SUSSEX INDUSTRIAL HISTORY

1967–2017
Sussex Industrial Archaeology Society

2017

NUMBER 47

£5.00

Sussex Railway Architecture
Southdown Bus Garages and Bus Stations
Manor Royal, Crawley
Fifty Years of Windmill Restoration
Coultershaw Beam Pump

SUSSEX INDUSTRIAL HISTORY

Journal of the Sussex Industrial Archaeology Society

AIA Publication Award 2010, 2011 and 2013

FORTY-SEVEN **2017**

CONTENTS

Cover illustration— Ashburnham Brickworks in 1968. The last wood-fired brick kilns in the County. Operated 1840 to 1968. Foreground shows the concrete strips on which the green bricks were initially dried and the stacked hack covers designed to protect them at this stage. The pair of Scotch up-draught kilns are shown in the background. Visited by the Society in 1969 and an account of the Works was published in Sussex Industrial History No 1 (Winter 1970-71).

Edited by Dr. Brian Austen, 1 Mercedes Cottages, St. John's Road, Haywards Heath, West Sussex RH16 4EH (tel. 01444 413845, email brian.austen@zen.co.uk). Design and layout by Alan Durden. The Editor would be interested to hear from prospective contributors of articles of any length. Shorter notices can be included in the Society's *Newsletters* which are issued four times a year.

The annual subscription to the Sussex Industrial Archaeology Society is £15 payable on 1 April. Life membership is available at fifteen times the annual subscription. Members are entitled to copies of the *Sussex Industrial History* and the *Newsletters* without further charge.

Membership enquiries to the Membership Secretary, Peter Holtham, 12 St Helens Crescent, Hove BN3 8LP (tel. 01273 413790 , email pandjholtham@virginmedia.com). Website: www.sussexias.co.uk

ISSN 0263 5151

THE BEGINNINGS OF SIAS

John Blackwell—Chairman

The loss of the Euston Arch in 1962 raised public awareness nationally, that important industrial buildings were being demolished without a proper record being made. In 1963 the then Ministry of Public Buildings and Works in conjunction with the Council for British Archaeology (CBA) began the National Survey of Industrial Monuments. This slowly encouraged local fieldwork which was undertaken almost entirely by individuals and voluntary groups and led to the formation of local Industrial Archaeology (IA) groups. Recognising that this important work could best be carried out by an organisation covering both the counties of East and West Sussex was the vision of Kim Leslie, of the West Sussex Record Office. He convened a meeting of representatives of local archaeological and historical societies under the chairmanship of G.P. (Philip) Burstow, an eminent member of the Sussex Archaeological Society. The meeting was held at the Royal Pavilion Brighton on Saturday 14 October 1967 and led to the formation of the Sussex Industrial Archaeology Study Group (SIASG) with Philip Burstow as Chairman and Kim Leslie as Hon. General Secretary.

An attendee at this meeting was wind and water mill enthusiast and expert, the late Frank Gregory, who was to play a leading role in our Society for the next thirty years. Survey groups were formed including Natural Power—wind, water and animal, led by Frank Gregory; Tollhouses and Milestones led by Brian Austen; Railway Architecture; and Breweries and Malthouses. CBA record cards (a forerunner of our own) were completed and forwarded for the National Survey. Five Newsletters were produced between 1968 and 1970, edited by Kim Leslie (and viewable on the Society's website www.sussexias.co.uk), and a programme of visits organised.

In 1970 *Sussex Industrial History No. 1* appeared, edited by John Farrant and printed by Phillimore as a commercial venture This was published twice yearly until the end of 1973, a total of six issues, when losses led Phillimore to withdraw. With the departure of Kim Leslie to pastures new and the ill health of Philip Burstow the Study Group appears to falter (records are sparse). Re-named in 1973 as the Sussex Industrial Archaeology Society, it revived in 1974 under the Chairmanship of Wilfred Beswick, ably assisted by John Haselfoot as Hon. General Secretary and Newsletter Editor. In the spring of 1976 *Sussex Industrial History (No.* 7) re-appeared under the editorship of Professor Eric Taylor, published by the Society for members as a yearly journal. Both publications have continued with an unbroken run.

FIFTY YEARS OF THE SUSSEX INDUSTRIAL ARCHAEOLOGY SOCIETY

Air Marshall Sir Frederick Sowrey—President

A lot can be achieved in 50 years – and it has in Sussex Industrial Archaeology. The initial meeting on 14 October 1967 formed the Sussex Industrial Archaeology Study Group. Kim Leslie was elected Hon. Secretary and played an important role in the early years. Study groups were set up to record specific areas of Industrial Archaeology within East and West Sussex. The first edition of *Sussex Industrial History* appeared in 1970 under the editorship of John Farrant. During the 1970s two important figures emerged to carry the work forward. One was Wilfred Beswick, who from April 1970 acted as East Sussex Secretary and four years later became Chairman of what was now the Sussex Industrial Archaeology Society. From the same date John Haselfoot became Hon. Secretary, took over as Chairman in 1979 and later became President.

Straightaway it was realised that communication with decision centres was vital. Approaches to both East and West Sussex County Councils and the District Councils helped to put the Society 'on the map' and provided professional advice on appropriate planning applications. With scant knowledge of I.A. amongst the wider population, the production of a comprehensive Field Guide was seen as a priority. The first publication appeared in 1972 followed by subsequent revisions and updates. The

importance of like-minded organisations loomed large, and none less than the Chalk Pits Museum (now Amberley Museum) resulting in exchanges between the two committees. Publications enabled our work to reach a wider audience: a regular quarterly Newsletter and the award-winning annual *Sussex Industrial History* edited since 1983 by founder member Brian Austen. Their contents bring back names from the past: Alan Allnutt, Frank Gregory with his encyclopaedic knowledge of mills, Martin Brunnarius, Ivan Margary, Ted O'Shea, Gerry Nutbeem, Jonathan Minns at the British Engineerium and Ted Henbery's M.B.E. for restoration work at Ifield Mill for Crawley Council.

The early days were awash with ideas. Contact was made with Sussex County in Delaware U.S.A. but their activities did not match ours, being more involved in local history. However, the launching of the South Eastern Region Industrial Archaeology Conference (SERIAC) in 1983 to Ron Martin's specification was an immediate and long-running success to this day, augmented by its modest bursary. Molly Beswick's Brick Study Group continued its work, resulting in the publication of *Brickmaking in Sussex* in 1993. The restoration of Rudyard Kipling's watermill at Batemans, Piddinghoe Kiln, and the Coultershaw beam pump, which originally provided water for Petworth (now generating electricity under Robin Wilson's guidance), were good publicity. With a number of wind and water mills being restored to working condition the need for a separate organisation was recognised, leading to the formation of the Mills Group in 1988. Being formed as a section of the Society, both have benefited from its active work under its successive chairmen, Frank Gregory, Brian Pike, Peter Hill and now Philip Hicks.

East and West Sussex form a big 'county'. In spite of the enthusiasm of members it was clear that the amount of I.A. existing in a largely rural countryside was going to take a very long time to record. Fortunately Sir Neil Cossons at the Science Museum was impressed by the Society and strongly supported our approach to the Leverhulme Trust for a grant for a recorder for two years from 1990. Our advertisement for the post provided some wonderfully enthusiastic young people, but our Don Cox ticked all the right boxes and produced over 4,000 records, so ours are now second to none and are all on CD-ROM. Small successes were having a question asked in the House of Commons to restrain over-zealous councils targeting refreshments served in our mills and similar. We also purchased a full set of the Simmons papers of Sussex mills from the Science Museum. Increased activity has resulted in the formation of the Canal Group within the Society, initially restoring the former Poyntz Bridge, under the leadership of Chris Bryan and then Adge Roberts repairing and excavating the remains of bridges on the Ford to Hunston section of the former Portsmouth and Arundel Canal.

Recently the Society has been instrumental in successfully obtaining statutory listing for the unique railway goods shed at Singleton and the swing bridge across the River Ouse at Southease. The applications were prepared by Alan Green and in the latter case led to the restoration rather than replacement of the bridge.

In 2015 the prestigious Association for Industrial Archaeology asked the Society to arrange a series of visits for their annual conference based at the University of Sussex. Under John Blackwell's organisation a wonderful programme, including open-topped bus tours, filled their three days. With Malcolm Dawes as host, Robert Taylor for the tour guide and Peter Holtham with Martin Snow for the gazetteer 'we did them proud'. The Society has been ably supported by every member in so many ways – recording, working parties, hands-on skills, talks and visits. Much has been achieved by all of us in the half century – a solid foundation for the future.

RAILWAY ARCHITECTURE IN SUSSEX 1967-2017

John Minnis

The railway architecture of Sussex can be bettered by very few counties. The London Brighton & South Coast Railway set a high standard for its buildings, engendered by it being predominantly a passenger line serving prestigious seaside resorts, while the South Eastern Railway's incursion into the county to Hastings had in William Tress's buildings what are considered to be one of the finest series of railway stations in the country.

Sussex's railway architecture in 1967 was still largely intact. The Southern Railway had made their mark with some major station rebuildings such as Barnham Junction, Hastings, Haywards Heath and Horsham. However, most stations were still largely Edwardian, if not Victorian, in character, retaining not just the principal buildings but the full panoply of ancillary structures that gave them much of their character: lamp huts, iron footbridges, goods sheds and signal boxes. Although most smaller goods yards had been closed, they had not yet been tarmaced for car parking. The buildings were still painted a very traditional green and cream. Posters were pasted on wooden poster boards. Longcase station clocks, red-painted fire buckets and parcels trolleys were also much in evidence. One could sit on traditional wooden seats. Gas lighting, although greatly in decline, was still to be found here and there. A few water columns and a handful of pre-1923 semaphore signals were still standing.

But while the traditional railway infrastructure, despite much of the system being electrified, had largely survived, perhaps the biggest difference between then and now is how little we knew about it in 1967. Then as now, the railway press was much more concerned with motive power than with buildings and even the books that had been written on railways in the south-east had little to say about their architecture. C Hamilton Ellis's history of the LB&SCR briefly mentioned a few of the more significant stations but generally, as in H P White's volume in the Regional Railway History series, the focus was more on the history of the lines than their physical appearance. There was quite literally nothing published on the infrastructure. I started to record the LB&SCR's buildings in the late 1960s and an extensive survey in 1970, conducted by using a Southern Rover ticket, was a journey into the unknown. As so few photographs of the stations had been published over the years, in many cases I did not know what some of the stations looked like until I arrived at them.

Fig. 1 Three Bridges in May 1980. The 1841 Mocatta station building on the down side, with the upper floor subsequently added to provide accommodation for the station master. The Italianate detailing closely resembles that at Hassocks.
C Durrant

This situation began to change in the early 1970s. We had Rodney Symes and David Cole's *Railway Architecture of the South East*, which illustrated a selection of buildings with line drawings but the turning point was Wikeley and Middleton's *Railway Stations: Southern Region*. This was a largely photographic book covering a high proportion of the region's stations, put together by the Southern Region's architect, and crucially giving dates for many of them, based on the information given in plans held by the Southern Region Chief Civil Engineer's department in the Plan Arch at Waterloo. At last some official information was available. Then came John Hoare's splendid *Sussex Railway Architecture*, based on primary sources. It was largely confined to stations but was a comprehensive survey. John started his recording a year or two before me and was just in time to capture a number of buildings that were lost soon after. John subsequently donated his negatives to SIAS, several of which have been used to illustrate this article. Since then the publications have multiplied, headed by the Middleton Press series written by Vic Mitchell & Keith Smith, the first of which, *Branch Lines to Midhurst*, appeared in 1982. Initially intended as a one-off, what became a series was extended to cover the whole of Sussex and is now aiming to include the whole country. As a result of this, we have numerous photographs of every station in the county, together with 25-inch Ordnance Survey maps, available in a handy format.

In addition, books such as Alan Elliott's *The Cuckoo Line* have given a much more detailed account of individual lines, enhanced in this case by an extensive series of drawings of many of the principal buildings, based on the original contract drawings.

Another development since 1967 has been the arrival of specialist societies for each of the pre-grouping companies in Sussex: the Brighton Circle, founded 1974 (www.lbscr.org), and the South Eastern & Chatham Railway Society, founded 1973 (www.southeasternandchathamrailway.org.uk), joined the already extant South Western Circle, founded in 1962 (www.lswr.org). All three have published much material relating to railway infrastructure in the county. The Bluebell Railway is in the process of developing a major archive for photographs and documents relating to railways in Sussex and the south-east more generally. Finally, Network Rail is making available a number of the drawings and plans held in its central York archive, which include several for Sussex locations. These may be viewed at http://nr.mediastorehouse.com.

Loss

The south-east has suffered relatively few line closures in comparison with other parts of the country. The principal branch line closures had taken place in the two years prior to 1967: Horsham-Guildford in 1965, Horsham-Shoreham in 1966 and the Cuckoo line from Eridge to Hailsham (1965) while the remaining goods services to Petworth were withdrawn in 1966. After that, the only closures were Three Bridges to Groombridge in 1967, the short spur from Polegate to Hailsham in 1968, the line from Uckfield to Lewes in 1969, the Kemp Town branch (goods only) in 1971, Eridge to Tunbridge Wells in 1985 and the goods only line from Chichester to Lavant in 1991.

Space precludes a discussion of why railway buildings were demolished and the broader context in which this took place. Historically, the most serious losses were the two remaining London & Brighton Railway intermediate stations with work by David Mocatta at Three Bridges and Hassocks, both dating back to 1841. Hassocks went in 1972-3 and Three Bridges in 1985 by which time we should have known better. The problem was that their significance was not properly recognised with Three Bridges disguised by a second storey, added in 1859. The remaining part of the 1860 iron roof by the Horseley Iron Co once spanning the tracks at Three Bridges also went at the same time.

Fig. 2 Hassocks. T H Myres' station was the largest of his Domestic Revival designs and replaced the Mocatta building seen on the right, which was retained as staff accommodation. *John Hoare/SIAS*

Just as regrettable was the destruction of numerous original stations along the west coast line. These had been constructed of flint with red brick quoins in 1845-6. Worthing was rescued in 1971, literally as the slates were coming off the roof, following last-minute spotlisting, a rare early intervention. But other survivors of the type at Lyminster (originally Littlehampton & Arundel), and Woodgate (originally Bognor) have gone. Yapton was burnt out recently. These were stations, closed in the 1860s when branches serving the coastal towns were opened, which had retained much of their original form when converted into housing for railway staff. The similar station at Drayton, closed in 1930, was also demolished in the late 1960s. Other early buildings to have gone were Hailsham (1849), Faygate (1848), the original 1846 station at Polegate and that on the down side at Burgess Hill, of indeterminate date but pre-1860, demolished in the mid 1980s.

Fig. 3 Littlehampton & Arundel. The 1846 station at Lyminster, closed in 1863, when the new line via Arundel opened, remained largely as built until its demolition in the 1970s. Photographed 1969. *John Hoare/SIAS*

The attractive route from Shoreham-by-Sea to Guildford via Christ's Hospital suffered the almost total loss of its stations. Those at Bramber, Steyning, Henfield, Partridge Green, Southwater (all of 1861), Slinfold and Rudgwick (both of 1865) were all demolished. Only part of the building at West Grinstead survives. Most went soon after the line closed but Partridge Green and Southwater survived into the 1970s. Country stations on the branches nearer to London seem to have been hard-hit. Those at Grange Road (1876) and Forest Row (1866) have gone while Ashurst (1888) was demolished due to structural failure.

Along the coast, from the 1860s to the 1880s, the LB&SCR built a number of very substantial Italianate two-storey stations, incorporating a flat for the stationmaster on the upper floor. Two have gone, Kemp Town (1869) and St Leonards West Marina (1888-9), while others have suffered the loss of platform buildings such as at Polegate (1881 station, resited in 1986) or the removal of their canopies as at West Worthing (1889) and Portslade (1881).

Fig. 4 Kemp Town, terminus of the short branch from Brighton, London Road, was an 1869 example of the LB&SCR's Italianate villa style widely used along the coast lines. Photographed 3 January 1969. *John Minnis*

The country stations of Thomas Myres are justly celebrated as some of the finest domestic revival stations in the country but they were not immune from destruction. The sole main line example, at Hassocks (1880-1), went along with the Mocatta station building in 1972. The others to go included the impressive East Grinstead (1882) with its high and low level platforms and refreshment rooms, Midhurst (1881), Horam (1880), West Hoathly (1882) and Newick & Chailey (1882).

Much of the railway infrastructure at Newhaven has been lost since 1967. The ornate station building at Newhaven Continental went early in the 1970s, followed by, over a period of years, the warehouses along the quay and, most recently the engine shed at Newhaven Town. The large goods shed of 1901 there also went by the end of the 1980s.

