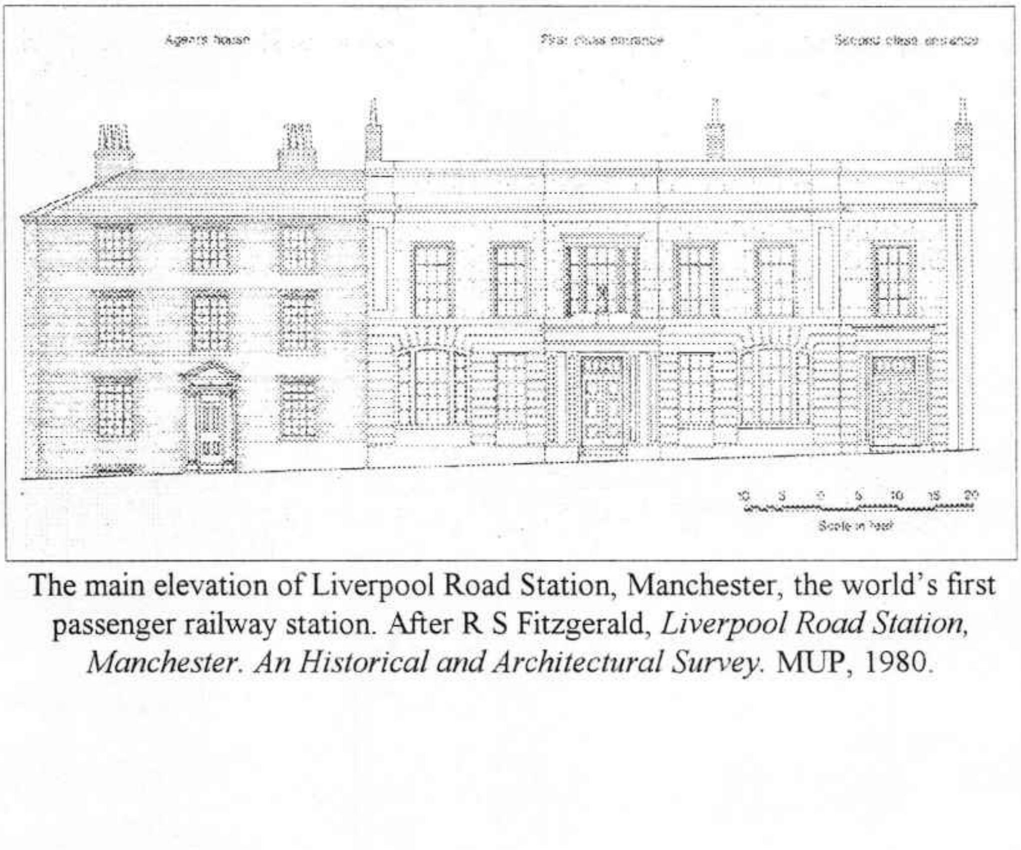
Association for Industrial Archaeology Manchester 2000 Conference

Tour Notes for 9th to 14th September



The main elevation of Liverpool Road Station, Manchester, the world's first passenger railway station. After R S Fitzgerald, *Liverpool Road Station, Manchester. An Historical and Architectural Survey.* MUP, 1980.

Compiled by:

The University of Manchester Archaeological Unit &
the Greater Manchester Archaeological Unit

THE UNIVERSITY
of MANCHESTER

Association for Industrial Archaeology
Manchester 2000

Background notes

The tour notes have been compiled by Robina McNeil, Sue Mitchell and Liz Varley. We are grateful to the numerous people who contributed to the notes with generosity, good humour and hard work.

Itineraries

Saturday 9 September

Tour A	Manchester and Salford - the Archetype City of the Industrial Revolution - Worsley, Delph and the Bridgewater Canal *Robina McNeil & Roger Lorenz*
Tour B	Bolton: Spinning and Steam *David Lewis & Angela Thomas*
Tour C	Coal, Iron and Canal - The Parkbridge Iron Works *Mike Nevell*

Sunday 10 September

Tour D	Manchester and Salford - The Archetype City of the Industrial Revolution - Ancoats *Robina McNeil*
Tour E	Castlefield - Communication, Transport and Storage *Derek Brumhead*
Tour F	The Museum of Science and Industry in Manchester *Alison Taubman & Pauline Webb*
Tour G	Warehouses - The Functional Tradition *David George*
Tour H	The Pump House *Steve Little*

Monday 11 September

Tour Ja	Winsford Salt Mine *Gordon Browne*
Tour Jb	Northwich Town Centre and the Salt Museum *Andrew Fielding & Robina McNeil*
Tours Ja&b	Lion Salt Works and Anderton Boat Lift *Andrew Fielding*
Tour K	Mills and Industrial Landscapes - Cheesden Valley, Helmshore Mill and Queen Street Mill *Ian Gibson*

Tuesday 12 September

Tour L	Coal, Iron and Canal - Parkbridge, Portland Basin and the Ashton and Peak Forest Canals *Mike Nevell*
Tour M	The Torrs Industrial Trail *Derek Brumhead*

Wednesday 13 September

Tour N	Mills in Oldham, Rochdale and Bolton *Roger Holden*
Tour O	From Coal Pit to Canal *David George*

Thursday 14 September

Tour P	Quarry Bank Mill, Styal *Gordon Browne*

Tour A Saturday 9 September
Manchester and Salford the Archetype City of the Industrial Revolution
Part 1- Worsley, Delph and the Bridgewater Canal

The Bridgewater Canal

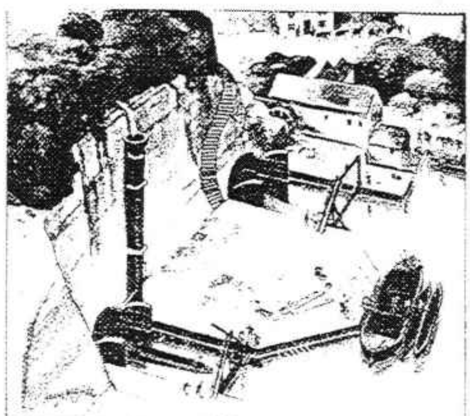
The Duke of Bridgewater's Canal, completed in 1765 was the first real industrial canal in the country. Independent of rivers it went straight from his Worsley coal mines to Manchester.

The Bridgewater Canal is notable in that it was an arterial canal, the first of its kind. An arterial canal is one that crosses over a number of valleys with the aid of such features as embankments, cuttings, tunnels and aqueducts and is distinct from a lateral canal, which runs alongside the banks of a river and thus has no major obstacles in its passage. Brindley carried the Bridgewater canal over a number of valleys, most spectacularly with the Barton aqueduct over the River Irwell.

When the Canal was built it was at the same level as the field it passed through. Today the Canal appears to be on an embankment, but the raising of the canal is the result of subsidence due to mining. Between Monton and Worsley the effects of subsidence are clearly visible, and between Boothstown and Astley Green the subsidence is almost eight metres high. The discolouration caused by iron ochre leaked out from the underground canals at Worsley, although a pollutant, is considered one of the attractions of the Bridgewater canal.

The Delph

The Basin at Worsley Delph gave access through two entrances in the quarried face to a system of underground canals, which at their peak totalled 46 miles (74 kms) on three levels. It is believed to be the earliest and the most extensive such underground system used for coal mining in the country, if not the world. The Delph is further distinguished for a number of reasons. Firstly it is an early and extremely rare survival of the connection between a subterranean canal system and a surface canal system. Secondly it also saw the development of an early system of containerisation. Within the mine coal was loaded into wooden tubs and placed in starvationers, which were then worked out of the tunnels on the main level to the surface canal. The tubs were then transferred to specially adapted boats, and in Manchester the canal warehouses were designed to accommodate this early form of containerisation. The surface expression of this system is limited to the basin at Worsley and the immediate landscape above the core of the mine



The Delph saw a number of developments. In 1759 the first tunnel entrance, Canal, Delph Basin and Dead End Canal Spur were constructed. By 1760s the quarry was in operation. In 1771 the second tunnel entrance was opened and the Basin enlarged, and at the same time the western spur was connected to the Basin. The sluice gates were installed some time before 1887 and around 1965 the footbridge and gantry were built and the apron level raised. However despite these alterations, all three uses of the Delph, the quarry, coal mining and transport features remained virtually unchanged from 1771.

The Development of Worsley

At Worsley remarkable developments were taking place. A warehouse was built, on the corner of which was a massive crane, a boat -building and works yard was established alongside the canal where the present Worsley Green is situated, so that the Duke became the employer of an army of boat men, boat builders, sail makers and riggers, blacksmiths, nail-makers, carters, miners etc. Many of these original canal structures survive, including canal basins, turning points, dry docks, and several bridges. In Worsley the Boat Yard and Dry Dock constructed in 1760, which are both still in use today are of considerable significance. The dry docks allowed boats to be repaired on stocks by closing gates and returning water to the canal. The two remaining dry docks are the earliest structures of this type. The Dukes works yard occupied the site of the Green and the memorial to the Canal Duke at Worsley, on the site of his works yard is the base of his old chimney, converted to a fountain. The houses on the cleared site were built in 1901 - 1909 in traditional timber framing.

By 1766 the Duke of Bridgewater's Canal had made sufficient progress to enable him to introduce passenger carrying at a charge of one penny per mile. Ticket offices were established, of which only the Packet House at Worsley with its fine steps remains. Passengers embarked from the steps for the flyboats to Manchester and Runcorn. It is an 18th century brick building, with 19th century timber framing, an early example of the black and white revival. Lantern house, a former nail makers shop with stables beneath, is Worsleys oldest building, dating from about 1700 and was converted to a reading room in 1845.

Other 18th century buildings include the cottages on Barton Road and another group known as the Crescent, which formed part of the original workmen's housing for the Dukes employees. The imposing boathouse was built to house the Dukes barge used for Queen Victoria's visit in 1851 and has accommodation above the boat house. Another interesting building is the buttressed oil house, built as an explosive store for the mines; it has flagged stoned floors, vaulted brick vaults at first floor level and all trusses and batons are made of steel.

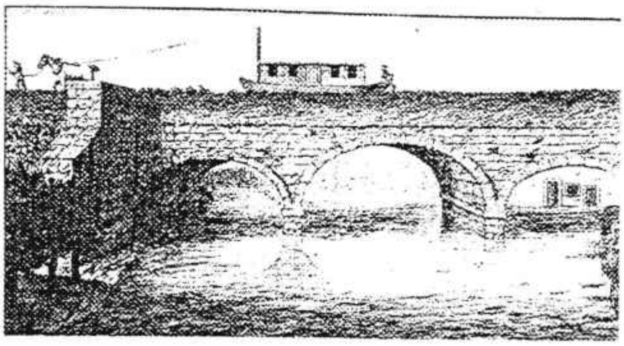
Public buildings include the Old Nick and the Old Court House (now the public library) both in attractive timber frame, evocations of an idyllic life. The granary was built as a forge with a water wheel, later converted to a grain store and now used as offices. It retains its loading door and gave access to both the Bridgewater Canal and Worsley brook. Beyond this are the huge remains of a lime kiln, built on the back of a branch arm to the canal.

Barton

The Barton Aqueduct, an ambitious engineering project, carried the Dukes canal over the top of the River Irwell, and was pronounced "the greatest artificial curiosity in the world". The aqueduct, from contemporary illustrations, was a three-arched stone bridge, 200 yards long, and twelve yards wide, carrying the Bridgewater Canal over the Irwell at a height of 39 feet. It was demolished in 1894 when the Manchester Ship Canal was constructed, and moved to its present position by Eccles Town Council in 1896, which while preserving one stone arch of the aqueduct, took it completely out of context.

The Manchester Ship Canal or *Big Ditch* is of great interest. It was opened by Queen Victoria in 1894. With it, Manchester achieved a feat without precedence in the modern world and transformed itself into an inland port 55 miles from the sea.

Brindleys aqueduct at Barton was replaced by one of the seven wonders of the canal age, Sir Edward Leader-Williams great swing aqueduct. Operated from the canal tower by hydraulics, the huge trough swings at right angles to the Bridgewater Canal to allow ships to pass up the Manchester Ship Canal, on their way to and from the Docks. The trough holds 800 tons of water, kept in by gates at either end. It is 234ft long and the structure itself weighs 800 tons giving a combined weight for swinging of 1600 tons. After 107 years of use the structure remains intact.



Sir Edward Leader-Williams swing aqueduct represents a specific design solution to an unusual problem of a multi-level waterway junction and was one of the first structures to use Roller Bearings. The Barton Swing Aqueduct is an example of the confidence of the industrialists and engineers of the late 19th century. It is the only swing aqueduct in the world.

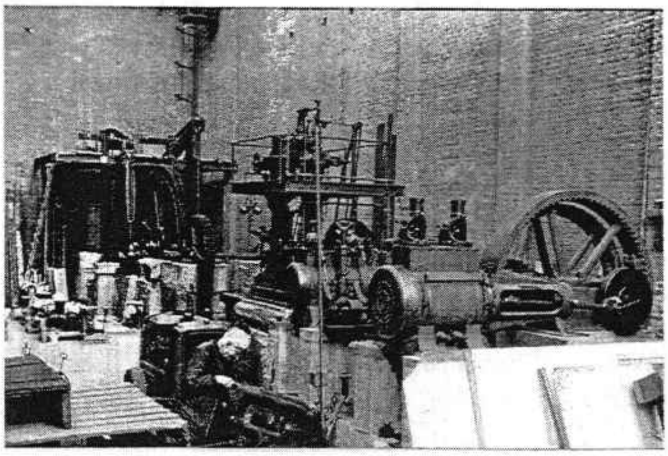
Tour B Saturday 9 September
Bolton: Spinning and Steam

Historical Background

Bolton's first museum was the Chadwick Museum (1883-1937), founded as the result of a bequest for the building of a free public museum by a local benefactor, Dr Samuel Taylor Chadwick. The museum opened to the public in 1884 and contained Natural History, Ancient Egyptian, Ethnographical, Local History and varied collections. From the beginning Bolton was in the forefront of assembling industrial material, which related to the textile industry and in particular cotton spinning, for which Bolton was renowned as a fine cotton-spinning centre. The early textile machinery collection was acquired mainly in the late 19th century, although some machinery continued to be collected until the 1930's. The later textile machinery, again relating to cotton spinning, was collected from the 1960's until the 1990's. An industrial museum was planned in the 1980's, but this could not be funded. At present an option on a building has been negotiated with close links to the Northern Mill Engine Society and the intention is to pursue a Social History Heritage Centre relating to Bolton's textile history and life in all its aspects.

The Collection

The early textile machinery collection is probably the most important in the world. It contains several items from Arkwright's Cromford Mill; purchased in the 1890's, namely a half water-frame, line shafting, a carding engine, a draw frame and two canisters. The spinning jenny of 60 spindles belonged to James Hirst, who bought it in 1819. It was used in Yorkshire until purchased by the museum in 1899. The most significant item in the collection is Crompton's Mule, a unique item, which was used by its inventor in the period 1800-1815 - this is on display in the Central Museum.



Two later carding engines from Arkwright's Mills were acquired in the early 20th century and this collection also includes a jack frame made by Isaac Dobson in 1830.

The later textile machinery collection comprises items which illustrate the processes from the breaking open of the cotton bale, the scutching, carding, drawing and finally the spinning, all of which relate to fine cotton spinning. Many of the machines were made by Dobson & Barlow, a famous local firm, and there is also a ring spinner by Richard Threlfall, another well-known local company. The fine cotton-spinning mule of 1927 by Dobson & Barlow has recently been reassembled in the museum store and may be the last surviving example of a fine cotton spinning mule.

Bolton has a superb collection of machinery relating to the textile history of the town, but also has a collection of pattern books, quilts and textile samples which supplement Bolton's contribution to the story of textile machinery and textile products in Great Britain from the late 18th century until the later 20th century.

The Northern Mill Engine Society

Early History

The textile industry of England has been declining since the 1920's but this accelerated in the 1950's and 1960's. As mills closed or re-equipped, the steam engines, which powered their spindles and looms were scrapped. A small group of people was concerned that some of these engines should be preserved and so in 1966 the Northern Mill Engine Society was formed. The first years were spent rescuing as many engines as possible, often quickly before demolition occurred. Robert Mason offered the Society the use of no.3 Engine House at the Atlas Mills complex in Bolton and the dismantled engines were stored here, and later in the adjacent no.4 Engine House.

In 1969 the Society was awarded 1st prize in the BBC TV Industrial Archaeology Programme "Chronicle" and the money (£250) helped to purchase a mobile crane. A local firm also presented a 2-ton electric hoist, and so re-assembly of the engines commenced in no.3 Engine House.

The Bolton Steam Museum

The Museum opened in 1983 with three restored medium-sized engines of different types and several smaller engines. Steaming Days were held about 6 times a year using steam initially from the Atlas Mills boilers and later from a small package boiler. Educational open days were held on weekdays during term time for schools in the district, sponsored by local companies. Meanwhile work was proceeding on some of the other dismantled engines in no.4 Engine House.

