WARWICKSHIRE Industrial Archaeology Society

WIAS

NEWSLETTER

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FROM THE CHAIRMAN

Diverse contacts, diverse sources

This Newsletter is due to be published on the occasion of a joint meeting with the Leamington Society. This is the first time that WIAS has done a joint meeting, and it caused me to reflect that this has perhaps been something of a missed opportunity. There are a number of local history societies in Warwickshire from whom we have had visiting speakers, but the actual opportunity of members of WIAS and another history group meeting on the same occasion has not been tried before.

One of the issues is, of course, that having our meetings in Warwick makes it difficult for joint meetings to take place other than for very local groups. Discussions are currently in progress about trying to get a joint meeting with the Warwick Society on the subject of the Warwick gas works.

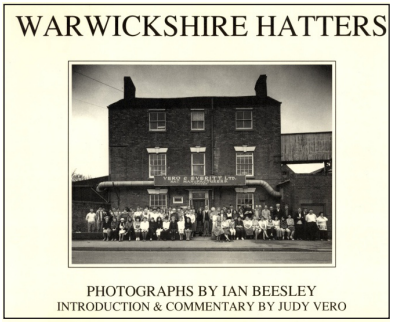
There is, of course, an overlapping membership between WIAS and other local groups, and knowledge and expertise is shared in this way. Similarly, my own visits to various local groups to talk on the Industrial Heritage of Warwickshire always generates items of interest from the audience. Several of these groups attract those of retirement age, and many in the audience frequently have experiences that supplement our knowledge of local sites. It is a real pleasure to be able to show a set of slides of local sites, many taken in the 1970s, and to be bombarded with responses about work experiences or local knowledge of these sites – yet another reminder of the importance of local history.

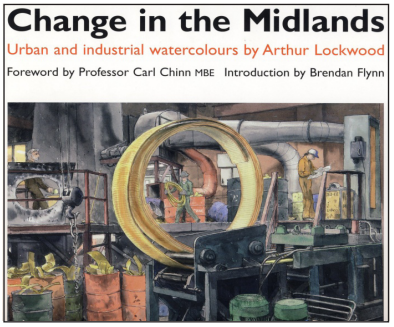
One of the most encouraging features of our Society is the very high proportion of members who attend meetings. This is unusual, and other groups admire us for this. I would like to believe that one of the reasons for this is the liberal interpretation of the industrialarchaeology/history/heritage theme, and that a diverse range of subjects can be accommodated in the programme – from detailed analysis of technological change through to the social history of industrial communities, with the content drawn from local, national or overseas examples.

This produces some blurring at the edges over what can be included but I regard this as a strength of the Society. Some of the items that creep into the last twenty minutes of some of our meetings defy classification anyway!

As I have written about before, the range of sources also seems to expand as time goes by. Earliest representations of industrial scenes relied on the skill of the artist, to be subsequently replaced by the photographer. Much archaeological recording requires photographs or drawings that present an accurate factual picture. Occasionally, collections emerge that add a great deal more to the vision of industrial experience than mere recording can achieve. Two examples are particularly appealing. One published in 1989 is *Warwickshire Hatters* (Ryburn Publishing) by Judy Vero and Ian Beesley. Judy Vero wrote the text, and Ian Beesley – who has done much photographic work on Yorkshire mills and foundries, particularly in the Bradford area - was commissioned to produce a photographic record of the last working days of Vero and Everitt, the Atherstone hat-making firm. The result is a wonderfully evocative record of the atmosphere within the works – the noise, the smell of warm damp wool, the steam of the hat-making processes - and of the lives of those who worked there. Once Vero and Everitt shut down, this left Wilson and Stafford as the only hat-making firm in Atherstone, and this, in turn, closed in 1999. A short video recording– another vital resource - of the last days of felt-making at Wilson and Stafford was made, but the (deteriorating) buildings adjacent to the Coventry Canal remain unoccupied eleven years later.