By the end of the 19th century the LB&SCR was building stations on quite a grand scale, distinguished by the valancing on their canopies which was a series of gentle arcs, often called 'loping'. Christ's Hospital (1902), which Ian Nairn described in the Sussex volume of *The Buildings of England* as 'a better building than the hospital itself' and 'worth preserving entire', and Uckfield (1900) have gone, together with the station building at Southwick (1899).

Two of the stations built by the SR have been largely demolished. The platform buildings at Gatwick Airport (1935) went for operational reasons when

Fig. 5 Christ's Hospital. The immense junction station of 1902 was almost completely destroyed in the early 1970s. Photographed 1969. *John Hoare/SIAS*

Fig. 6 Hastings, a handsome structure of 1931 by the SR's architect, J R Scott. Photographed 20 August 1970. *John Minnis*

the new station was opened to the north of the original one in 1958. They were not a great loss in architectural terms but the second station to go, Hastings (1931) was an imposing building by the SR's architect J R Scott.

Platform shelters have been greatly reduced in numbers. Mainly constructed of timber, they have a tendency to rot and require regular maintenance and painting. Those at Goring-by-Sea, Angmering, Faygate, Buxted, Warnham and Billingshurst have gone. For the same reason and presenting particular difficulties under today's health and safety regulations, canopy valancing is very much under threat with, for example, the fine decorative timber valance at Hove being replaced with corrugated metal.

Fig. 7 Faygate, built in 1875, with a charming scalloped valance, seen here on 11 August 1970. The innocently sexist Evening News advertisement, which reads 'Dear Mrs Engineer, could your husband earn more? See our Engineers Page.' is a reminder of how things have changed in the last fifty years. *John Minnis*

Fig. 8 Buxted had a substantial waiting shelter on the up platform, removed in 1990 on singling of the line. The shelter, constructed in 1894 to a standard LB&SCR design, is a splendid example of what may be termed 'railway vernacular', simple but full of character. Photographed 1985. *John Minnis*

Goods sheds no longer have a role on the modern railway and around half those of those extant in 1967 have now gone. The two-storey structures put up in the 1860s were some of the most handsome to be built, singled out for praise by Ian Nairn (who seems to have been the kiss of death for Sussex railway architecture!) as having Georgian proportions and delicacy. He was referring to that at Steyning (1861), but it, together with those at Seaford (1864), East Grinstead (1866) and Littlehampton (1863), has been demolished. A single-storey version of it became the standard LB&SCR goods shed from the 1860s to the 1890s and those at Amberley (1863), Partridge Green (1861), Bexhill (1897), Hailsham (1880) and Uckfield (1884) were demolished.

Fig. 9 Hailsham goods shed seen in derelict state in 1975, just prior to demolition. The LB&SCR had an especially handsome standard design of goods shed of which the example at Edenbridge, Kent , is listed. *John Minnis*

The handsome T H Myres goods shed at Singleton, with its tiled roof, ridge tiles and half-timbering, intended to match the adjacent station buildings was recently listed but its companions at Hassocks (1881), Rotherfield & Mark Cross, Mayfield and Heathfield (all of 1880) have all gone. Among the earliest goods sheds to go were the two large examples at Lewes and St Leonards West Marina, both built to the same drawing in 1846. Other large ones now demolished are the extensive range at Brighton Lower Goods, the distinctive set with barrel vaulted roofs at Newhaven Harbour from the 1880s and the late examples at Hove (1903), Newhaven Town (1901), Horsham (1898) and Midhurst (1902). The LB&SCR had a predilection for plain corrugated iron structures at this period and those at Seaford (1905), Brighton Holland Road (1899) and Worthing (1899), together with that just outside the county at Emsworth (1912) have all been pulled down.

Signal boxes have been greatly reduced in numbers since 1967. There are far too many to list individually but a few should be mentioned. The greatest loss was the last surviving Saxby & Farmer 'stilts' box at Hardham Junction, built in 1863 and demolished in the year of the SIAS's foundation. This was nationally significant as the last tangible link to the earliest days of railway signalling where signal posts passed through the roof of towering structures raised up on timber baulks. Other early boxes to go include Kemp Town Junction of 1869, which managed to last in private use into the 1980s, long after it was closed, Chichester East (1875) and Stone Cross Junction (1871). All the signal boxes designed by T H Myres to accompany his stations have gone, with the exception of that at Horsted Keynes while the ranks of the once ubiquitous Saxby & Farmer type 5 boxes have been thinned.

A high proportion of railway housing was still in railway ownership in 1967. Since then, almost all of it has been sold and most of it has been considerably altered with new windows and extensions being the most obvious changes. Although much of it remains, many of the earlier examples, which tended to be very small for present day needs, have been demolished, among them the row of 1855 cottages at Three Bridges, the 1852 terraces at Haywards Heath and the single-storey timber range at Partridge Green.

Fig. 10 The 1846 goods shed at Lewes, originally entered via a wagon turntable at the side. Photographed 1980. *John Minnis*

Fig. 11 A loss of national significance in the history of railway signalling was Hardham Junction signal box. Built in 1863, it was the last survivor of the original design of box introduced by John Saxby in 1858 with the operating floor mounted high off the ground on large baulks of timber, providing a good range of vision for the signalman. Seen here on 2 February 1967, it closed on 21 March the same year. *D Cullum/ Lens of Sutton Association*

Fig. 12 Woodgate serves as an example of the many boxes of the Saxby & Farmer type 5 design used on the LB&SCR. Built in 1876 and closed in 1985, it retained an LB&SCR nameboard when photographed in 1971. The gates are another feature that, with the removal of those at Plumpton, is almost extinct in the county. *John Minnis*

Fig. 13 Most signal boxes were constructed to standard patterns but T H Myres designed a special box to accompany his Domestic Revival stations, employing tiled rather than slated roofs, ornamental terracotta ridge tiles, boxed eaves and quatrefoil motifs in panels above the windows. The result was one of the most handsome signal box designs of which just one example, at Horsted Keynes, survives. This is Midhurst East of 1881, closed in 1925, but retained as an office, and photographed while derelict on 17 July 1969 before demolition later that year. *John Minnis*

Fig. 14 Railway cottages at Keymer Junction, built in 1850 at a cost of £237, were good examples of the relatively small buildings put up at that time for the company's staff. Photographed April 1983. *John Minnis*

Fig. 15 Stroudley pattern water column from the 1880s at Lewes, 20 August 1970. *John Minnis*

Until the early 1970s, considerable amounts of other long obsolete railway infrastructure remained in place, especially in out of the way places. Some water columns, notably at Lewes and Polegate, survived the elimination of steam for some years alongside such features as trolleys, barrows, goods yard cranes and old van bodies used as stores. Stables at more important locations survived including those at East Grinstead (1892), demolished in the late 1970s. LB&SCR level-crossing gates, such as at Goring-by-Sea were still in use.

The incursions into the county by the SER have not fared too badly, with all the original stations between Tunbridge Wells and St Leonards surviving. The Bexhill West branch, opened in 1902, is the major casualty. The junction station at Crowhurst had its substantial but relatively plain Italianate buildings replaced by shelters. The intermediate station, Sidley with an ornate station building, later converted into a garage, and a large goods shed, saw both demolished many years after closure while, other than the listed principal station

Fig. 16 Stables were once common at larger stations and very few survive. Those at East Grinstead, built in 1892, were demolished in the late 1970s. Photographed 1974. *John Hoare/SIAS*

Fig. 17 Rye goods shed, an imposing SER structure of 1851, demolished in the late 1970s. Photographed 1974. *John Minnis*

building at Bexhill itself, everything else there has gone. The distinctive goods sheds with their almost slit-like windows at Frant, Wadhurst, Stonegate, Etchingham and Battle, dating from 1851, have all gone, leaving Robertsbridge as the sole survivor of the type. On the Hastings-Ashford line, the 1888 timber station buildings at Ore have been demolished as has the 1851 goods shed at Rye - a much grander structure than those on the Hastings main line. The LSWR's branch from Petersfield to Midhurst has seen much change – the stations at Rogate and Midhurst are barely recognisable, such is the degree of alteration they have undergone, while it is questionable whether anything is left of the original fabric at Elsted at all.

Gain

In 1967, as has already been noted, many of the Southern Region's stations had changed little in decades. While this meant that they had retained a great deal of their Victorian and Edwardian character, it also in many cases meant that they were somewhat shabby with dark and gloomy interiors giving staff working conditions that were positively Dickensian. For passengers too, conditions were hardly welcoming. While in some instances, things only got worse with the replacement of staffed stations with a couple of bus shelters, in the majority of cases, stations in Sussex today offer both staff and passengers a much brighter environment. Toilets that were almost invariably disgusting are now much more tolerable, although, as with all aspects of stations, levels of vandalism are much higher than they were 50 years ago.

The major stations on the system are looking better than they have done in years. There have been some notable refurbishments, many funded in part by the Railway Heritage Trust. Most impressive among them has been the restoration of the great roof at Brighton from the late 1990s onwards which involved repairs and strengthening , together with the total reglazing of the structure. The total for this work exceeded £28M. Mocatta's station building saw much work, including the reinstatement of much of the moulded decoration on the stucco facades. The 1865 building at Hove had its decayed stucco completely stripped and reinstated in 2005. Bognor Regis is in an excellent state, with buildings well restored in 2000. Other major late nineteenth century LB&SCR stations at Eastbourne and Bexhill underwent extensive renovation with repairs to stone detailing at Eastbourne and renovations of the booking hall and canopies at Bexhill. St Leonards Warrior Square underwent regeneration in 1999 and Etchingham had an attractive garden provided as part of an initiative by a Community Interest Group. Finding new uses for redundant station accommodation is a major part of such schemes with cafes and restaurants a popular option although the medical drop-in centre at Eastbourne is an example of an imaginative approach. All these buildings were listed and the value of this in attracting a sympathetic approach to refurbishment cannot be underestimated. The Southern Railway started to rebuild Littlehampton in 1937 in connection with electrification but having demolished the station building, a collection of huts then sufficed for the next 50 years until a pleasant building was provided in 1987. Although the loss of the 1931 station building at Hastings is a pity, its replacement of 2004 is a striking structure.

A number of stations on closed lines that appeared almost past redemption have been rescued from dereliction by private owners who have converted them into houses, among them Fittleworth, Petworth (with bed and breakfast use) and Selham on the Midhurst branch, and at Barcombe. Hartfield, after a period of disuse, became a children's nursery.

Some are coming back to life – Kingscote on the Bluebell Railway with the signal box top from Brighton Upper Goods and a demonstration goods yard with the lock-up shed from Horsted Keynes. Bodiam on the Kent & East Sussex Railway, a fine example of a Col Stephens corrugated iron light railway structure and Isfield on the Lavender Line, preserving station, signal box and lock-up goods shed.

Numerous goods sheds have found a variety of new uses: Chichester – a restaurant; Eastbourne – a market; and Bognor – a builders' merchants. Signal boxes, too are well represented. A good proportion have been listed: 11 in all. The important early box at Billingshurst has gone to Amberley Museum, numerous Saxby & Farmer type 5 boxes from the small example at Isfield (1877) to the grand structures at Eastbourne (1882) and Chichester West (1882) survive in situ. The late gable-ended design has an excellent survivor in Barnham Junction (1911), now preserved at a new location and appropriately housing a model railway club.

What is particularly striking about Sussex is how many stations survive largely intact with a full range of buildings. It would be hard to find a better example of a country junction on the national network than Pulborough which retains main station buildings, all its awnings and platform buildings, a goods shed and a signal box while Berwick is a well-preserved wayside station with 1846 station building, 1877 waiting shelter, signal box of 1876 and cottages of 1846 and 1892.

Although the number of buildings that have been lost since 1967 seems to form quite a long list, Sussex is fortunate in that the majority of its pre-1967 stations still survive. This is in stark contrast to the position in many other parts of the country, particularly the north of England. The stations serving the major towns are, with the exception of Hastings, still intact and a surprisingly high proportion of small rural stations survive. There is little to equal the Tunbridge Wells-Hastings line for a consistently high standard of architecture and, for the sheer variety of station buildings, the east and west coast lines, together with their branches, of the former LB&SCR are hard to beat. The county has a claim to have a higher proportion of its railway structures surviving than any other.

References

1. C Hamilton Ellis, *The London Brighton & South Coast Railway*, London, Ian Allan, 1960; H P White, *A Regional History of the Railways of Great Britain Volume 2 Southern England*, London, Phoenix House, 1961.
2. Rodney Symes & David Cole, *Railway Architecture of the South East, Reading*, Osprey, 1972; Nigel Wikeley & John Middleton, *Railway Stations: Southern Region*, Seaton, Peco, 1971; John Hoare, *Sussex Railway Architecture*, Brighton, Harvester, 1979; A C Elliott, *The Cuckoo Line*, Didcot, Wild Swan, 1988.
3. The question is examined in John Minnis, *Britain's Lost Railways, the twentieth-century destruction of our finest railway architecture*, London, Aurum, 2011.
4. Building dates are derived from LB&SCR Board Minutes and Engineering Committee Minutes at the National Archives RAIL 414 65-79, 153-164 and signal box dates from C K Hall (ed.), *Signal Box Register, Volume 4: Southern Railway*, Signalling Record Society, 2009.
5. For Myres, see Alan Green, 'The Architecture of T H Myres for the London, Brighton & South Coast Railway', *Sussex Industrial History 46* (2016), pp2-12.
6. Ian Nairn & Nikolaus Pevsner, *The Buildings of England: Sussex*, Harmondsworth, Penguin, 1965, p188.
7. Examples of refurbishment and re-use are principally taken from the Annual Reports of the Railway Heritage Trust.

SOUTHDOWN BUS GARAGES AND OTHER PREMISES IN SUSSEX

Paul Snelling

As a bus enthusiast for the best part of 50 years I'd never really given the bus garages a great deal of thought. As a teenager one would peer inside to get a glimpse of what was hidden within; sometimes an offer to enter was eagerly accepted with the usual "don't go near the pits". In later years Health and Safety conspired with the operational need to keep the fleet on the road for most of the time which lessened the appeal. Notwithstanding this, a number of operators took to having garages on remote industrial estates, often with hardstanding for the buses, a small maintenance shed and a Portakabin for staff purposes. The Brighton and Hove Bus and Coach Company have had a similar facility at Newhaven for a number of years

A book on London Transport Bus Garages kindled my interest in the subject about 15 years ago. On that note it's worth remembering that we had two London Transport Country Area Garages in Sussex, one in East Grinstead and the other in Crawley. Sadly both are gone and I don't have pictures of either, despite living between both for my first 25 years and regularly using buses from each garage.

A greater interest in Southdown garages came about when, as a member of the Southdown Enthusiasts Club committee, there was a discussion about what to show at the next club meeting. Somehow, I ended up being passed a memory stick with a number of pictures of garages and was "volunteered" to make a presentation for the meeting.

It then became evident that whilst we all enjoyed the buses, their routes and the bus tickets, that there was precious little written about the garages. The most noteworthy exception is Southdown, Volume 2 - The Details, written by Colin Morris and published by Venture Publications in 1994. I have only become aware of this book in recent months. The Southdown Enthusiasts Club makes mention of garages in its fleet histories and snippets appear from time to time in its Miscellany series. As I mention above, their Photographic Team has a good selection photographs of the garages and periodically has them for sale. Even so some garages never seem to have been photographed or perhaps just with a bus passing by. It is from this source that this article is illustrated.

From an IA perspective we do know where most of the garages were, albeit there are queries over some of them; Scaynes Hill and East Hoathly come to mind. Dates of opening and closing are often sketchy, as precious little research has been done.

The garages were built in various ways and again no research has been done as we have become accustomed to in the IA field. Simple garages would be typically a timber-frame structure clad with either timber or corrugated iron. The frame may be built on a brick foundation or perhaps placed atop a wall up to about six feet high. The floor may be of rolled earth or laid in concrete. Full height doors would be provided to keep the weather out. These small garages were known as Dormitory or "Dormy" sheds. The crews typically lived in the adjacent villages and the routes worked were from that locality to surrounding villages and main town/s. The vehicle roster would include running to the nearest main garage to refuel and perhaps a wash. The vehicles would also go to the main garage for servicing and would have a spare vehicle whilst theirs was away.

An excellent example of one of this type of structure can be seen at the Amberley Working Museum in their White Pit. This is the former Storrington Garage that was moved to Amberley upon its site having been acquired for housing. One of the buses that ran from Storrington for a number of years has also entered preservation. The other buildings on the site are excellent representations of the smaller garages and are highly recommended to view.

