

WARWICKSHIRE

Industrial Archaeology Society

WIAS

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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 Stoneycroft, 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 on 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.