

North East Derbyshire Industrial Archaeology Society



NEDIAS Newsletter No. 51 – August 2013
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The Shepherd Wheel Restored

Derek Grindell

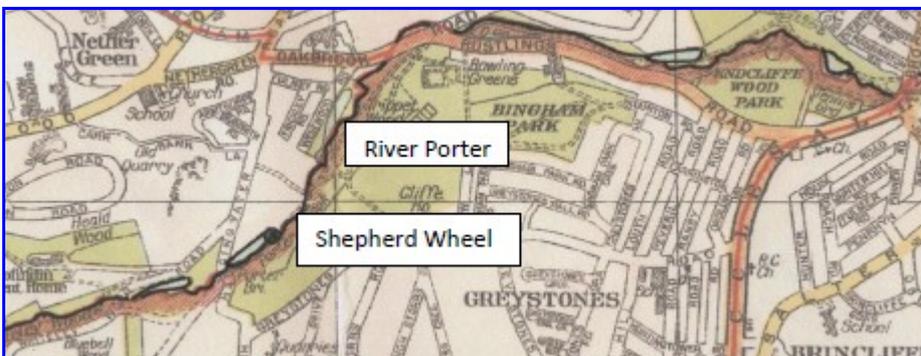
The old dictum that ‘location is everything’ was surely never more aptly applied than to Sheffield; it’s early settlers were quick to realise that, situated on the eastern flank of the southern Pennines, a combination of water and gravity could be a source of cheap power. The river Don, a significant arm of the Humber’s navigation system, rises above Penistone and reaches the heart of the city on a south south-easterly course but within a few hundred yards abruptly veers to the north north east. From Saxon to Elizabethan times, the Don’s south bank at this location was fortified and such street names as Castlegate can only hint at its former strategic importance, which had a national dimension.

Within the city the river Don is fed by four streams from the western hills. The Loxley, rising on high ground west of Bradfield, meets the Rivelin, which rises on Hallam moors, and they both enter the Don at Neepsend. The sinuous Porter Brook, falling from Ringinglow more than 1000ft. (300m.), joins the Sheaf, which rises on Totley →



Above: Photo courtesy of *Friends of the Porter Valley* (<http://www.fopv.org.uk/>)

Left: The Porter on the map runs along the boundary of Endcliffe Park and heads across Brocco Bank into Ecclesall Road on its way to join the Sheaf.



In this issue: What's On? ■ NEDIAS Visits ■ MARKHAM GRANGE STEAM MUSEUM ■ News & Notes ■ 617 Squadron and its Derbyshire Connections ■ NEDIAS Journal Volume 5 – Hot off the Press! ■ Chairman's Chat ■ And Finally Samuel Oldknow's enormous venture and his debts, debts, debts! ■

Moss and they flow into the Don at its dramatic change of course. The gradient on the Porter and its water supply was such as to enable a series of dams to be constructed, capable of supplying numerous mill wheels without attenuation of motive power downstream. By the mid 18thC, Sheffield was Britain's foremost exploiter of water power, aided by the availability of local millstone grit, which afforded a ready supply of grinding wheels. Of the ninety mills in operation, two thirds were used for grinding edge tools. By 1850, the Porter Valley had 21 mill dams serving 19 water-wheels, the majority operating forge hammers and rolling mills, as well as grinding corn and knives.

Activity on the Shepherd Wheel site can be traced back to 1584 when it passed to the sons of Wm. Beighton but it is named after its tenant between 1749 and 1794, when there were 10 employees. It was taken over in the 1820s by the Hinde family, who operated the site for more than a century. The Sheffield City Council acquired the adjoining land from the Duke of Norfolk in 1900 and the Wheel was restored and opened as a museum in 1962 but closed in 1997 and placed under the care of the Sheffield Industrial Museums Trust in 1998. Its restoration and recent reopening are entirely due to the voluntary efforts of The Friends of the Porter Valley, who conjured up a £500,000 funding package to match a lottery grant. The attraction is manned at weekends and visitor numbers, 30,000 over 12 months, are already exceeding forecasts.

WHAT'S ON?

NEDIAS Lecture Programme

Meetings are held at: St Thomas' Centre, Chatsworth Road, Brampton (opposite Vauxhall/Bristol St Motors) S40 3AW. There's plenty of parking in their own car park, including disabled spaces, as well as on-road parking in front of the Church. All meetings commence at 7:30pm.

Monday, 9th September 2013	Dr. David Dulieu: "<u>The Pioneers of Stainless Steel</u>" 2013 marks the centenary of the discovery of Stainless Steel, a major advance attributed to Harry Brearley, who worked within the Sheffield steel industry, but who lived in Chesterfield.
Monday, 14th October 2013	Dave Barrie: "<u>History of the Good Luck Mine</u>"
Monday, 11th November 2013	Prof. David Hey: "<u>Millstones on the Moors</u>"
Monday, 9th December 2013	Christmas meeting. Hear about the Wingerworth dig; see some of the finds.