The larger garages are often formed of a brick or similar facade. The side and rear walls would extend up to roof height, either fully or up to around ten feet. If not reaching roof height they would be clad either in corrugated or asbestos sheet. Both these materials would be used for the roof atop a series of steel spans. Chichester Garage was built with a barrel-vaulted roof, as was the Southdown Hilsea West Garage in Portsmouth.

Many smaller garages disappeared over the years when services were restructured and buses moved to operate from more central, larger, garages. Modern buses do not need to be housed in garages so hence some operators moved to basic facilities and which don't attract such large business rates. Hitherto, garages were often placed along trunk routes to facilitate the changeover of buses and crews plus enabling crews to have a rest break. Many companies today run the out-of-service vehicles back to the garage or the drivers are conveyed around in cars,

vans or minbuses from a pre-arranged stop en-route to the garage.

The 1970s was a period where many garages were lost. Declining passenger numbers called for a radical look at the route structures so fewer buses were required, albeit they were getting bigger. The Transport Act of 1968 demanded that the major bus companies were to be operated by the National Bus Company from 1969. Further rationalisation took place until 1986 when the National Bus Company was split up and privatised under deregulation. Garages were sold off to obtain funds aided by services being further cut. Smaller companies came into the arena, such as Cedar Bus in Worthing, run by Chris Chatfield who later came to run Compass Bus. Many of the low-cost operators used low-cost facilities to enable them to undercut the major operators

The latest hawks looking to scoop up bus garages are property developers. Hilsea East garage on the outskirts of Portsmouth was demolished to make way for flats, Hailsham went that way many years ago as did East Grinstead, Horsham, and Haywards Heath, to name but a few. Covetous eyes are forever looking at Worthing with its garage being a prime position on the sea front. In Chichester both bus garage and bus station are being viewed as a promising site to revamp the city's retail offering, forsaking an excellent public transport interchange. Uckfield was demolished, along with its bus station to make way for the link road from town to by-pass. Some of the old garages survive but performing other functions, Hassocks became a car workshop as did Fareham. Chelwood Gate was until recently a warehouse for a retailer. Possibly the strangest use for a former bus garage is that at Moulescoombe, on the outskirts of Brighton which is a household waste transfer station.

Although the basis of this article is about the bus garages it is also worth remembering that Southdown also owned bus stations, coach stations, general offices and enquiry offices. They owned their huge Central Works in Victoria Road, Portslade, where every type of work was undertaken on the fleet. It even boasted a rifle range running the full length of the roof! Southdown also owned Refreshment Rooms at County Oak, near Crawley where a coach load of passengers on the A23 London to Brighton road could be accommodated in a 10 minute break. On other roads (A3, A22 and A24/A29) the needs were covered by stops at Public Houses.

(Left) SEC 301. Built in 1950 we see Arundel Bus Station on 7th September 1962. Today a spartan bus shelter replaces this useful facility. Although we mourn its loss, current regulations wouldn't allow buses to reverse into the bus station on this busy corner.

(Right) SEC 303. Possibly the jewel in the crown of the Southdown estate was Bognor Regis bus station. Opened in 1934 it was designed by architects Clayton and Black of Brighton and presented with an Art Deco style facade. The bus garage was on the corner of Richmond and Station Roads until 30th January 1957 when Southdown swapped this land with Hall and Co for their garage in Bedford Street behind the bus station. The bus station and garage were demolished and today the site is occupied by a Morrisons supermarket.

SEC 304. It's quite unusual to see the inside of a bus garage but on 31 October 1962 the photographer was able to get this shot within Brighton's Edward Street garage. For the industrial archaeologist it enables one to see the internal construction details. We can also see a snapshot of the bus fleet at the time. The Ford Thames van is part of the service vehicle fleet as is the breakdown tender in front of it. Beyond the bus wash a Guy Arab bus has been cleaned to maintain the Southdown sparkle.

SEC 307. Pool Valley, Brighton.

Two for the price of one. The building nearest the camera was 5 Steine Street. Originally a house, in 1915 part of the building was let to Southdown. Eventually they took over the whole building in 1917 and it remained the Head Office until new offices in Freshfield Road opened in 1964. Beyond is the exit from the Manchester Street coach station, opened in 1931.

SEC 314. The 1950s saw Southdown expend large sums of money on new garages and bus stations. Here we see the splendid bus station at Chichester, still doing today what it was built for in 1956. Southdown didn't really want to spend money on such facilities as it would simply be an on-cost to be paid from fares taken.

SEC 320. Southdown operated from an open yard at the Lion Brewery in Eastbourne from March 1916. The acquisition of the Piper business of Langney Road in 1929 allowed the construction of the fine Pevensey Road Bus Station as seen here in July 1963. The main building remains today as a night club whilst the further exit, where we see an open topper on the famed Beachy Head service, is a taxi office and bar.

SEC 321. Royal Parade Garage was where the coach fleet were kept in Eastbourne, although buses occasionally paid a visit. Opened in October 1924, this view taken in October 1962 shows three of the Leyland Leopards built in 1961 with very stylish bodywork built by Thomas Harrington of Hove. The coach outside is only one year older, bodied by Weymann at Addlestone, but it's dumpy lines ages it.

SEC 325. Buses stood on Haywards Heath station forecourt and on roads adjacent to Commercial Square until a new bus station was opened on 1st May 1956. It remained in use until October 1998. Following mixed use for nearly 30 years it was demolished and the whole site has been transformed into a Waitrose supermarket. In this shot a service bus is on the bus station stands while others are at the stops in Perrymount Road. It's debateable if the bus on the left is a relief on the 85A as this Saturday only rural route ran through Lindfield to terminate at Freshfield Crosssways in the middle of nowhere. It is more likely that it was a relief for the circular local route via Haywards Heath town centre to Walstead and Lindfield numbered 85A to distinguish it from services operating to Lindfield first which were numbered 85. A substantial bus garage was provided near the bus station in Gordon Road.

SEC 330. Southdown opened a new bus station in Lewes on 26 March 1954 which incorporated additional garage facilities. This eased the pressure on accommodation at Brighton, and enables the closure of the rented two-bus garage nearby. Maidstone & District buses used the bus station on the joint routes that it operated with Southdown, the 18 to Hawkhurst, 119 to Tunbridge Wells and the 122 to Gravesend.

SEC 332. Opened in 1926 we see a Leyland PD3 bus depart from Littlehampton combined bus garage and bus station on the premier route 31. The date is October 1962 and the small boy is pitching for a penny for the guy. The garage closed around 1971 and subsequently demolished. A shop is now on the site and passengers wait at spartan stops around the corner.

SEC 333. Customer service was at the forefront of Southdown service. Enquiry offices were situated in many locations around their area. Here we see the office at Midhurst which closed about 30 years ago and became a café. It opened on 10 December 1956 replacing the previous office on the west side of North Street. The bus garage was up a tight alley nearby. The yellow door of the adjacent premises denotes that it was the property of the Cowdray Estate.

SEC 335. Here we see an external view of Southdown's Central Works in Victoria Road, Portslade. Opened in stages between 1927 and 1928 it brought together the various disciplines of engineering hitherto undertaken at various locations. It also allowed standardisation of the fleet. Day to day maintenance remained at the garages. After the privatisation of Southdown the works continued to undertake bus work having been sold off. After closure the site was demolished and today suffers the ignominy of being a car dealership.

SEC 337. Seaford has been home to three bus garages. Initially in Richmond Road, then Dane Road, this is the final garage built in 1957. After closure in the 1980s it was leased by an antiques company. Latterly demolished the land was used by a car dealer but is currently being redeveloped.

(Right) SEC 342. Seen here in September 1963, possibly the only bus garage to be moved into preservation. Storrington Garage moved a few miles down the road to the Amberley Museum and Heritage Centre. Its site is now the Amberley Close housing development.

SEC 343. This shot taken at Uckfield epitomises all facilities in one place. The garage is behind the bus station which houses a café and enquiry office. Sadly it's all gone, demolished to make way for Bell Lane to take traffic out of the town to the A22 by-pass. Route 119 from Tunbridge Wells to Brighton is now operated by Brighton & Hove as route 29. The single deck Southdown route 92 from Eastbourne to East Grinstead has been replaced by two buses requiring a change at Uckfield.

SEC 346. A remarkable survivor from the early years of Southdown is the East Garage at Library Place, Worthing built in 1920. Observe the ornate fan light, roof ventilators and pebble dash exterior. The lamp lights a now closed footpath which until quite recently allowed pedestrians to walk from the seafront to Warwick Street. The garage still continues to function albeit it has been re-clad.

MANOR ROYAL, CRAWLEY 1948-1980

Brian Austen, Ted Henbury and John Blackwell

Introduction

The concept for garden cities had been expounded by Ebenezer Howard in his book *Garden Cities of Tomorrow* (1898) and soon thereafter the first to be built, Letchworth Garden City, was commenced in 1903 aimed at a population of 30-35,000. Welwyn Garden City followed in 1920 but its closeness to London, only 20 miles away, and investor demand for quick returns, left it largely as a commuter settlement rather than a self-supporting town. World War II revived the idea. Housing in London had suffered badly from the blitz and industry had been obliged to meet war needs. The ending of the War in Europe and the election of a new Labour government under Clement Atlee, forced a focus on post-war needs and the aspirations of the demobilised forces and their heightened expectations. Patrick Abercrombie's plan of 1944 envisaged a ring of ten new towns placed at a distance of about 25 miles from central London which would reduce the population of that city by about 1.5 millions. His ideas influenced the New Towns Act, passed in 1946, which envisaged a number of such self-supporting towns with housing and industrial needs planned together, so that a diverse manufacturing sector could advance hand-in-hand with housing and social amenities. All were to be close to London from which the population and businesses that were to support them would be drawn. The industries were to be diverse in their scope and the labour drawn from the newly migrated population. The only New Town designated south of London was to be Crawley.

Crawley already had a population of around 9,000 and some industry, such as the important building contractors, Longleys, active since the 1890s on such important contracts as Christ's Hospital School near Horsham and the King Edward VII Hospital at Midhurst. They had 700 employees in 1898. It had good transport links, initially through its key position as a coaching centre servicing the London to Brighton stage and mail coaches. This was to disappear when the railway station was built at Three Bridges, some distance to the east, from which London to Brighton trains operated from 1841. It did however have a more central, though less important, railway focus when Crawley station was built on the new Three Bridges to Horsham line in 1848. As a site for the new town it did present problems. The scattered built-up area of the town was within two counties, those of West and East Sussex, with the Surrey border close to its northern boundary at County Oak. It also incorporated several other parishes apart from that of Crawley itself. These problems were however largely solved by the terms

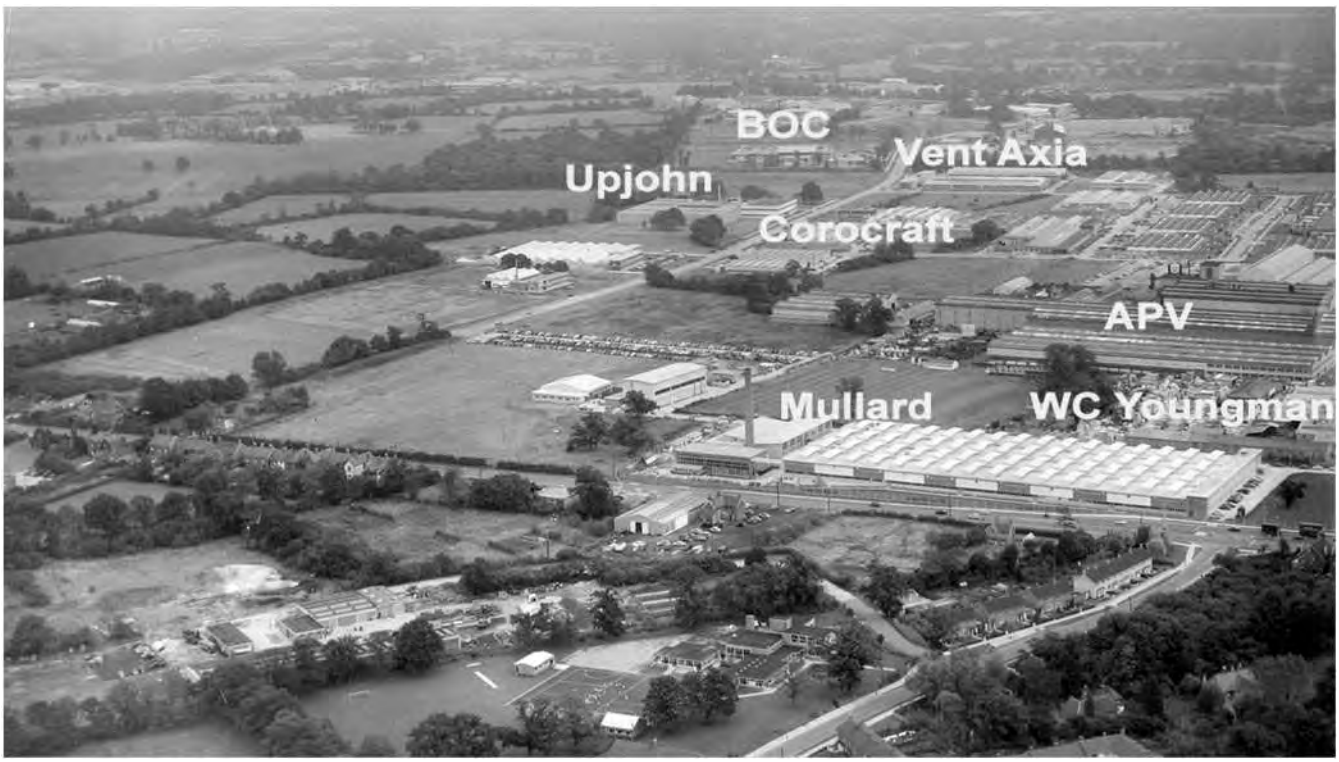


Fig. 1 An early aerial view of the Manor Royal Industrial Estate looking east from the London Road

of the New Towns Act and subsequent alterations to the county borders which left the town clearly in West Sussex. Development of the new town was also left clearly in the hands of the Development Corporation set up under the terms of the parliamentary Act.

The origins of the Crawley Development Corporation can be found in an informal committee set up by Lewis Silkin, the Minister of Town and Country Planning in October 1946, though its work could not be implemented until February of the next year when the official designation of Crawley as one of the New Towns was formally recognised. The plan was to develop a "self-contained industrial town of 50,000 within 15 years" and the Corporation had powers of compulsory purchase of land and properties. Finance would be provided by the central government in the form of 60 year loans. The Corporation had an obligation to provide infrastructure, roads and public services (electricity, gas, water, sewerage) and to build housing, commercial properties and civic buildings.

A master plan was drawn up by Anthony Minoprio, a London planning consultant, which was approved in December 1947 and work commenced despite the shortages of materials and the straitened economy in the early post-war years. The plan envisaged a grouping of industry on a site north of the town centre which was subsequently named Manor Royal. The planning for this area took place in 1948 and work started on the sewerage system in the same year. At the same time, businesses in the London area were encouraged to take an interest in the new development with its attractive layout, good transport connections and accessible factory sites. The Corporation built units for rental to a standard design from 1950 but at the same time were prepared to build larger custom-designed units for major companies prepared to move. Land was also offered on lease to those businesses that wanted to plan and build their own premises. Although the aim of the Corporation was diversity, with units of various sizes located throughout the estate, the reality was that larger factories tended to locate near the main estate roads. Housing was developed by the Corporation at the same period as the industrial estate but entirely separate from it, in self-contained neighbourhoods. The housing was intended for families moving from sub-standard properties in London and established residents of Crawley stood less chance of acceptance. The location of the industrial estate was deliberate as the prevailing south-westerly winds would carry pollution away from housing designated areas.

Factories started to develop on the Manor Royal site from the early 1950s. By 31 March 1952, 10 companies had leased sites or standard factories. The largest was A.P.V. Co. Ltd. which had leased a site of 17 acres, and it was estimated that by June 1952 the first stage of their factory amounting to 200,000 sq. ft. would be complete providing employment for 722 persons. Vitamins Ltd had leased 10 acres of building land and a further 25 acres of agricultural land and expected their works to be ready by June 1953 employing 95. W.C. Youngman Ltd leased a 10 acre plot, moving from Wandsworth, and expected to be in full production by February 1951. In March 1952 they were employing 250, supplying builder's plant and equipment and bathroom fittings. The remaining five leasers of plots opted for amounts varying from 5 to 1 acre and all expected to be in production employing 931. Two standard factories had been leased, one 6,228 sq ft and the other 5,548 sq feet. These were already in production with a total of 56 employees.