The main buildings in the Atlas Mills complex were empty or in multiple occupation, and their condition was deteriorating. The site was sold and after several applications for development were refused, permission was finally given for the mills to be largely demolished and a Morrison's supermarket built on the site. Morrison's offered to move the Society into a much larger building at the rear of the site, the no.4 Cotton Store, on very favourable terms, and so the last Open Day in no.3 Engine House was held in December 1991 and work began on dismantling the engines for removal.

The Current Situation

Since 1992 the Society has been reassembling the engines in their new home. This process is almost complete, but the next stage will require a large amount of capital - installing a boiler and steam pipes, building an external boiler house, fitting a suspended floor, safety railings and suitable toilets, providing disabled access and generally putting the building into a suitable condition for opening to the public. Around 25 engines will finally be displayed, all we hope in working order. The Society has attempted to obtain an example of every main type of engine used in the textile mills of Northern England, though inevitably there are some gaps.

In the early 1990's a consultant was employed to produce a business plan for an application for Lottery funding to develop the building as a Science Education Centre. For various reasons the application was unsuccessful. We hope to submit another application on a smaller scale, allowing opening solely as a steam museum. Bolton Borough Museums are considering leasing the adjoining building as a Heritage Centre to house their industrial collection; we need to know their final plans before we can proceed with our own applications for funding.

The Museum building is not yet open to the general public but interested individuals or groups are welcome to make an informal visit on working days (Wednesdays and Sundays.) Visits can be arranged at other times by contacting the Secretary, John Phillp, 84 Watkin Road, Clayton-le-Woods, Lancs, PR6 7PX, tel. 01257 265003, E-mail: johnphillp@ talk21.com. John can also supply further details or membership application forms. Further information about the NMES is available on the Internet at http://www.oldenginehouse.demon.co.uk/nmes.htm

Tour C Saturday 9 September
Coal, Iron and Canal
The Parkbridge Iron Works

Introduction

In 1969 Professor Owen Ashmore called Park Bridge the finest example of an industrial community linked with wrought iron manufacture, textile machinery making and coal mining in the North West, and despite the loss of a number of buildings in the last 30 years, this remains the case. The original reasons for its establishment were the availability of waterpower and the demand for textile machinery in the nearby cotton towns of Ashton and Oldham. Later, the local supply of coal from the nearby Fairbottom and Rocher mines, and the growth of a faster system of communications (a branch of the Ashton Canal was opened as far as Fairbottom Colliery in 1797 and the Oldham, Ashton under Lyne & Guide Bridge Railway passed next to the Bottom Forge when it opened in 1860) enabled it to expand in the remote part of the Medlock Valley.

History of the Firm

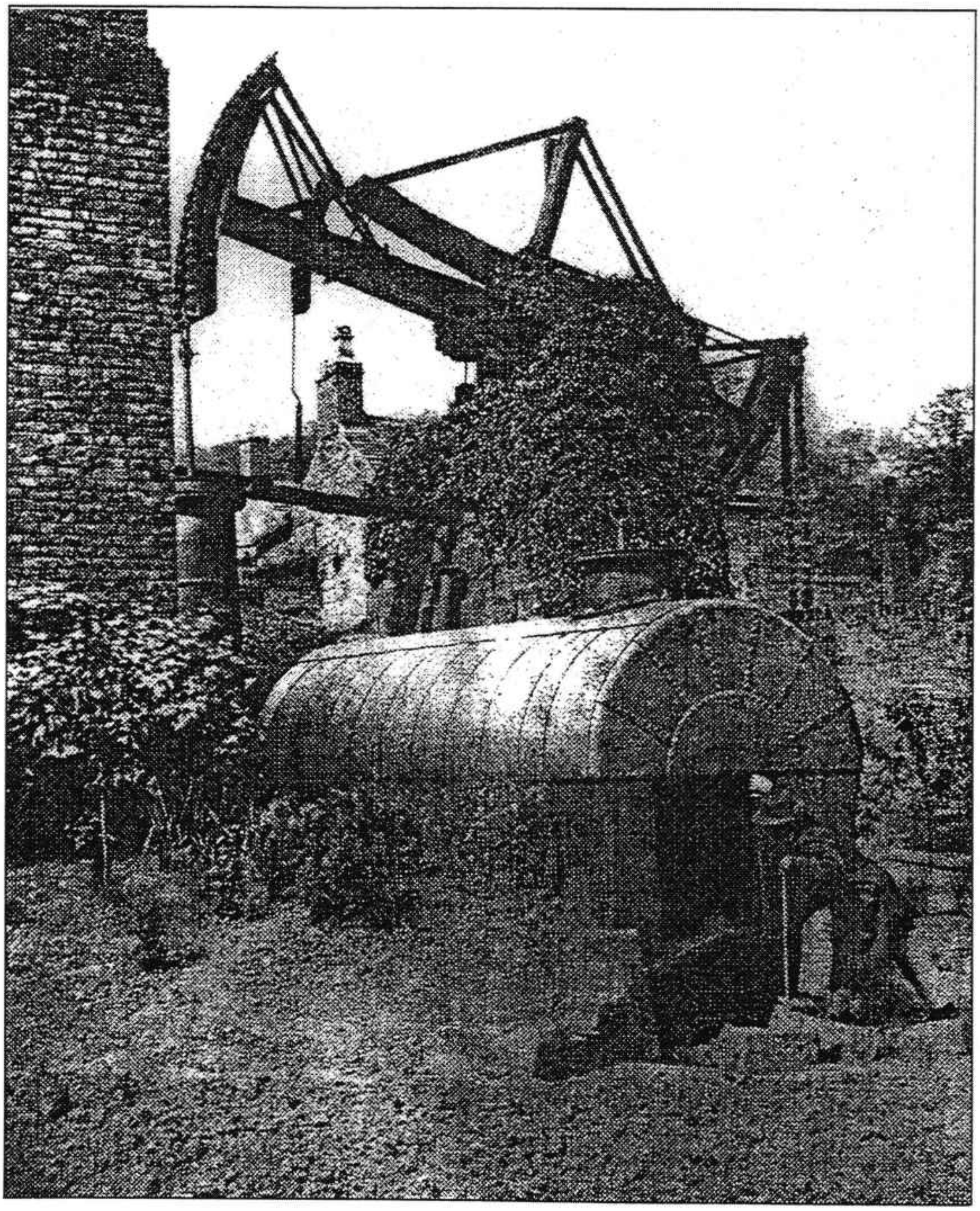
The firm was started around 1784 by Samuel and Hannah Lees on the site of an old corn mill on the River Medlock at Park Bridge. Samuel was a whitesmith and clock maker and he used the water powered corn mill for his first business. In the 1790s he began making rollers and spindles for cotton spinning machines. After he died in 1804 his wife Hannah was left with 6 young children and the business to run. She did so well that in later years her sons agreed to rename it 'Hannah Lees & Sons'. The company and site continued to expand in the mid and later 19th century, the family taking over the Fairbottom Colliery Company in this period. New buildings from this period include a roller-making shop, rolling sheds, a forge and a cotton mill, the foundations of which can still be seen on the northern banks of the river. Behind that are the remains of the later rolling shop, which is now used as a car park. The single-storey rolling mill (the bottom forge) lies in valley to east and is now used for storage. Thanks to the arrival of the railway in 1860 products from Park Bridge began to be exported internationally and iron rivets were used in the construction of the Eiffel Tower in Paris and the Sidney Harbour Bridge. The railway also enabled the ironworks to start processing scrap iron, which it did until the works closed. The ironworks was still owned by the Lees family when it closed in 1963.

The Ironworks

The ironworks were located in an isolated position so from the early 19th century the Lees family built a variety of workers' housing, including two rows of terraced houses dating from the 1850s and 1860s and later an institute, school and church. The Lees family themselves lived in Dean House, a mid 19th century Gothic mansion overlooking the works. The family also bought the neighbouring Keverlow Farm. The surviving remains include the quadrangular stable block from c 1860, the terraced housing, Dean House, the foundations of the 1880s Roller Building, the foundations of the later 19th century cotton mill, the foundations of the c1900 Bright Works, the buildings of the Bottom Forge, the remains of the Rocher Vale winding house and the tramway tunnel, built around 1800.

The 2000-2002 Fieldwork Programme

The current investigations, which will be published in 2002, include the excavation of the foundations of Fairbottom Bobs (a Newcomen style steam engine probably dating from the early 1770s which was associated with the Fairbottom Colliery Company): excavations on the site of the Top forge building of the iron works, where the smelting furnaces were located, and building survey work to record the Bottom Forge and the winding house for Rocher Vale Colliery.



The Fairbottom Valley engine and its boiler in the late nineteenth century.
(Coutesy of the Henry Ford Museum, Dearborn, Michigan)

Tour D Sunday 10 September
Manchester and Salford – the Archetype City of the Industrial Revolution
Part 2 - Ancoats

(The following is an edited version of a forthcoming paper by Mike Williams)

The mill complexes of Ancoats provide a spectacular illustration of urban industrial architecture in the late 18th and early 19th century. Two of the four sites originated in the 1790s. They were owned and occupied by the successful firms of A. and G. Murray and McConnel and Kennedy. The owners of these firms migrated to Manchester from Scotland to specialize in the most profitable branch of the cotton industry, fine spinning. Their mills were the largest in Manchester by the early 19th century and continued to be extended until the early 20th century, so that today they contain an exceptionally wide chronological range of surviving structures. The other sites, Beehive Mill and Brownsfield Mill, date from the 1820s and were occupied by a number of smaller firms, as were many other early mills in Manchester. They include early examples of fireproof and fire-resisting construction.

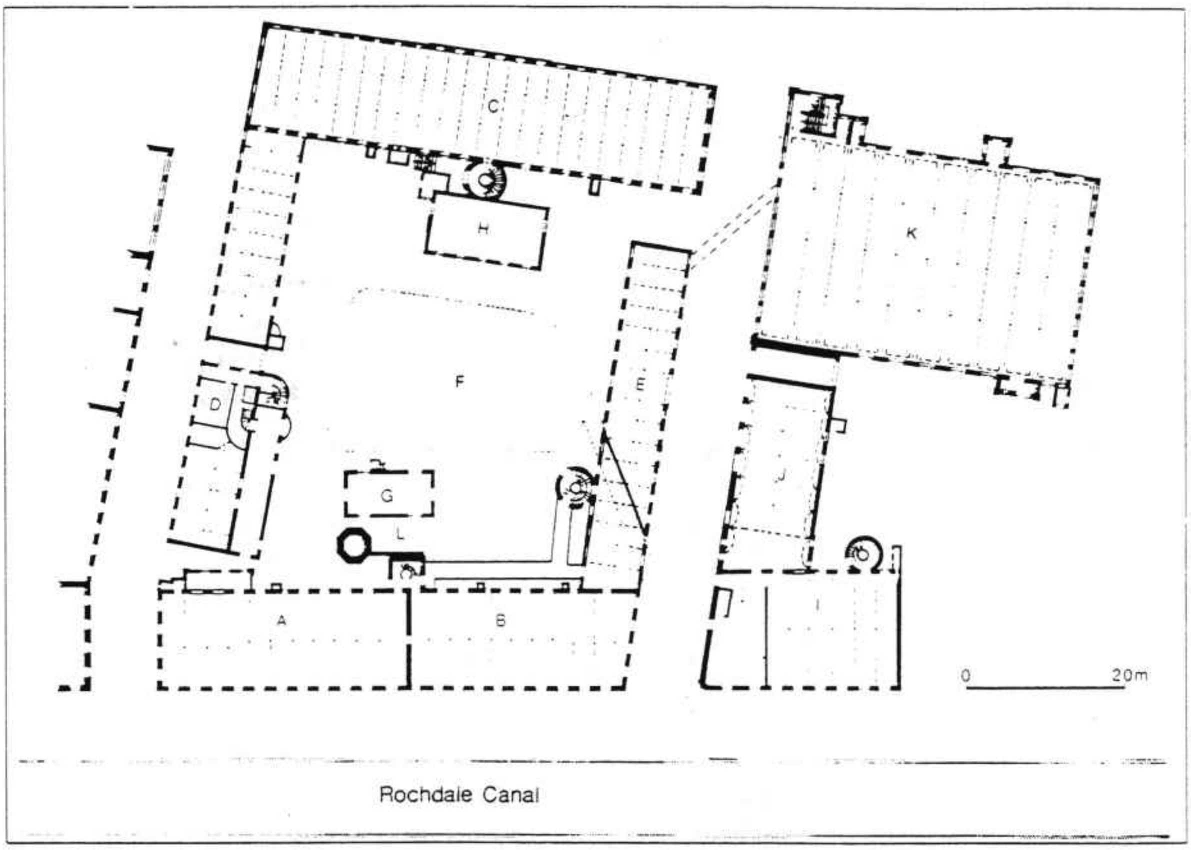
Murray's Mills

Adam and George Murray moved to Manchester in the 1780s and moved to their main Ancoats site in 1798. By 1806 this site had grown into Manchester's largest mill complex, most of which survives today. The first phase of development was the construction of the eight-storeyed Old Mill on Redhill Street. This was powered by a Boulton and Watt engine and was probably used for carding and spinning. In 1802 the mill was doubled in length with an addition to its east end, which included a more powerful engine. Although it was later lowered to seven storeys, this building is today Manchester's oldest extant textile mill.

From 1802 the site was extended to form a quadrangular complex enclosing a central yard. On the northern side of the yard, fronting Jersey Street, the six-storeyed New Mill was built by 1804. It was powered by another Boulton and Watt engine in a detached engine house in the yard, and was also probably used for carding and spinning. By 1806 two narrower blocks forming the east and west sides of the yard were added. These were not originally powered and were mainly used for warehousing and ancillary processes such as the preparation of raw cotton for carding. The main entrance and offices were located in the western warehouse block. The mills were built with wooden floors of standard joisted construction supported by distinctive early cruciform-section cast-iron columns, many of which still survive.

Murray's Mills was designed to be fully integrated with the canal system. The unusual quadrangular layout enabled a private canal basin to be built in the yard, linked to the main canal by a tunnel.

By the mid-19th century Murray's Mills had been further expanded to include three additional mills along the east side of Bengal Street. The first, Little Mill, built on the corner of Bengal Street and Jersey Street by the 1820s, was replaced by the extant building in the early 20th century, a concrete-floored mill designed for electrically-powered mule spinning. In c1842 two more mills were added to the south of Little Mill, all three buildings being linked to the original mills by tunnels beneath Bengal Street. Doubling Mill, on the corner with Redhill Street was independently powered by another beam engine. The third mill, Fireproof Mill, was attached to Doubling Mill at about the same time. This was of fireproof construction with brick-vaulted ceilings supported by cast-iron beams and the more common type of cylindrical columns. Further modifications include the widening of the Murray Street warehouse and the replacement of the 1802 engine with a larger detached engine house and chimney which still stand in the yard.



. Murray's Mills, Manchester, ground-floor plan.