Painting has not played a significant role in the recording of industrial sites in the twentieth century, but one exception to this is the work of Arthur Lockwood. Twenty years ago Arthur Lockwood began painting scenes of the changing industrial and urban landscape of the Midlands. His paintings have been gathered





in a collection entitled *Change in the Midlands* (Sansom & Co. 2007), and – in the same way as Ian Beesley's photographs – the results are a wonderfully evocative record of times past.

Included in the collection are paintings of Coventry Colliery and the Homefire Plant – not every artist's dream location!

Both books are highly recommended, both for the skills of the artists concerned, and for their contribution to the record of our industrial heritage.

Martin Green

PROGRAMME

March 11th 2010
A joint meeting with the Leamington Society: *The works of William Louis de Normanville*

April 8th 2010
Dr Malcolm Dick: *Matthew Boulton (1728 – 1809) and the celebration of industrial technology*

May 13th 2010
Peter Coulls, Alain Foote and John Willock: *Willans Works*

June 10th 2010
A presentation by members: *Industrial Archaeology Abroad*

Meeting Reports

December 2009: Roger Cragg
Robert Stephenson, His Life and Works

Roger Cragg ended our year in style with his review of the life and works of Robert Stephenson, a fact-filled story of one of Britain's foremost engineers, the 150th anniversary of whose death was commemorated in 2009. Roger concentrated on Stephenson's work as a civil engineer but he also examined his substantial involvement in what would now be termed mechanical engineering.

Regarding Stephenson's early life, we learnt that he was born in October 1803, but erroneously celebrated his birthday in November. The only son of George Stephenson, he attended a private school in Newcastle, commuting by donkey. In 1819 he was apprenticed to the Viewer at Killingworth Colliery learning mine surveying and the design and operation of machinery. However, his father's career was developing and as his son's assistance was needed Robert left Killingworth and, effectively became apprenticed to his father who was rapidly developing a name in what was to become railway building.

In 1821 George Stephenson was commissioned to re-survey the route of the proposed Stockton and Darlington railway with a view to the use of locomotives on the line and he was subsequently appointed Engineer for its construction. The opening of the Hetton Colliery line in 1822 and that of the Stockton & Darlington in 1830 established him as a consulting engineer, much in demand for advice on early railway schemes.

In addition to his work on colliery wagonways, George had also been developing his skills as an engine mechanic, making improvements to winding engines and installing new engines. In all this work he was ably assisted by Robert, one of whose useful talents was that he could write clearly!

William James, an early railway entrepreneur, discussed with the Stephensons the use of locomotives on his proposed Central Junction Railway. James had undertaken the first survey for a railway from Liverpool to Manchester, a project with which the Stephensons were to become very involved and Robert accompanied James on a further survey of the route.

In 1822 Stephenson went to Edinburgh University. During his short time there he met George Bidder who became a close colleague throughout his working life. Returning to Tyneside in 1823, he commenced his professional career alongside his father. One of the first tasks which he undertook on his own was the survey and design of a branch of the Stockton & Darlington Railway and he proudly signed the drawing 'R. Stephenson, Engineer'.

In June 1823 George and Robert Stephenson, together with three others, founded the firm of Robert Stephenson & Co. with Robert as the managing partner, a huge step for one so young. The purpose of the company was to develop the mechanical engineering side of the Stephensons' business.

Roger then explored the rather mysterious period in Stephenson's life when in 1824 the Mexican Mining Company consulted the Stephensons with a view to re-opening gold and silver mines in Mexico and Colombia. Stephenson was invited to go out to supervise the work. Although his partners were reluctant, they agreed that he could go for about one year but unknown to them at the time he had contracted to go for a three year period. The discovery of this fact did not please his colleagues!