Queen Elizabeth II visited Crawley on 9 June 1958 and one of her engagements on that day was to officially open the Manor Royal Industrial Estate. By that date much had been achieved, and the 1960 *Crawley Official Guide* stated that a total of 71 new factories had been built providing 2,220,000 sq feet of space and employing 9,400 workers. The diversity of manufactures envisaged in the early planning had been achieved: 31 factories were classified as engineering, 11 as electrical and electronics, seven in food and pharmaceuticals and five each in woodworking, plastics and metalworking. The estate continued to grow, and by 1966 "16,500 people were employed in a diversity of trades". Thereafter expansion slowed to some degree though the average number of employees per unit had increased. In 1978 there were 105 factories providing employment for 19,780. Compared with 1960 when 132 employees was the average, the number had risen to 188. Ian Nairn in the Sussex volume of the "Buildings of England" series (1965) noted only two buildings of architectural merit on the Manor Royal Estate. These were the tallest building, then occupied by the Building and Engineering Holiday Management dating from 1959 by Eric Firmin & Partners, and the Silentbloc factory of 1954-55 by D.M. Austin-Smith & Partners in Newton Road.

As early as the late 1960s the Manor Royal Industrial Estate was beginning to feel the effect of the expansion of Gatwick Airport, a close neighbour, which had hardly existed as a competitor for labour when the Manor Royal Estate had been planned. The airport had been licensed on 1 August 1930, but its owners, Airports Ltd, had a succession of difficulties in the 1930s in attracting and keeping business. Despite the building of its innovative terminal (the "Beehive") in 1936, and its dedicated station connecting with Southern Railway services, airlines attempting to operate services found the grass runways ill-drained and all too often water-logged.

On the outbreak of World War II the airport was requisitioned by the Air Ministry and was not available for civilian usage again until 1947. By then the New Town Commission for Crawley had already been established, and a meeting took place between Lt. Col. C.A.C. Turner, its Chief Executive, and Marcel Desoutter of Airports Ltd. Turner subsequently obtained from the Ministry of Town and Country Planning an understanding that the airport would only be used as a base for charter activity and would never become a major airport with international scheduled services. The rising volume of post-war air traffic, however, forced the government to realise that congestion was going to occur in the next few years in London's existing airports and the space at Gatwick might be required. A public enquiry was held on March 1954 at Horley and, despite public opposition, the government proceeded with the plans for expansion of facilities and to build the new terminal, concrete runway, and develop the existing Gatwick Racecourse station to serve air passengers.

The new airport was officially opened to traffic on 30 May 1958. Initially it had only a relatively small impact on the Manor Royal Industrial Estate from which it was physically separated. The airport operators did however need to develop at Gatwick their own aircraft maintenance facilities and encouraged firms engaged in aeronautical engineering to come here, also airline caterers to service passengers and provide warehousing for air freight both for despatch and inward distribution. This did encourage labour, as early as the 1960s, to move from Manor Royal to Gatwick, leading to shortages in certain employment sectors. Some firms active in connection with the Airport because of the demand for their services, were encouraged to seek accommodation in empty units on the Manor Royal Estate. Gradually the commercial activity associated with the growing airport grew out from the original base and expanded south to connect with Crawley industry. This changed the nature of Manor Royal Estate and distorted the original vision of a balance of diverse firms and trades at Manor Royal serviced for their labour from the inhabitants of the New Town.

In 1962 after 15 years of activity the Crawley Development Corporation was wound up. Some of its powers were taken over by a national Commission for New Towns which had been created under the terms of the 1959 New Towns Act, but when this too was wound up in the 1980s their Crawley properties were to be presented to Crawley Borough Council, but first the tenant companies were offered the sale of the freehold of their properties. In May 1956 Crawley had become an Urban District replacing its former status as part of Horsham Rural District and in April 1974 its status and powers were again elevated to that of a borough. During the 15-year period of the Development Corporation it had to a large extent followed the plan devised in its early years. In April 1960 the Chairman, Thomas Bennett, reported a population of 51,700, factory and industrial space of 2,289,000 square feet and 10,254 corporation-built houses. The employed labour force was 21,800 and the majority of these worked in the manufacturing sector. Since then Crawley has grown considerably and by 2001 the population was 99,744. Extensions to existing neighbourhoods were built at Broadfield and Bewbush and this was followed by the substantial Maidenbower estate. These were built by private developers and the houses were for outright sale. The employment pattern changed markedly with the incorporation of Gatwick Airport within the borough boundaries in 1974. Recently a survey of employment identified 79,700 employee jobs in the borough of which only 7,500 were in manufacturing (9.4%). This contrasted with the 70,100 jobs in service industries (87.9%). This later group included 24.6% in distribution, hotels and restaurants, 30% in transport and communications and 19.3% in finance, IT and other business activities. The town has materially changed its nature.

Brian Austen

A Working Life in Crawley

After World War II, with thousands of properties demolished and damaged, finding somewhere to live obviously became very difficult. I had left school

in late 1947 and, having been interested in all things mechanical, I was fortunate in getting a five-year Aeronautical Apprenticeship at Hawker Aircraft at Kingston. This was very thorough and gave experience in all departments of engineering from fitting to assembly. I then moved into the Planning Department and it was here that I met my future wife and married in 1953. I was eventually conscripted into the RAF in 1955 and discharged in 1957. This was the start of the problem of looking for somewhere live! Having been on the Wandsworth Council housing list, we were informed that they were unable to offer any housing for at least 25 years! There was a small note attached which said 'you might consider moving to a New Town'. This was the first mention of such a scheme and I never did find out why this had not been mentioned before. I applied for a job at Crawley, which I accepted, and after travelling to and fro for nine months was offered a three-bedroom house in the Langley Green area, where I still reside today.

Obviously a great deal of forethought had been applied by the government of the time into the task of building the vast housing requirements. The satellite towns were positioned about 20 to 30 miles from the boundaries of the capital and encouraged not only the inhabitants to move but also the businesses where they worked. I found this Utopia with not only a new house to live but also a wide range of work to choose from, together with fair wages.

The first job I had was with a ball bearing manufacturer, British Manfactured Ballbearings (BMB), in Charlwood, who made small diameter bearings including those for BIC pens. I stayed there for two years before joining Pictorial Machinery Ltd in Kelvin Way on the Manor Royal industrial estate. They produced equipment for lithographic printing and I stayed there for 14 years. It was a fairly small company, employing about 200 people. I then moved to Stone Platt, off the Gatwick Road they produced four very different pieces of equipment including lighthouse equipment, buoys for shipping lanes, air conditioning units and 'Vapor' boilers. After two years I moved to Mullard Equipment Limited (MEL) for 14 years. I really enjoyed my time there which included working on a microwave landing system for military aircraft. Quite a range of jobs, which certainly helped in doing any DIY at home!

Manor Royal was quite different from what it is today. Every morning there was a mass of bicycles from all over Crawley, all descending on Manor Royal. It was a traffic jam of hundreds and hundreds of bicycles! There were a few cars, perhaps belonging to managers, but the vast majority of people who worked on Manor Royal lived in Crawley. Most people stayed on the estate for their lunch breaks, many using their on-site canteens or bringing sandwiches from home. We had to work about 42-44 hours, which included Saturday mornings, and everyone only had two weeks' holiday every year. In the last 30 years supplying the needs of Gatwick Airport has taken over so that there is very little engineering on Manor Royal, some of the largest companies having closed or been taken over and moved away; APV, Beechams, and Edwards High Vacuum are examples. MEL was acquired by Thales but remains on the original site and is involved in similar products. Some factories have been divided into smaller units for use by smaller companies. However I consider myself to have been extremely fortunate to have been living in a town, in the countryside, in a modern well-built house and with a wide range of employment on the doorstep—Utopia.

Princess Elizabeth officially opened the Industrial Estate located at County Oak on the A23 road. The site chosen was generally open farmland with some small areas of woodland. A green buffer zone was envisaged as far north as Gatwick Airport. The Ministry of Aviation had made it clear that there was no intention of developing Gatwick as an international airport in the near future. The later decision to go ahead with the airport expansion, although agreed with the New Town Commission, eventually had a dramatic effect on the composition and growth of the Industrial Estate. Initially the main access road to Manor Royal was laid down eastwards from the A23, with subsidiary roads radiating off: to the south Crompton Way, and to the north Faraday Road and Newton Road, the latter two being linked by Kelvin Way. At the end of Manor Royal was Gatwick Road running north-south. The choice of road names reflected that the estate was to have a substantial engineering presence with the intention to encourage industry to leave cramped and war damaged areas in primarily South London to relocate together with their workforce to Crawley New Town where housing for their families would be built.

The industrial area as first envisaged allowed for some 13 companies to lease sites at favourable terms

and to construct buildings according to their own requirements, and some 58 smaller companies to lease/rent 'Standard' single bay units. These single-storey units were all of similar construction, comprising of 2, 3, or 4 bays with minimum steel supports for the roof, allowing for a maximum open space of some 30,000 square feet. With the erection of dividing walls they could be easily be converted into smaller units, each single bay being approximately 7,000 square feet. The exterior walls were of concrete and brick infill with an undulating reinforced roof constructed on site by Twist Steel Ltd. The offices were constructed externally to the factory as a facing feature. Heating was by gas units high in the roof space in the factory and by wall-mounted convectors in the offices. Skylights in the factory areas had remote-controlled louvres. The first units in Crompton Way were ready in 1950 with those in Kelvin Way in 1952. A later different style of unit was erected in Gatwick Road with offices above the factory area. Some of these units survive in Crompton Way and Kelvin Way (south side but somewhat altered) and also in Gatwick Way. Expansion saw factories erected in Napier, Rutherford and Priestly Ways by 1960, with an east-west road, Fleming Way, from Gatwick Road

Fig. 2 Standard unit 'wavy roof construction:
Above: exterior *Below:* interior (Crompton Way)

parallel to Manor Royal. The story of some of the larger leased factories is recounted below. Where the area of the site is given it does not mean that the entire site was developed but most of the companies expanded their initial production areas considerably reflecting the economic prosperity of the country during the 1960s. The development of Gatwick Airport together with the slump in manufacturing and amalgamations/takeovers during the 1980s caused some of the original engineering companies to close or move away their sites often sold for profit and development into business parks or units often supplying the service needs of the airport or the airlines operating from it. This process continues to the present day.

Ted Henbury

Some Manor Royal Factories

A note in a 1986 *SIAS Newsletter* referred *to "many of the original factory sites being demolished and the established companies disappearing from the scene"* and commented that *"The industrial archaeologist of the future will have a task indeed to trace who traded where and when and what was made!"* Such has been the case with little company history in print and much information has been obtained from national and local newspapers and social media. There is still much more to discover about these companies and the many more that traded there and further information would be welcomed by the authors via the editor.

The genesis of this article is a map produced by the Crawley Development Corporation dated 1960 showing the Manor Royal Industrial Estate at this time. Unfortunately it is in too poor a condition to be copied but a facsimile has been produced as a centrespread to this journal. What follows is a potted history of some of the companies shown on the map. Our journey moves east along Manor Royal, north on Gatwick Road and returns west along Fleming Way.

Mullard/MEL/ Thales Manor Royal (N) 1961- Present

Mullard Equipment Ltd, a division of the Dutch group Philips, moved from South London to a large site bounded by London Road and Manor Royal in 1961 to make electronic and telecommunications equipment. The works was extended to 312,000 sq. ft. (7acres) in 1966. As M.E.L. Equipment Co. Ltd. the firm employed over 1,000 in 1964 and was developing components for Concorde. Expansion continued with over 2,000 employees in 1977 when a

Fig. 3 Mullard Equipment Ltd (MEL)

microwave landing system was developed, suitable for landing on rough airfields and offshore platforms. The name changed to MEL in 1981 and products and systems began to be developed for military purposes alongside medical linear accelerators (LINAC) for cancer treatment. In 1989 Phillips retained the LINAC business but sold the military side, radar, communications and electronic warfare (use of radio waves or laser light, to confuse or disable an enemy's electronics) to Thorn EMI. The LINAC business has been owned since 1997 by the Swedish company Elekta on an adjacent site, the northern part of that originally belonging to Youngmans. Thorn EMI became one of the biggest defence contractors in the UK but was sold to a French company Thomson C.S.F. in 1995, renamed Thales in 2003. Thales demolished the MEL buildings in 2009 and subsequently moved their UK operation to new buildings on the site.

W C Youngman Ltd Manor Royal (N) 1951-1987

W. C. Youngman Ltd leased a ten-acre site in Manor Royal in 1949 on a 99-year lease from the New Towns Commission, at a tiny annual rental of £2,000 and moved their wooden ladder production from Battersea and their 'Leda' chrome bathroom fittings from Vauxhall in 1951 with 187 employees. It is alleged that Charlie Youngman, the founder of the firm in 1926, purchased good timber at knockdown prices by clearing the viewing stands after the Coronation in 1953, but business boomed when timber from Canada and Scandinavia ceased to be rationed in 1954. By 1964 the factory had over 500 workers and manufactured builder's and contractor's plant, including ladders, steps and trestles, platform staging, sectional timber buildings and site offices. They also made handling equipment, including factory trucks and trailers, pallets, stillages and other equipment. Charlie Youngman died in 1968 and in 1969 the firm was acquired by SGB Group. During the 1980s the New Town Commission was wound up, their Crawley properties were to be presented to Crawley Borough Council, but first, the tenant companies were offered the sale of the freehold of their properties. The freehold of the Youngman site was offered for the price of about £500,000 which was quickly accepted. In 1987 the Youngman group, now part of Mowlems, bought Gravity Randall and moved to its site in Slinfold near Horsham. The Manor Royal site was then cleared. but in the year 2000 it was still awaiting a purchaser who would pay the price asked by the developer. It is now occupied by L3 Commercial Training Solutions, previously Thales/Redifon flight simulators.

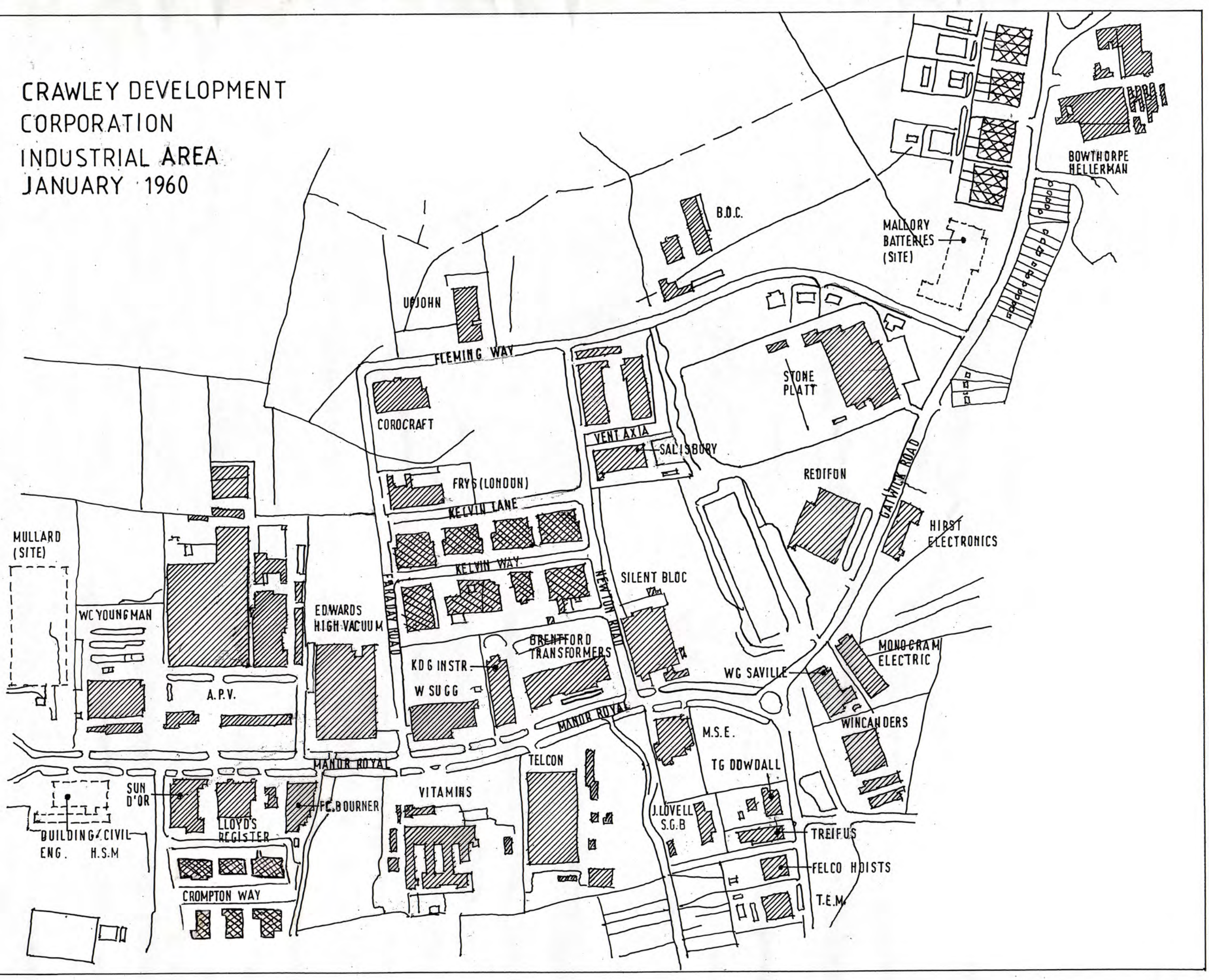
Fig. 4 W C Youngmans (*West Sussex Past Pictures*)

Aluminium Plant & Vessel Co Ltd Manor Royal (N) 1952-1988

One of the largest firms to move to Manor Royal was the A.P.V. Co. Ltd., a family company founded by Richard Seligman (1878-1972), which specialised in the fabrication of welded containers for the brewery, dairy and vegetable oil industries. He invented the plate heat exchanger in 1923, which revolutionised methods for indirectly heating and cooling fluids. In 1949 APV began to investigate a move from Wandsworth and four other sites around London to Crawley. Encouraged by the development corporation's willingness to re-house its London employees, it leased a site in Manor Royal in 1950. The factory was built by James Longley, the Crawley builder. Its operations moved to the 17-acre site in three stages in 1952, 1955, and 1956. It was later claimed that A.P.V. brought 1,500 families to Crawley. A subsidiary APV Paramount, a foundry company, also moved to Crawley with 350 workers making high alloy steels. One ton of stainless steel per hour could be produced by the quickest furnace. In 1962 the firm became a subsidiary of A.P.V. Holdings Ltd and in 1965 more land was leased and the works extended to over 400,000 sq. ft., an eighth

MANOR ROYAL INDUSTRIAL ESTATE

CRAWLEY DEVELOPMENT CORPORATION
INDUSTRIAL AREA
JANUARY 1960



Standard units to rent/lease in Crompton Way, Kelvin Way, Kelvin Lane and Gatwick Road are shown cross-hatched.