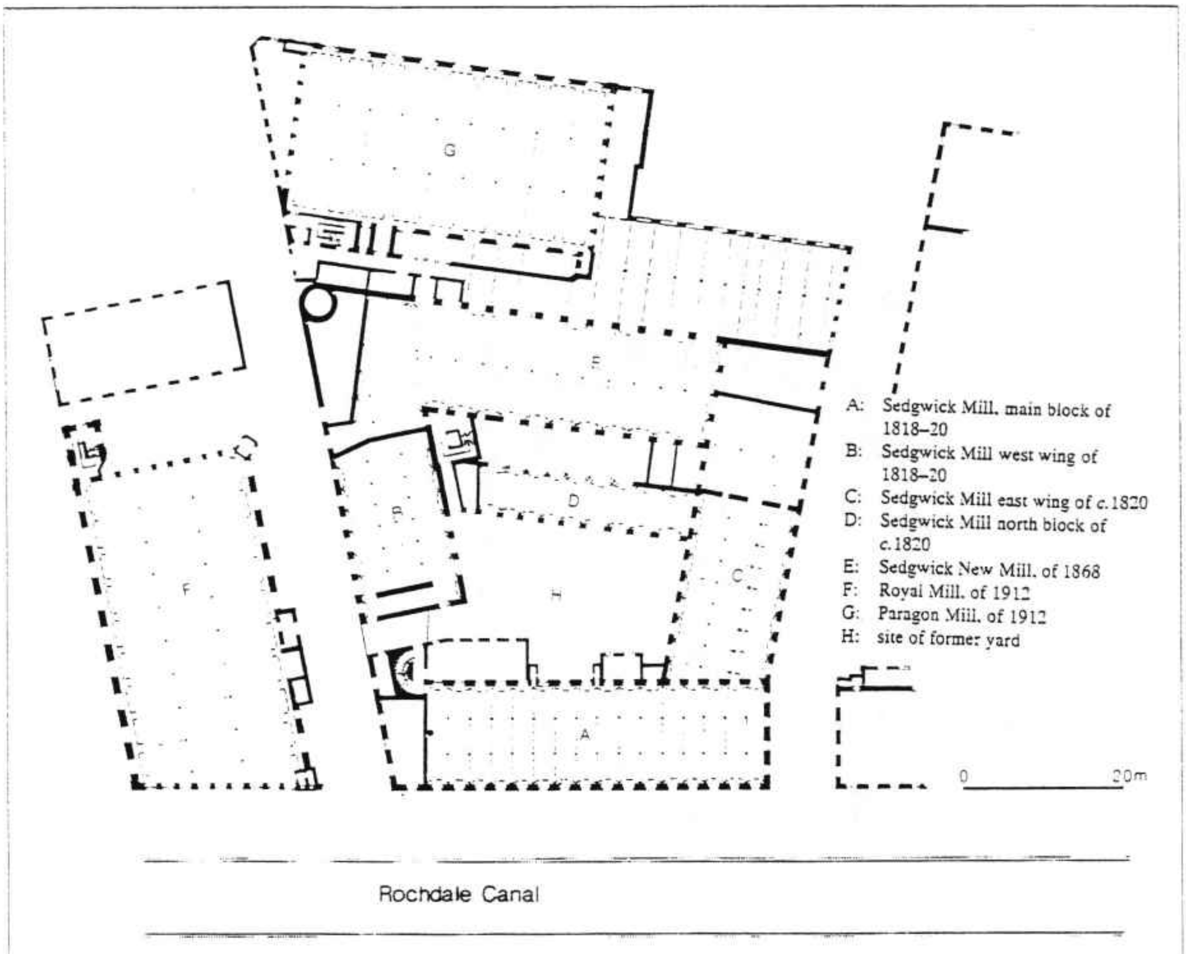
A: Old Mill, of 1798
B: Decker Mill, of 1802
C: New Mill, of 1804
D: Murray Street block of *c.* 1804–6
E: Bengal Street block of *c.* 1804–6
F: canal basin
G: mid 19th-century engine house
H: partly rebuilt engine house of New Mill
I: Doubling Mill, of 1842
J: Fireproof Mill, of *c.* 1842
K: New Little Mill, of 1908
L: site of former engine house of 1802

McConnel and Kennedy's Mills

McConnel and Kennedy's complex occupied the five plots to the west of Murray's Mills, between Redhill Street and Jersey Street. The two original mills were contemporary with Murray's site but do not survive.

The next phase, between 1818 and 1824, was the construction of the eight-storeyed Sedgwick Mill, which is today the oldest extant part of the complex. Sedgwick Mill was distinguished by its fireproof construction, comprising an internal framework of cast-iron beams and columns supporting brick-vaulted ceilings and tiled floors. It was built to a U-shaped plan with north-projecting wings at each end. The internal engine house, containing a fifty three horse-power beam engine, was in the west end of the front block on Redhill Street, with an internal boiler house in the west wing.

In 1868 the six-storeyed Sedgwick New Mill was added and used for doubling the yarn spun in the firm's earlier mills. It was attached to the west wing of the original Sedgwick Mill and was of similar fireproof construction. Between c1911- c1913 the site reached its maximum size with the additions of two more six-storeyed mills built for electrically powered mule spinning. Paragon Mill replaced earlier housing on Maria Street and Jersey Street. Royal Mill was a rebuilding of the firm's original 1797 mill on Redhill Street. Both these mills reflected the latest developments in mill building, with concrete floors supported by steel beams, electric motors housed in external towers with external architectural detailing in red brick, stone and terracotta.

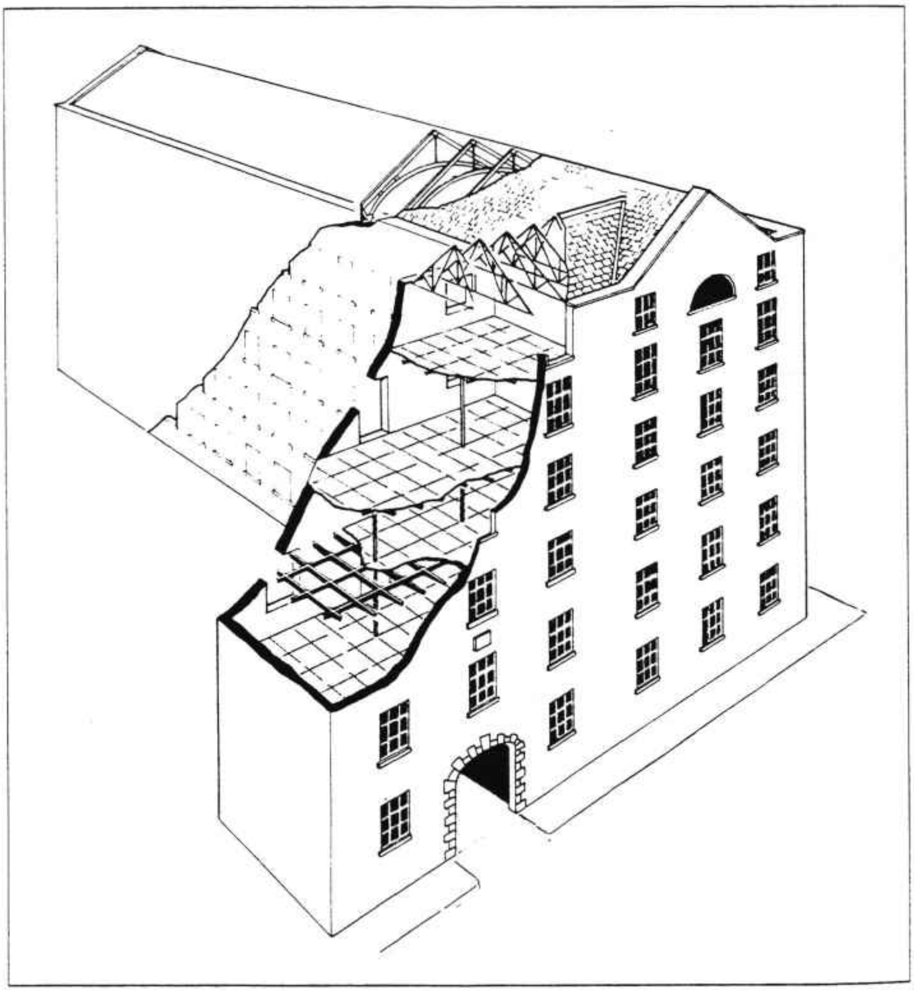


Beehive Mill

Beehive Mill was built by 1824 on Jersey Street, opposite Murray's Little Mill. It comprises a long five-storeyed range with an attic alongside Radium Street, an adjoining full-height wing on Jersey Street and a separate later mill to the west on Bengal Street. The site was served by the Bengal Street Arm of the canal and originally had its own private basin. It had a similar power system to the other early mills, with an internal beam engine house in the north end overlooking the canal. In contrast with Murrays and McConnel and Kennedy's Mills, this site was not owner-occupied but was built for sub-letting, "a room and power mill". Beehive Mill was damaged by fires and repaired in the early 1840s and the early 1860s. The interior may have been altered and the main block alongside Radium Street probably lowered. The earliest parts of the site were sympathetically restored in the mid-1990s.

Another contrast with the larger mills was the method of construction. The Radium Street block has heavy-timbered floors in which thick boards were laid directly on the floor beams without joists. This floor system provided a degree of fire resistance and was able to withstand the weight and vibration of heavy powered machinery. The roof of the Radium Street block is also of interest. The trusses comprise curved slender cast-iron ribs supporting timber principals, providing a well-lit and unobstructed attic.

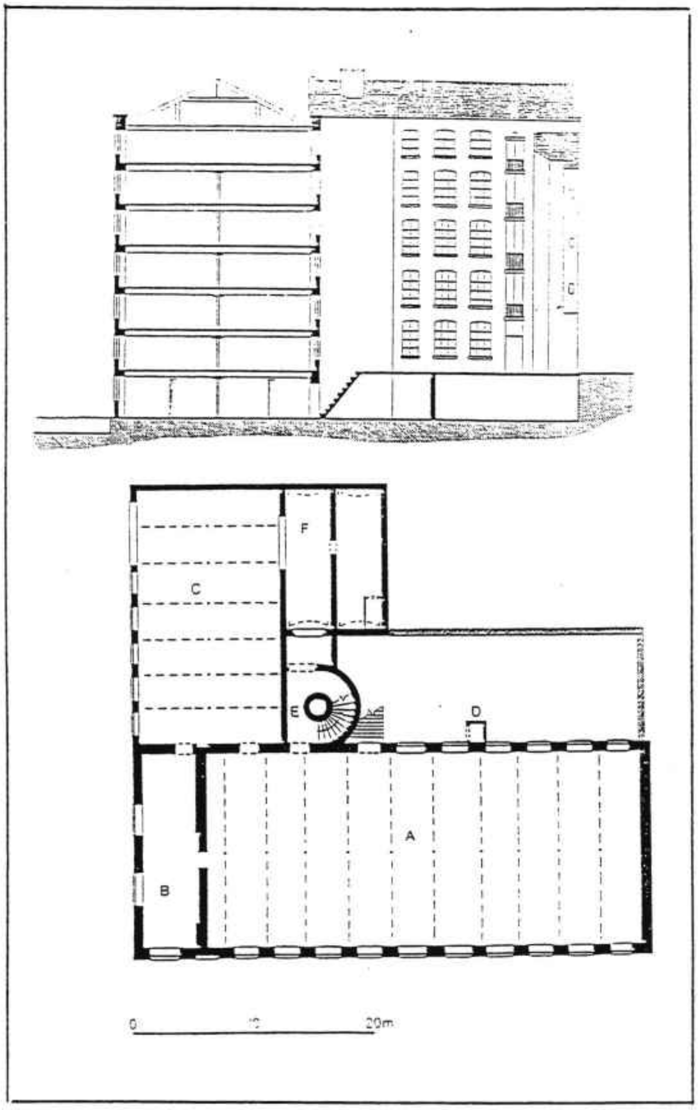
A fireproof wing had been attached to the Jersey Street end of the mill by 1824. The wing was probably used for warehousing and is again distinguished by its unusual methods of construction. The building has an important early fireproof floor system, comprising stone flags laid on a complex grid of interlocking cast-iron beams. Its intricate fireproof roof is also an early design, using a combination of prefabricated cast-iron and wrought iron components.



Brownsfield Mill

Brownsfield Mill also dates from the mid-1820s and is located to the west of Great Ancoats Street. It has relatively few later alterations and is today probably the most original early mill building in Ancoats, and is the only mill in the area to retain its original chimney. It was built to an L-shaped plan, the seven-storeyed main block overlooking a basin in the main canal and a six-storeyed wing overlooking a former branch canal.

Brownsfield was built as a room-and-power mill and is of heavy-timbered internal construction, but with a timber roof. In this case the interior is largely original. The building was powered by a beam engine in an internal engine house in the west end of the main block.



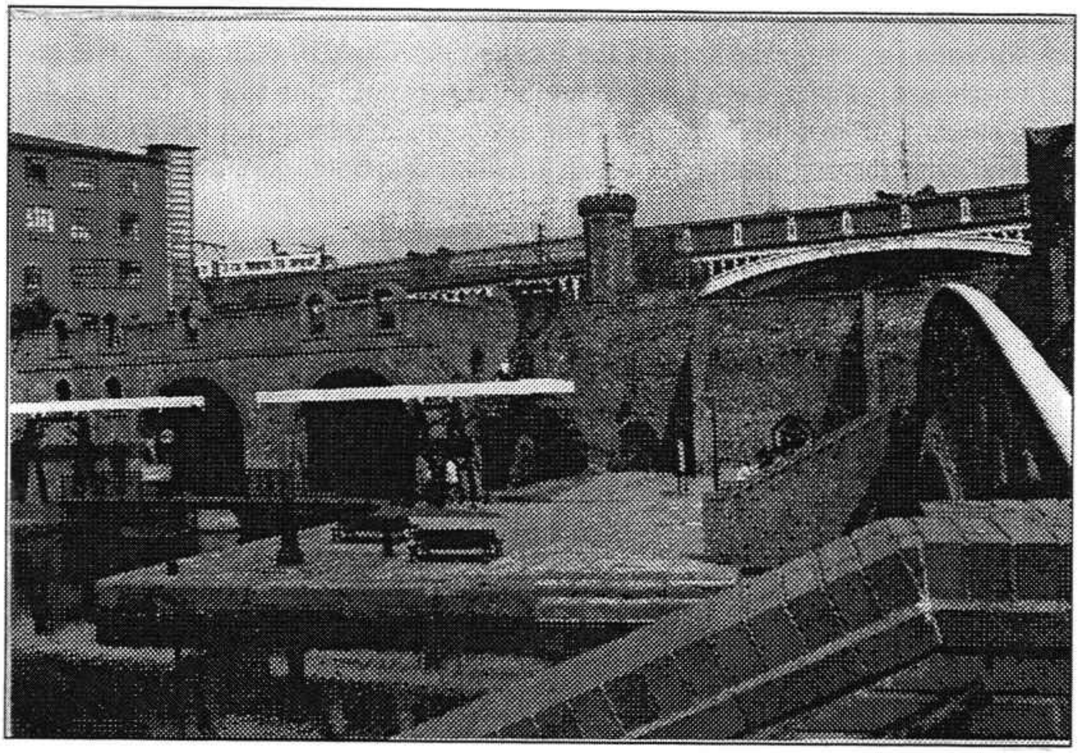
A: original mill
B: engine house
C: wing
D: privy tower
E: combined chimney and stair tower
F: probable site of boilers

Ancoats Village

Ancoats was also the first working class suburb. The tour will look at terraced housing, the first municipal housing in Britain, the last back to backs in Manchester, the Gun Street warehouse, an oil factory, the Daily Express Building, the school, the Methodist Mission and St Peter's Church.

Tour E Sunday 10 September
Castlefield Communication, Transport and Storage

In 1765, the terminus of the Bridgewater Canal was opened at the foot of the Sandstone river cliff below the present Castle Street, and was built to tranship coal from the Duke's mines at Worsley. When the canal was extended to Runcorn in 1776, coal was soon followed by, cotton, timber, chemicals, salt and grain. This facility for the transport of bulk raw materials was an economic revolution, truly innovatory. Special advantages were conferred on the businesses, which congregated near the canal terminus, and this became one of the first industrial complexes of its kind in the country. In 1805, the Rochdale Canal was completed to Castlefield, where it joined the Bridgewater Canal.



In the 1960s-1970s, the area became badly run down and neglected. The arrival of Castlefield in public consciousness coincided with central government's urban programme in the late 1970s and early 1980s. Urban Development Corporations were established by central government for managing the redevelopment and regeneration of inner city areas. Although not housing or transport authorities, their role was somewhat akin to that played by development corporations in the establishment of New Towns. UDC's assembled and regenerated land, and planned and coordinated its subsequent use. The Central Manchester Development Corporation was established in 1988 and disbanded in 1996. Without private sector involvement, it seems unlikely that long-term regeneration of decayed urban areas could have taken place. Environmental improvements have included cleaning and floodlighting buildings, clearing canals and basins of many tons of rubbish, excavating infilled canal arms, repairing and replacing towpaths, demolishing prefabricated warehouses, relocating undesirable industries, improving the area's infrastructure by creating new access points, restoring towpaths, building new bridges and new roads, landscaping, and providing public and private car parks, seating, street lighting and street furniture.

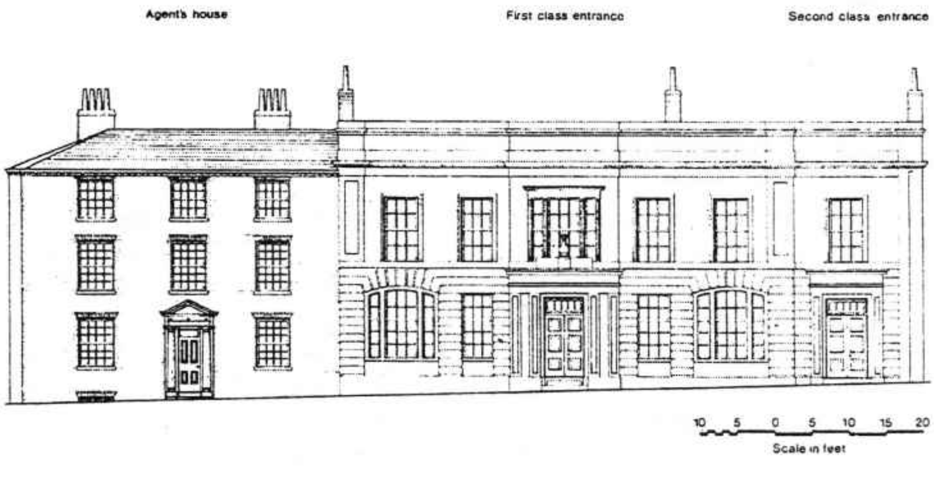
It is important that historic buildings should not be allowed to decay or be demolished, but it is rare that a building can be re-used sympathetically without some kind of change. Adaptive re-use, as it is called, while respecting the original fabric and character as far as possible, is hardly possible without making some changes in layout, decoration, outward appearance, and additions of various kinds including those required by health and safety regulations. The splendid 1825-6 Merchants Warehouse has modern glass appendages at each end containing stairs for a fire escape.