Other Diary Dates

Thursday, 12th September 2013 to Sunday, 15th September 2013	<u>Heritage Open Days</u> – thousands of volunteers invite you to experience local history, architecture and culture. To find events near you visit http://www.heritageopendays.org.uk/
Thursday, 19th September 2013	<u>GB Productions – Steaming Through Britain</u> – Graham and the team return to present a DVD show of preserved steam at work around Britain. Barrow Hill Roundhouse Lecture Theatre commencing at 19:30 and finishing between 21:45 and 22:00. Doors open at 19:00.
Saturday, 21st September 2013 and Sunday, 22nd September 2013	<u>Diesel Locomotive Weekend</u> – Ecclesbourne Valley Railway, Wirksworth Station, Coldwell Street, Wirksworth, Derbyshire, DE4 4FB (http://www.e-v-r.com/)

Thursday, 17th October 2013	Phil Lockwood and Enid Vincent – “<u>Diverted! Rotherham to Doncaster via Toton and Shirebrook</u>” – Diesels. Mainly at work on freight, 1975-2011. Includes the Brampton Branch, Avenue Coking Plant, Bennerley Opencast Disposal Point, South Yorkshire Joint Line and Kirk Sandall Glassworks. Barrow Hill Roundhouse Lecture Theatre commencing at 19:30.
Saturday, 26th October 2013	“<u>Oils Well that Ends Well</u>” . Seminar exploring the history of the oil exploration and production history within the East Midlands, including Tibshelf and the Derbyshire wells, Eakring. Includes visit to Duke’s Wood Oil Museum. Booking form from Cliff Lea.
31st October 2013	Dave Darwin and Phil Hodgkiss – <u>Trevor Dean Remembered</u> An extra meeting in memory of Trevor, who died suddenly on 26th October 2011. A look at some of his extensive collection of steam and diesel slides, including some local scenes. Proceeds from the evening towards the continued preservation of D213 Andania, which Trevor owned. Barrow Hill Roundhouse Lecture Theatre commencing at 19:30.
Until end October	Exhibition to commemorate 100th Anniversary of the seminal invention of stainless steel, Kelham Island. (See talk at NEDIAS on 9th September)
21st November 2013	Geoff Proctor – <u>Offbeat Lighting Effects</u> Photography has many different elements, interpretations and effects. Tonight Geoff demonstrates that there is more to railway photography than the traditional front three quarter view and uses different lighting situations to create a different, and often dramatic, picture. Barrow Hill Roundhouse Lecture Theatre commencing at 19:30.
Saturday, 23rd November 2013	<u>South Yorkshire Archaeology Day</u> – <i>more details at a later date</i>

NEDIAS VISITS

Co-ordinator: Brian Dick, 01246 205720

Saturday 28 September - Rowsley Railway Walk

Meet at 10 am on Sat 28 September at Rowsley Station/ Peak Shopping Village for a walk led by Glynn Waite. Starting from the original station of 1849 in the centre of the shopping complex, where participants will receive an illustrated guidebook, we first learn about Rowsley’s development as a rural railway centre. Amongst other features, the walk then takes in the railway cottages, the Derwent Viaduct, the second passenger station, the Marshalling Sidings and the engine sheds. After refreshment at Peak Rail’s Rowsley South station (bring your own, or purchase it from the cafe), we will take a steam train journey to Matlock and back.

Please park in Section A of the car park, which is on the right as you enter the complex. This is because we will be away from the Peak Village for quite some time, and will therefore not take up parking spaces that will be more convenient for those who come there for shopping.

To help estimate of numbers, please add your name to the visit list, or advise Brian Dick, see phone number above .

MARKHAM GRANGE STEAM MUSEUM –

How the Museum came about

George Dickinson

The name of Markham needs no introduction to members, and this article, which was originally published in Industrial Archaeology News Volume 165-Summer 2013, will be of interest to many. We're currently sorting out a date for a group visit to this fascinating museum.

Family ownership of several coal mines and an important engineering works at Chesterfield caused the name “Markham” to be spread around in numerous places, not all of them obvious. It was ownership of Brodsworth Main Colliery just north of Doncaster that resulted in an associated house being named “Markham Grange”. Naturally, the Markham company supplied mine winders to the Markham family collieries, including four steam winders to Brodsworth between 1906 and 1922, also two electric winders in 1959 (NCB). Ownership of the house kept in step with changes in colliery ownership, until Tom Nuttall bought it in 1967 as a base to develop adjacent land into a nursery - in the days well before garden centres started to spring up on any plot of spare land.