Map drawn by Philip Spells

Fig. 5 A.P.V. Co. Ltd., 1980s

of all new factory space in Crawley. There were further extensions in 1968 and 1971. In that year the company was acting as process engineers, plant manufacturers and stainless steel founders to the chemical, petroleum and food and drink industries worldwide. Profits peaked at £19m in 1979 but, following a merger with the American company Baker Perkins, work was transferred to the U.S. and the Crawley site vacated, being sold for £28m in 1989. Subsequently it re-developed as the Manor Royal Business Quarter in 1994.

Edwards High Vacuum Manor Royal(N) 1954 -2010

W. Edwards (London) Ltd., a south London vacuum -pump maker, arranged to move to Crawley from Lower Sydenham in 1953 and opened a works in 1954 with c.300 employees on a 9½-acre site in Manor Royal. In the same year it became a public company, Edwards High Vacuum Ltd. An extension of 45,000 sq. ft. was added in 1959. Behind the typical 1950s two-storey office frontage was the large factory area with a sawtooth roof. In 1963 the firm became Edwards High Vacuum International Ltd. and, following the death of its founder Frederick Edwards, in 1968 they became part of the British Oxygen Company, initially retaining the same name, but eventually in 1997 becoming BOC Edwards.

Fig. 6 Construction of Edwards High Vacuum
(*West Sussex Past Pictures*)

Linde A G, the German gas products company, bought BOC in 2006 then sold off Edwards to a private equity consortium whereupon the name reverted back to Edwards. Although traditionally known for its rotary vacuum and diffusion pumps, 500,000 have been installed worldwide; the past 50 years has seen an expansion into other products that utilise these pumps, with systems such as coating units, freeze dryers, leak detectors and electron microscopy preparation units being developed, leading eventually to dedicated specialist coating systems for the semi-conductor and TV screen industries. In recent years manufacture has moved away from Crawley and the factory closed in 2010 and has since been demolished.

Fig. 7 The demolition of Edwards High Vacuum

William Sugg & Co Ltd Manor Royal (N) 1955-1969

Part of the factory was laid out for a new company, Sugg Solar Ltd, to manufacture under licence the American designed Mars gas turbine engine but the difference between the manufacture of gas appliances and that of a gas turbine engine was not fully considered and it turned out to be a disastrous white elephant. Fortunately a long-term project was coming to fruition— the 'Halcyon' a warm air gas heater connected to ducts with adjustable grills to heat one or more rooms. Pioneered by house builders Wates, the system was installed in 20% of all new domestic construction in the UK in the mid-1960s, a lifeline for the Crawley factory which manufactured over a thousand heaters per week. They extended their production area in 1965, not with barrel-vaulted roofing, but with a ramp to a flat roof car parking area. By 1966 the prototype of a low water content gas water heater had been developed, being the basis of modern central heating systems and was in production together with the 'Raymaster' radiant overhead gas heater and a gas-fired incinerator.

Fig. 8 William Sugg & Co. Ltd.

Within three years a hostile takeover bid by Thorn Electrical was accepted and the Crawley operation moved to Birtley, Co. Durham, in 1969. The original factory floor and front office block remain, having been occupied by a variety of users since 1970, including Redifon. The rear extension now forms a separate unit.

KDG Instruments Manor Royal (N) 195? -2004

The company manufactured hydrostatic and pressure gauges and other specialist measuring instruments. Originally sited in Manor Royal next door to Suggs in a small purpose-built factory, they moved to occupy the original Vent Axia and Axia Fans buildings in Fleming Way (Vent Axia having relocated to the opposite corner of Newton Road). Another move followed in the 1980s to a new factory in Crompton Road. The company remained on this site, with various name changes as part of the Mobrey Group, until c.2004 when they moved to Slough and are currently trading as Rosemount Measurement Ltd. The original factory premises survive in Manor Royal.

Fig. 9 Original KDG factory

Brentford Transformers (Later Electric)
Manor Royal (N) 1957- 1998

Moved from Kidbrooke in south east London to a 4.5 -acre site in 1957, with half the workforce of 270 relocating. The company outgrew the site and took over an adjacent factory (presumably KDG). In May 1990 the company moved to another site in Manor Royal and acquired a new modern factory to manufacture both its existing and new products, becoming Allenwest Brentford in 1994 until liquidation in 1998. The company's staple products were electrical power control systems, voltage regulators and voltage stabilising transformers, including a 'Highly Stabilised Power Supply' used for nuclear particle research. After the demise of Allenwest Brentford the intellectual rights to Brentford products were acquired by Transformers and Rectifiers who continue manufacture at their Guildford plant. The original factory was demolished and replaced by Compass House.

Silentbloc Manor Royal (N) 1954- 1989

Silentbloc Ltd., a subsidiary of T. V. André, automotive engineers, moved from Notting Hill Gate to an 11-acre site in 1954 for manufacturing anti -vibration components and flexible couplings for vehicles and industrial machinery. The factory was designed by J. M. Austin-Smith & Partners with the factory area being well lit by a glazed sawtooth roof, fronted by an impressive office block. The works was extended in the 1962-3, doubling capacity, when it employed between 250 and 400 workers and was the headquarters of the André Silentbloc group. In 1977 the company was taken over by the BTR group. The workforce in Crawley had been reduced to c.200 by 1983, partly because the site was no longer a head office. At the same time, however, the factory was re-equipped and the range of products extended to include aircraft engine mountings, bearings and mountings for railway trains, and marine engines. Closure came in February 1989 when production transferred to BTR at Birmingham. Silentbloc are still

Fig. 10 Silentbloc, 1954

trading as part of the Icon Polymer group in Staffordshire but the Crawley site has been redeveloped.

Redifon Ltd Gatwick Road (W) 1957-2011 Now part of Thales in Manor Royal

Redifon, a subsidiary of the Rediffusion Organization and a manufacturer of flight simulators and advanced training devices, moved from Wandsworth, London, to Crawley in 1954, initially to 'standard units' in Crompton and Kelvin Way before moving to a purpose-built factory in Gatwick Road in 1957. The factory had expanded from 90,000 sq. ft. in 1957 to 230,000 by 1985. Employees increased from c.450 in 1954 to a peak of c.1,800 in 1979, falling back to c.1,300 in 1985. The firm's name changed to Rediffusion Simulation Ltd. in 1981. In 1988 the company was bought by Hughes Aircraft and renamed HRSL (Hughes Rediffusion Simulation Ltd), only to be taken over in 1994 by the French company Thomson CSF, who merged the Crawley flight simulation business with that of Link Miles, and changed the name to Thomson Training & Simulation Ltd. In 2000 Thomson CSF re-branded itself as Thales (named after the 6th century BC Greek mathematician, astronomer and philosopher, Thales of Miletus.)

The Gatwick Road factory was demolished in 2011 and the site is now being developed as offices restaurant and retail with associated car parking and landscaping. Thales have moved their Crawley operations, which specialise in military applications, to the former MEL site at the corner of Manor Royal and London Road. Meanwhile, the commercial airline training part of the business was sold off in 2012 and became L3 Commercial Training Solutions, also based in Manor Royal on the redeveloped former W C Youngman's site.

Redifon was a major business with divisions operating from a number of sites in Manor Royal which are all now closed or merged.

Stone Platt Crawley Ltd Fleming Way (S) 1956

The Rail and General Engineering of J Stone (Deptford)Ltd relocated in 1956 together with the Lighthouse business of Chance Bros which Stone's had acquired the previous year. In 1958 J Stone (Holdings) Ltd merged with Platt Bros textile machinery manufacturers to form Stone Platt Industries and subsequently Stone Platt Crawley Ltd. Production at the Crawley factory included 'Vapor ' boilers (huge steam pressure boilers to keep

Fig. 11 Stone Platt (top) and Redifon (later Thales) c.1980

ships workable in docks), submersible pump motors, air conditioning, heating and lighting for railway carriages, glass lanterns switchgear and fog signalling equipment for lighthouses and lightships, with sizeable export contracts. Many can recall the Saturday morning foghorn testing. Problems arose in the late seventies with allegations that the profitable(?) electrical division at Crawley was supporting the textile arm. In March 1982 the banks stated no further loans were available and a receiver was appointed. A quick move by the ex-chief executive and other managers concluded a buyout of the 14-acre Crawley factory site for £14.8m renamed as Stone International Ltd. This traded until a rescue bid, becoming FKI Electrical in 1987, when the company left Crawley. During 1984 the site had been cleared, except for a few buildings used by Stone International, being subsequently redeveloped as Sussex Manor Business Park.

Building & Civil Eng HSM (Holiday Scheme Management) Ltd Manor Royal (S) 1963-present

The company administers the holiday with pay scheme and other benefits for the Building & Civil Engineering industry. Following the passing of the Holiday with Pay (for one week) Act in 1938, the company was set up, in 1942, by trades unions and the employers' organisations with equal board representation from both groups and an independent chairman; a structure that exists to this day. Relocating from Fulham Broadway a new building in Manor Royal was occupied in 1963; at the time this was the tallest office block in Crawley. Costing £750,000 it was hailed by the local newspaper as 'a gleaming palace.....where 340 lucky people are employed'. The move from just being a holiday stamp scheme developed from the 1970s and now accident and life policies and individual pensions

Fig. 12 Building and Civil Engineering HSM Ltd

are administered. The company, now known as B & CE, is still in Manor Royal and moved, in 2001, to new premises on the same site close to the London Road roundabout. The original building was demolished and a new 'high tech' factory built and occupied by GEW in 2012.

Sun D'Or Ltd Manor Royal/ Crompton Way 1952-c1989

A H Scrace's Young Randall & Co moved in 1952 from East Croydon with their Sun D'Or chocolate and sweet brands. With 150 mainly female workers the working hours were adjusted so that they started work at 7.30am and finished work at 4pm. This was to make sure that they could make their families' evening meals. Many fondly remember the misshapen 'rejects' purchased by the staff. By 1989 the factory was vacant. The site is now occupied by Schneider Electric, energy management services, formerly Invensys Ltd.

Fig. 13 Sun D'Or factory (*West Sussex Past Pictures*)

Lloyds Register Manor Royal (S) 1954-1989

Lloyds Register of Shipping had been engaged in the survey and classification of merchant shipping since 1760, with its head office in Fenchurch Street, London. The Printing House which produced the *Register of Shipping* and the *Register of Yachts* moved to the purpose-built site in 1954 together with the large letterpress machines. London subscribers to the posted edition of the Register Book had it regularly updated by hand, a service that had been continuously carried out since 1775. Sixty tons of paper per year were used for the Register Book and Appendix. Modern litho presses were introduced in c.1985 but the printing side of the business was sold in 1989, moving to Burgess Hill. A research block occupied part of the site with vibration, electronics and metallurgical laboratories for stress and strength testing used in mercantile accident investigation. The building still stands with a fine stairway to the first floor but the wavy roof construction to the printing floor is now obscured by parapets.

Fig. 14 The letterpress at Lloyds Register

F H Bourner & Co. (Engrs) Ltd Manor Royal (S) 1951-c.1975

Moved from Croydon in 1951. Manufacturer of 'Supataps'; where one could change the washer without turning off the mains supply. It is believed they were the standard fitting in all Development Corporation housing. Deltaflow, who probably acquired Bourners, used the premises to manufacture flowmeters, and are listed as being on this site in 1976. By 1986 Delmar Rubber and Plastics were in occupation. The original buildings have been subsequently demolished and replaced. Site now occupied by car dealership, Hendy.

Vitamins Ltd, Beechams, SmithKline Beecham, GlaxoSmithKline Manor Royal (S) 1953-2011

Vitamins Ltd re-located from Hammersmith in 1953 and set up its pill production operation in a spacious purpose-built factory which featured a tower, a popular architectural feature of the period. It was the second company to move after Youngmans, who also sported a tower, and before APV. Vitamins Ltd produced a wheatgerm breakfast cereal, 'Bemax'

Fig. 15 SmithKline Beecham factory

"the best known vitamin mineral protein food in the world", between 1927 and the 1970s as well as numerous other high protein pills and natural products. In 1955 two and half million pills were produced. Taken over by Beechams in 1967, production expanded to include pharmaceuticals. Following mergers with Smith Kline in 1987, and Glaxo in 2000 the company became the world's second largest drug maker producing medicines to treat Parkinson's disease, heart disease, HIV/AIDS, bacterial skin infections, depression, and hypertension with a workforce of 500 at Crawley. Closure in 2011 was blamed on "declining volumes, regulatory delays and patent expiries". The site was subsequently sold for £9m and the factory demolished 2012.

Telcon Metals Ltd Manor Royal (S) 1955-1989

Telcon Metals Ltd., an alloy and metal product manufacturer, was formed from the metals division of the Telegraph Construction and Maintenance Co. Ltd. of Greenwich (Kent) and moved to a 10-acre site in 1955 with 300 workers. An enlarged sheet metal shop was built in 1957, the laboratories and the foundry were extended in 1958 and 1967 respectively, and a cooling tower and pond was built in 1973. BICC Ltd. bought the company in 1959. The company produced specialised alloys such as Mumetal and Beryllium Copper. A process described in 1958 involved mercury in dies being frozen in a freeze tank and the resulting frozen mercury patterns, after removal from the dies, being dipped in a ceramic slurry to form a mould. As the mould warmed up the mercury ran out and the mould was fired at high temperature. These ceramic moulds were used for the casting of alloys to produce high quality castings for the aircraft, electronics and gas turbine industries. (*The Sphere* 9 August 1958 BNA).

Fig. 16 Telcon Metals (*West Sussex Past Pictures*)

Over 500 were employed in 1965 but this had declined to 234 in 1983, when 2½ acres of the site were sold. In 1983 the management bought the company and continued trading as a private limited company which in 1985 made alloys and metal products for the electronics, electrical, aircraft, automotive, and instrument industries. The factory and foundry closed in 1989 and was subsequently redeveloped. Telcon was, and is, a world leader in the field of soft magnetic cores and components including open and closed loop Hall Effect sensors. Its offices are based at Old Brighton Road, Lowfield Heath, Crawley.

M.S.E. Precision Manufacturers Ltd Manor Royal (S) 1955 –c.1985

M.S.E. Precision Instruments Ltd. (later MSE Measuring and Scientific Equipment Ltd), were centrifuge and scientific equipment makers, and moved its staff of 90 from Stratford East in 1955. Concentrating on export, the firm grew rapidly, employing c.500 people in 1964 and over 900 at its peak in the early 1970s and extending its premises correspondingly. It was sold to Fisons Ltd. in 1972 to form part of Fisons' scientific equipment division. In the later 1970s MSE was losing money; Fisons transferred production to Uxbridge and reconstructed MSE as a marketing company, reducing to only 85 employees in Crawley by 1985. The factory was later demolished and the site redeveloped.