Nevertheless, Stephenson sailed in June 1824 accompanied by a party of Cornish miners who were to work the mines. He was engaged on a number of projects including the surveying of a route for a 7 mile railway which he advised was not possible owing to the mountainous terrain. From Caracas he went, by mule, to Bogota and thence to the Sanata Ana silver mine. He also undertook a 1,100 mile tour of the interior. The work was trying and there were problems with drunken miners but it did develop his managerial skills. In 1827 he travelled to Cartagena to take passage home. There he met Richard Trevithick who had fallen on hard times and Stephenson provided the funds for Trevithick's passage to England. Robert eventually returned to England after a brief tour of the United States.

On his return he was engaged in the two tasks of managing the factory of Robert Stephenson and Co. and working alongside his father but now as an equal rather than as a subordinate. To facilitate this a new company was created, George Stephenson & Son with George and Robert appointed as Chief Engineers with 18 employees.

Stephenson first assisted with the design and construction of the Liverpool and Manchester Railway. However, his major contribution to that railway was the Rocket locomotive. George Stephenson had been active in locomotive design and his engines were already at work on the Stockton & Darlington railway. Robert's task was to develop these slow and ponderous beasts into something more useful for a major public railway. The rival merits of stationary engines against locomotive haulage were being debated. The Stephensons argued forcibly for the use of locomotives and it was decided to hold trials at Rainhill in October 1829. Several locomotives were entered for the competition but on the day only five were available and of these only three were serious competitors; Novelty, Sans Pareil and the Rocket. In the trials Novelty and Sans Pareil suffered mechanical failures and only Rocket performed the tasks set satisfactorily.

The Rocket was a major step forward in locomotive design with inclined cylinders driving directly on the crank pins of the driving wheels, enabling the driving wheels to be sprung, and its multi-tube boiler vastly increased the heating surface. The ultimate development of the Rocket type locomotive appeared shortly afterwards in the shape of the Northumbrian in which the cylinders were placed horizontally and a separate firebox was incorporated into the boiler, thus setting the pattern for all steam locomotives to the end of steam in the 1960s.

Meanwhile Stephenson had taken over responsibility from his father for the completion of the Canterbury & Whitstable Railway. Already he was making use of assistants although his absences from the works was the subject of some criticism by the Directors of the company.

From this time on Stephenson was involved in many schemes but Roger was only able to highlight some of the more outstanding projects. These included the 16 miles long Leicester & Swannington Railway, whose mile long tunnel at Glenfield near Leicester survives *in situ*, and the winding engine from the Swannington incline is preserved at the National Railway Museum at York. Another was the London & Birmingham. Several different routes had been suggested and in 1830 George and Robert Stephenson were appointed as joint Engineers to survey the line and prepare a final scheme. Robert appeared before the parliamentary committee to defend the proposals and acquitted himself well, impressing many people with his skill in dealing with many hostile questions.

At this stage his father dropped out of the project and Robert was appointed sole Chief Engineer for the railway at a salary of £1,500, later raised to £2,000. At this time he was not quite 30 years of age and solely responsible for the building of a railway with an estimated cost of £1,701,000, equivalent to many millions of pounds today and probably on the scale of the channel tunnel rail link. Some responsibility for one so young!

Roger highlighted two of the major difficulties which Stephenson had to overcome at a time when railway building had hardly started and little experience had been gained. First was the great cutting at Roade. The contractor failed and the work was taken over and finished by the Company. However the problems at Roade were dwarfed by the difficulties encountered in the driving of the tunnel at Kilsby where quicksands were encountered and the tunnel flooded. Again, the contractor was released from his obligations and Stephenson took charge. Unsurprisingly, there was a huge cost overrun, from £98,988 to £291,030! Of the workforce of about 1,300 men, 26 were killed during construction.

That these difficulties were successfully overcome, was

largely thanks to the qualities not only of Stephenson but also his subordinate staff which included many who went on to become eminent engineers in their own right, such as John Birkinshaw, Thomas Gooch, Charles Fox and George Buck. Generally, Stephenson's policy was to appoint young aspiring engineers to junior posts, trusting them with more responsibility as they proved themselves.