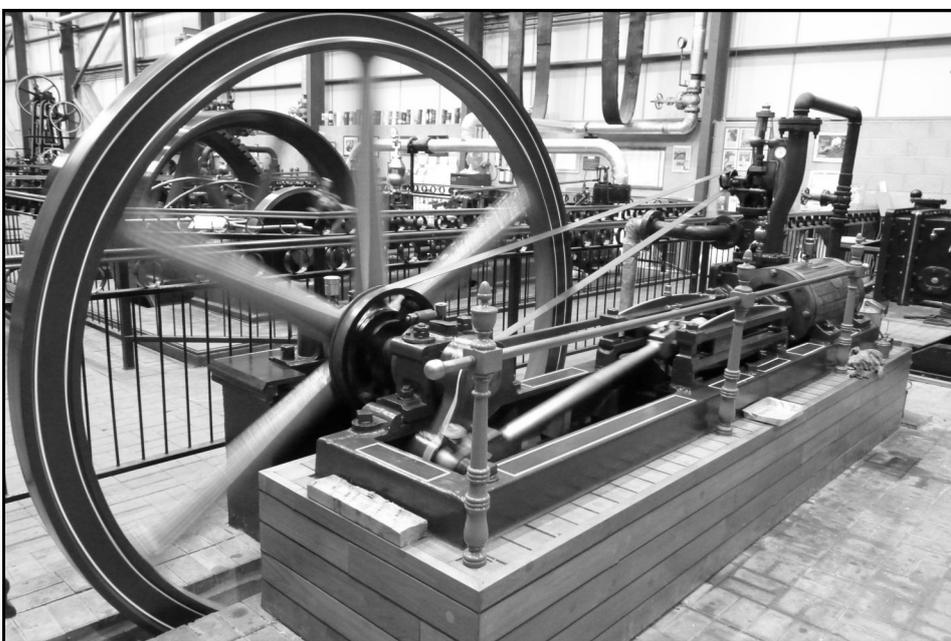


General view of the Museum

Now Tom had served an apprenticeship at Doncaster Railway Works (aka “The Plant”), as well as having sea-going engineering experience. So he had a dormant desire to have some steamable stationary engines himself. An increasing acreage of glasshouses needed keeping warm in the cooler months, and a stage was reached where individual boilers really needed replacing by a centralised installation. This entailed a new boiler house, and it was not too great a step in lateral thought that, if the building was made a bit bigger, there would be room for a steam engine display - a Museum. It began quite modestly with three enclosed engines, two Belliss & Morcom and a Sisson, each driving an alternator, also an Allen turbo-alternator set. A further sideways step enhanced the new system, namely a combined-heat-and-power installation. Based on the turbine, electricity was generated first, while the exhaust was passed through heat exchangers to transfer the heat to a low pressure hot water circulation network keeping the greenhouses warm. Fuel was scrap chipboard etc that would otherwise go to landfill, but it involved a crushing and transmission system to prepare it for blowing into the boiler - not without its problems.

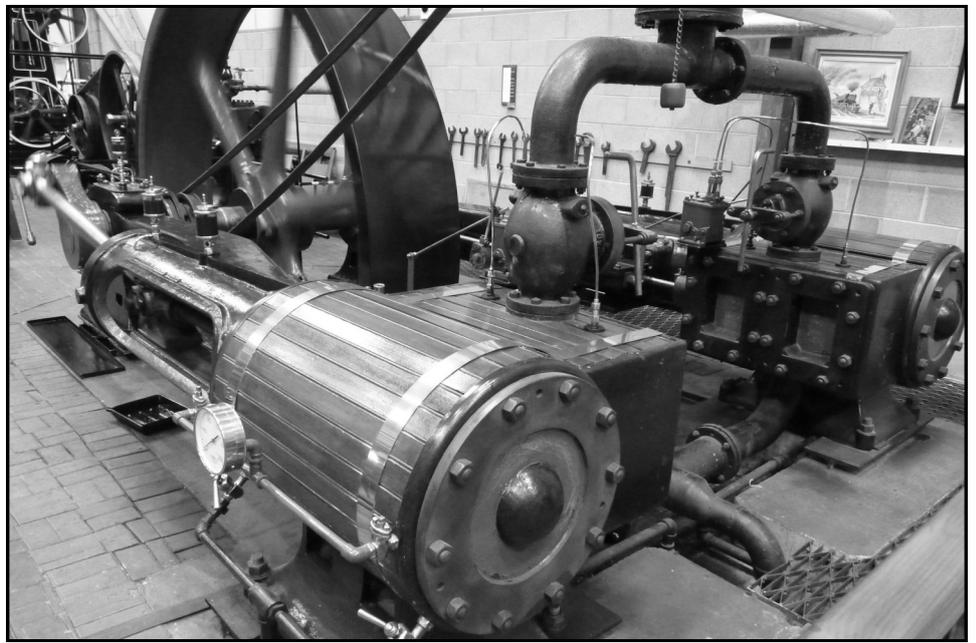
How the Museum has developed

Working on the principle that great oaks from little acorns grow, in 1996 a completely new Museum building was erected into which engines collected very quickly. These included a Thornewill & Warham pair from a brewery in Warrington, and a superb 1909 Pollit & Wigzell tandem compound



LEFT: A horizontal, single cylinder engine built in 1874 by **Needham, Qualter, Hall & Co.**, Railway Foundry, Barnsley, South Yorkshire. It was installed in the premises of Barnsley Brewery Co. Ltd. The engine was probably only the third engine to be built there.

RIGHT: A twin cylinder, slide valve engine built by **Robey & Co.**, Lincoln, in 1902, Nos 22110 and 22111. The engine was working, until 1981, at the Silica Firebrick Company brickworks at Friden in Derbyshire. The flat belt drive provided power for a variety of machinery such as:- grinding mills, jaw crushers, conveyor belts, dust fans etc. This was amongst the first engines to be acquired by the museum. Prior to that it was in the possession of the Cromford Canal Society.



named “Agnes” from Washpit Mill, Holmfirth. These were augmented by a Fleming & Ferguson compound from a crane ship and a variety of small and medium industrial engines. After the turn of

the century, additional marine engines, some on loan, made the Museum the custodian of probably the largest steampable collection of such engines anywhere on land. The current major project is the rebuilding of an 1878 Goddard & Massey waterworks beam pumping engine from Bedford after the English weather has had 45 years of exercising its malevolence on it.

How the Museum works

The operation of the Museum is based on volunteers, numbering about a dozen, who restore, maintain and run the engines. Sufficient volunteers can operate the workshop machine tools. There is no charge for admission - charging being a deterrent to family visitors. Payment for the building, the transport of the initial engines to the Museum and the early days of operation were funded by Tom Nuttall, but since 2004 the Museum has been funded from the donations box. This just keeps the Museum solvent, bearing in mind that the steam is provided free of charge from the nursery boiler plant. There being no source of cooling water, the engines have to exhaust to atmosphere, which does have the benefit of “advertising” that we are in steam!

Steam days are Wednesdays, the first Sunday in the month, and Bank Holiday Mondays. Because of the need to keep the greenhouses warm and because of reduced visitor numbers during the winter, limited steaming, i.e. small engines only, applies from November to February.

To formalise the Museum and its volunteers as a “body” and to hold and administer the funds, a MGSM Association was formed in 2004, with a formal Constitution.

Our website www.markhamgrangesteammuseum.co.uk has more information and photographs of our engines.

Problems?

It is essential to be open on this question, even if it is somewhat uncomfortable.

