontypool's example was John Taylor of Birmingham, a leading enameller and gilt-button-maker who, in about 1740, added japanned tin snuff boxes

to his range of products. Once perfected, japan varnish could be applied to many other products as well - slate, copper, leather, and, in particular, papier mâché. Although they were frequently conducted under one roof, tinplate working and papier mâché were two distinct trades, calling for different skills, and carried on independently within each establishment, the products of each coming together only for the final process of japanning.

In terms of chronological development, what happened was that the Welsh japanning trade declined, and the Midlands trade - Wolverhampton, Bilston, Birmingham - expanded. Advantages for the Midlands included the ready supplies of raw materials, the development of a canal system centred on Birmingham and the Black Country, and a rapidly emerging reputation as an area for specialist metalworking skills. The list of Midland Japanners grew as did the pages of the catalogues of Japanned goods that were available. As one might expect from this innovative district, 'Midland Japanners rarely fought shy of attempting the impossible - there were few luxury objects or household items they were not prepared to make'.

Mrs Jones then went on to describe the contributions made by a number of Midland Japanners. As one might expect with the development of the product range, scale of operations also grew, and significant capital investment was made in creating suitable premises. Firms such as Henry Loveridge & Co. of Wolverhampton produced a wide range of goods to the highest standards, and established a worldwide reputation for the quality of output.

The papier mâché industry seems to have arrived in Birmingham in the 1760s and Henry Clay took out a patent in 1772 on a technique that produced a stronger and more versatile 'pasteboard' (principally by oiling and baking the paper). Simple products such as trays were initially manufactured, but the sophistication and range of papier mâché products developed over time (including furniture!). Birmingham became the centre of the papier mâché industry, with Clay and Jennens & Bettridge major players in that industry, with the latter employing 300-400 workers in the 1840s.

The Japanned tinware and papier mâché trades both declined quite rapidly in the latter part of the nineteenth century. By the 1860s, Japanners were beginning to feel the effects of the electro-plating trade, and few manufacturers survived successfully into the twentieth century, with the industry dying out in the 1930s. The luxury papier mâché market began to suffer from attempts to create even more elaborate designs, whilst keeping costs under control. Cheaper, inferior products began to emerge, and the fate of papier mâché was sealed.

Mrs. Jones then answered a range of questions, including some related to workshop conditions, the nature of the workforce, and any remaining evidence of Japanning premises in Birmingham, Bilston and Wolverhampton. In the end, the Chairman had to interrupt the flow of questions to allow Mrs. Jones the opportunity to get home! A hugely successful evening, greatly appreciated by all who were able to attend.

November 2016: Chris Barney

Report by Martin Green

The Work of the Association for Industrial Archaeology followed by a Report on the AIA Conference 2016.

Chris Barney, a long-serving member of the Association for Industrial Archaeology's Council, and currently the editor of the AIA Quarterly Newsletter - as well as sitting on the WIAS Committee - gave a presentation on the origins, work and future plans of the AIA.

The origins of concern for the industrial heritage had their beginnings in the inter-war period with the formation of such groups as The Newcomen Society (1920), and the Cornish Engine Preservation Committee (1935), together with the Society for the Preservation of Ancient Buildings undertaking surveys of historic bridges and of wind and watermills, whilst some industrial sites e.g. Ironbridge received protection as ancient monuments.

The Second World War then witnessed the destruction of a great many historic sites and the transformation of industry. But such losses and changes brought a new grassroots appreciation of heritage generally and industrial heritage in particular. The renewed transport of heavy commodities on the narrow boat canal system was short-lived and boating enthusiasts such as Tom Rolt fought hard to preserve access across the canal system in the face of Government closures. Eventually, the Inland Waterways Association, which had been formed in 1947, proved to be spectacularly successful and much of the canal system is now preserved for leisure activities. Indeed, a new charitable body, the Canals & Rivers Trust, has just been created to look after inland navigable waterways and British Waterways, the government agency, has been transferred to the CRT. Similarly, the closure of many railway lines led to the formation of numerous preserved railway societies which now operate over one thousand steam locomotives and are very effectively advised by the Heritage Railways Association.

The interest in industrial heritage fostered by the Workers' Educational Association in the 1950s spawned numerous local industrial archaeological societies which, under the umbrella of the Council for British Archaeology, put pressure on the national Government to identify more industrial heritage sites for protection. Public opinion, outraged by the needless demolition of the Euston Arch in 1962, galvanised Government ministries to fund a National Survey of Industrial Monuments in 1963 to be managed by the CBA.