However, wherever regeneration has taken place it is commonplace for buildings to have only their shell remaining, and it is still common, unfortunately, for many to have no explanation as to their original purpose. Perhaps even worse are the dangers of 'copyism'. Where well-meaning attempts have been made to construct new buildings in styles of the past. For instance, on Liverpool Road, the YMCA's Castlefield Hotel, standing alongside two reopened arms of the Bridgewater Canal, is built in the style of the canal warehouse, possibly misleading to future visitors not being able to distinguish refurbished buildings from newly built ones. The development transformed the canal into an asset, opening up the two canal arms, which are filled with boats during the carnivals.

Tour F Sunday 10 September
The Museum of Science and Industry in Manchester
Liverpool Road Station

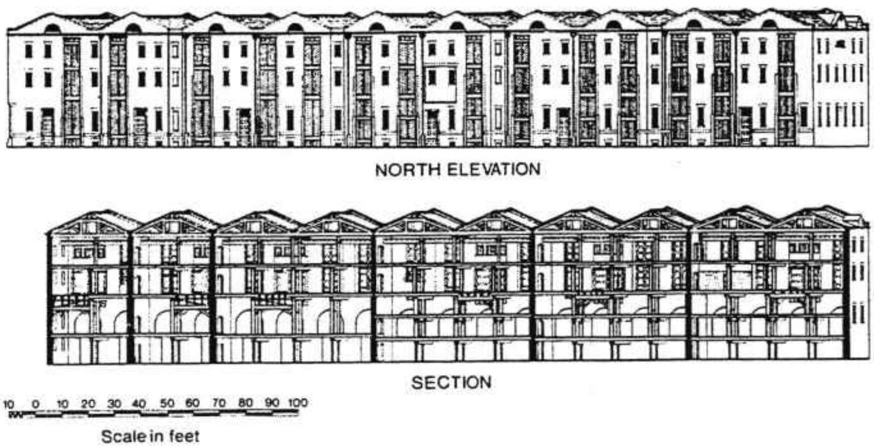
Liverpool Road Station was the original Manchester terminus of the Liverpool and Manchester Railway, the world's first purpose built passenger railway. It lies in Castlefield, the area on the south west of the city centre where the Bridgewater and Rochdale canals meet. The site contains the oldest surviving passenger railway station in the world and the world's first railway warehouse. Both of these buildings are Grade I listed, while the other surviving buildings and viaducts are Grade II listed. The Museum of Science and Industry in Manchester occupies all of the surviving buildings of Liverpool Road Station except for the Grape Street Bonded Warehouse (occupied by Granada Television).

The route approved by parliament in 1826 placed the Manchester terminus of the Liverpool and Manchester Railway on the west bank of the River Irwell in Salford. However, the Liverpool and Manchester Railway Company continued to look for opportunities to purchase land on the Manchester side of the Irwell in the hope of getting approval for a revised terminus. It succeeded on both counts: land in Castlefield was purchased in 1828 and parliamentary approval followed in May 1829. Construction of the Manchester terminus did not begin until 1830. The only pre-existing building on the terminus site was a three-storey brick house with cellars, built in about 1808. It had been the residence of John Rothwell, partner in a nearby dye works on Water Street. The Railway Company retained it as living accommodation for its Station Agent



As a pioneering passenger and goods rail service, the Liverpool and Manchester Railway had no clear template to follow. The design of the Liverpool Road passenger departure station seems to have based on that of Crown Street Station, the Liverpool terminus, which was already built by then. The Company was slow to come to a final decision about what it would offer in terms of facilities for goods handling and storage at the Manchester terminus. In March 1830, it decided to provide a warehouse on site. The contract was put out to tender and the successful contractor, David Bellhouse Jnr. was appointed in April. The resulting warehouse abuts the original railway viaduct longitudinally. It has survived in substantially original form and the original timber frame is preserved in the four of its five bays. The functional design of the 1830 warehouse owes much to the nearby canal warehouses in the Castlefield Basin. Goods offices were constructed adjacent to the passenger station.

Within months of the opening of the Railways on 15th September 1830, passenger and goods traffic was exceeding expectations and it was evident that additional facilities were required. Eight shops were built, extending along Liverpool Road from the goods offices. Their upper floor formed a canopied carriage shed facing the railway track. The shops were evidently never a commercial success so the spaces were later taken over for workshop and office use. Warehousing facilities were expanded in 1831 by the insertion of a mezzanine floor in three bays of the 1830 Warehouse, and the erection of two warehouses for storing cotton and a transit shed for the rapid transhipment of goods, particularly perishable goods, between rail wagons and horse-drawn carts. The 1830 Warehouse was provided with a steam engine to improve goods handling. In 1844, all passenger traffic ceased when passenger trains were re-routed to terminate at Hunts Bank Station, considered to be a more convenient location.



Liverpool Road Station warehouse: north elevation and section.

Thus, thereafter Liverpool Road Station operated solely as a goods station. It was operated by the London & North Western Railway from 1846. In about 1855, the 1831 transit shed was demolished to make way for a larger single-storey transit shed with adjoining freight offices. The later transit shed in now the Museum's Power Hall. A major fire in 1866 precipitated a more comprehensive phase of redevelopment. It virtually destroyed one of the cotton warehouses and damaged the other. Both had to be demolished. The L&NWR took the opportunity to review facilities and decided to build a second viaduct to the north of the 1830 viaduct. The Grape Street Bonded Goods Warehouse was built abutting the new viaduct in 1869. Finally, in about 1880, a warehouse was built across the end of the second viaduct, with a frontage on Lower Byrom Street. It was for the use of the Great Western Railway, which had obtained running powers into the site. Today, this warehouse is the building through which visitors arriving on foot enter the Museum. As part of the late nineteenth century redevelopment, hydraulic power was introduced to improve the efficiency of goods handling. The site changed little over the next hundred years.

British Rail closed Liverpool Road Station in 1975. The buildings were generally in a poor state as the decline in goods traffic over many years had made the station increasingly uneconomic, resulting in minimal investments in building maintenance. Greater Manchester Council was interested in acquiring the site for museum use, but had failed to reach an agreement with British Rail by January 1978 when the Liverpool Road Station Society was formed. The twin aims of the society were to secure the preservation of the station as a museum and ensure that there was suitable celebration of the 150^{th} anniversary. In late 1978, Greater Manchester Council finally reached an agreement with British Rail whereby the Council purchased most of the station site for the token sum of £1 and British Rail contributed £100,000 towards the repair and restoration costs.

The first phase of restoration, culminating in the opening of the museum on the 15^{th} September 1983, brought the Station Agent's House, Passenger Station, Transit Shed and part of the ground floor of the Lower Byrom Street Warehouse back into use. Since then, there has been a phased process of restoration, tailored to funding opportunities. The 'Final Phase' of restoration, funded by the Heritage Lottery Fund and the European Regional Development Fund, is scheduled for completion in 2000.

Tour G Sunday 10 September
Warehouses the Functional Tradition

Around the River Irwell Navigation, the Bridgewater Canal Basin and Liverpool Road Goods Depot, a series of warehouses, storage sheds and wharves for the receipt and storage of mixed cargos such as cotton, grain, salt, fruit, potatoes etc were constructed between 1770 and 1880s. They continued to be used into the mid twentieth century despite bulk cargos and containers, in conjunction with road transport, which often was given direct access to load up straight from barges or wagons or to deliver to the warehouse for onward transmission by barge to the factories.

Two other types of warehouse are to be found in the city centre and along the canal branches.

There were the **packing and shipping warehouse** for the receipt of bales of cloth, weighing, examination, pressing, packing and exporting the goods abroad. Offices for merchanting firms would be housed in part of the floors and the rear would have cart runs, loading bays and hoists.

Another type was the **home trade warehouse** which acted as a gathering ground for one or several firms; finished goods which were then sold on to the wholesale or retail trade.

Examples of all these types will be seen on the tour.

The walk will begin on Water Street next to the Old Mersey, Irwell Navigation and the Old and New Quays

Water Street Shipping Warehouse

In 1838 the Bridgewater Canal was joined through Hulme locks to the old Navigation which the trustees had taken over. The Victoria and Albert shipping warehouses built about this time have now been converted to a hotel. The new buildings at the former yard entrance stand on the site of the old Quay Co. offices. The loading slots on each floor are hotel windows, but the hoist covers have been retained. The raised roofline and stone cornice of the Albert range on the right are of interest. The warehouses were last used by the Bridgewater Dept. of the Manchester Ship Canal Co. The interior structure has cast iron columns, at the top of which are timber caps under the main wooden joists, which support the flat floors.

(Former) L.N.W.R. Bonded Goods Warehouse

Now incorporated in Granada T.V. Studios and Tours, this building completed 1869 was originally part of the Liverpool Road Goods Depot down to its closure in 1975. Goods wagons formerly entered at ground floor level. The internal structure consists of cast iron cruciform columns, longitudinal iron beams and transverse wrought iron joists which carry shallow brick arched flooring to spread the load.

The 1830 warehouse at Liverpool Road

The rear of the 10 Bay Warehouse is visible from Water Street. It is built against the railway viaduct so that goods wagons were turned for unloading into the second floor entrances. On the other side was the carriers' yard; a series of loopholes and gravity hoists craned down goods from the various floors. Five brick cross walls divided the building, but a mixed variety of goods seem to have been housed throughout from the evidence of surviving order books. The interior of the building has now been restored for new galleries such as "Feeding the City" "Communications History" etc.

Merchants' Warehouse Castlefield Canal Basin

This brick built warehouse was erected about 1825 and has the characteristic small round headed windows of the period, together with lucams or catheads (hoist covers) and two large shipping holes on the canal side for barges to tie up and unload undercover. The interior has timber posts, thick plank joists and wooden floors. The building was damaged by fire some years ago but has been restored through the aegis of Jim Ramsbottom and various grant awarding bodies. It is now occupied by a computer firm.

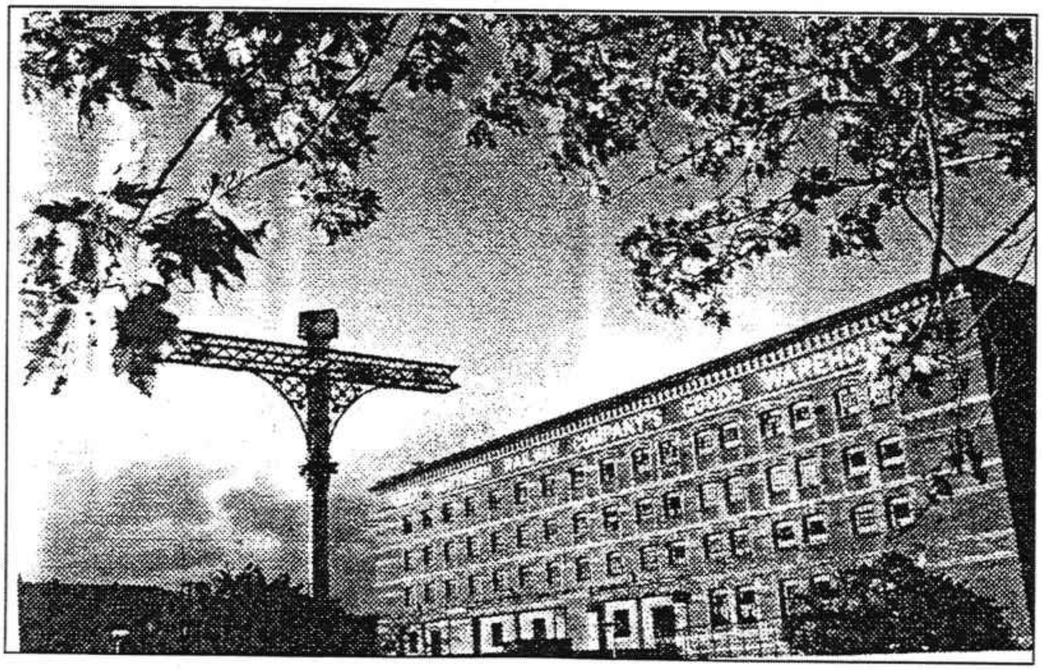
Middle Warehouse

Built in 1831, and in use until the 1970's by the Bridgewater Dept of the Manchester Ship Canal Co, who used is it to tranship maize products to and from the docks and Kellogg's factory in Trafford Park. Restored for two radio stations, apartments, shops and studio offices, the six loophole loading platforms have been converted into balconies. The elliptical arch with its two shipping holes is superb.

The walk will now follow the Towpath of the Rochdale Canal extension and detour at Albion Street to view:-_

The Great Northern Railway Warehouse

Opened in 1898 as a three- way interchange for goods between canal, rail and road. The M.S.J.Canal runs below the warehouse and was reached by wells. Steel stanchions and wrought iron girders support four fireproof floors originally allocated to different goods. Internal rail docks and loading platforms were incorporated at ground and first floor levels and served by hydraulic cranes. Road transfer was also achieved through hatches, recesses and access doors.



The walk now returns to the Rochdale Canal via Watson Street and Whitworth Street West

Manchester Cotton Warehouse

Adjacent to the canal and visible in Chepstow Street are a number of packing or shipping warehouses for cloth export. The half basement was for the hydraulic presses and other machinery, floors above were sample rooms, and used for examination, weighing, labelling and offices for the agents and merchants. Leading architectural practitioners were often commissioned by firms to design these buildings in the "palazzo style". Impressive stone facades, different window designs on each floor, large customer entrances and stairwells were notable features. The rear elevation was much plainer, white brick to reflect light, or a steel and glass frame. Loading bays were also at the back.

Examples include

Tootal, Broadhurst and Lee

The 1898 offices of a highly integrated firm who owned spinning mills, weaving sheds, garment works and stocked a variety of cloth and goods for the home trade (drapers). The striped terracotta and red brick and the colossal features on the corner and down the side are exciting architectural embellishments. Lee house behind is a 1931 extension in steel frame and glass infill, intended to be seventeen stories high but never completed.

St James Buildings (Oxford Street) Calico Printers' Association

Built 1912 as the headquarters building in Portland stone, as combined offices and sample rooms. The façade is a study in ingenious decoration flourishes. The garage facilities are underneath.

India House (Fairhurst 1906) Whitworth Street

Eight storeys and a basement, terracotta façade and approaching the Odeon or Gaumont style of a few years later. Belongs to the last wave of expansion or cotton's golden autumn following the completion of the Ship Canal in 1894.

Tour H Sunday 10 September
The Pump House the Last Building of its Type in Manchester

Hydraulic Power in Manchester

In the early 20th century the power to raise the safety curtain at the Opera House and to wind the Town Hall clock came from Manchester's municipal hydraulic power supply. The Pump House on Bridge Street was one of three pumping stations, the other two were at Whitworth Street and Pott Street. The most widespread use of the power was for hydraulic cotton presses used in the cotton baling and packing warehouses of Manchester. The packing industry depended almost entirely on hydraulic power. The Manchester Guardian took out an agreement for supply in 1911 and the cold stores at Smithfield Market used two hydraulic machines.

The Bridge Street Pump House is the last building of its type in Manchester. It is a monument to an extensive public supply of hydraulic power, which powered much of Manchester's civic and industrial operations. The building does more than provide an efficient working structure for its provision of a municipal power supply. Like many municipal buildings of its type it was built to express the confidence and civic pride of a wealthy industrial city. The elaborate exterior and interior construction of the building points to the importance attributed to the hydraulic power system within the development of Manchester.

Before the introduction of the municipal supply numerous companies, industries, shops and warehouses utilised small hydraulic systems on their own premises. The opening of Whitworth Street station in 1894 led to increased demand for this revolutionary piped power supply. The Pump House in Bridge Street was the last to start operating in 1909. The supply was operated through a high pressure mains system laid under the city's thorough-fares.

The Pump House originally operated with six steam driven Galloway pumping engines, each capable of producing a pressure of 130Ibs per square inch. The steam was generated in four Lancashire type boilers. In 1927 the steam driven pumps were replaced with six 200 bhp electric motors.

The engine house is the showpiece of the building, where the technology, which powered much of Manchester's industry, could be admired. Apart from a travelling crane for moving heavy engine parts, the engine house has had all machinery and equipment removed.

The water required for hydraulic pumping had to be pure and of sufficient quantity. It was stored in the roof-top tanks. This was for easy storage rather than for an accumulation of pressure. Water was taken from a borehole driven to a depth of over 300 feet.