All volunteer organisations have to live with the volunteers! In other words volunteers are not employees and cannot easily be given instructions as to what they are to do (or, in some instances, not to do). The operation depends on goodwill and mutual co-operation. On the whole it works very well, but “personal idiosyncrasies” have to be allowed for (tolerated?).

A more important, the most important factor, is ageing. Our volunteers are pensioners. We are not being replaced or augmented by younger people. This is partly due to the fact that our most active days are weekdays, when potential new volunteers are engaged in their essential gainful employment and are therefore not available. We are however rather surprised that in a formerly very busy industrial area, teeming with engineering activity, there are so few of their retired employees among our ranks. And the ageing factor has already made a significant inroad on us.

Volunteers in steam plant are, as a generalisation, practical people rather than “theorists”; they like to do things rather than become ensnared in paperwork. While this is a cause for criticism from some quarters, it is a fact. And, as a partial answer, no practical volunteers means no operation at all. However, this bias does

mean that there is no great rush to become involved in keeping records, filing papers and drawings systematically, or writing letters - in fact in "administration". This was demonstrated when the previous Association Hon Sec wished to hand over because of health problems; there were no volunteers to accept the duties, so someone "had to be volunteered". We have a member who runs our web site - but only one.

Another angle on the volunteer question is that new ones need to be able to make a positive contribution to the operation, i.e. "working volunteers" and "co-operating volunteers", not just "talking volunteers", "watching volunteers" or "disruptive volunteers". And the working volunteers need to know what they are doing - safely - or they need to be able and willing to learn - fast. We have experienced some of these difficulties in the past.

Another problem is finance. In our case, being a private and non-registered Museum, we cannot qualify for support from the various funding sources available, so we rely on contributions in the box, but we have no fuel bill or boiler plant bills. Volunteer operations can be viable because there are no wage bills, so continuing existence can be fairly independent of visitor numbers. If paid employees become necessary, then the enterprise cannot continue without numerous visitors, expensive advertising, maybe a subsidy, and probably an admission charge - which latter of course tends to diminish visitor numbers.

No doubt many readers will hear echos of some of these factors in their own organisations. The worrying aspect is that, though the problems are very clear, answers are not.

The Future

In practice we run on, week by week, year by year, project by project, not worrying or even thinking a great deal about the longer term. The ageing factor is very real and obvious but, as there seem to be no answers, it has to be kept at the back of the mind. The Museum floor space is very nearly full, including the 2006 extension, so new projects will eventually cease, reducing the overall long-term manpower requirement. The volunteer (and visitor) numbers might perhaps be increased if we changed from mid-week steaming and working to week-end-only operation, but conversely, while retired volunteers are happy to have a regular activity during the week, they value their week-ends as family time. Considering the future, therefore, there hang a few question marks. But a paucity of answers. Into the immediate future, we are very active.

News & Notes

Crich Tramway Museum is 50

CONGRATULATIONS to **The Crich Tramway Village** on its 50th birthday. It was established in 1963 to preserve trams which, at the time, were being removed from cities in favour of trolley buses. The museum now has more than 60 trams in its collection, including models from New York, Berlin and South Africa. By the 1950s, trams were disappearing from UK. The first exhibit at Crich was a Sheffield horse-drawn tram, and it's interesting to see that Sheffield more recently re-introduced trams, as did a number of other cities. NEDIAS made a very enjoyable visit there one summer evening – maybe it's time for another look.

Tibshelf Oilwell approaching 100

Cliff Lea

It's still a few years away from the centenary of Britain's first successful deep oil well, sunk by government funded exploration. It was one of 7 wells sunk in the area, the only one to be successful in 1919, but it amazingly continued to produce oil for the next 25 years. I'm in touch with the Geology Society, Oilwell Nursery and others to see whether we can gain funding to mark the occasion.

Lea Wood Project

THIS PROJECT IS GATHERING MOMENTUM. Detailed surveying had been carried out by late Spring, which identified 190 sites of potential interest. These included 49 pits/kilns, 45 platforms, 18 querns, 5 building remains and 26 stone structures, features, piles.

An archives workshop was held early in May and searching got underway to sift through the 'Nightingale papers' held at the DRO. During June, several groups of pupils from Lea Primary School and Alderwasley Hall School took part in some 'test pitting' in Lea Wood, to explore in and around an enclosure in the wood within which two cottages and associated out-buildings had once stood.

Further main excavations during July and ongoing are to investigate a selection of sites, including some

white coal kilns and other stone features, some of uncertain origin and use. The call is still out for more volunteers to assist, and if you have a spare day, please contact James Hawksley at james@jlh01.plus.com

For more information about the project, see <http://leawoodhcp.wordpress.com/>

617 Squadron and its Derbyshire Connections

Derek Grindell

The roads around Ladybower Reservoir became temporary car parks on May 16th as thousands of spectators gathered to watch a fly past marking the 70th anniversary of the raid by 19 Lancaster bombers on Germany's Mohne, Eder and Sorpe Dams. The location of Derbyshire's Dams will forever be associated with one of the epic raids of WW2 but the county has other links which proved to be even more crucial to its successful prosecution and indeed the outcome of the war in general.

Barnes Wallis (1887 - 1979), the son of a doctor and born in Ripley, was the genius behind the concept of the 'bouncing bomb', which he designed specifically for the raid. Having started his career in shipbuilding, he seized an opportunity to move into airship design. His concept of the geodetic airframe was incorporated in the R100 airship, which made a successful return flight to Canada. By the time R100 was broken up following the crash of R101, Wallis had moved to the Vickers factory at Brooklands where his airframe technology was incorporated in the design of the Wellesley and Wellington bombers. He later devised the 'earthquake bombs', which were specifically designed to penetrate the U-boat pens at St. Nazaire. Although they were never used against the pens, both versions, the *Tallboy* (5.5 tonnes) and *Grand Slam* (10 tonnes) were dropped on Brest, Lorient and the V2 launching sites in 1944.