From this point a chronological view of Stephenson's career becomes impractical because of the sheer volume of his activities and Roger used a few of his more prominent projects to give a flavour of his career and of the man himself through his private and business life.

It was indicative of the status of the Stephensons that in 1835 they went to Brussels to meet with the King of the Belgians to discuss the creation of the Belgian State railway system, and by 1840 the Newcastle factory was sending locomotives all over Europe including France, Belgium, Austria, Germany, Italy, Russia and also to the United States.

In 1832 Stephenson agreed to act as Consulting Engineer to the Stanhope and Tyne Railway which was to build a line over the moors. It incorporated on its various sections; horse traction, locomotives and stationary engines and had three miles of inclined planes – almost every method of traction possible on one line! Economically the line was a disaster and unfortunately Stephenson had accepted five £500 shares in the company in lieu of his fee. When the company collapsed he discovered that, as the company had never been incorporated, he had an unlimited personal liability for its debts which eventually cost him £20,000.

Stephenson enjoyed a good relationship with his near contemporary Isambard Brunel who was only three years younger. Although they had different views on some aspects of railway development, the track gauge and the atmospheric system being two, they always had a high regard for one another and corresponded on friendly terms. Brunel wrote: *"despite our very bitter contests I have a great regard [for him]"*.

The 1840s were perhaps the greatest years of Stephenson's career and included: Consulting Engineer to the London & Birmingham Railway, Engineer to the South Eastern Railway, Chief Engineer to the Eastern Counties Railway, Engineer in Chief to the Chester & Holyhead Railway, Chief Engineer of the Midland Railway, Joint Principal engineer to the North Staffordshire Railway, Chief Engineer to the Shrewsbury & Birmingham Railway and many others.

The Chester & Holyhead Railway included one of Stephenson's less successful structures. The coming of the railways had lead to bridge building on an unprecedented scale; whereas most previous bridges had been of the stable arch type, railways needed adequate headroom and width which favoured the horizontal beam. Cast iron was the preferred material but engineers were well aware of its brittle nature, especially when subjected to tensile stresses.

The trussed compound girder became a popular solution this problem. Large numbers of these beams with spans of up to 70 ft. were built in the 1840s including a bridge carrying the Chester & Holyhead Railway over the River Dee. In early 1847 one of the spans of the bridge collapsed and five people were killed and sixteen injured when the train fell into the river. Stephenson took full responsibility for the bridge design at the inquest. The whole matter of trussed compound girders was the subject of a Royal Commission enquiry. This led to the rapid strengthening of existing girders and, by the late 1840s the abandonment of cast iron, trussed or not, for railway bridges.

The Chester & Holyhead Railway also saw the introduction of another new form of bridge design – the wrought iron tubular bridge. Thomas Telford had solved the problem of crossing the Menai Straits for road use with his suspension bridge. However, suspension bridges were not considered suitable for railways and after much experimentation the riveted, wrought iron tube was developed.

Two such bridges were built on the Chester & Holyhead. The first bridged the river Conwy with twin 400 ft. long tubes crossing the river at a low level. The 1,000-ton tubes were built on dry land and then floated out on pontoons and raised onto the supporting abutments by hydraulic jacks. The Britannia Bridge was a much greater challenge with four twin spans. Again, the tubes were floated out and jacked into place. The tubes of the spans were joined to give a continuous beam and the trains ran through the tubes instead of above them.

Other tubular bridges built by Stephenson included two over the River Nile and the Victoria Bridge over the St. Lawrence River as part of the Grand Trunk Railway which linked Toronto with Quebec. The Victoria Bridge was the world's longest bridge. It overcame the winter freezing of the river which gave rise to large quantities of ice coming down river in the spring thaw by incorporating large sloping cutwaters into the upstream side of the piers.

Two other bridges nearer to home that stand out are the High level Bridge at Newcastle and the Royal Border Bridge at Berwick upon Tweed. The former is unusual in that it is a two level bridge which carries the railway line along its upper deck and the road on the lower. There has been some controversy as to who designed the bridge but although Thomas Harrison was asked to prepare a design for the bridge he wrote that *"...the designs are not mine but my friend Mr. Robert Stephenson's."* The latter is a bold masonry arch structure above the River Tweed and Stephenson was again assisted by Harrison.