Then from 1964 to 1970 a series of CBA Conferences took place in Bath, and after 1970 the Conference was taken to other locations, with the 1973 Conference held on the Isle of Man. The 50+ delegates at this Conference established the Association for Industrial Archaeology, with Tom Rolt as Chairman, Angus Buchanan as Vice-Chairman, and Neil Cossons as Secretary.

The AIA's aims as stated in September 1973 at the Isle of Man Conference, though slightly amplified, hold good today. These were to promote the study of industrial archaeology and to encourage improved standards of recording, research and specialist survey and research groups; to encourage bodies involved in the preservation of industrial monuments; to represent the interests of industrial archaeology at a national level; to hold conferences and seminars; and to publish the results of research.

Chris then went through each of these goals and explained how the AIA fulfilled each of them, and had amplified several in the process. In terms of promoting recording and research, the AIA now has a number of Awards - for outstanding scholarship and for digital initiative; for archaeological reports; for university dissertations; for publications; as well as for student bursaries and travel

bursaries. At a national level, the AIA has an industrial heritage support officer, and the All Parliamentary Party Group on Industrial heritage was formed in 2013 to champion the industrial heritage sector at Westminster.

Perhaps the most familiar ingredient of the AIA's work is the Annual Conference, held in a different location in the UK each year, and Chris showed the geographical spread of these Conferences (with Warwickshire a conspicuous absentee!). He then went on to report on this year's conference at Telford.

These Conferences always include tours to sites in the area, often giving access not normally available to the general public. Visits included Apley Estate Farm, the Clee Hills Industrial Landscape, Thomas Telford's Roads and Canals, Birmingham Jewellery Quarter, the Museum of Carpet at Kidderminster, Burleigh pottery, Middleport, and Ditherington Flaxmill in Shrewsbury, all reflecting the wide range of interests of the industrial archaeologist. Chris had particularly enjoyed the visit to the Aga Rangemaster Foundry at Coalbrookdale (with its Leamington connection) and showed a series of slides of the various stages in the foundry process.

The AIA also organizes one day seminars to showcase and explore a topical issue.

This year the subject was - 'What has World Heritage Site Inscription done for Britain's Industrial Heritage?' The UK has 26 World heritage Sites, and 9 of these have industrial heritage interest - Ironbridge Gorge; The Cornwall and West Devon Mining Landscape; Saltaire; The Pontcysyllte Aquaduct; Liverpool Docks; New Lanark; Derwent Valley Mills; Blaenavon; and The Forth Bridge.

In terms of publications, the *IA Review* is the AIA House Journal. It has changed publishers, title and format several times but it has been a continuous series with an illustrious pedigree and high levels of scholarship maintained throughout. The *IA News* is the Quarterly Newsletter, which started life in March 1974, with the next edition No. 179. Chris does a very fine job as editor of this Newsletter, and he was delighted to announce that this latest edition will be in full colour.

In addition to the five original aims of AIA, it has been possible to add a sixth goal. This is to support the restoration of industrial sites and artefacts. This was an initiative launched in 2009, with a total of over £400,000 allocated since then. Chris then went through a number of examples of such Restoration Grants, from the Salt Wagon at the Lion Salt Works in Cheshire to the Gas House at Hackney. From 2015 an additional award was also added for the Best Creative Re-use of an Industrial Building, with illustrations of the most recent recipients.

So there is more to the AIA than meets the eye, and Chris concluded with a re-emphasis on the threats posed to our industrial heritage, citing the example of the closed and demolished Snibston Discovery Museum in Leicestershire, with many direct and indirect costs of closure, including employment in the local community. The ambitious plans for Ditherington Flaxmill show what can be done, and Chris added the example of the imaginative museum use of the Volklingen Ironworks in Saarland to illustrate this further.

WIAS is one of 50+ societies affiliated to the AIA, but this did not prevent individuals from becoming members and adding to the crusade for the preservation of our industrial heritage. Chris had indeed presented a convincing case for such support.

December 2016: Alain Foote:*The Kempton Great Engines.*

Situated alongside an elevated section of the A316 near to Kempton Park racecourse is a national monument to the last days of the steam age. Alain Foote knew it well from his schooldays and brought its history to life in another meticulously researched presentation.

The story begins in the early 17th century with the development of London's water supply and the proposal for the New River Head at Highbury. By 1850, London's water supply was in crisis due to cholera outbreaks. Parliament forced the water companies to move their intakes to above Teddington Lock and to filter the water.

Later, in 1897, the New River Company created the Kempton Water Treatment Works on the SW outskirts of London.