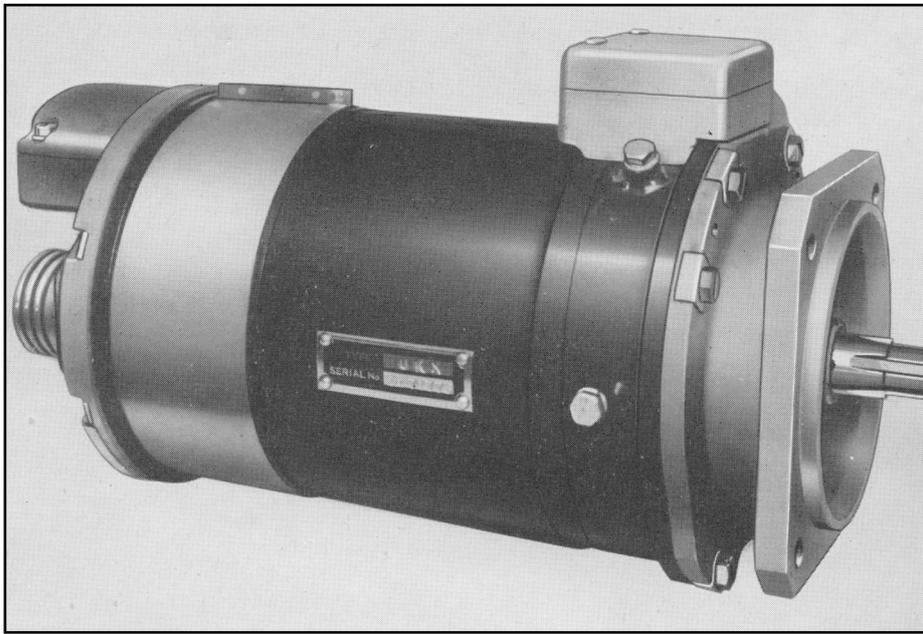
The crews of 617 Squadron would have been unaware that in rehearsing their low level approaches to Ladybower Reservoir they were overflying a small satellite factory at Bamford, which had been established by Metrovick Ltd. of Sheffield to produce a specific item of aircraft electrical equipment. Indeed it is not too fanciful to speculate that their Lancasters could have been equipped with a Type UKX standard combined alternating and direct current alternator, one of 45,000 produced in Derbyshire. This was a remarkable example of how a work force from an essentially rural background could be trained within a factory environment to deliver precision equipment to a production line in large quantities.

The role of radar and its various applications as a factor in the allies winning the war has been exhaustively discussed over the years but what is frequently overlooked is that without a dedicated power source its introduction would have been delayed. In the 1930s, aircraft generators had developed from small wind-driven dynamos to machines powered by the aircraft engine and capable of delivering 500 watts at 12 or 24 volts direct current. These machines, in conjunction with a storage battery, provided lighting and starting facilities. Sets requiring higher voltages for communications purposes were generally fed from rotary converters operating from the 12v or 24v d.c. services. The introduction of radar equipment called for higher voltages, which made additional demands on the d. c. system. Early in 1939, the Air Ministry identified the need for an a.c. generator from which the output could be stepped-up (i.e. transformed) and rectified (i.e. converted to d.c.).

In cooperation with the Royal Aircraft Establishment, Metrovick's Sheffield works designed a single phase alternator to be driven from the aircraft's main engine like existing types of d.c. generators. It was specified that the machine should be light in weight, be compact, have mechanical strength and be inherently reliable under all conditions of service, including a wide range of temperature variation and reduced air density at altitude. The machines had to be interchangeable both in fixing dimensions and drives and with existing d.c. machines; like the latter, they were to be cooled by air piped to the machines under pressure.

The first alternators were rated at 80 volts with an output of 500 watts and a frequency range of 1200-2400 Hz (cycles per second) to accommodate the varying speeds of the aircraft engine. Production of the first units commenced in the late summer of 1939 and delivery was completed by the following Christmas. As aircraft production increased, the design of the alternators was modified by utilising glass insulation and increasing the operating temperature, which not only reduced their weight but decreased production man-hours by 40 per cent. At the end of 1940, deliveries of the alternators had risen to approximately 900 per month.

Their design was further modified with some versions dispensing with pipe ventilators, thereby achieving a further reduction in weight and the increasing demand for a.c. supplies led to the production of larger units. The combination of alternators with d.c. generators to create dual purpose machines enabled separate a.c. and d.c. supplies to be sourced from one drive. The *UKX* model, for example, provided both a 1200 watts, 80



volts a.c. supply and a 1740 watts, 29 volts d.c. supply. Even more powerful designs were developed as motor-alternator sets for use on land and sea.

One priority was a power source for the "Leigh" light, the airborne searchlight, which in conjunction with airborne radar, was especially effective in locating surfaced U-boats at night. Such was the demand on Metrovick's Sheffield Works that the firm selected the site at Bamford to provide additional production capacity.

Pre-war, Metrovick's Sheffield site had employed around 1000 workers, who were engaged in the manufacture

of electric traction equipment. At the outbreak of war one important contract was the production of electric equipment for seventy-eight 1800 h.p. locomotives destined for the electrification of L.N.E.R.'s Leeds - Manchester line. The factory's swift adaptation to a new range of products was a remarkable achievement since 90 per cent of the work involved small scale electrical equipment. In contrast, the firm's peace time contracts comprised machines ranging in weight from around 1 cwt. to several tons. At peak output the Sheffield and Bamford factories had 2,500 employees of which half were women.