Stephenson's professional life was widely recognised, he had joined the Institution of Civil Engineers in 1830 and was its President between 1856 and 1858. In 1857 he had received the honorary degree of Doctor of Civil Law from Oxford University. He was a founder member of the Institution of Mechanical Engineers when it was created in 1847 and became its President in 1848. In 1849 he was made a Fellow of the Royal Society. Also in 1847, rather surprisingly he became a Member of Parliament, being elected for the constituency of Whitby, a role which he continued until his death. He appears to have taken little part in Parliamentary proceedings although in 1857 he did speak in the House against the Suez Canal – one of his rare errors of judgment.

Stephenson remained in great demand as one of the leading civil engineers of the day but his health was beginning to suffer as was that of his friend and rival Isambard Brunel. The pair took a cruise to Egypt in 1858 in Stephenson's yacht *Titania* to recuperate as both were suffering from Bright's disease. Returning to London in February 1859, his health seemed improved and he returned to work but he soon relapsed and made one last voyage in *Titania* to Norway to take part in the opening of a railway which he and George Bidder had engineered. He returned to London but died on 12 October 1859 at the age of 56.

Stephenson was one of the greatest engineers of his day and arguably one of the greatest of all time. He was buried in Westminster Abbey. One of the pall bearers was his old colleague Joseph Locke who had succeeded him as President of the Institute of Civil Engineers.

What of Robert Stephenson the man? Roger fittingly closed with a quotation from Samuel Smiles' biography of 'The Chief' as he was invariably known to his associates:

"... he was eminently practical and yet always open to the influence and guidance of correct theory. ... He inherited his father's kindly spirit and benevolent disposition ... He will be judged by his achievements as an Engineer ... by the immense practical services which he rendered ... to civilisation through ... the railways constructed by him in all parts of the world."

Robert Stephenson was a truly great man and one to whom we owe a great debt of gratitude.

February 2010: Roger Hartree

The Aluminium Works at Banbury, 1929-2009

The 'Ally' was for many years the industrial heart of the old market town of Banbury and Richard Hartree gave us a very personal view of the plant and its products which resulted from his thirty-six year career with the Northern Aluminium Company and its successors. Richard joined the graduate training programme as a metallurgist in 1954 and retired in 1990 when working in Vancouver. He was based in Banbury for most of the 1960s and 70s and saw much change during this time.

The Banbury plant was located one and a half miles North of Banbury. It was always a processing plant for the aluminium ingots provided by the parent company from which rolled and extruded products were produced. However, the processes involved required a high degree of competence and attention to detail to ensure the quality demanded by customers which ranged from the burgeoning aircraft makers to hollowware spinners.

The Northern Aluminium Company (NACo) was a subsidiary of the Canadian giant Alcan which had an existing warehouse in West Bromwich, where aluminium sheets from North America were cut to size or blanked into discs and a small extrusion press produced trim sections. In 1929 Alcan decided to build a sheet rolling plant in the UK which would be the largest in the group. 40 acres of land were purchased in Banbury, a central location with good road and rail links plus a reliable electricity supply. Interestingly, the choice stemmed from a chance meeting on an Atlantic liner between an Alcan engineer and the brother-in-law of the Banbury Town Accountant. It was suggested that Alcan look at Banbury where Samuelsons, an agricultural engineer and a major employer had just closed and the Town Council was anxious to attract another major employer.

That the Council was anxious is shown in the final deal that was struck. An asking price of £12,000 was met with an offer of £10,000 from NACo who upped this by £200 after a local banker, Gillet put up £1,000 and the Councillors personally contributed £800. Banbury wanted NACo to come!