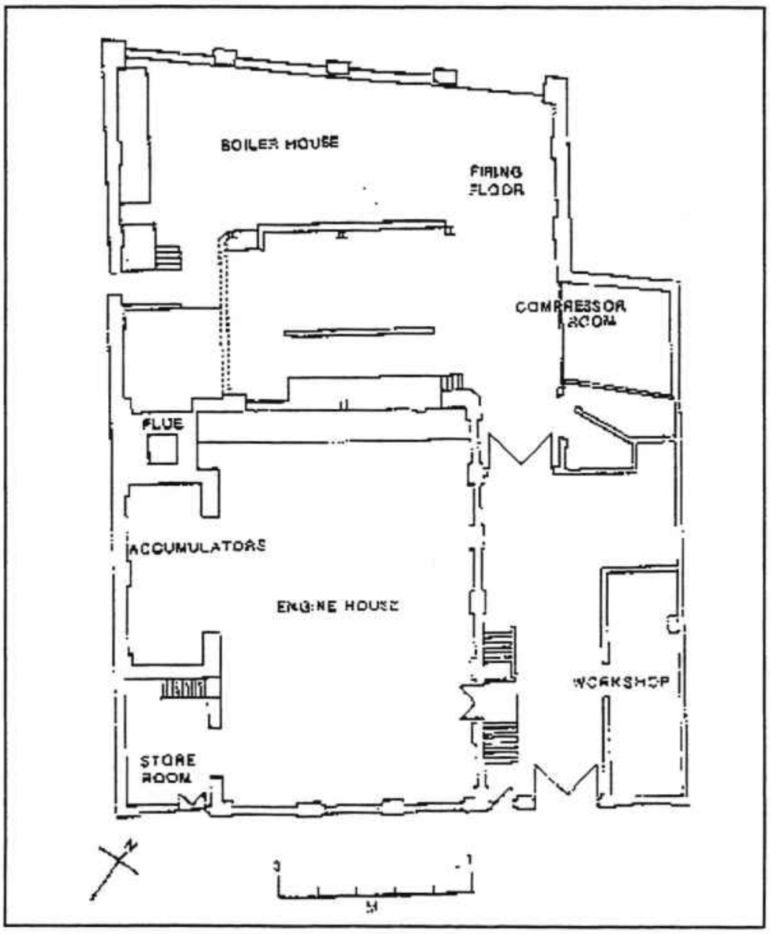
The accumulator tower has been altered and the large opening to the engine house blocked. It held two hydraulic accumulators whose purpose was to equalise the strain on the engines when there were fluctuations in supply.

The boiler house was originally in three divisions; the economisers, the boilers themselves and the firing floor, but has been altered.

The compressor house is where the borehole was situated. The water was raised using an air-lift device.

Coal was unloaded from the River Irwell and stored in the coal store. It was loaded from a hoist at the top of the building and taken inside to steel skips. Remains of the loading gear survive. A Vickers mechanical stoker automatically fed the coal to the boiler house

Hydraulic power was either produced by using pumps or by steam intensifiers. Hydraulic pumps were usually controlled by means of a by-pass valve, which opened when the pump was unhooked and allowed the pump delivery to be returned to a suction tank. While the valve was left open water could circulate through the pump and back to the suction without building up pressure. When the by-pass valve was closed, the delivery was again directed into the accumulators. The valve was operated by the accumulators so that when the water supply was almost empty, the accumulators being close to the bottom of their strokes closed the valve. The pumps then delivered to the accumulator until enough water had been pumped to raise the accumulators to their maximum stroke. Thus as the pump ram in the engines was drawn up, water entered the cylinder under pressure and, as the ram returned, water poured into the supply pipe.



Tour Ja Monday 11 September
The Salt Industry of Cheshire
Winsford Salt Mine

History

(The following is an edited version from the Salt Union Leaflet)

200,000,000 years ago, Cheshire was under water. As the years passed by, the inland lakes dried out and left cast deposits of rock salt. The rock varies in colour from crystal clear to dark brown, mainly due to the presence of marl, a gritty, insoluble material, and comprises about 94% sodium chloride.

In 1844, two four foot square shafts were sunk at Meadow Bank, Winsford, and that was the start of the **only dedicated salt mine in Britain today.** Black powder, picks and shovels were used to mine the salt and tallow candles provided essential light underground. In those days, the main use for rock salt was for cattle licks and animal feed and only about 20,000 tonnes were produced each year. In 1975 the two old shafts were filled and sealed.

Three shafts serve the present day mining. One was sunk in 1940 and has now recently been converted into a "people carrier" lift, which will take up to about 15 people. It takes the lift just sixty seconds to get from the top to the bottom of the shaft which is 150 metres deep. The second shaft constructed in 1964, is 5 metres in diameter and used as a ventilation shaft and, for lowering heavy machinery into the mine for re-assembly. The third and most recent shaft, installed in 1973, is where the salt is lifted out of the mine.

Method of Mining

The rock salt is extracted from working faces about 20 metres wide and 7.5 metres high to form a series of caverns by leaving behind about 35% of the total area in the form of giant square salt pillars to support the roof. This method of mining is called "room and pillar"

The rock face is undercut at floor level to a depth of 4.5 metres using universal rock cutting machines. The face is then drilled to a standard pattern using a computer-controlled electro-hydraulic rotary drill. Two people, working from a special mobile platform vehicle, charge the drill holes with explosives and short delay detonators. The face is then blasted to bring down about 1400 tonnes of well fragmented rock salt.

The rock salt is picked up by a huge Caterpillar loader with a 20 tonne capacity bucket which carries it a short distance to a mobile feeder breaker: the feeder breaker crushes the biggest lumps down to a size suitable for transport on a conveyor belt. The broken rock salt then begins the first stage of a long journey out of the mine. On its way the rock is conveyed to an underground crushing plant where it is broken down to the correct size. The product then continues its journey by conveyor belt to the shaft where it is hoisted to the surface in 9 tonne skips. On the surface the salt is discharged to another conveyor belt where it is treated with a free-flow additive before being discharged onto bulk stockpiles. Some product is used in animal food and also as fertiliser for sugar beet, but its primary use is for de-icing roads in winter.

Today the Winsford Rock Salt Mine is one of the safest and most productive mines in the world, with the capacity to produce up to 2.5 million tonnes of rock salt a year. And with over 100 miles of tunnels it is also the **largest and oldest working mine** in the country.

Tour J b Monday 11 September
The Salt Industry of Cheshire
Northwich Town Centre and the Salt Museum

Northwich

The three salt towns or "wyches" in Cheshire, which traditionally produced salt from brine by the "open pan method", are Nantwich, Middlewich and Northwich - all with a long history of salt making. Northwich was a Roman salt town (Condate) and a major medieval centre attested by the size of its 14th 16th century church, St Helens. In the 19th century it used to have numerous boat yards and docks. Today it is a salt and chemical town.

In 1670 rock salt was discovered at Marbury and led to the development of rock salt mining around Northwich and Winsford, (see tour **Ja** for further information on rock salt mining).

The extraction of salt as brine from the pre-Roman period and as rock salt by mining since the seventeenth century has led to widespread subsidence of the countryside and town centre particularly from the mid-nineteenth century. Northwich suffered from 'wild brine pumping': Here bores were drilled down to the hard salt rock head and the brine pumped out; this allowed fresh water to flood in, dissolving more salt and removing substantial quantities of salt from the salt beds. Eventually major subsidence occurred, not always in areas involved in wild brine pumping.

The Cheshire Flashes are the most extreme example of this phenomena - huge submerged tracts of land - now often Sites of Special Scientific Interest. The Adelaide Mine to the north of the Lion Works collapsed in 1928 to form the Marston Flash. Other good examples include Ashton and Neuman's Flashes, between Marston and Northwich, which were used to tip mine waste and now support a wide range of special plants, birds and butterflies.

The extent of damage caused by subsidence to buildings, canals and roads was widely recorded and Northwich was the one of the most photographed towns in Britain, as three storey buildings one day became two storey the next. Northwich has an appearance of black and white Tudor buildings, although all are Victorian or later. Thomas Ward commented that in 1899 "by degrees" the town is becoming one of framework buildings, and will, for England, be quite unique. The timber-framed architecture is not a pastiche of the medieval urban vernacular, but provided a very real answer to a very real problem - subsidence. Timber-framed buildings are designed to withstand ground movements, but can also be jacked up, moved, dismantled and re-erected.

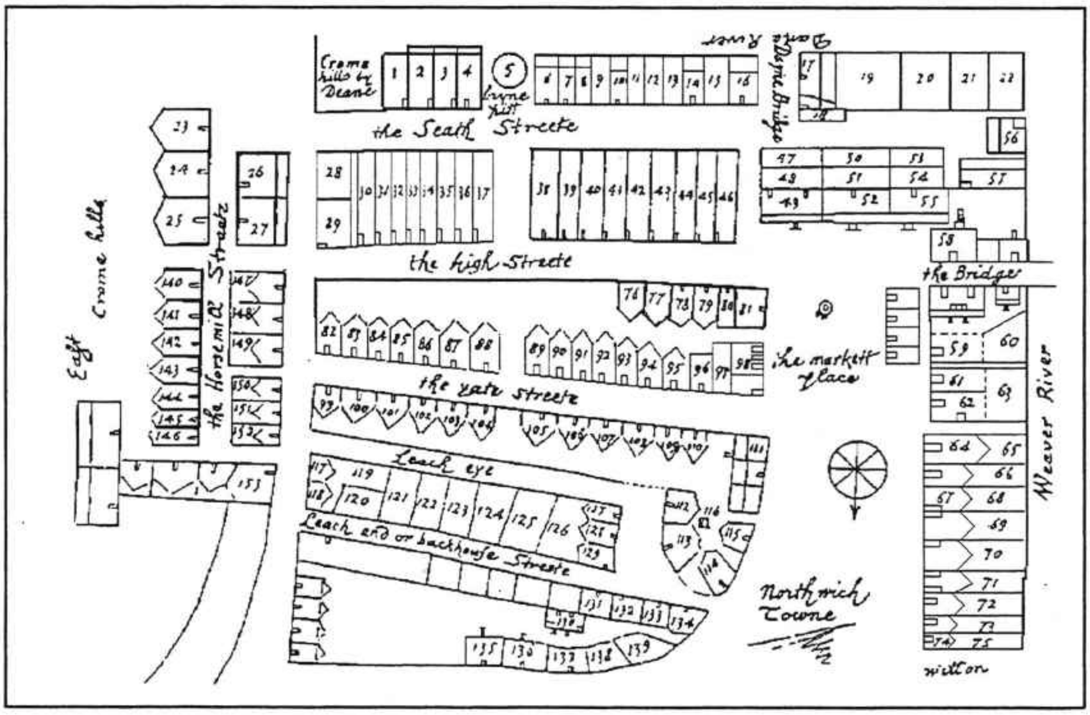
Northwich, with its timber-frame buildings, is believed to be the only town to attempt to counteract the effects of subsidence by re-introducing the timber-frame. In 1891 Parliament passed the Brine Subsidence Compensation Act and the local Brine Board controlled and developed a method of construction to withstand subsidence. This regularised the construction of lightweight, timber framed buildings with brick panels held between the vertical timbers. Instead of conventional foundations the buildings rested on a timber frame with jacking points incorporated. If subsidence occurred the structure could be jacked to a new level position or dismantled and moved. Some buildings were moved whole to a more stable position on rollers.

In 19th century Britain the town may have been exceptional in pioneering this approach, an exemplar for modern town planning in earthquake zones.

The tour will examine 19th and 20th century solutions to the problem of subsidence and explore some unique timber framed buildings. It will include Town Bridge and Hayhurst Bridge opened in 1899, early electrically assisted swing bridges, which were designed to partially float in the River Weaver thereby avoiding problems of subsidence on the adjacent riverbanks.

Some of the larger buildings are flamboyantly decorated, making a virtue of a necessity. There are, however, many small and simple buildings, which add to the unique street scene, and many interesting features can be seen from the rear. The largest buildings was built as the main Post Office in 1918 but has recently been converted into a theme pub and restaurant. Bridge House, which replaced the brick building Bridge Inn was moved 185 feet in 1913 has been converted into sheltered accommodation. Casa Latina, once a bank had been originally constructed with a brick and stone ground floor only to have the upper-framed floors propped and supported as a more practical timber framed ground floor was inserted to replace the cracking brickwork.

There are now just under 100 of the framed buildings remaining. Many are under threat from poor maintenance and changes in high street retailing practices. Photographs of the original buildings will be available to show the endeavours undertaken to retain business premises in the town centre.



Northwich in the 16th Century

Tours Ja and Jb Monday 11 September
The Salt Industry of Cheshire
Lion Salt Works and Anderton Boat Lift

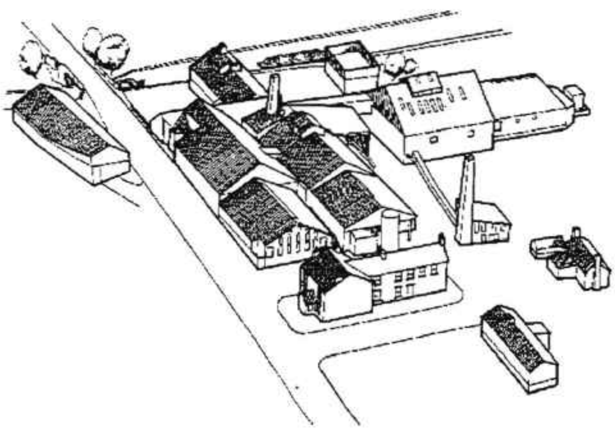
Lion Salt Works

The Lion Salt Works is the last open pan salt works in Cheshire. It was built in 1894 by the Thompson family who operated it until 1986.

The site was expanded and altered throughout its working life though operationally it remained essentially a Victorian works.

The works closed as a result of lost markets in West Africa at a time when Henry Lloyd Thompson was at retirement age and the business went into voluntary liquidation. It has been recognised as an important piece of industrial history and was purchased by Vale Royal Borough Council to prevent demolition.

A charitable trust was established in 1993 and is working with the council to restore the site as a working industrial museum. There is an exhibition centre and small shop on the site and volunteer stewards open the centre every afternoon.



The site comprises five pan houses, brine pump, horizontal steam engine, boiler house, manager's office and smithy. It has its own private railway line and is located on the Trent and Mersey Canal.

For the AIA visit the Trust will be demonstrating the evaporation of brine in two of its replica historic saltpans. A replica Iron Age/Romans-British pan is based on an excavated example from Shavinton, Cheshire. However this pan produces salt with a lead content too high, therefore the remaining pans, which make up a complement of three, are made from stainless steel. Another scale replica iron pan is based upon Agricolas illustrations of 1565 in De Re Metalica. Delegates will be able to sample 'the best of all salts'.

Lunch is to be provided in The Salt Barge immediately opposite the Lion Salt Works.

Anderton Boat Lift

At Anderton the Trent and Mersey Canal lies close to the River Weaver but on higher ground 15 metres above the river.

Soon after the canal opened in 1777 a river basin was excavated to provide docking for boats and pathways chutes were constructed to ease the task of moving tons of cargo by hand.
Tramways were laid to assist the transference. Cranes and later steam engines were installed to power some of the inclined planes.

Early in the 1870s the Weaver Navigation Trustees decided to build a physical link between the canal and the river at Anderton to eliminate the cost, effort and wastage involved in hand transportation.

Edward Leader Williams the Trustees engineer suggested the idea of a boat carrying lift. The resulting design in consultation with Edwin Clarke produced a design that was unique - a magnificent example of the Victorian mastery of cast iron and hydraulics.

The lift consisted of two vertical sets of interconnected hydraulic cylinders and pistons supporting a boat carrying tank 22.86m long and 4.27m wide. Two tanks were linked and counterbalanced to enable the movement of the boats to be achieved with very little energy.

Corrosion of the cylinders led to a redesign in 1906 by J A Saner with a large iron framework suspending the counter balanced boat tanks on wire ropes.

The lift was operational until 1982 when it was closed due to structural faults.

In 1998 British waterways were successful in a, 3.3m bid to the Heritage Lottery Fund for a contribution towards a, £7m restoration scheme. Work commenced in November 1999 and completion of the work is expected in September 2001.

A team of volunteers from the Anderton Boat Lift Trust provides information at a reception centre on site to provide visitors with information about the site and the progress of restoration work.

Tour K Monday 11 September
Mills and Industrial Landscapes; Cheesden Valley, Helmshore Museum and Queen Street Mill

Cheesden Valley

There are quite a number of places which were once thriving industrial communities and which today are rural and sparsely populated. Often these are in mining or quarrying areas where their abandonment can be quite directly linked to the exhaustion of the supply of economically recoverable raw material.