Some years prior to the outbreak of hostilities Metro-Vick had been engaged in discussions with the government on the development and production of war *materiel*. Searchlight production had begun at Trafford Park in 1934, automatic pilots in December 1936, radar in June 1937 and gun mountings only months later. It was originally envisaged that heavy bombers should be assembled only but the Company later undertook the complete manufacture save for the engines. A new factory, comprising 100 ft. bays was erected in 1939 and trebled in size in the following year to provide a floor area of 800,000 sq. ft. Only six months after the first sod was turned, the machine shop, requiring 26,000 jigs and tools, was in production. By December 1940, the first airframe for the twin-engined *Manchester* bomber had passed its inspection tests but two days before Christmas it was wrecked in an air raid, which badly damaged the building and delayed production by six months.

After building forty-three *Manchesters*, production was switched to the four-engined *Lancaster* in May 1941, which required a further 9000 jigs. Within seven months the first bomber was ready and the monthly programme was accelerated from thirty to forty and then to forty five. In total almost 1100 were produced until it was superseded by the *Lincoln* bomber. Metro-Vick's aircraft factory had 8,411 employees at its peak, of which 3250 were women.

Sir Frederick Henry Royce was born in 1863, the son of a miller, at Alwalton near Peterborough. Following the death of his father when he was nine he was brought up by his mother and an aunt, who paid £20 p.a. for him to serve an apprenticeship at the Great Northern Railway works in Peterborough. When her funds ran out he was unemployed but managed to find work with Greenwood & Batley, an engineering firm in Leeds. After working 54 hours per week for 11 shillings he then decided to pursue his interest in electricity by joining the Electric Light & Power Co. in London. When, in May 1884, it went into liquidation Royce decided to be his own master and set up his own business, F. H. Royce & Co. in Cooke Street, Manchester.

Initially, to meet a growing demand for electrical equipment, the firm manufactured dynamos and motors and later winches and cranes. Such was its reputation for quality and reliability that the Japanese Imperial Navy installed a faithful copy in its Kobe Dockyard, complete with facsimile Royce nameplate. The slump that followed the Boer War and competition from foreign imports, were influential in persuading Royce to develop a motor car and, in the spring of 1904, he built a 10 h.p. two cylinder model, which embodied established technology but with added emphasis on quality and reliability. The ignition coil, for example, then a common weak spot in cars of the time, was designed by Royce and exhaustively road tested prior to marketing, thereby sowing the first seeds of a reputation for sound engineering, which endures to the present day.

The Hon. Charles Rolls, born in Mayfair, was educated at Eton and Trinity College, Cambridge where he read engineering. His early fascination with cycling was soon eclipsed by a belief in the potential of the 'autocar' and on 23 December 1904 he went into partnership with Royce although the two had only first met in the previous May. Following a public flotation in December 1906, saved only by the intervention of Arthur Briggs, who purchased shares to the value of £10k, Royce was able to manufacture his new 40/50 h.p. 6 cylinder model, which he named *Silver Ghost*. With production limited to three or four cars per month and the potential for no more than nine or ten, Royce sought a move to a green field site where annual output could be increased to 200 cars. Leicester and Nottingham were considered as potential locations but, fortunately for the future economy of Derbyshire, he opted for a site on Nightingale Road, on land once a part of the Osmaston Estate.

The Rolls-Royce Archive holds an estimate, handwritten by Royce, of the cost of the move. Of the total expenditure of £24,585, the major components in the column headed 'must spend' were buildings (£7,400), machinery & installation (£15,000), transfer of machinery from Manchester & installation (£290), site levelling & roads (£820). A 10% contingency figure of £2458 brought the total to £27,043. The cost of erecting cottages for chargemen @ £250 each (£2000) were featured in a separate column, presumably adjudged to be of a lesser priority.

The factory was opened on 9th July 1908 with a work force of 400 but Rolls, having met the Wright brothers in New York in 1906, was indulging his passion for flying. He took his first flight at Le Mans when they were on a demonstration tour of Europe and persuaded Wilbur to sell him an aircraft, a *Wright Flyer*. He became the first Englishman to cross the Channel both ways in a single flight but in July 1910 he was killed in a display at Bournemouth. The future of the company was then under serious threat since Royce himself was in deteriorating health due to his erratic eating habits and work regime. Fortunately, the danger was recognised by Claude Johnson, his Managing Director, who took the initiative and persuaded Royce to take an extended holiday and pass the winter in Egypt. On the return journey Royce was so impressed with the French Riviera that he expressed a wish to live there. Before he could have second thoughts, Johnson had acquired a plot in his chosen location, Royce designed his own house and he never worked in Derby again. His winters were spent in France and his summers in the South of England. Johnson's inspired intervention had saved Royce from an early grave and enabled him to serve the company for another 22 years. His geographical detachment from the works, which by 1912 had a work force of 800, revitalised Royce. He directed a constant stream of ideas to his management team, which were destined to have an inestimable effect on both the fortunes of the company and the UK.