Fig. 17 MSE Precision Instruments

Mallory Batteries, Duracell from 1980 Gatwick Road (W) 1961 - 1988

Mallory Batteries, an American company, who developed the constant voltage mercury battery for portable military equipment during WW II, which was later used for hearing aids, calculators and watches. Their UK subsidiary, established in 1947 at Dagenham, Essex, moved to a five-acre site at Crawley in 1961. The factory on the corner of Gatwick Road and Fleming Way manufactured mercury batteries for hearing aids and zinc carbon batteries for torches. During the 1950s 'Kodak' introduced cameras for use with flash guns and these required a new cell size AAA, also developed by Mallory, which in 1964 was branded as the Duracell (durable cell) alkaline battery and prompted a change of company name to Duracell in 1980. By this time a separate factory had been acquired in Napier Way for the manufacture of battery components. In 1988 the Gatwick Road factory, "which manufactures specialist long-life power packs for calculators, watches and hearing aids", closed with the loss of 350 jobs. The reason cited was the extraordinary long life of the batteries and market saturation but that "normal alkaline batteries would still be produced in factories at Crawley". However this would be short lived as the Napier Road factory closed in 1992 with the loss of a further 320 jobs, and production was transferred to Belgium. However the European HQ and Technical Centre in Manor Royal employing 300 staff remained until c.2000.

Fig. 18 Mallory Batteries

BOC Ltd (Part of the Linde Group since 2006) Fleming Way (N) 1960-present

A 1960 purpose-built factory for the British Oxygen Company, BOC, with a single-storey office frontage and large workspace behind. The long and low brick offices, now unused, have windows running the length of the building and a central canopied entrance; features typical of the period. Some windows retain their original Crittall metal frames. The site was sold in 2014 and the special gas manufacturing and research plant at the rear was demolished in 2016/17, but BOC Gases remain at present in occupation.

Fig. 19 British Oxygen Company

Upjohn Ltd Fleming Way (N) 1958-1999

In 1884 William Upjohn a U.S. physician patented the friable (easily digestible) pill. The patent describes a process of moistening, spraying and rolling the ingredients of the pill in a pan "until the pills have grown to the desired size". Upjohn also completed work on a machine to mass-produce pills by this method and in 1886 established the Upjohn Pill and Granule Co. In 1952 a UK subsidiary was formed , Upjohn of England Limited (Upjohn Ltd from 1961) entering into an agreement with Boots (the chemist) to manufacture Upjohn's products in return for know -how on "corticosteroids and antibiotics". In 1957 the company moved from their premises in Aldford Street, off Park Lane in Central London, to Crawley. A single-storey office block designed to take an additional floor at a later date and a warehouse with two temporary walls to allow expansion was initially built. In 1962 the buildings were rebuilt/re-modelled to provide pill packaging lines, research laboratories, purchasing and marketing departments in addition to the warehousing and distribution operation. Pharmaceutical and veterinary research etc. continued until 1995 when Upjohn merged with Pharmacia AB, a Swedish Company, to form Pharmacia & Upjohn Limited, and between 1996 and 1998 the UK operation moved to Milton Keynes. The building has now been incorporated into the Virgin Atlantic's training facility 'The Base'.

Fig. 20 Upjohn Ltd, 1958

Vent Axia Ltd Fleming Way / Newton Road 1958 - Present

Operating since 1936, when the company invented the world's first electrically operated window fan and famously installed two at Sir Winston Churchill's home at Chartwell in 1945 (the company retains his uncashed cheque). Axia Fans and Vent Axia relocated from cramped quarters in Palfrey Place near the Oval in 1958 and from Putney in 1959 to a four and a half acre site on the north-east corner of Fleming Way and Newton Road. Typical 1950s two storey offices fronted Fleming Way with separate factories behind for Axia and Vent Axia. In 1959, a merger was made with J E Hall of Dartford and Thermotank of Glasgow to form ventilation and refrigeration company Hall Thermotank. Profits dropped and the Axia fans division which supplied air conditioning to the shipping industry was sold in 1968. Results improved and a new factory was built for Vent Axia across the road on the opposite corner in 1971, the original factory being taken over by KDG, but now demolished. Acquired by the APV group in 1976 and sold to become part of Smith's Industries in 1992, before being acquired by the present owners, the Volution Group, in 2002. In recent years manufacture of domestic fans was brought back from China and the company now produces a range of heating, ventilation and air conditioning products with a staff of 270.

Corocraft/Swarovski Fleming Way (S) 1959-c.1998

In 1955 an American jewellery company Coro bought the British Jewelcraft business, but could not use their U.S. name because of the similarity to another British company Ciro Pearls. In 1958 the company moved from Charlotte Mews in Central London to Crawley. During the 1960s the Crawley company was a prolific and highly influential manufacturer of costume jewellery, marking its products 'Corocraft' or 'Jewelcraft'. Its pieces featured frequently in magazines from *Vogue* to *Woman's Weekly*. Assembly was undertaken mainly by female staff and there were many 'homeworkers' earning ' pin money'. Production under the Corocraft name continued until the mid eighties by which time Swarvoski U.K. were the owners and production was gradually transferred to their Brazilian factories. Model making and casting of jewellery patterns continued at Crawley and Fleming Way remained the registered office of Swarvoski U.K. until 1998. The original building remains with an altered office facade to Fleming Way .The premises were recently occupied by Pasta Reale but are currently disused.

Fig. 21 Corocraft

Ten Henbury and John Blackwell

Other factories shown on the map

Bowthorpe Holdings (Hellerman Electric Division) Gatwick Road (E)
Small electrical items, eg, terminals, sleeving, clips and wire.

T G Dowdall & Sons Ltd Gatwick Road (W)
Bird Cages and Domestic Hardware.

Felco Hoists Gatwick Road/Napier Way

Hirst Electronics Gatwick Road (E)
Welding equipment, power controllers, magnetic chargers, measuring instruments.

Lovell (SGB) Ltd Napier Way
Scaffolding and building plant.

Monogram Electric Ltd Gatwick Road (E)
Part of Dreamland group manufacturing electric blankets.

Salisbury Newton Road
Handbags, luggage and leather goods. Building remains though remodelled, currently occupied by TLC Electrical Distributors.

W J Saville Gatwick Road (E)
Manufacture and Processing of Cardboards, Papers and Plastics.

Triefus Industries Ltd Napier Way and later Priestly Way
Precision Industrial and Mining Tools. Diamond tipped drills.

Test Equipment Ltd Now Varian Medical Systems UK Ltd. Gatwick Road (W) 1955-present
Radiotherapy equipment.

Wicanders GB) Ltd Maxwell Road/Gatwick Road
Cork wall and floor tiles and other cork products.

FIFTY YEARS OF MILL RESTORATION

Philip Hicks

with contributions from Michael Chapman, John Harvey, Peter Hill, Brian Pike, Simon Potter and James Tasker

Over the last 50 years there have been enormous changes to the milling heritage of Sussex. Many mills have been rescued from an uncertain future and preserved for future generations. Several mills which were derelict or preserved as static landmarks by owners who lacked the financial resources to undertake substantial repairs have now been restored to full working order. Much of this would have been impossible without the enthusiasm and commitment of unpaid volunteers who have devoted so much of their time to fund-raising, public open days and even 'hands on' restoration work. Tribute should also be paid to the professional millwrights who have undertaken countless repairs to the county's mills.

Windmills

Argos Hill post mill has been in council ownership since 1955 and millwrights E. Hole and Son were regularly employed for renovation work, repairs and maintenance. During the fifty-year period they undertook various structural work and repaired storm and lightning damage. By the start of the twenty-first century the mill needed another major overhaul but Wealden District Council lacked the resources to fully implement the work and so the Argos Hill Windmill Trust was formed in 2010. A temporary steel support structure enabled millwrights to execute major structural repairs to the body and trestle. Both side girts were discreetly strengthened with hidden stainless steel plates. Work also included replacing one front corner post, some of the breast framing and much of the tail extension. Millwrights also made and fitted new sweeps. The volunteers have renewed the weather-boarding and fitted a new tail ladder and tailpole. It is intended to renovate the machinery and reinstate the fantail in the following years.

Jack and Jill windmills are iconic Sussex landmarks. Jill post mill was moved to Clayton from Brighton in 1852 and ceased milling in 1906. Some minor repairs were carried out in the 1940s and 1960s, but the mill then deteriorated. Henry Longhurst gave Jill to Cuckfield Rural District Council, later absorbed by Mid Sussex District Council, who closed the mill to visitors in the early 1970s. A steering committee of SIAS members, local residents and Council officers

Fig. 1 Argos Hill Mill, external restoration virtually complete, August 2016 (*Photo by Philip Hicks*)

Fig. 2 Jill Mill preserved as a static landmark in the 1960s (*Philip Hicks collection*)

Fig. 3 Jill Mill in working order and Jack Mill with newly restored cap, April 2017 (*Photo by Philip Hicks*)

was formed to plan Jill's salvation. A public meeting in September 1978 resulted in the formation of a preservation society, whose first major task was to recruit volunteers to assist with the removal (using ropes and pulleys) of the sweeps in January 1979. The society was fortunate to have the benefit of Frank Gregory's invaluable knowledge as well as the engineering and draftsman skills of many SIAS members including John Blackwell, Philip Spells and Martin Brunnarius. After some structural mill-wrighting work, including repairs to the crown tree, volunteers began restoring Jill, and have met on site virtually every Saturday for the past 37 years. By 1986 Jill was once again milling and her long-term future was secured. In addition to weekly routine maintenance, major works are scheduled on a seven year cycle.

Neighbouring Jack tower mill, however, is in private ownership. In August 1973 a new set of dummy sweeps were erected on behalf of Universal Pictures who used the two windmills as a filming location for 'The Black Windmill' starring Michael Caine. Following a change of ownership in 2013 another repair program commenced to renovate the curb, cap and reinstate a working fantail. Work is still in progress and will hopefully also include refurbishment of the tower and erection of a new set of sweeps.

In 1959 High Salvington post mill was acquired by the Borough of Worthing which carried out repairs and basic maintenance for many years. By 1976 major structural repairs were needed so responsibility for the mill passed to a charitable trust which intended to execute a full restoration. Much of the internal machinery was dismantled and a substantial steel structure was erected under the side girts which enabled the body to be raised up off the main post. The trestle and crown tree were completely renewed, as were many of the posts, braces, studs and joists. Following completion of the structural work, the weatherboarding was completely renewed. A new set of working sweeps were constructed based on old photographs and evidence from similar mills and erected using manual lifting equipment. Other work undertaken included reconstruction of the brakewheel, refurbishment of the machinery, rebuilding the tail ladder, scarfing a new piece of timber onto the end of the tail pole which had been shortened in the past, and erecting a traditional timber roundhouse. The mill is now in full working order and holds regular open days.

In 1967 the owner of Nutley post mill, Lady Castle Stuart, gave permission to a team of volunteers to carry out a restoration, but on condition that they did not dismantle the structure. Volunteers completely renewed the trestle and renovated the framework of the body which involved handling large timbers by blocks and ropes. In August 1972 temporary sweeps and sail cloths were fitted which could turn in the wind. It was a very proud achievement and was the first windmill restored by virtually all volunteer labour. The mill has regular maintenance, is in workable order and holds regular public open days.

Fig. 4 Nutley Mill in workable order, 2012 (*Photo by Philip Hicks*)

Fig. 5a (above) Oldland Mill, preserved in the 1960s (*Philip Hicks collection*)
Fig. 5b (below) Oldland Mill in working order, 2017 (*Photo by Philip Hicks*)

Oldland Mill was preserved by the Sussex Archaeological Society from 1927 who carried out occasional repairs but lacked financial resources to undertake full restoration. By the late 1970s concern regarding the mill's ongoing deterioration influenced the Hassocks Amenity Association to acquire a lease and later the freehold. Work progressed steadily during the 1980s using volunteer labour which involved removal of the single surviving pair of sweeps, erection of timber A-frame buttresses to stabilise the body, temporary removal of the machinery and replacement of the trestle and crown tree. Later the unorthodox decision was taken to completely rebuild the mill body as the extent of decay was revealed to be worse than previously assessed. During the early 1990s the new frame-works were sequentially constructed on site using green oak timber. The old body was then taken down and the new structure erected using manual lifting tackle. Since 2000 renovation work has included new weatherboarding, reconstruction of the roundhouse reusing the original bricks, erection of new sweeps and brakewheel and reinstatement of the auxiliary engine drive. Flour is milled regularly and Oldland Mill Trust has been established as an independent charity.

Polegate tower mill, built in 1817, was purchased for £1000 by the Eastbourne and District Preservation Society in 1965. Renovation work was subsequently undertaken by professional millwrights to overhaul the sweeps, reconstruct the fantail and reinstate the missing reefing stage. It was officially opened to the public by the Duke of Devonshire in 1967. Another phase of restoration work commenced in 1987 which involved removal of the cap by crane for repairs and to replace the timber and iron curb. Within two years the sweeps were again turning by wind power. The ongoing development of the premises has also included establishment of a tea room, toilet facilities, workshop and museum in the adjoining outbuildings. The museum has been furnished with models, illustrations, information boards and artefacts.

Fig. 6a Polegate Mill, semi-derelict in the 1960s (*Philip Hicks collection*)

Fig. 6b Polegate Mill restored, 2011 (*Photo by Philip Hicks*)

Fig. 7a Stone Cross Mill, disused in June 1993 (*Photo by Philip Hicks*)

Fig. 7b Stone Cross Mill in working order, March 2017 (*Photo by Philip Hicks*)

Following many years of neglect, the tower mill at Stone Cross was leased to a charitable trust in 1993 for a term of 99 years at a peppercorn rent to secure its preservation. In March 1997 volunteers removed the last intact original sweep using ropes and pulleys so it could be carefully recorded and later replicated. Restoration of the mill to full working order began in November 1998. The cap was removed and renovated at the millwrights' workshop in Reading, the exterior of the tower was refurbished, the cracked iron curb replaced, the internal machinery and flooring carefully restored and the old damaged roundel demolished and rebuilt. The restored cap was reinstated by crane in August 1999 and the new sweeps hung in the following September. Most of the work was funded by a large grant from the National Heritage Lottery Fund. Just under a decade later another major refurbishment was undertaken by mainly volunteer labour. The renovated cap, fantail and sweeps were re-erected by crane in November 2012 and the mill now produces flour and is regularly open to the public.

West Blatchington smock mill was purchased with surrounding land from the Abergavenny Estates by Hove Corporation in 1937 and was preserved as a landmark. The adjoining west barn was used for storage of council equipment until the local press published an article by the Planning Department of Hove Borough Council suggesting that the mill should be opened to the public. This resulted in a two-year project of clearing out, cleaning down and painting by individuals and groups of volunteers under the guidance and close scrutiny of one of the country's leading mill experts, Frank Gregory. By July 1979 the mill was opened to the public. Thanks to a small nucleus of enthusiastic volunteers, during the subsequent years all floors throughout the mill have been returned to 'as they were' and the loading floor used as a museum, displaying milling and farming artefacts along with beautiful scale models of some of our Sussex mills. Over the past 40 years the sweeps have been replaced twice, as has the skeletal fan tackle, the tower and cap have been reweatherboarded, the reefing stage rebuilt and several historic mill related machines have been acquired, authentically restored and put on display. One momentous event in the recent history was the construction of a new north barn. Although never intended to replicate the old one, it was built on the original footprint and has proved a tremendous asset not only for use as a tearoom and educational resource but also as a community meeting place, the hire of which helps boost repair and restoration funds. Continual maintenance is ongoing and the mill is regularly open to the public.

Fig. 8a West Blatchington Mill. Lifting the newly restored cap back onto the tower, 1999 (top).