The Cheesden Valley was different in that textile mills were erected on the Cheesden Brook starting in the mid-eighteenth century. By the nineteenth century the valley contained at least fourteen mills and provided work for over two thousand people. Changes in the pattern of the textile trade, poor communications and harsh winters all combined during the last quarter of the nineteenth century to close the mills. Virtually all were shut by the time the twentieth century dawned although a small bleach works struggled on until just after the First World War.

Many of the workers had moved away as the mills closed to find work elsewhere, but a small community did remain and indeed some of the workers' cottages were occupied until the 1950's. Buckhurst Church School was built in 1840 to provide education for up to 225 children. It also acted as a Sunday school, a place of worship and a village hall. It is one of a few complete buildings surviving in the Valley and is now a private residence.

The creation of a reservoir for drinking water has obliterated a number of the sites of mills and houses. A Walk down the whole length of the Valley (for which at least a couple of hours would be required) takes one through a now rural landscape in which it is difficult to imagine that the ruined walls and mounds of earth are the sole remains of a once bustling industrial community.

Weather permitting; a short walk is planned from the New Inn down to the Cheesden Lumb Mill. This was one of the first mills (a fulling mill) to be constructed in the Valley and is now the site with the largest amount of standing walls. There is evidence of a terrace of workers cottages quite close to the mill. Cheesden Lumb Mill is also interesting in the context of this tour because elements of what it must have been like as a fulling mill in its early days will be seen at Higher Mill, and after 1854 when it was converted to the waste cotton trade at Whitaker's Mill, Helmshore.

Helmshore Textile Museum

Three mills comprise the Museum of the Lancashire Textile Industry, which has been designated as a museum with an outstanding collection. Only fifty-two museum bodies in the country have received designation and the Museum of the Lancashire Textile Industry is the only one to be designated purely for the quality of its textile industry collections.

Higher Mill

Higher Mill was constructed as water powered fulling mill in 1789 (just three years after Cheesden Lumb Mill was built for the same purpose some 5 miles away). Under the ownership of the original family (called Turner) Higher Mill developed and prospered. William Turner became one of the most powerful figures in the area but following his death in 1852 with no male issue Higher Mill, in due course, passed to the Whittaker family. This family ran it right up to its commercial closure in 1967. Unlike the Turners the Whittaker's were not great innovators and under their stewardship the late 1840's waterwheel and fulling stocks continued in service until 1954 and survived to be refurbished in the 1970's when Higher Mill had become a museum. These and other nineteenth century wool finishing machines are demonstrated for visitors.

In the 1880's the important textile machine makers Messrs. Platt Bros. Of Oldham obtained original machines from Arkwright's mills at Cromford, Derbyshire. Their purpose in making these acquisitions was to display the Arkwright machines (which were by then a hundred years old) alongside their then current textile machinery to demonstrate how much they had advanced since the Arkwright inventions. Other items were later added (including an improved Spinning Jenny) and the collection came to be known as the 'Platt collection of early textile machines'. In 1971 with the decline in the fortunes of Platt (by then known as Platt Saco Lowell) the machines came to Higher Mill and most were later bought with a Science Museum Grant.

The ninety-six Spindle Arkwright Water Frame is the only surviving complete production Spinning machine by Sir Richard Arkwright in the world. The original Arkwright lap formers and carding engines, which accompany it are a valuable resource.

Whitakers Mill

Only a few feet away from Higher Mill is Whitaker's Mill. This was also built by William Turner for Woollen cloth production. Unfortunately it was almost all destroyed by fire in 1858 and only a small part of his 1820's mill survives. The main mill as it stands today was erected in 1860, and early in the twentieth century it was converted to condenser spinning. Not only the general decline of the Lancashire cotton industry but changes in the way the trade operated and the popularity of certain types of household textiles brought about Whitaker's Mill closure at Christmas 1978. The mill was bought by Lancashire County Council in 1979 complete with its cotton opening, carding and mule spinning machinery. Almost half of the Mill is given over to preserving these working machines, still set out exactly as they were during the Mill's commercial operation.

Most other historic machinery has been brought into the building and a great deal of it is stored on the top floor.

The tour will look at all the preserved areas, together with demonstrations of the working waterwheel, fulling stocks and Condenser carding and spinning machinery. The high point of these demonstrations will be the running of a pair of Condenser cotton spinning mules. The spectacle of these huge machines spinning yarn on 1,428 spindles and running at full commercial production speed is most impressive. Although never normally demonstrated and only run handful of times for filming it is hoped, in addition, to provide a unique opportunity to see a few spindles of the Arkwright Water Frame actually producing yarn.

Lunch with be taken in the Helmshore Textile Museums cafe.

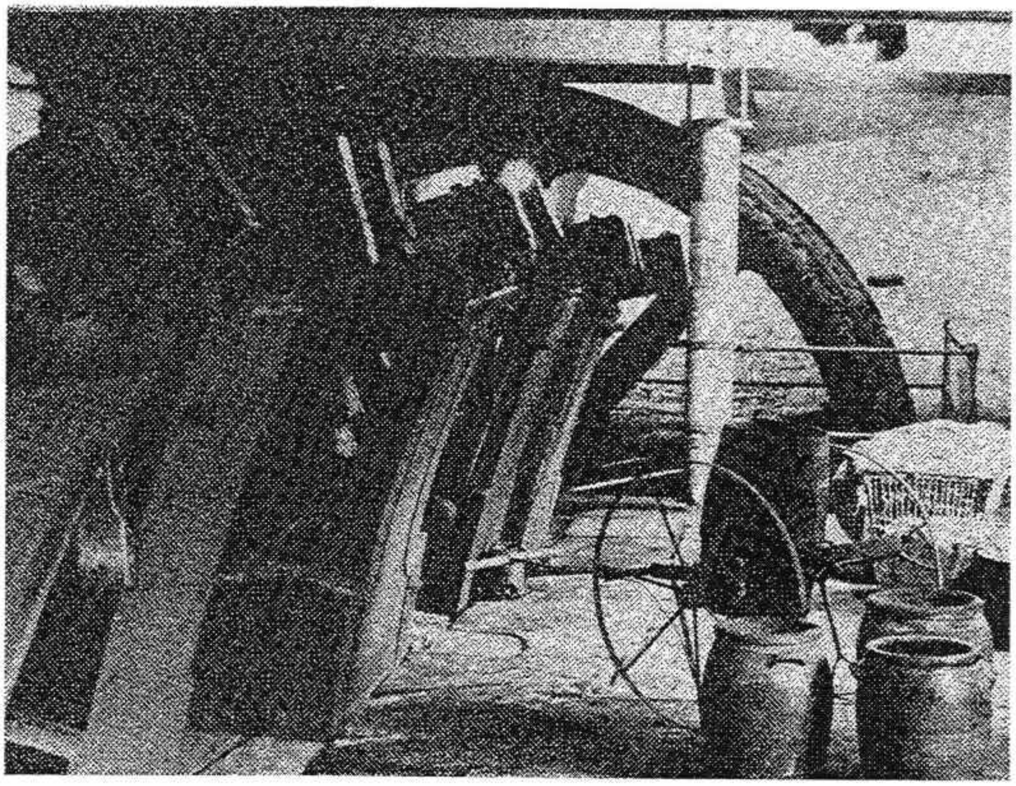
Queen Street Mill

Some fifteen miles away from Helmshore on the outskirts of Burnley lies the third mill which makes up the Museum of the Lancashire Textile Industry. Queen Street Mill was built in 1894 as a workers' co-operative. Decisions to spend relatively large sums of money on such projects as re-equipping the Mill with more modern machinery were, perhaps, more difficult to make in a workers' co-operative. Whatever the reason Queen Street Mill closed on 12 March 1982 still equipped with Lancashire looms installed when the mill was built in 1894. It was the last surviving steam powered textile mill.

Over three hundred Lancashire looms remain in the weaving shed and these are still driven by the 500hp tandem compound steam engine called `Peace`. Although all looms could be made operational, for economic reasons only a few are actually producing cloth at the moment. Nevertheless the weaving shed is a vast area (some 17,000 sp.ft. or 1,700 sq. metres) filled with whirling leather belts and noise. It is today a unique spectacle which none of our visitors forget.

During the visit to Queen Street Mill the engine will run and looms will be weaving. There will be an opportunity to study some of our other loom types (including one of the most complex historic Jacquard looms in existence) and to see the tape sizing and other preparation equipment. For those particularly interested in steam engines our original Lancashire boiler (hand fired with coal) and 120 tube economiser will be operating and available for inspection.

For this trip footwear suitable for walking `off road` and appropriate outdoor clothing (according to the weather) will be needed. Clothing which is not too light coloured and easily marked is preferable especially if you want to look `behind the scenes` at our steam engine and boiler plant.

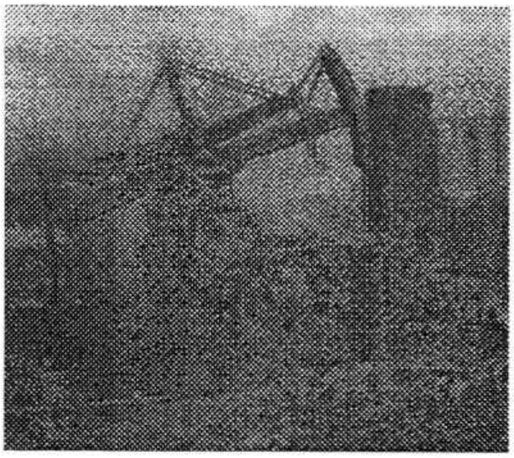


Helmshaw Waterwheel

Tour L Tuesday 12 September
Coal, Iron and Canal;
Parkbridge, Portland Basin and the Ashton and Peak Forest Canals

In 1969 Professor Owen Ashmore called Park Bridge the finest example of an industrial community linked with wrought iron manufacture, textile machinery making and coal mining in the North West, and despite the loss of a number of buildings in the last 30 years this remains the case. The original reasons for its establishment were the availability of waterpower and the demand for textile machinery in the nearby cotton towns of Ashton and Oldham. Later, the local supply of coal from the nearby Fairbottom and Rocher mines and the growth of a faster system of communications (a branch of the Ashton Canal was opened as far as Fairbottom Colliery in 1797 and the Oldham, Ashton under Lyne & Guide Bridge Railway passed next to the Bottom Forge when it opened in 1860) enabled it to expand in the remote part of the Medlock Valley.

It was started around 1784 by Samuel and Hannah Lees on the site of an old corn mill on River Medlock at Park Bridge. Samuel was a whitesmith and clock maker and he used the water powered corn mill for his first business. In the 1790s he began making rollers and spindles for cotton spinning machines. After he died in 1804 his wife Hannah was left with 6 young children and the business to run. She did so well that in later years her sons agreed to rename it 'Hannah Lees & Sons'. The company and site continued to expand in the mid and later 19th century, the family taking over the Fairbottom Colliery Company in this period. New buildings from this period include a roller-making shop, rolling sheds, a forge and a cotton mill, the foundations of which can still be seen on the northern banks of the river. Behind that are the remains of the later rolling shop, which is now used as a car park. The single-storey rolling mill (the bottom forge) lies in valley to east and is now used for storage. Thanks to the arrival of the railway in 1860 products from Park Bridge began to be exported internationally and iron rivets were used to help build the Eiffel Tower in Paris, the Titanic and the Sidney Harbour Bridge.

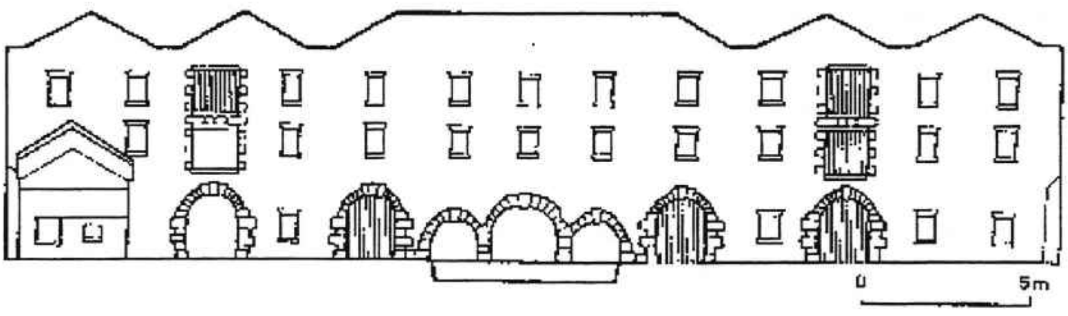


The railway also enabled the ironworks to start processing scrap iron, which it did until the works closed. The ironworks was still owned by the Lees family when it closed in 1963.

The ironworks were located in an isolated position so from the early 19th century the Lees family built a variety of workers' housing including two rows of terraced houses dating from the 1850s and 1860s and later an institute, school and church. The lees family themselves lived in dean house, a mid 19th century Gothic mansion overlooking the works. The family also bought the neighbouring Keverlow Farm. The surviving remains include the quadrangular stable block from c 1860, the terraced housing, Dean House, the foundations of the 1880s Roller Building, the foundations of the later 19th century cotton mill, the foundations of the c 1900 Bright Works, the buildings of the Bottom Forge, the remains of the Rocher Vale winding house and the tramway tunnel, built around 1800.

The Portland Basin Museum

The Portland Basin Warehouse is one of over 40 canal warehouses built in North West England between the 1760s (the Duke of Bridgewater's warehouse in Castlefield) and 1910 (Salford Docks/Trafford Park warehouses). These ranged in size from small warehouses such as the example on Melbourne Street in Stalybridge, to the huge complex of the Great Northern Warehouse which had a storage and transhipment floor area of over 10,600m. Five warehouses are known to have been built in Tameside, of which four survive: Hyde Wharf, Portland Basin, Stalybridge Melbourne Street and Stalybridge Cornmill



By far the larges warehouse structure in Tameside was the Portland Basin, which in floor area compares with the largest examples built in Manchester in the late 18th and early 19th century. The original building was constructed by David Bellhouse in 1832 for the Ashton canal company at a cost of £8,901/13s/3d, as their third warehouse, two others being designed and built by David's father at the Manchester terminus in 1798 and at the Heaton Norris terminus in 1799. The main southern façade has three arched-shipping holes flanked on either side by two large cart openings allowing for the convenient transhipment of goods.

The warehouse stands on the northern side of the Ashton New Wharf in Portland Place, and was originally a three-storey building, 14 bays long and 5 bays deep, built into the hillside. The fine southern façade of three storeys, with stone quoins and stone lintels and sills to all of the openings, fronted the canal wharf. The impressive brick façade included three central archways with rusticated surrounds, all of which allowed access for boats into the warehouse. Two further archways on either side of the wharf arm, also with rusticated surrounds, provided land access into the building. The wharf side of the warehouse was protected by high walls and two pairs of cast-iron gates, which prevented access to the more expensive goods. The northern façade, with its external hoists and canopies, had two floors. The hoist system was powered by a 15hp external waterwheel fed from the Ashton Canal and debouching into the River Tame. A unique feature of the design was the long flat roofed section that covered the middle five bays of the building. None of Bellhouse's other warehouses have this design.

Unfortunately most of this structure was destroyed by fire in 1972, leaving only the first and second floors remaining. In 1988 a small visitors centre and museum opened in the eastern half of the warehouse. However, the whole warehouse ruins were substantially rebuilt by Tameside MBC to its original design in 1998-9 and opened as a museum for the industrial and social history of the Tameside area.

Ashton & Peak Forest Canals in Tameside

The Portland Basin represents the junction of the Ashton and Peak Forest Canals, and was the busiest transhipment centre in the Tameside area. The main branch of the Ashton Canal left the Rochdale basin in Manchester and after 6¾ miles and 18 locks reached Ashton Old Wharf and the junction with the Huddersfield Narrow Canal. It cost £170,000 to build between 1792 and 1797 and, amongst its promoters were a number of local colliery and landowners. There were also branches to Fairbottom, Hollinwood and Stockport. The Peak Forest Canal, which was begun in 1794 and whose construction was supported by the Ashton Canal Company, was opened as far as the Portland Basin in 1800, its northern terminus, although the full 14½ miles and 16 locks to the Bugsworth terminus near Whaley Bridge was not opened until 1804.

The Portland Basin represents one of the most important grouping of canal structures left in the Greater Manchester area, only surpassed in extent by the remains in Wigan and Manchester. Firstly, there are the reconstructed remains of the 1834 warehouse with its large external waterwheel, remains of which can still be seen. Secondly, there is the Stakes Aqueduct dating from 1800. This stone bridge carries the Peak Forest Canal across the river Tame in a cast iron trough and is one of the earliest examples to survive in the country. Thirdly, there is a fine stone roving bridge across the Ashton Canal with a date stone of 1835. Finally, there are still a number of textile mills built along the canal in the mid to late 19th century, which retain the industrial feel of the area.