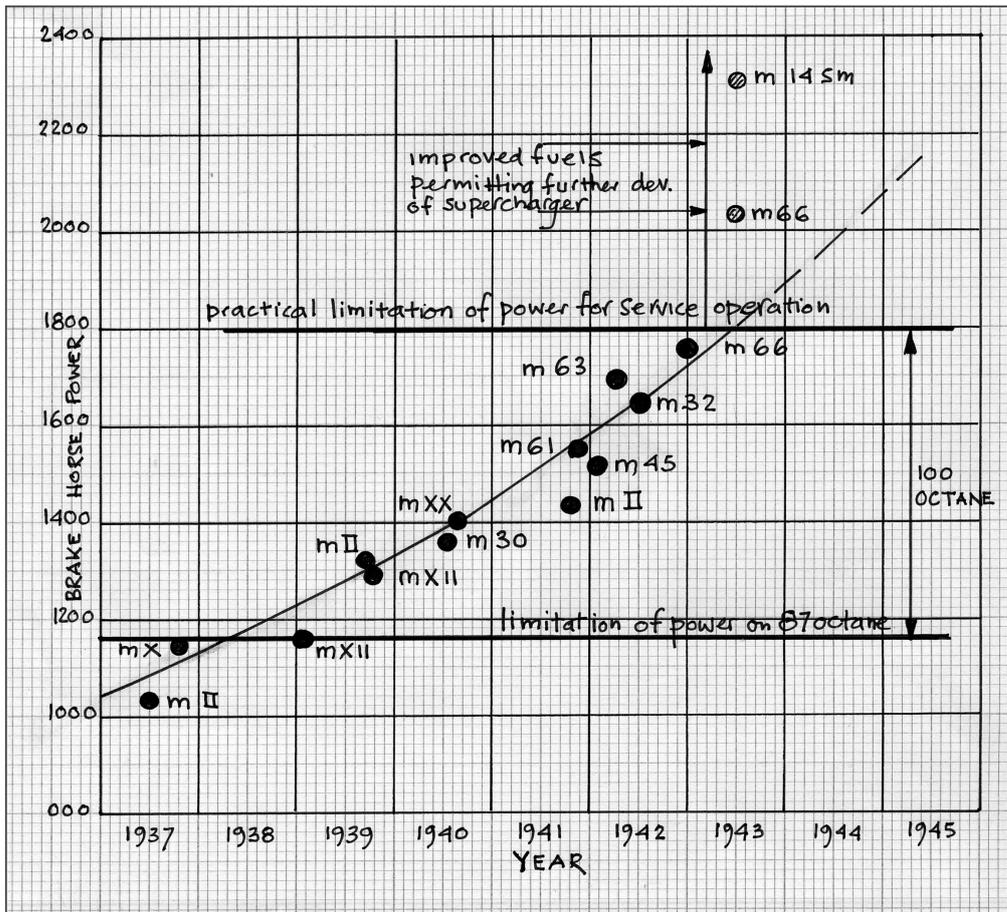
The announcement in August 1914 by the Rolls-Royce Board that it *would not avail itself of the opportunity..... of making or assembling aero engines for the British Government* was soon forgotten when the grim reality that the conflict would not be quickly resolved struck home. Rolls-Royce were requested to develop a new 200 h.p. air cooled aero engine but Royce, aided by two assistants, Elliott and Olley, elected to draw on his experience and produce a water-cooled engine that was safe, reliable and capable of mass production. Working from his home in Kent and liaising closely with Derby, the *Eagle* as the new engine was christened, exceeded its design criteria on its first test run, achieving 200 bhp at 1600 rpm. Some 4,681 units in eight increasingly powerful versions were eventually produced and it was installed in 50 different aircraft and airships. Such was the demand that R-R engineers were sent to the U.S.A. to supervise the production of 1500 engines. Royce went on to develop the *Hawk*, *Condor* and *Falcon* aero engines. The Vickers Vimy, which carried Alcock and Brown across the Atlantic on the first non-stop flight, was powered by two R-R *Eagle* engines.

Jacques Schneider, the scion of a French armaments manufacturer, envisaged a future for air travel which would not be reliant on land based airports. To encourage the development of seaplanes he presented a trophy, which Britain had won in 1927 with a *Supermarine SS* designed by Reginald Mitchell and powered by a *Lion* engine produced by Napier, a competitor of R-R. Mitchell, convinced that the Napier engine had achieved its full potential and would be outclassed by either an Italian or American design in 1929, approached both R-R and the Air Ministry with a view to a British engine being especially produced. There was some initial reluctance within the Derby board but such was the political sensitivity of the issue with Mussolini's propaganda machine eager to grasp at any straw that the Air Ministry ordered the company to proceed.

Royce developed the 'R' engine, which secured a victory for Mitchell's S6 in both 1929 and 1931, thereby allowing Britain to retain the Schneider Trophy in perpetuity. Shortly before his death in April 1933, Royce had authorised the development of a new aero-engine, which whilst having R's features would be more

compact and thus lend itself to military applications. Designated PV12 (Private Venture) it later became known as the *Merlin*, which was to power not only fighters but the Wellington and Lancaster bombers, the Mosquito and the *Comet* tank.

A modified version of the Merlin, called Meteor, powered the *Cromwell* tank. Mitchell, whose experience with the S6 informed his design of the *Spitfire*, only outlived Royce by four years and by a cruel twist of fate neither lived to see their signal contributions to Britain's survival in 1940 and ultimate victory recognised.



The graph demonstrates the significant increase in the Merlin's performance, expressed in brake horse power, which was achieved by R-R engineers between 1937 and 1943. The availability of higher octane fuel later in 1943 saw the Merlin's output increase to 2300 bhp, virtually twice its value in 1937.

Bibliography

- Contribution to Victory** compiled by Frank Rowlinson and published by Metropolitan - Vickers Electrical Co. Ltd. (1947).
- 1899 - 1949** by John Dumelow, M.A., A.M.I.E.E. (1949) and published by Metropolitan - Vickers Electrical Co. Ltd. (1949).
- Rolls-Royce 1904 - 2004 a century of innovation** pub. by Rolls-Royce Group plc 2004

NEDIAS Journal Volume 5 – Hot off the Press!

The major theme of NEDIAS Journal Vol.5 covers the history and function of what is said to have been the largest coal coking plant ever built in Europe – The Avenue Plant at Wingerworth.