Fig. 8b Fully restored, 2016 (bottom). *(Photos by Peter Hill)*

Fig. 9a Windmill Hill Mill, derelict in April 1991 (*Photo by Philip Hicks*)

Fig. 9b Windmill Hill Mill, restored to working order, May 2016 (*Photo by Philip Hicks*)

The post mill at Windmill Hill ceased milling in the late 19th century due to structural failure. The sweeps were removed and the roundhouse was partly modified to accommodate an extra pair of millstones driven by steam engine. The mill was later abandoned and slowly deteriorated. In 1993 the property was bought by Dr. and Mrs. P Frost. A steel support structure was erected to support the structurally unsafe body in advance of a full restoration. In 1996 the owners formed a charitable trust to which the mill was leased enabling applications for large financial grants and in 2001 the Heritage Lottery Fund awarded £577,000 - then the largest grant ever made for an individual mill. The unorthodox method of restoration involved completely dismantling the mill body and renovating it piece by piece at the millwrights' workshop in Reading. A large crane lifted the skeletal body back onto the post in 2004 and a new set of stocks and empty sweep frames were erected in the following year. To prove the strength and safety of the mill's trestle a survey, unique in molinology, was undertaken in conjunction with Newcastle University to measure the stresses imposed upon it. This took some three years from 2010 to 2012 of diligent monitoring to confirm the integrity of the structure. Further financial grants were eventually obtained to restore the machinery and add shutters to the sweeps. Work commenced in 2014 and was completed by late 2016 returning the windmill to working condition.

Some windmills such as Chailey, Halnaker, Punnetts Town and Rottingdean have been preserved as landmarks for several decades and have undergone several large repair programs. Chailey smock mill is often open to the public and is set up as a rural history museum. Rottingdean smock mill is also now open to the public and retains some of its basic machinery.

Fig. 10 Chailey Mill restored, March 2017 (*Photo by Philip Hicks*)

Fig. 11 Rottingdean Mill during renovation work in September 1999(*Photo by Philip Hicks*)

For many years the smock mill at Shipley was cared for by a trust and team of volunteers with support from West Sussex County Council. It was restored to working order by millwrights in 1988-1992 and much maintenance work was subsequently undertaken by volunteers but the mill closed to the public in 2009 in consequence of the owner's decision not to renew the lease to the charitable trust. The post mill at Icklesham was restored to workable condition by the owner in the late 1980s/ early 1990s but there is no public access.

Cross-in-Hand post mill was the last commercial working windmill. Milling ceased when the sweeps were damaged by a storm in 1969. Various repairs have been undertaken by the owners, the Newnham family, including various structural work, some new weatherboarding, and various weatherproofing. In recent years, groups of mill enthusiasts have assisted the owners with weatherproofing the building and have raised funds to employ millwrights to repair the two severely decayed cross tree/quarter bar joints.

Many derelict remains have been converted into living accommodation including the post mills at Harebeating and Lower Dicker, smock mills at Cuckfield, Hunston, Lewes and Lunsford Cross and tower mills at Angmering, Arundel, and Nyetimber.

Fig. 12a Nyetimber Mill, derelict in the 1960s (*Philip Hicks collection*)

Fig. 12b Nyetimber Mill converted into living accommodation, 2012 (*Photo by Philip Hicks*)

The tower at Nutbourne has been converted into premises for the adjoining vineyard. The restoration of Barnham tower mill progressed well during the late 1990s/early2000s including reconstruction of the missing reefing stage, renovation of the cap, reinstatement of the missing fantail, refurbishment of some of the floors and machinery and erection of a new set of stocks with much of the work funded by a café successfully established in an outbuilding. Unfortunately, several setbacks including the loss of customer parking facilities lead to the closure of the café and later listed building consent was granted to convert the premises into living accommodation.

Fig. 13 Ashcombe Mill, the excavated pier foundations of the original mill (*Photo by James Tasker*)

The six sweep post mill at Ashcombe was built in 1828 by millwright, Samuel Medhurst and collapsed in the spring of April 1916 during a storm. Archaeology was all that survived in 1960; three of the four main brick foundations to the trestle remained together with the small flint footings below the roundhouse stools and the wooden post holes to the adjacent granary. A large number of small cast iron parts were found during the archaeological excavations and many broken shutter cranks were also found lying on the surface in the field, still there some 90 years after the mill had collapsed. Reconstruction commenced in 2007 using old photographs to replicate the original external appearance of the mill. In view of the very high horizontal wind load on the six sweeps, which is around 20 tons at a wind speed of 100 mph, the replica mill incorporates a steel frame which will also avoid the 'head sick' problem that beset the original mill. Steel has also been used for the sweeps, to increase their life expectancy, but with wooden shutters. The steel sizes duplicate the original timber sizes as far as is practicable. The replica will act principally as a turbine but may incorporate a pair of millstones in the future. It is privately owned with no public access.

Fig. 14 Ashcombe Mill, the replica (*Photo by James Tasker*)

Sadly there have also been some windmill losses. The eighteenth-century post mill at Winchelsea, was preserved as a landmark by the National Trust although virtually all the machinery was removed and the original oak structure replaced with steel. The Great Storm of October 1987 caused the entire mill to topple over and crash to the ground. Now the four brick piers and a pair of millstones are all that remain at the site. In the 1980s the truncated mill tower at Eastbourne and in 2002 the roundhouse at Angmering were demolished for new housing developments.

Fig. 15 Winchelsea Mill, collapsed during the Great Storm of October 1987 (*Photo by Simon Potter*)

Watermills

The situation regarding the county's watermills is rather different. There are still many examples standing derelict. Only a few have been restored and opened to the public.

Park Mill at Batemans, Burwash, was part of Rudyard Kipling's estate. He removed the old waterwheel in 1903 and installed a turbine to generate electricity for the property. Between 1969 and 1975 a major restoration project was undertaken by the National Trust as the mill had fallen into a poor state of repair. The Royal Engineers rebuilt the turbine-generator which had been damaged by frost and a team of volunteers executed the renovation of the building and machinery, including replacing the water wheel. The ground floor was reconstructed, the leaking roof overhauled, defective brickwork was made good and the external weatherboarding replaced. Milling of flour continued until 2015 when the 40-year-old axle tree began to fail. Following a major fund-raising initiative another renovation programme commenced which included improvements to the mill's water supply to enable more frequent milling to take place and in 2016 a new axle tree was created by Ian Clark Restorations.

Fig. 16 Park Mill at Batemans, Burwash, restored, April 2014 (*Photo by Philip Hicks*)

In 1974 the disused Ifield Mill was compulsory purchased by Crawley Borough Council who allowed a group of volunteers to undertake some restoration work. Hydraulic jacks were used to raise the timber structure to allow replacement of rotten load bearing beams. Retaining walls had to be rebuilt and the oak and iron waterwheel was partially rebuilt. Most of the work was undertaken by unpaid volunteers and some unemployed people

enrolled in a job creation programme. The waterwheel has since been rebuilt using a grant from the National Heritage Lottery Fund and in recent years volunteers have been installing a variety of carefully restored historic machines and artefacts including an animal feed grinder, seed polisher, grain conveyor and flour grader. The mill is occasionally open to the public.

Lurgashall Mill was donated to the Weald and Downland Museum by the Leconfield Estate in 1973. At the new site, it was necessary to excavate and create an upper and lower millpond to provide a sufficient flow of water to turn the waterwheel. The building was carefully dismantled and re-erected stone by stone and timber by timber. Work was completed by the end of 1977 although renovation of the machinery and interior took a further three years. The mill now regularly produces flour and is regularly open to the public.

At Michelham Priory Mill all machinery was removed after 1924 when milling ceased. For a time, a turbine was installed in the mill race to drive a

Fig. 17a Michelham Mill in 1976 (*Photo by John Harvey*)

Fig. 17b Michelham Mill, restored with replica iron water-wheel, 2010 (*Photo by John Harvey*)

generator to make electricity for the main house. The mill was restored twice in the 20th century. In 1971 the Friends of Michelham Priory led a project to return the derelict mill to working order. A new wooden waterwheel was installed in 1972 and the rest of the machinery was refurbished during the following three years. The mill, operated and maintained by volunteers, ran regularly until 1994 when the wooden waterwheel failed. Cast iron was chosen instead of timber to reflect the last-known original wheel in addition to maintenance and efficiency considerations. The new wheel, with a new horizontal shaft, pit-wheel and wallower, were installed by Janes of Wimbourne in 1997.

Mills at Frant, Hellingly, Horsted Keynes and Sheffield Park water mill have also been restored by their private owners. Plumpton Mill has been renovated and now works commercially. The following watermills have recently been converted into living accommodation or other purposes: Balcombe, Bignor, Bosham, Chiddingly, East Grinsted, Fittleworth, Fletching, Hartfield, Henfield, Heyshott, Cobbs Mill at Hurstpierpoint, Isfield, Lindfield, Mayfield, Upper Mill at Plumpton, Storrington, Terwirk, Uckfield, West Lavington and Warnham. There are currently plans to convert High Hurstwood, Speldhurst and Brewhurst Mill.

Fig. 18 Plumpton watermill , working commercially in 2008 (*Photo by Philip Hicks*)

Fig. 19 Cobbs Mill at Hurstpierpoint, house-converted but retaining much of the machinery, 2014 (*Photo by Philip Hicks*)

COULTERSHAW SINCE 1967

Robin Wilson

The restoration of the waterwheel-driven Coultershaw Beam Pump was one of the first projects undertaken by the Society. The Pump was installed in 1782 by the 3rd Earl Egremont alongside the corn mill at Coultershaw on the River Rother 1½ miles south of Petworth. The Pump provided a supplementary water supply to Petworth House and town, pumping river water into two cisterns in the town. The mill was burnt down in 1923, replaced by a steel framed concrete structure in 1924 and finally demolished in 1973 leaving the remains of the Beam Pump in a basement underneath what had been a garage and office building above.

Fig. 1 Demolition of the former concrete Coultershaw Mill in 1973

In !975 Gerry Nutbeem, a WSCC Planning Officer and trustee of the embryonic Amberley Chalk Pits Museum, drew the attention of Alan Allnut to the Beam Pump. Alan Allnut, a retired civil engineer, was the West Sussex Secretary on the SIAS Committee. The Pump was inspected and found to be in tolerably good condition, albeit partially buried by rubble from the demolished mill. Lord Egremont was approached and gave his support to a proposal to restore the Beam Pump to working order.

The first working party took place on 27 September 1975. Access was gained through a lower window above the tailrace. The waterwheel was found to be breast-shot, 12ft diameter; 4ft 6in wide, with a crank shaft driving a three-throw pump, and in tolerably good condition. The river side bearing of the wheel was completely buried but found to be intact. The machinery was cleared and the pump turned by hand demonstrating that it was not seized.

The following year a site hut, provided by Messrs Longley, was erected and electricity laid on. Volunteers led by Alan Allnut, Gerry Nutbeem and Michael Palmer, working on alternate Sundays, replaced timber parts, restored the machinery including a new connection between the wheel-shaft and the crankshaft which was found to be permanently out of alignment. Grants were received from West Sussex County Council (Coast and Countryside Committee)) and the Department of the Environment (Ancient Monuments Branch).

In January 1978 Planning Approval was obtained for the erection of a traditional timber-framed building over the Beam Pump for protection and to provide an exhibition space. Lord March gave his permission for the transfer of a cart shed from the Goodwood Estate, which volunteers re-erected at Coultershaw. The heavily-cracked concrete slab, once the floor of the garage, was replaced by a timber floor in the new pump house. The underground pipe to Petworth was blocked beyond repair and a fountain was constructed at Coultershaw to demonstrate the Beam Pump operation.

The restored Pump ran for the first time on 11 May 1980, (Alan Allnutt, Michael Palmer and Chris Bryan present) The Pump was ceremoniously restarted by Lord Egremont on 20 July 1980. The Beam Pump

Fig. 2 Beam pump restored, July 1980

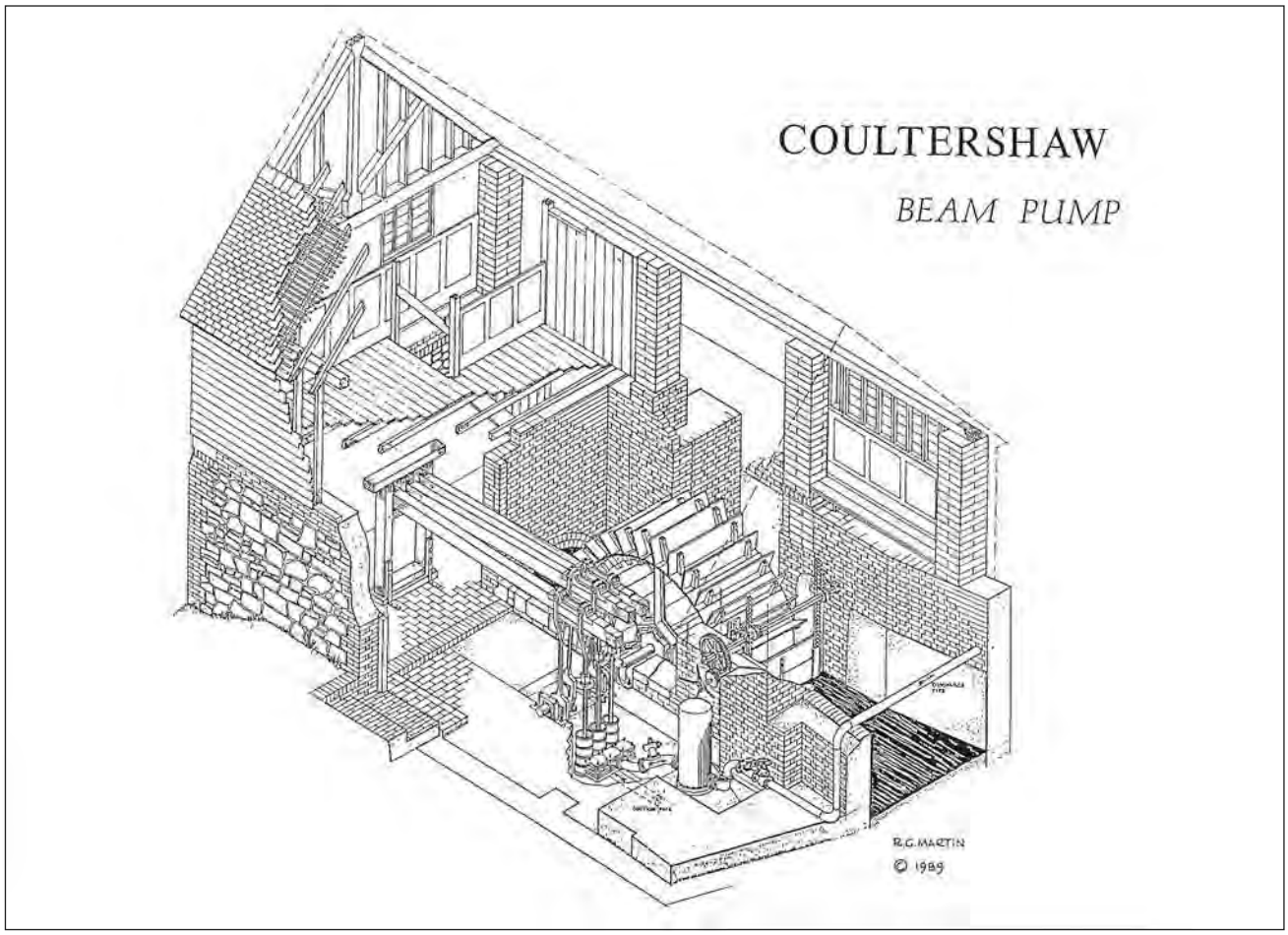


Fig. 3 Isometric drawing of Coultershaw Beam Pump by Ron Martin

has been open to the public ever since on the 1st and 3rd Sundays in the month, and all Bank Holiday Mondays from April to September. Volunteers have acted as Stewards showing visitors round. Working parties have continued improving the Pump House display, adding to the historic collection of pumps and doing maintenance tasks. Alan Allnut sadly died in 1989; Michael Palmer took over as Chairman of the Coultershaw Group. Stalwart supporters included Chris Bryan, Peter Parrish, Terry Allen, Michael Bevan, Frank Gregory, Colin Webb. Fred Jay, Roy Jennings, Don Cox, Tony Baxter, Leslie Martin, Phil Herrington, Kate Cosway, Steve Boakes, Alan Brown, Howard Browne and Rolf Rowling. Visitor numbers increased to over 700 in the year. The Pump was Scheduled as an Ancient Monument in June 1981.

The restoration of the Beam Pump was followed by other initiatives to improve the Heritage site. The National Conservation Corps landscaped the area round the Mill Pond, improving footpaths, constructing revetments and planting. The National River Authority dredged the river south of the Mill Pond clearing tons of accumulated silt. In 1983 the WSCC (led by Gerry Nutbeem) persuaded the Manpower Services Commission to facilitate the restoration of the stables once used by horses pulling boats on the Rother Navigation.

Volunteers installed three new sluice gates (1985). The River Authority converted one sluice into a fish ladder (1988) and in 1989 attempted to construct a fish ladder round the weir in the by-pass stream (Tumble Bay, where local children swam). The partially constructed structure and the old weir were washed away in the autumn floods. The weir was replaced by the current concrete structure, and later (1990) raised with rag bolted timbers with a V notch, to correct the water level upstream which was too low to drive the Beam Pump. In 1988 police divers on a training exercise first discovered the void under the sluice structure. The Rother Valley Project volunteers built steps over the flood bank by the Warehouse.