Tour M   Tuesday 12 September
The Torrs Industrial Trail

At New Mills, as the River Goyt leaves the Peak District and flows into Cheshire, it abandons its floodplain and takes an unusual route   a meandering course through a 30m deep sandstone gorge known as the Torrs, which formed a perfect site for the new water powered cotton mills at the end of the eighteenth century. Rocky waterfalls and cascades in the riverbed allow the construction of weirs and a steady supply of water; there were good mill sites on a rocky terrace several feet above the water, and the sides of the gorge provided sandstone for building. Three cotton spinning mills were built in the Torrs   Torr Mill at the confluence of the rivers Sett and Goyt, Rock Mill and Torr Vale Mill. This latter mill is the only one of the three left standing and is listed Grade II*. It is the last working cotton mill in New Mills, working continuously since 1788. The technology of the waterpower is still there to be seen at close quarters, with a large weir sluice gate and headrace and tunnel into the mill.

The obstruction caused by the gorge to communications and the growth of the town was not overcome until well into the nineteenth century, with the building of the two-arch Thornsett turnpike road bridge in 1835 and the four-arch Union Road Bridge in 1884. As well as these two imposing road viaducts, there is an 1867 railway viaduct and 1868-railway bridge over the gorge and two railway tunnels under the town. In 1984 the Millward Memorial footbridge, over the river Sett near its junction with the river Goyt, was opened to commemorate the centenary of the opening of the 1884 Union Road Bridge.

The Millennium Walkway, a 175-yard long elevated steel walkway, built with the aid of a Millennium lottery grant, now spans the otherwise inaccessible cliff wall above the river Goyt opposite Torr Vale Mill. From the walkway, with the river Goyt beneath them rushing round a bend, visitors are able to inspect close at hand one of the most remarkable stone retaining walls to be seen anywhere, built in the 1860's to support the railway, the former Midland Railway line from London and Derby to Manchester. Although the walkway is of modern design, this does not detract from its place in history following, as it does, a series of distinguished predecessors which have negotiated the physical problem of passing through, over and under the sandstone gorge.

Bugsworth Canal Basin

At the end of the eighteenth century the tiny isolated hamlet of Bugsworth was chosen as the transfer point between two of, what was then, comparatively new forms of transport   the Peak Forest Canal and the Peak Forest Tramway. Opened in 1797 (the tramway in 1795), this dual scheme was planned to bring lime and limestone from the quarries in the Dove Holes area of the Peak district to the industrial and agricultural areas of the Manchester region and beyond. The horse-drawn tramway   6½ miles long. 4`2½" gauge, built of iron plate rails on stone blocks brought the stone down from Dove Holes to Bugsworth where it was transferred onto narrow boats for shipment. The flood plain of the Black Brook was ideal for the excavation of canal basins and a series of tramway sidings were built to serve the basins, warehouses, stone crushers and three sets of lime kilns.

In the early nineteenth century, huge quantities of limestone were required for agricultural lime, for the glass works at St Helens, and for lime mortar for building the thousand of brick dwellings in the new industrial urban areas of Manchester. Within a few years of opening, some 50,000 tons of limestone per year were being brought down the tramway. In the late twentieth century, 20,000 tons per year were sent via the Macclesfield Canal and the Trent and Mersey to the alkali works at Northwich. Two nearby grit stone quarries were also linked to the canal basin, one of them via a tunnel. The tramway and basin were closed in 1925, soon after becoming part of the LNER, and remained derelict for many years. But visitors today benefit from three decades of restoration put in by members of the Inland Waterways Protection Society, providing one of the most important monuments of transport history in North West England.

Peak Forest Canal Basin at Whaley Bridge

Although a small settlement must have existed near the ancient river crossing over the Goyt for centuries, the town of Whaley Bridge is almost entirely a product of the industrial and transport revolutions of the nineteenth century canal terminus, railways, printworks, cotton mill, bleachworks, coal mining and various other industries all resulted in the growth of the town. In 1797, the main line of the Peak Forest Canal was completed to Bugsworth but a branch was soon built to Whaley Bridge, from where coal was taken to Bugsworth for the lime kilns. In 1831, the Cromford and High Peak Railway (CHPR), which crossed the Peak District by a series of inclined planes and level sections was terminated here. The incline of the CHPR here was a double line incline, and a horse capstan at the top, using chains, acted as a brake or for haulage. It replaced an earlier stationary steam engine. This incline worked until 1952 and carried mainly coal to the works at the bottom as well as limestone in earlier years.

The CHPR made it possible to bring limestone from the Buxton area, particularly from the quarries at Grin Hill to be transferred onto narrow boats at Whaley Bridge from Stockport in 1857; a siding into the CHPR (which the LNWR also owned) robbed the canal of its limestone traffic. Since the canal was owned by the Manchester and Sheffield Railway, this soured the relations between the two companies, from which arose important consequences for the Manchester region.

Standing astride the end of the Peak Forest Canal is the 1832 transit shed built soon after the CHPR arrived. In 1910 an extension was built at the far end of the transit shed and a change in stonework marks this extension. A bow girder bridge formerly carried the CHPR over the river Goyt. A siding ran to Goyt Mill, a cotton mill, which stood on the site of the new houses (Woodbrook estate). Bridge Street is a crossing point over the river Goyt, which probably dates back to medieval times. Whaley Bridge railway station stands on the line of this ancient road, which continued up the hillside following the present Whaley Lane towards Disley.

Dorothea Restorations

Dorothea Restorations was established in 1974 to provide a specialist `traditional engineering= service for those charged with the care of the engineering and architectural heritage. Their philosophy is to:

Retain as much existing material as possible, repairing sympathetically rather than renewing

Where renewals are unavoidable, to use traditional techniques and materials wherever racticable

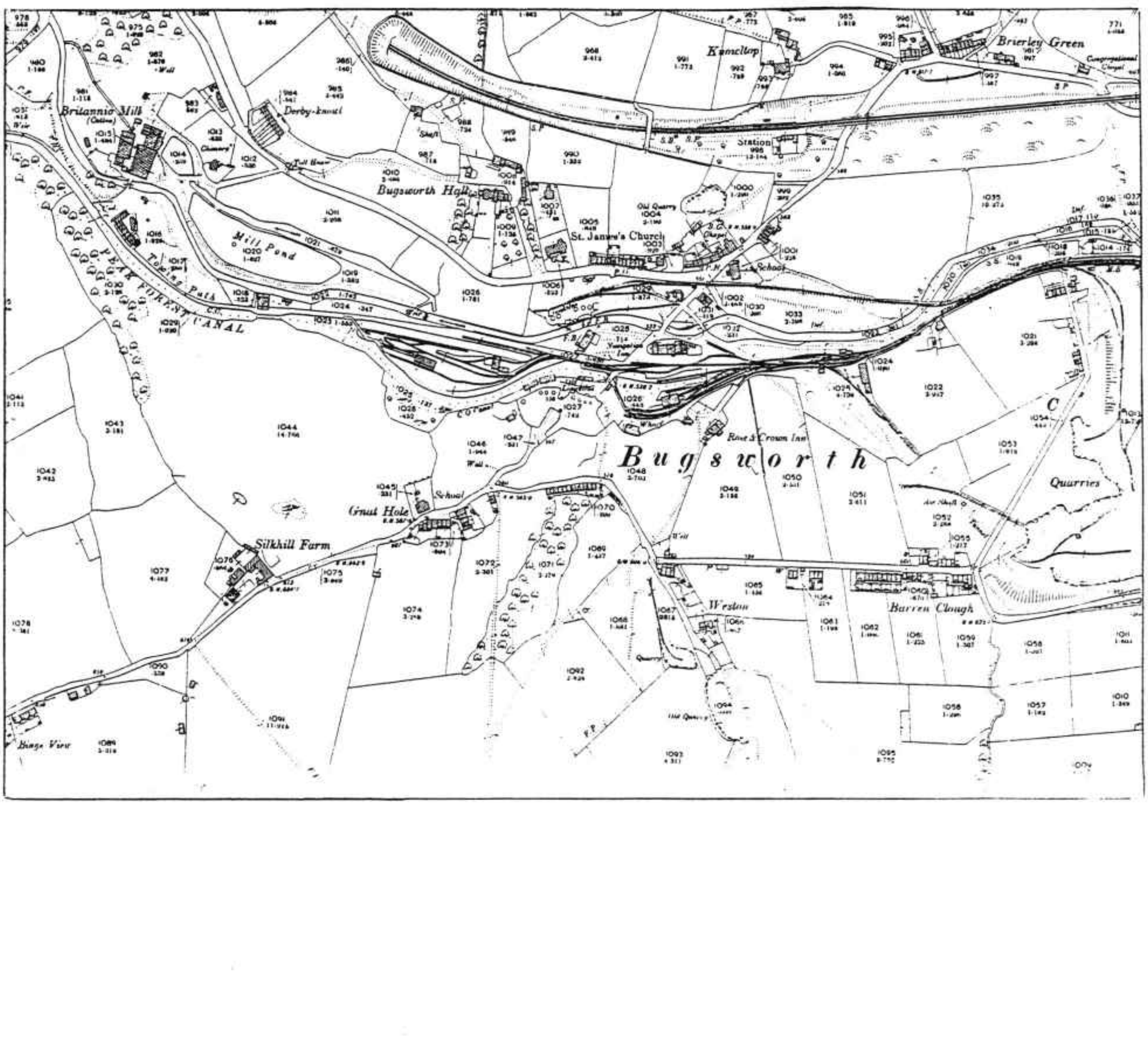
Change historic appearance as little as possible consistent with achieving a stable condition

Plan, record and supervise work carefully

Instruct those concerned with on-going care and maintenance in correct procedures

- Work to the highest standards consistent with the original style of manufacture

By incorporating into one organisation the ability to deal with a range of traditional engineering materials (principally wrought iron, cast iron, steel and timber), and the diverse skills required **Dorothea Restorations** has established an international reputation for high quality restoration.



Tour N Wednesday 13 September
Mills in Oldham Rochdale & Bolton

This is a day devoted to later cotton spinning mills, rather than those of the classic period of the Industrial Revolution. Many of the mills we will see today were built after 1900 and form a contrast with other mills, which will be seen during the Conference, in Ancoats, at Helmshore and at Styal.

Mills in Oldham

"On the way from Manchester to Oldham there is a vantage point, soon after Hollinwood, with a most magnificent view of the many Oldham mills, all alike with their emerging chimneys, a vast, theatrical depiction of the industrial power. I used to take foreign visitors to this grand mirador, and they were always impressed, particularly when I told them that the Oldham spinning industry there before their eyes contained 18,000,000 spindles, as many as all of France and all of Germany had together."

Joseph Noguera *Textile Engineering Experiences*
(Privately published 1978) pg.35.

Alas, not a lot of this `grand mirador' now remains. The last mill in Oldham to spin cotton ceased at the end of 1998 and only three chimneys now stand to their full height. Joseph Noguera's vantage point would have included the group of four mills at Whitegate, which we shall be viewing first. These are Gorse Mill of 1906, Ram Mill of 1907, Rugby Mill of 1907 and Ace Mill of 1914, but not completed until 1923. We shall leave the coach to view, from the road, these characteristic Oldham mills of the period five or six storeys in height with prominent and decorative water towers, projecting engine houses and cart shed extensions.

The exact route and stopping points from here depends on the time but we shall proceed up

road, these characteristic Oldham mills of the period five or six storeys in height with prominent and decorative water towers, projecting engine houses and cart shed extensions.

The exact route and stopping points from here depends on the time but we shall proceed up Fields New Road to note, amongst others, Nile Mill of 1898 built for ring spinning and powered by a beam engine. Manor Mill in Victoria Street of 1906 is an outstanding example of its period and retains its chimney. We shall then travel through Royton and Shaw noting further mills of this era.

Ellenroad Mill, Newhey, Rochdale.

The mill itself has been demolished but the engine survives in its engine house together with the boiler house and chimney. The engine will be in steam today. The mill was built 1890-1892 and designed by the Oldham architects Stott & Sons. It was thus similar to some of the mills we have seen in Oldham this morning. As originally built it was a mule spinning mills of 99,756 spindles; the mill was extended in 1899-1901 to house 121,580 spindles. The engine was a 2,000hp (1.49MW) triple-expansion cross compound supplied by John & William McNaught of Rochdale. Despite being of fire proof construction the mill was seriously damaged by fire on the 19th January 1916. In 1919 a new company purchased the remains of the mill and rebuilt it as an 80,000 spindle ring mill. Additional power was required, so the engine, which was undamaged by the fire, was rebuilt by Clayton Goodfellow of Blackburn as a 2,650hp (1.98MW) twin tandem compound. The engine drove the whole mill until 1970 when progressive installation of electric drives began and it was finally taken out of service in 1975. The mill ceased operation in 1982 and was subsequently demolished except for the engine house, boiler house and chimney, which were put in the care of the Ellenroad Trust. Only one of the original five boilers remains in the boiler house and the remaining space houses the Whitelees beam engine of 1841 and the reception area.

Swan Lane Mills, Bolton.

DELEGATES MUST BE AWARE THAT THIS IS A WORKING MILL AND MUST OBSERVE DUE SAFETY PRECAUTIONS AS INDICATED BY THE GUIDES. IN PARTICULAR PHOTOGRAPHY IS ONLY PERMITTED IN AREAS WHERE IT WILL NOT CAUSE PROBLEMS WITH MACHINERY OR FIRE DETECTION APPARATUS.

Swan Lane consists of 3 mills: No.1 of 1901, No.2 of 1904 and No.3 of 1914, all designed by Stott & Sons. Nos 1 & 2 really form a single mill, which is now the only, mill in Lancashire still spinning cotton. Our visit today is courtesy of Shiloh Spinners and has been arranged by Brian Clegg, Group Personnel Manager. These mills were built for fine counts mule spinning and all were equipped with steam engines supplied by George Saxon. Nos 1 & 2 mills had almost identical cross-compounds of 1,500hp (1.12MW) while No3 mill had a vertical triple expansion engine of 2,000hp (1.34MW). In total these mills housed 307,120 spindles. As nos 1 & 2 form a single structure with identical exterior detailing it is surprising to find that internally they have a different method of construction. They have lost some of their exterior detailing and the controlled environment demanded by the modern spinning plant now installed has resulted in windows being bricked up. The engine house and truncated chimney with, swan symbol, still stand. No3 mill ceased spinning in 1963 and is now in separate ownership, split into industrial units. We shall not be able to go inside but will be able to note from the exterior that it was a large and ambitious structure, decorated with swan motifs.

Depending on the time, we should be able to pass other mills in Bolton on our return route.

Tour O Wednesday 13 September
From Coal Pit to Canal

The south Lancashire and Manchester Coalfield had a long life, the last pits closing in the 1970s. Amongst the earliest were those on the Duke of Bridgewater's estate around Worsley, which were extended and improved by Brindley and Gilbert in the 1750s by the use of soughs and underground canals. Earlier Brindley had been involved at pits in the Irwell Valley, which because of faulting, were wet and difficult to work, requiring ingenious drainage schemes and like Worsley canals to move away the coal. On the other hand, the Irwell was nearby and drainage levels and soughs could be cut to it to take away the water from underground. The drainage levels at Worsley of course gave rise to the Bridgewater (surface) canal and the transport of cheap coal to Manchester and Salford.

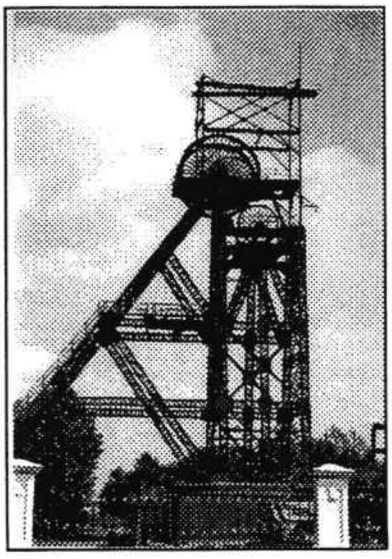
As the demands of the steel industry grew and also the Liverpool steamships, St. Helens glass and Widnes chemical complexes, so deep pits were sunk post 1870 in the S Lancs Coalfield to reach the concealed reserves which stretched under the Cheshire plain. These required powerful steam-winding engines, triple deck cages, ventilation fans and compressors, and eventually elaborate coal screening and washing plant. Many of these collieries lasted into the 1960's but because uneconomic to work and have now largely been cleared with the exception of the surviving installations at Astley Green on the East Lancs Road (A.580).