The site extended over 240 acres, took 760 people to build, and employed approx. 800 people. When operating at full capacity, the coking works carbonised 2,175 tons of coal a day, producing approximately 1,400 tons of smokeless fuel, 65 tons of Sulphuric Acid, 35 tons of Ammonium Sulphate, 20,000 gallons of crude Benzole and 250 tons of Tar. The trade name Sunbrite was once recognised across the nation and with the environmental clean-up of the site now well advanced, it is an opportune time to place on record the reason for its construction and the story of its short operational life for future generations.

Early in his career, David Jenkins was a Cost Research Officer in the NCB's HQ Finance Dept. When he heard that NEDIAS was about to publish a selection of photographs recording the construction of the Avenue Plant, he readily agreed to write an article on the project since he had been involved in monitoring expenditure from 'the turning of the first sod' to commissioning. His account throws light on previously unpublished details of the early planning stages, the phases of construction, the plant's productive life and its ultimate closure. To complement the coal coking theme, Derek Grindell has summarised key extracts from the 1927 Adshead Report, which reviewed the prospects for the mining industry within North East Derbyshire, as well as other industries of note; the contents of the Adshead Report are combined with much relevant information on industries, which were important to the local economy and listed in Commercial Chesterfield, a directory published by the Chesterfield Borough Corporation just four years later.

The paper by Richard Patilla relates the history of one of the area's cotton mills, the Amber Mill, which is

located within the parish of Shirland. With the establishment of the Derwent Valley World Heritage Site a decade ago, the story of Amber Mill, just a few miles outside the valley has been somewhat neglected and forgotten. It is therefore most welcome that this current paper highlights its considerable importance within the area in the early 1800s.

Last but not least, the Journal contains a fascinating article by John Robinson giving much detail of the industrial activities carried out by the various Robinson family businesses in the area over the last 400 years, putting to paper a talk he gave to the Civic Society last year.

As members, you can purchase copies at the greatly reduced price of just £3, saving £5. Order forms are on the web site, or pick up a copy at the next meeting.

Chairman's Chat

Cliff Lea

Life in Britain is still difficult, with government spending cuts set to carry on for many years; some areas seem to manage to weather the storm, but others sink into decline with continuing closures. One of the features which help to boost individual local economies is tourism brought in by a new museum or attraction. But central government funding for heritage projects is not likely to improve.

But witness the extra cash from visitors, which has helped the local economies over the last few years in Wakefield with the new Hepworth Gallery, Doncaster with the amazing Yorkshire Wildlife Park, the Turner at Margate, Liverpool with its iconic waterfront buildings, the Deep at Hull and so many more around the country. And dare I mention York and the NRM!

So, what do we have in the wider north-east Derbyshire area? One thing's for sure – we have a tremendous history as the centre of industrial Britain. We can all name vanished world-beating companies and entrepreneurs who have really “made” this area, and indeed, almost everything has been made here at one time or another. And we're just a few miles away from the county's only UNESCO World Heritage Site.

But can we turn these local industrial sites to our advantage? As well as the two small Museums in Chesterfield, we have the incredible transformation of Barrow Hill into a nationally famous attraction. During its special weekends, it brings thousands of people flocking here, many by train to Chesterfield, and then being bussed directly to the round-house. This area would be financially and culturally poorer without it, and the Barrow Hill Roundhouse Society are to be congratulated, and recognised for their contribution.

Could we and should we do more? Already Chesterfield Museum beats the drum very effectively, performing an amazing job with very limited resources. Maybe it's time for us all to try to give it greater support. Should we look to see whether there is any way that we in the local heritage societies and clubs can help to promote and support. Those people coming to Barrow Hill from other parts of the country are probably just as interested to visit

complementary industrial and transport museums, and make their trips doubly enjoyable. For us it means that they'll pump a little more cash into our local economy. Suggestions?



LNER A4 No 4468 Mallard pictured at Barrow Hill Engine Shed alongside LNER A2 Blue Peter and LNER V2 Green Arrow in April 2012

Photo: Doug Spencer

No 4468 will be re-visiting Barrow Hill on 28th/29th September 2013

And finally ...

... Samuel Oldknow's enormous venture and his debts, debts, debts!

If you haven't yet been over to Mellor to see the ongoing excavation at Samuel Oldknow's Mellor Mill, then I'd recommend a trip to the north west of the county. Mellor Mill was built in 1790-92 by Oldknow using funding from Richard Arkwright, and he initially used the Arkwright spinning technology. Mellor became one of the largest cotton mills of its time, but was destroyed in a fire in the 1890s.

The excavation on site is revealing much of interest and has been uncovering the footings of the enormous building – and enormous it undoubtedly was, with one of the water wheels – the “Wellington Wheel” being 22 ft diameter and 17 ft wide.

Clearly Oldknow spent most profligately and had grand designs; and although his business empire grew to enormous size, he clearly never made any money. He was constantly arranging for another loan or mortgage from the Arkwrights.

His first loan from Sir Richard Arkwright was for just £3000 in 1788 to purchase the land, but followed with unflinching regularity by later loans of £15,000, £12,000, £11,000, £11,500 and £40,000 – to achieve a total of £109,836 9s 7.5d by 1805, £185,426 5s 3d in 1823 – and the mammoth debt of £205,979 14s 3d on his death in 1828!

In today's terms Oldknow's debt to Arkwright Jnr. would be equivalent to about £20M. But since the whole of the Oldknow estate was valued at only a little more than this on his death, the debt was settled by passing his entire properties, lock, stock and barrel, to Arkwright Jnr.



“Wheel pit for the enormous Wellington Wheel”



Mellor Mill

NEDIAS Committee:

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