The original engine house contained 5 triple expansion engines built by Lilleshall. Two lifted water into the reservoirs from the Thames and three pumped clean water to Finsbury and Cricklewood.

From 1920, the Metropolitan Water Board (which had acquired the New River Company in 1904) began planning increases in capacity at Kempton. As part of this capacity increase, a new Engine House was constructed to house two additional triple expansion engines.

Contemporary photographs and copies of the original plans for the new engine house provided the background and an indication of the scale of the enterprise. Construction of the new engine house began in 1926. The outside is faced with red Southwater bricks and Portland stone dressings. The walls are 8ft thick. The two chimneys stand 135ft high. The first chimney was built to serve the Lilleshall engines, the second to serve the new ones.

The two triple expansion engines were built by Worthington Simpson in Newark. Partially assembled in the factory they were then stripped down and sent by rail to Kempton and rebuilt. The scale of these engines is difficult to imagine but one photograph of the lower part of one under construction includes a man who is dwarfed by it.

The engines are believed to be the largest of their kind in Britain. Designed for 24-hour 7 days a week operation they ran for 52 years between 1928 & 1980.

The engine house was designed for three engines but only two were built and a steam turbine subsequently took the place of the third. Recent photographs clearly showed the scrupulous cleanliness that was maintained throughout. The entire building is lined with glazed bricks whilst the two floor levels are quarry tiled with patterns of black & white tiles giving an art deco effect. Its impressive scale has found favour over the years as a film location for such diverse productions as *Titanic*, episodes of *Poirot* and several children's programmes.

The plant stopped working in 1980 and English Heritage declared it a National Monument and, along with its contents, was listed Grade II*. In 1995, the Kempton Great Engines Trust was formed with the aim of restoring and maintaining this piece of steam heritage. The first task was to remove large quantities of asbestos lagging with grateful thanks to Thames Water for footing the bill. Then volunteers spent the following six years restoring one of the engines before Prince Charles was invited to restart

it in 2002. The first public steaming weekend took place in October 2004.

Turning to the technical details of the inverted triple expansion engines, Alain used photographs and animated graphics to describe the operating principles and the many unique features. The statistics speak for themselves; Height of the engine and pumps is 62ft 6in, Length 45ft, Weight some 800 tons, Power 1008 hp, Speed 25.4 rpm max, Steam conditions 200 psig with 150 deg F of superheat, Steam Consumption 9.875 lbs per pump HP per hour, Flywheel diameter 17ft, Flywheel weight 32 tons each. The pumps delivered some 19 million gallons of water a day or 520 gallons for every revolution.

One important feature was the emergency shutdown system. The engines pumped water directly into the pressure main, if the mains pressure dropped (e.g. due to a fractured main) the engine would speed up out of control. The shutdown system prevents this from happening. A spring loaded valve downstream of the steam inlet valve is kept open by pressure from the water main whilst a vacuum breaker valve on the exhaust line is kept closed by pressure from the water main. In the event of loss of mains pressure the inlet valve closes and the vacuum breaker valve opens rapidly bringing the engine to standstill. This system can also be operated by a lever at the driving position.

The illustrations of the various mechanical features all demonstrated the monumental scale of the machinery. Although huge, every aspect could be related to equipment of more modest size. A triumph of upscaling that really worked.

A small twin cylinder barring engine is located adjacent to each flywheel. They are used to turn the main engine through sufficient revs to get steam through all three cylinders & build up a vacuum in the condenser. At this stage the main engine will start and automatically throw the barring engine out of gear as it accelerates.

The condenser is a cast iron horizontal shell and tube heat exchanger 13ft long and 5ft diameter with 655 brass tubes giving a surface area of 1700 sq ft arranged in three passes. The exhaust steam passes through the tubes and is condensed whilst two vertical reciprocating air pumps are directly driven from the bottom crosshead of the LP Pump.

The bearing oil system is gravity fed using mineral oil which is pumped from the basement to the head tanks. Oil from the upper head tank flows by gravity to oil distributors on the top gallery to feed the top valve gear and from the lower head tank to oil distributors on the middle gallery to feed the bottom valve gear and all engine and camshaft lubrication points. The cylinder oil system is force fed using heavy grade steam oil with injector pumps for each cylinder.

Steam was originally provided by six Babcock & Wilcox Boilers and 1945 two John Thompson Boilers were added. Today the much lower demands are met by a Cochrane 'Wee Chieftain' boiler.

These engines represent the pinnacle of reciprocating steam engine development and well worth seeing. For members with a head for heights Alain is planning a Society visit but regular monthly steaming days between March and November are open to visitors.