The Racehorse public house (previously the Railway Inn) became the Badger and Honeypot, later just the 'Badgers'. Petworth Old Station became a private residence later converted into bed & breakfast

Fig. 4 Exterior of pump house, showing the fountain.

accommodation, supplemented in 1999 by two Pullman coaches, two more in 2001.

The first Evening Opening took place on 18 July 2001 when in the presence of over 100 invited guests, Lord Egremont unveiled a plaque to commemorate the 21st Anniversary of the restoration of the Pump. The Evening Opening is now an annual event each summer.

Michael Palmer stood down in 2001 and was succeeded as Chairman by Robin Wilson, a retired civil engineer living locally. A new trust – The Coultershaw Trust - was formed in December 2001. Four trustees from SIAS – Gerry Nutbeem, Michael Palmer, Tony Baxter and Robin Wilson were joined by four trustees from The Petworth Society – Andy Henderson, Steve Boakes, Tim Martin and Jean Gilhooly. In May 2002 the Trustees were incorporated as a company limited by guarantee. The object of the Trust is to "to advance the education of the public by affording them access to the Beam Pump at Coultershaw ..... and its surrounding environment as would have existed during its working life." SIAS transferred the assets of the former Coultershaw Group to the new Trust. Robin Wilson was appointed Chairman and Secretary; Andy Henderson was appointed Treasurer.

With the strong support of Anne Bone, then Arts and Heritage Development Manager at the Chichester District Council, the Trust was registered as a separate charity on 20 February 2003. Prior to the formation of the Trust, members of SIAS worked on the Coultershaw site by kind permission of Lord Egremont; there was no legal entitlement. Subsequently the Trust was able to obtain a 20-year-lease from the Leconfield Estates at a nominal rent, to raise funds and to apply for grants. The Estate also facilitated Employers and Public Liability Insurance.

After a long learning period, and with advice from Anne Bone, the Trust submitted an application for a Heritage Lottery Project Planning Grant towards the cost of developing a Conservation Management Plan for the site. The application was made on 3 March 2005. A grant of £31,500 was awarded on 17 March 2006; the Estate and the Trust each contributed £1,000. After competitive proposals Richard Andrews of Carden & Godfrey Architects was appointed Lead Consultant. The Report on the Plan was received on 7 September 2007. The Report included an analysis of the historical significance of the site, a survey of the condition of the existing buildings, an Access Plan, an Audience Development Plan and policies for future conservation and management. A Report on the Industrial Archaeology of the site prepared by Ron Martin was submitted as a separate document.

The Conservation Management Plan Report also included a further report on the void under the sluice structure, discovered by police divers. The Estate commissioned a further survey in September 2001 which showed that the extent of the void had increased considerably extending over the full width and to half the depth of the structure. There are many opinions as to the cause of the void. The original waterwheel in the wheel pit was replaced by two vertically mounted Francis turbines, one in 1908 and the second in 1928; these were removed when the mill was demolished in 1972; the wheel pit was then used for flood relief, the flood passing unrestricted through the draft tubes of the turbines.

Fig. 5 Turbine in former wheel pit. Archimedes screw driving 15kW generator.

If the invert of the lower turbine draft tube broke up under this loading, flood water would have washed progressively into the foundations of the structure.

The Coultershaw Group of volunteers meets annually at the end of each season. In 2007 the meeting noted the installation of a turbine to generate electricity at Guildford and suggested one could be installed in the Coultershaw wheel pit. Lord Egremont funded a pre-feasibility visit by consultants, who indicated that the site conditions could support an Archimedes Screw generating 11kW. In October 2008 the Trust obtained a grant from the South Downs Sustainable Development Fund of £3,700 towards the cost of commissioning consultants to prepare a Scheme Design to confirm feasibility and cost. An Environmental Appraisal of the turbine proposal was prepared incorporating a Flood Risk Assessment, a Fisheries Impact Assessment and an Ecological Appraisal. Planning Approval was obtained on 25 March 2010. The Environment Agency issued a Licence to Impound Water on 22 March 2010 and a Flood Defence Consent on 5 May 2010.

The estimated cost of installing an Archimedes Screw in the wheel pit of the old corn mill generating 15kW, including works to fill the void under the sluice structure, was £187,956 + vat. The forecast income from power generated was £15,600 per annum. It proved impossible to obtain grants at this level, and in the event the project was funded by The Leconfield Estates, with a further contribution from the South Downs Joint Committee. The scheme was designed by Derwent Hydro, J T Mackley & Co were the civil engineering contractors, the Archimedes Screw and generator were supplied by Spaans Babcock in Holland. Robin Wilson acted as Project Manager on behalf of the Estate.

The work started in July 2011 and was not without difficulty. The temporary cofferdam to enable the work to be carried out 'in the dry' failed twice; the resulting scoured riverbank was repaired with rock-filled gabions, and a munitions contamination survey was necessary to check that sheet piling would not disturb a suspected unexploded bomb. Divers placed over 50 tons of cement grout in voids under the sluice structure, and the original wheel pit, which had been backfilled with rubble from the last corn mill, was excavated by hand and re-filled with mass concrete.

The 6-ton screw, complete with gearbox and generator, was lifted into the wheel pit on 15 March 2012 – it was a tight fit, less than 30mm on each side. The final cost was nearly double the original estimate. The generator was commissioned on 28 March 2012. Volunteers subsequently manufactured and installed acoustic panels to reduce noise nuisance on neighbouring properties. The turbine was formally switched on by Lord Egremont on 11 July 2012. The Trust receives a management fee from the Estate which recognises the contribution made in realising the asset and managing the project.

The Conservation Management Plan included an Outline Development Plan. The development proposals comprised the restoration of the Warehouse next to the stables as an education room with toilet facilities; the refurbishment of the Pump House with improved interpretation of the site; the restoration of the Engine House including the return of the original 1937 engine. The Plan also included extended safe access for visitors across the site by

Fig. 6a Warehouse in a state of collapse, 2012.

Fig. 6b Warehouse restored in 2013.

building two new bridges, one across the river above the sluices and the other a boardwalk to the west bank.

Terry Adsett of Smiths Gore provided architectural services. The WSCC gave permission for their standard footbridge design to be used for the bridge above the sluices, supplied and erected by Caroway Contractors. The boardwalk to the west bank was to be built by Coultershaw volunteers. Detailed designs and estimates were prepared to inform a Planning Application and an application for a Delivery Stage grant from the HLF. Planning Approval was received on 10 November 2009.

At this stage the Trust learnt that the HLF had revised their procedures for grant application. Every application had to go through a two-stage assessment. The project must include the cost of fitting out and additional interpretation of the expanded site. The application must be accompanied by an Activity Plan detailing the activities which will be offered to visitors to achieve the HLF objectives of 'learning, participation and conservation'.

A First Round Application was made on 3 March 2011.The application was for further development work including for a Learning Consultant, a Museum Design Consultant and a Consultant to draft the Activity Plan. A grant of £30,100 was awarded on 14 June 2011. Much of the input was made by Robert Taylor and Elaine Sansom, Trustees.

A Second Round Application was submitted on 30 May 2012. The application was for a grant of £244,400 towards the cost of £322,817 for delivering the project. Further grants were received from South Downs National Park Authority (£20,000) and Chichester District Council (£15,000). The value of volunteer time on the project was over £40,000. The full grant of £244,400was awarded on 17 October 2012. Formal permission to start was given on 19 November 2012.

Following competitive tenders Lucking Bros were appointed contractors for the building work. Caroway Contractors of Rowlands Castle were appointed to supply and erect the steel footbridge across the river above the sluices. Progress was delayed by winter weather and flooding. Work to repair the Engine House wall was greater than expected.

The boardwalk—Chandlers Walk—from the Engine House to the coal yard on the west bank was built by volunteers and opened by Rob Sadler on the Evening Opening on 17 July 2013. Rob is the grandson of Fred Sadler who started the business at Heath End in 1945. Unfortunately in the extreme floods in December 2013 the river above the sluices overflowed into the old channel of the Navigation, picked up a vast quantity of debris which collected against the newly-built boardwalk and washed it away. In the following six months the volunteers rescued about 60% of the timber and rebuilt the board walk with a longer and higher span over the Navigation Channel, with generous grants from individuals and South Downs National Park Authority.

Fig. 7 First boardwalk washed away in the floods of December 2013

Following completion of the building work, the fitting out included new display panels and a model interpreting the site, new furniture, a display of George Garland photographs in the Warehouse, working models of the beam pump and the Archimedes Screw, and a full size model horse in the stables! The completion of the Restoration Project was celebrated at a party on the evening of Wednesday 16 July 2014. The event was held in the restored Warehouse with a marquee attached. Over 120 guests enjoyed wine and refreshments on a magnificent sunny evening with the Petworth Town Band playing under its colourful awning. Lord Egremont unveiled a commemorative plaque and joined other speakers in congratulating the volunteers on their achievement.

The Trust was awarded a Sussex Heritage Award 2015 for the Restoration Project. The award is a hand-crafted slate plaque which is now displayed in the Pump House. The Volunteers received a Judges Special Commendation. The certificate reads:

Fig. 8 View across the Mill Pond showing the second boardwalk constructed at a higher level, refurbished engine house, fish ladder, two sluice gates and Archimedes Screw.

> "for exceptional contribution to the Coultershaw Site. The volunteers are at the heart of the group with strong links to the local community, their enthusiasm for their work and achievements are outstanding".

The Trust depends on admission receipts and donations for the operation and maintenance of the Site. Friends of Coultershaw are supporters who give regularly to the Trust; like-minded groups use the Warehouse for meetings and courses and give generously. Although the Archimedes Screw has had periods of not generating due to debris, equipment failure, floods and droughts, the Trusts income from the management fee is significant and provides a useful contribution towards further restoration of the site. 361,342 kWh have been generated in first five years of operation at a load factor of 55%.

There are currently nine Trustees:

Robin Wilson, *Chairman & Secretary, Retired Civil Engineer. Appointed 2002. Lives in Fittleworth.*

Tim Martin, *Industrial Conservator, appointed 2002. Lives in Brecon.*

Robert Taylor, *Museum Consultant, formerly Director Amberley Museum. Appointed 2005. Lives in Amberley.*

Elaine Sansom, *Museum Consultant and Trustee Weald & Downland Museum. Appointed 2011. Lives in Haywards Heath.*

Chris Davies, *Retired electrical/mechanical/engineer. Appointed 2012. Lives in Duncton.*

David Davison, *Retired automotive engineer. Appointed 2015. Lives in Barnham.*

Tony Sneller, *Part time University Lecturer in History & Social Policy. Appointed 2015. Lives in Petworth (former member of Town Council).*

Michelle Clifford, *Retired primary school head teacher. Appointed 2016. Lives in Pulborough.*

Philip Stephens, *Treasurer, Retired civil engineer. Appointed 2016. Lives in Petworth.*

PUBLICATIONS

Previous numbers of *Sussex Industrial History* still available:-

No. 2 (1971)	Dolphin Motors of Shoreham; Lime Kilns in Central Sussex.
No. 3 (1971/2)	Lewes Population 1660-1880; Kingston Malthouse.
No. 5 (1972/3)	East Sussex Milestones; West Brighton Estate; A Bridge for Littlehampton 1821-2.
No. 18 (1988)	The Windmills and Millers of Brighton (revised edition).
No. 19 (1989)	Leather Industry; Bignor Park Pump; Lowfield Heath Mill; B.M.R. Gearless Car; Wadhurst Forge.
No. 20 (1990)	William Cooper, Millwright; Foredown Hospital; Ford Trimotor & Aerodrome.
No. 21 (1991)	Quick's Garage, Handcross; Punnett's Town Wind Saw Mills; Hollingbury Industrial Estate.
No. 22 (1992)	Swiss Gardens, Shoreham; Seven Brighton Brewers; Mill Bibliography; Beddingham Kiln.
No. 24 (1994)	Pullinger's Mouse Trap Manufactory; Ice Houses; Forest Row Mills; Lewes Old Bank; Lumley Mill; Estate Industry at the Hyde; Slindon Bread Ovens.
No. 25 (1995)	Ricardo at Shoreham; Windmill Hill Mill; Portslade Brewery; Brighton General Hospital; Bognor Bus Station; Kidbrooke House Farm; Contents of *Sussex Industrial History*.
No. 26 (1996)	Eastbourne Buses; Sussex Lidos; The Sea House Hotel; Bishopstone Tide Mill; Mountfield Gypsum; Uckfield Workhouse; Brighton Oven; Medieval Water Mills.
No. 27 (1997)	Sheffield Park Garden Hydraulic Works; Brighton Tunbridge Ware Industry; Railway Cutting Excavation; Eastbourne Mills; Tunnels of South Heighton; Sussex Lime Kilns.
No. 30 (2000)	Balcombe Tunnel; Ditchling Common Workshops; Midhurst Whites; Keymer Brick & Tile Works.
No. 32 (2002)	Henry Turner, Brickmaker; Crawley Water Company; Tamplins, Brewers; Ifield Steam Mill; Burgess Hill Pug Mill.
No. 33 (2003)	H.A. Waller & Sons; Electrical Generation at High Salvington; C.V.A./Kearney & Trecker; Cocking Lime Works; Nutley Windmill; Longleys at Christs Hospital.
No. 34 (2004)	West Sussex Brewers; Swanbourne Pumphouse; Hammond Family and Mills; Shoreham Cement Works; Pullinger's Registered Designs; Balcombe Road Forge, Crawley.
No. 35 (2005)	Halsted & Sons of Chichester; Swanbourne Pump House, Arundel; Concrete Shipbuilding at Shoreham; Turnpike Roads to Chichester, Petworth and Midhurst.
No. 36 (2006)	The British Syphon Company; Turnpike Roads to Arundel, Worthing and Littlehampton; Brewers of East Sussex; West Hill Cliff Railway, Hastings—Engine Room; The Lamp Posts of Ditchling.
No. 37 (2007)	Poynings Mills; Lavington Park Pump House; Tollhouse and Milestone Survey; A Colonel Stephens 'Find'; CVA Eaton Road, Hove; Cowfold and Henfield Turnpike (Part 1).
No. 38 (2008)	Brighton Brewers; Rottingdean Mill; Turnpikes to Horsham; Cowfold and Henfield Turnpike (Part 2); CVA at Coombe Road Brighton.
No. 39 (2009)	*Sussex Mills*: Windmill Sweeps in Sussex and Kent; Alfriston Tower Mill; Earnley (Somerley) Windmill; Isfield Water Mills; Duncton Mill.
No. 40 (2010)	Norman & Burt of Burgess Hill; Shipbuilding at West Itchenor; Winding St. Warehouse, Hastings; Midhurst North Mill; Turnpikes to Steyning, Henfield & Shoreham.
No. 41 (2011)	The Arun Navigation and Hardham Tunnel; Sources for Sussex Mills, Millers and Millwright Research; The Canal Pumping Station at Ford; Hollingbury and the Airbus; Turnpikes to Brighton.
No. 42 (2012)	Preston Manor Pump House; Windmills on Juggs Lane; Hollingbury and the Change to Decimal Currency; C & H Tickell, Ironfounders; Turnpikes to Lewes and Newhaven.
No. 43 (2013)	Printing Works, Chichester; Heathfield Natural Gas; Argos Hill Mill; Turnpike through East Grinstead; Turnpikes of the High Weald.
No. 45 (2015)	Turnpikes to Eastbourne; George Allen, Ironmonger; Windmill Caps; Phoenix Ironworks; Friends of Forest Row.
No. 46 (2016)	T H Myres Railway Architecture; Bedfordwell Pumping Station, Eastbourne; Brighton Tram Shelters; Turnpikes to Battle and Hastings; Hempstead Early Fulling Mill.

Copies are available at £2.75 (to include post and packing). For a list of articles in volumes no longer available see *Sussex Industrial History* No. 25. The Treasurer is prepared to quote for photocopying articles in these issues that can be supplied at cost.

Also available: M. Beswick, *Brickmaking in Sussex* (revised edition 2010) £8.00 (plus £2.00 post & packing)
F. Gregory, *A Sussex Water Mill Sketchbook* £3.00 (plus £1.25 post & packing)

Orders with remittance (payable to SIAS) to:-
P. J. Holtham, 12 St Helens Crescent, Hove BN3 8LP Tel. 01273 413790 email: pandjholtham@virginmedia.com

Redifon/Thales factory in Gatwick Road, Crawley, prior to demolition in 2011
(*copyright Anthony Rouse*)

Coultershaw Beam Pump—pump house and fountain