Wet Earth Colliery, Clifton

Originally sunk by Heathcote and Fletcher in the 1740s, to the five quarters and Doe seams. Because of the Irwell Valley fault, the pits suffered from water inundation and so were brought to the notice of James Brindley. He suggested using the flow of water to operate a waterwheel driven pump. From the weir on the River Irwell, water was fed to an inverted siphon underneath the river and so along a channel to a penstock and water wheel 22ft in diameter. Tail race tunnels and drainage adits took the water back to the river. Brindley's wooden water wheel survived until 1867, when it was replaced, by a turbine. In recent years the former wheel pit and turbine insulation has been excavated by G.M.A.U. and the local exploration group who have also dug out the sough, and consolidated a number of surface remains including engine beds, tops of pit shafts, loco sheds, canal loading docks, boiler and compressor house etc. There are also remains of cottages and branch railways. The pits finally closing in 1928

Astley Green Colliery

Astley Green Colliery was sunk in 1908 to exploit the coal reserves in the concealed coalfield beneath the South Lancashire Plain. The pit bottom is 890 yards. Deep and was reached without loss of life, in 1912. The winding for the No.1 shaft required the installation of one of the largest steam winding engines used in Britain. Built by Yates and Thom of Blackburn. It is a four cylinder, twin tandem compound of 3300 h.p. The headgear for the shaft is an impressive lattice steel riveted structure 98ft high, with winding pulleys 21ft in diameter. The whole structure weighing 120 tons. Sixteen Lancashire boilers raised the steam, and steam compressors generated the compressed air used underground. The total capacity of the electricity plant, which was used from the beginning, was 3000 K.W. from turbine generators. Three deck cages could accommodate 4 tubs of coal on each deck.



Coal from the screens was moved principally by railway to the main line Liverpool to Manchester. Some went by barge on the Bridgewater Canal to power stations at Trafford Park and Stretford. The Colliery employed 2000 men and until 1955, women were also employed on the screens picking coal. The pit closed on 3rd April 1970, after which the large winder and headgear were protected by the Greater Manchester Council. Fortunately a number of other buildings such as the lodge and engineer's shop survived, and the Red Rose Steam Society were able to move in to establish a Museum on the site. Considerable numbers of written and photographic records of the colliery have survived which has made the task easier: but many hours of voluntary labour have been necessary.
After a slide presentation there will be a tour of the engine house and surface buildings A call will be made if time permits on the return trip to Worsley, Delph Tunnels.

Tour P Thursday 14 September
Quarry Bank Mill – Styal

Quarry Bank Mill with Styal Village is the most complete and least altered factory colony of the Industrial Revolution. It is of outstanding national and international importance.

Founded in 1784 by a young textile merchant Samuel Greg, Quarry Bank Mill was one of the first generation of water-powered cotton spinning mills. Styal was chosen for a number of reasons, not least because of the suitable head of water provided by the River Bollin and its proximity to the Bridgewater Canal and thus Liverpool. However, the area was also sparsely populated and so a workforce had to be imported. During the 1790s there was a ready supply of cheap labour in the form of orphan children from workhouses across the country. The children brought to work in the mill lived in the Apprentice House, now restored as part of the Museum. Between 1790 and 1847, when the system ceased around 1,000 children were apprenticed to live and work at Styal.

As the Greg enterprise flourished the Mill itself was extended and a working community established at Styal. This included two chapels, a school and a shop as well as cottages and terraced housing. By the 1830s Samuel Greg & Co was one of the largest cotton manufacturing businesses in Britain with four other mills as well as Quarry Bank.

The apprentice house was built in 1790, with later additions and could house up to 100 children. Internally it was divided into five distinct sections: the living accommodation of the master and mistress who ran the house, the schoolroom, a large kitchen and refectory and dormitories for boys and girls.

Many of the great entrepreneurs were Non-Conformists. Samuel Greg built Norcliffe Chapel in 1822 and in 1837 a shed was converted into the Methodist Chapel. Without education `you are nothing' was the Greg philosophy. Oak School was built in 1823 and a Mutual Improvement Society was formed for the men of the village in 1826. Today Oak School is a local authority primary school.

The village shop and bakery were opened in 1823 originally for the sole use of mill employees. In 1873 it was run by the Styal Co-operative Society, eventually closing down in 1968. The Co-op bakery behind the shop was rebuilt by the National Trust in 1985.

The Gregs were benevolent employers and saw the virtue of having a healthy workforce; the houses were far superior to those built in towns. Styal's houses were separated by alleys; `back-to-back' houses were never built there. Each house had its own private back yard and lavatory. Each one also had a cellar, parlour, scullery, two upstairs bedrooms and its own allotment garden to supplement the families' basic diet.

The Development of Power Systems at Quarry Bank Mill, Styal

There were five distinct phases in waterpower development during the Mill's working life, with a further development once it became a museum.

Phase one: the first waterwheel of 1784. The first waterwheel, which was of breastshot rather than the undershot type, was located inside the northern end of the existing Mill Building, in line with the Clock Tower. In 1796, the wheel drove 2,425 water frame spindles and some preparatory machinery, but many processes were still performed by hand.

Phase two: the second waterwheel of 1801. In 1796, **Samuel Greg** and **Peter Ewart**, a highly regarded mechanical engineer and millwright, formed a business partnership. Ewart oversaw the Mill's first expansion. He improved watercourses to supply a second wheel and installed new machinery to increase productivity.

To increase the volume of water, Ewart built a stone weir and dam, flooding the valley upstream from the Mill to store millions of gallons of water, shortening the headrace channel. A tunnel was dug under the Mill yard to supply the wheels with water. Ewart's weir is still used today.

The second waterwheel was installed in 1801, sited in the extension to the original Mill, south of the first wheel. The extra power, which this wheel provided allowed the number of spindles in use at the Mill to rise to 3,452 by 1805, with a proportional increase in preparatory machinery

Phase three: the replacement wheel of 1807

A more efficient wheel replaced the first wheel in 1807, and was of wooden and iron construction.

Phase four: The Great Wheel of 1816-20

Thomas Hewes was contracted to supervise the design and installation of a new wheel, much larger than any of its predecessors.

This wheel was part of a planned expansion, with the building of a new block with a Mansard roof, allowing for the greater utilisation of attic space. Housed in the new building, the wheel powered most of the Mill's machinery, a few hand processes surviving. When it was installed, all the water was diverted on to the new wheel, rendering the older wheels redundant.

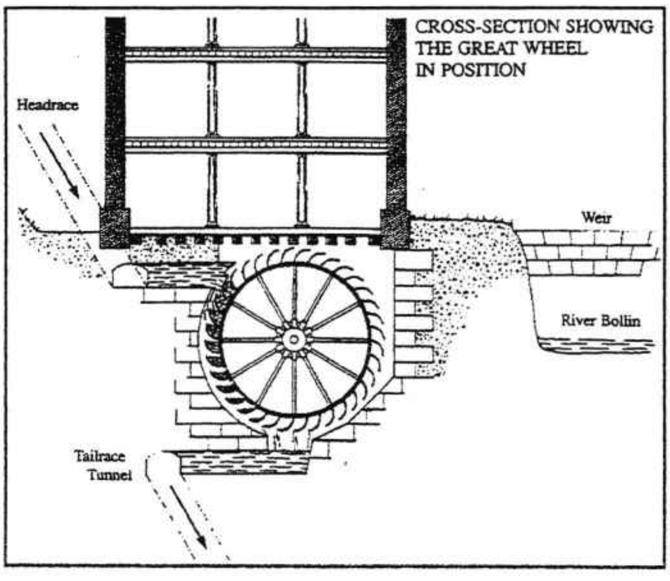
Hewes surveyed the valley downstream from the Mill in 1816 and found there was a difference in height of 2ft 6in. To make use of this extra fall, Hewes dug a tunnel for 869 yards. The height difference between the weir and the bottom of the wheel chamber was 32ft (9.75m), allowing a wheel of this diameter to be built.

The tunnel was built in 1817-18. One of the draughtsmen employed to survey routes for the tunnel was William Fairbairn, later to become an eminent engineer in his own right, developing many of Hewes' suspension wheel designs.

The waterwheel.

The wheel, a high breastshot suspension type was the first Mill wheel to be built solely of iron.

Installed by 1820 it was 32ft (9.75m) in diameter and 21ft (6.4m) wide, weighing approximately 44 tons (44.7 tonnes). It could generate 100 horsepower, and was likely to have been the largest known prime mover of the time: The norm for steam engines was up to 60 horsepower.



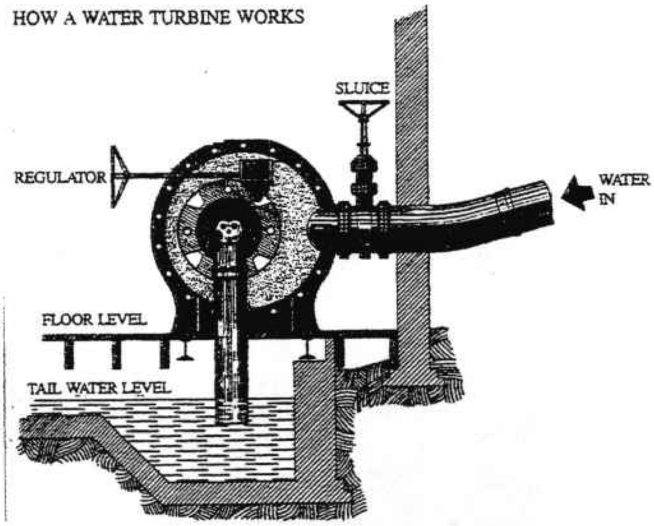
Cross-section showing the wheel in position in the wheel chamber in relation to the weir, headrace, river and tailrace

The water flow was controlled by a penstock (sluice) with a sliding gate, regulated by a governor. The governor ensured that the wheel, and therefore the spinning machinery, could operate at a constant speed. Although from the outset the wheel was unable to work to its capacity at all times.

Phase five: The water turbines 1904 – 05

A turbine uses the force of water, with the velocity (speed in a given direction) of water important. It converts the kinetic energy of a moving fluid into mechanical energy by causing a bladed rotor to revolve. This energy, available in the revolving shaft, can be used either directly to operate machines or linked to a generator to produce electricity

A turbine generates power through the force of the water turning its paddles. It is important that the water arrives at the paddles as a smooth, constant flow, so reducing the amount of power lost through turbulence.



Turbines at Quarry Bank Mill.

In 1904, the Mill commissioned Gilbert Gilkes and Co. of Kendal to supply two turbines, both using the existing head of water. They operated from January 12th 1905 until production ceased in 1959. The smaller double vortex turbine produced 20 horsepower. Used independently, it ran areas like the mechanics' shop, which sometimes operated when the Mill was not in production.

The Larger Twin Trent turbine could generate 200 horsepower. It was used to drive the main machinery.

Phase six: The present Fairbain wheel

In 1976, the newly established Museum Trust sought to acquire a waterwheel, returning the Mill to the water powered production of cotton cloth. William Fairbairn built the present waterwheel in 1850-51 for Glasshouses Mill, Pateley Bridge, Yorkshire. The wheel, a high breastshot suspension type, is similar to that built for the Mill by Hewes.

Fairbairn's wheel is 24ft (7.3m) in diameter, 22ft (6.7m) wide and weighs 50 tons (50.7 tonnes), making it smaller but heavier than Hewes. Its extra width meant that slots had to be cut into the walls of the wheel chamber for it to fit. It can also produce 100 horsepower but, with a more efficient design, requires less water to produce the same power. It was Fairbairn's penultimate wheel, the last and most powerful for a British customer.

Chronology of steam power developments at the Mill

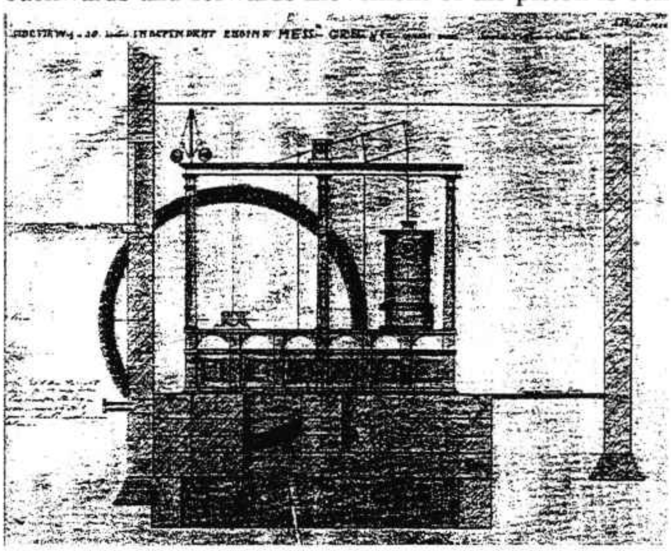
The first engine and boiler of 1810

In 1810, a 10 horsepower side lever steam engine was purchased from Boulton and Watt. It was installed in a purpose built Engine and Boiler House, parallel and behind the original Mill building.

The 1836 engine

In 1836 Boulton and Watt supplied and installed an independent beam engine of "superior perfection ... for all purposes".

Beam engines transfer motion from the piston moving in the cylinder at one end of the engine to the flywheel at the other through a pivoted horizontal bar, the beam. The discontinuous backwards and forwards movement of the piston is converted into the constant rotary motion of the flywheel better suited for powering machinery.



Side view of the 20 horsepower independent beam engine installed in 1836, from a drawing in the museum archive.

It was located in a new Engine House, adjoining the north gable wall of the main Mill building, the site of the coal yard for the 1810 boiler.

New Boiler of 1843

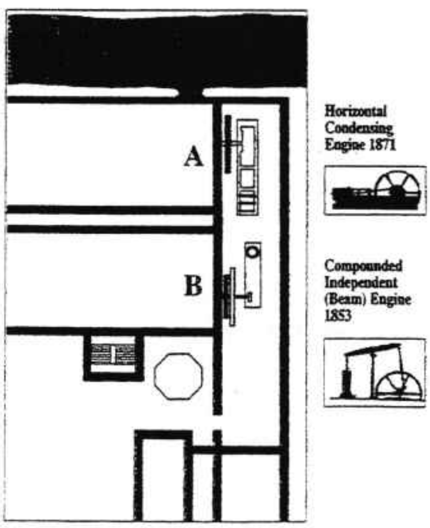
A new 31 horsepower boiler was commissioned from Boulton and Watt in 1843 to supply steam to the 1836 engine. Replacing the 1810 boiler, it was housed in an extension to the Engine House, running to the river wall.

Engine " McNaughted" and boiler purchased 1853

To increase the power output the 1836 engine was compounded in 1853 by installing a high-pressure cylinder. It was installed in a new Boiler House, which extended from the Engine House towards the road.

The horizontal condensing engine 1871

From the late 1860's, there had been proposals to remove some of the load from the waterwheel and place it on the 1836 beam engine. It was finally decided that a new engine was required for the extensive and permanent relief of the wheel.



Supplied by Martin and Smethurst of Manchester, this engine was installed in 1843 Boiler House. Relieving the waterwheel, it was suitably positioned to power the scotching and weaving rooms alongside the river.

Second hand engine 1906

With the introduction of more looms in 1906, it was realised that steam power would be needed more frequently, especially during the summer and periods of drought. The old beam engine was scrapped and replaced with a more economical 60 horsepower engine, made by Marshall Sons and Co. of

Gainsborough. After a trial period, the flywheel was replaced with a rope pulley flywheel, with the original flywheel being sold. The engine operated from 1907, and was used to power three rooms containing a total of 171 looms.

The Museum's steam engine

In 1992 the Museum purchased a circa 1840's independent beam engine, capable of generating 20 horsepower. The engine had been partially restored in recent years, but was incomplete and not in working order when purchased. In 1994, the engine was dismantled and brought to the Mill, where it will be restored, reassembled and installed on the 1836 engine bed.

Quarry Bank Mill will soon provide the visitor with the unique opportunity to see the great prime movers of the Industrial Revolution – the waterwheel and the steam engine – working in the context for which they were originally installed, namely powering machinery.

The Horizontal Steam Engine

In the late 19th Century, Quarry Bank Mill was powered by a waterwheel, beam engine and horizontal engine. All of these had been scrapped by the time the Mill closed in 1959.

Replacements for the waterwheel and beam engine were installed in 1984-86 and 1997-98 respectively, enabling visitors to have the rare opportunity of being able to view the machines in question in original buildings designed for the purpose. In 2000, a replacement horizontal engine, dating to the 1880s will complement these.

Unique features of the site

Its Original Buildings

The Mill is one of the finest and most impressive brick buildings of its day to survive. Together with Styal Village it represents and unrivalled example of an early factory colony.

An Extensive Archive

A varied collection of objects, pictures and documents provide evidence about the life and work of the Greg family and their workforce.

A Living Museum

Quarry Bank Mill is still a working Cotton Mill producing over 18,000m (20,000 yards) of cloth each year. Visitors can see, hear and smell 19th century textile machines working and meet stilled mill workers with years of experience of working in the cotton industry.

The Great Iron Waterwheel and 1830s Steam Engine

Quarry Bank Mill now offers a unique opportunity to see the two major sources of power available during the Industrial Revolution, working in an original context. The most powerful working waterwheel in Britain and a Boulton & Watt type beam engine powered by like steam to illustrate how power can be harnessed to drive machinery.