Construction was completed in 1931 and sheet shearing and blanking plant was moved from West Bromwich and local labour hired and trained. By 1932, 300 people were employed on two shifts. The extrusion press with its associated die-making facilities was moved in 1933 and a Paste and Powder Plant located away from the main buildings because of the explosion hazard.

In the mid-30s the plant was expanded substantially, not least to meet the increasing demand from the aircraft industry which was changing from wooden to metal airframes. A notable technical advance was the development of 'clad' aluminium whereby a pure outer skin was bonded onto a copper-rich core to combine strength with corrosion resistance especially for aircraft. More sophisticated heat treatment and re-rolling equipment were also installed.

Given the dangerous nature of some of the manufacturing processes it is not surprising that safety was given a high priority; even extending to the title of the work's magazine - 'Safety First'. The Safety Committee was also the name of the first regular joint management/workers forum. Nonetheless, accidents did occur with foot injuries being quite frequent. Safety shoes were available for purchase but their use was not compulsory.

Labour relations hit the national press in 1936 when a strike over pay occurred. However, the underlying cause was over union recognition and there were some unpleasant incidents at the work's gates over 'blacklegs' entering the site which resulted in a police presence. The dispute was resolved in about a week (ed: pretty swift by later industrial relations standards) with 5% wage increase, from 10 1/2d to 11d per hour for a 50 hour week and a 'shift bonus' of 12.5%.

In 1938 a major expansion programme doubled both sheet and extrusion capacity to meet growing demand resulting from the rearmament programmes of the RAF. A new office block and Alcan's first research laboratory, both now listed, were built.

Two new extrusion presses came from Germany, and the installation engineers who were still on the site at the outbreak of hostilities were interned. At this time Banbury was the largest aluminium sheet and extrusion plant in England and as such was one of the first to be camouflaged and 'dummied' some two miles to the North.

The need for aircraft put huge demands on the aluminium industry as production rose from 2,828 units in 1938 to 15,049 in 1940 and over 26,000 by 1944. NACo built and operated a major 'recycling' plant near Adderbury to process aluminium from both British and German crashes.

On 3 October 1940 the dummy plant was bombed and the German news later claimed the destruction of a munitions factory at Banbury. The damage was quickly repaired! 'Dummy Ally' was preserved as an address in the 1964 electoral register and the dummy gateposts survived until the 1970s.

Throughout the war the plant operated continuously and a high proportion of the workforce, which exceeded 4,000 at its peak, were women. Until new plant elsewhere came on stream in 1942, Banbury supplied between 50 and 60% of the needs of the aircraft industry. NACo provided technical assistance to these new plants.

After the war came diversification to find new uses for the greater capacity now in place. Banbury concentrated on small order specialist products including all aircraft sheet. Nevertheless, the plant remained the largest employer in the town and played an important part in its social life.

The installation of new plant in the mid 1950s led to the need for labour and Roger touched on the problems at that time of recruiting from among the newly arrived Carribean immigrants. Within a few years a new productivity-based incentive scheme increased output and avoided the need for additional labour.

However, excess capacity existed in the industry and rationalisation was needed. In 1968, Alcan bought Delta Metals' 50% stake in James Booth Aluminium with the balance owned by Kaiser Aluminum. As a result, there was a major rationalisation across four sheet and extrusion plants with consequent redundancies (some 1,200 at Banbury but generous terms meant few were compulsory).

Plant modernisation continued through the 1970s and 80s but the workforce steadily reduced to around 750 when the 50th anniversary was celebrated in 1981. In 1986 the anodising plant was closed and by 1993 employees numbered but 528.

Alcan continued to rationalise, selling surplus land and then the business in 1966 to a merchant banking group which operated it under the name of British Aluminium until selling it on to Alcoa in 2000, who in turn sold it to the French company SAPA in 2007. SAPA finally closed the plant in 2008 thus ending nearly 80 years of the 'Ally' in Banbury.

The listed 1938 Office and R&D buildings remain together with the 1931 Gates and the Memorial Garden to the forty-one employees who died on WW2 service.