Historic England

Education

Teacher's Kit

Industrial Heritage - The Textile Industry

Background

There is archaeological evidence of textile production in Britain from the late-prehistoric period onwards. For many thousands of years wool was the staple textile product of Britain. The dominance of wool in the British textile industry changed rapidly during the eighteenth century with the development of mechanised silk production and then mechanised cotton production.

By the mid-nineteenth century all four major branches of the textile industry (cotton, wool, flax, hemp and jute and silk) had been mechanised and the British landscape was dominated by over 10,000 mill buildings with their distinctive chimneys. Overseas competition led to a decline in the textile industry in the mid-twentieth century. Today woollen production is once again the dominant part of the sector together with artificial and man-made fibres, although output is much reduced from historic levels.

Innovation

Thomas Lombe's silk mill, built in 1721, is regarded as the first factory-based textile mill in Britain. However, it was not until the handloom was developed following the introduction of John Kay's flying shuttle in 1733 that other branches of the textile industry (notably cotton and wool) became increasingly mechanised.

In the second half of the eighteenth century, a succession of major innovations including James Hargreaves's spinning jenny (1764), Richard Arkwright's water frame (1769), his carding engine (1775), and Samuel Crompton's mule (1779), revolutionised the preparation and spinning of cotton and wool and led to the establishment of textile factories where several machines were housed under one roof. Although the spinning jenny remained largely hand-powered, many forms of the new machinery were driven by horse or water-power and later by steam. The term 'mill' was used to describe textile factories because so many, like the earlier corn mills, were water-powered. The textile industry pioneered the use of the factory system.

The textile industry in the mid-eighteenth century

During the initial stages of industrialisation, water was used to power a range of processes usually housed in separate buildings. These early attempts at mechanisation ran alongside domestic-based weaving in small dwellings.

The first purpose-built textile buildings were water-powered fulling mills, established as early as the thirteenth century to wash and pound woollen cloth. Scribbling, the process of disentangling the woollen fibres was followed by carding, a process by which the fibres were separated using wooden bats into which wires had been inserted. Carding was first mechanised for the cotton industry in 1775 by Arkwright's carding engine, a development which led to a boom in carding mill structures during the 1780s and 1790s.

Jenny shops began to appear from the 1760s, housing hand-, horse- and water-powered jennies spinning both cotton and wool. Hargreaves's spinning jenny could spin multiple ends of yarn on one machine and held between 80 and 120 spindles worked by a single large wheel. These machines did not require purpose-built structures and were often installed in barns or weaver's cottages. Increasingly jennies were housed together with carding machines in a single building which came before the integrated cotton or woollen mill.

Flax for linen required a different preparation process from cotton and wool. Flax stems were soaked or 'retted' to soften them, then beaten to break them up. This process often took place in water-powered 'scutching' mills. The carding process for flax was called 'heckling' or 'hackling'.

Spinning mills

Although industrial-scale mills were first introduced in the silk industry, it was the cotton industry that popularised the spinning mill. The earliest cotton spinning mills were those built to house Arkwright's water frame. Arkwright's first water-powered mill opened at Cromford, Derbyshire, in 1771. From the 1770s to the early decades of the nineteenth century, the Derbyshire cotton industry was at the forefront of textile manufacturing technology, both in the development of the powered process and in the construction and design of the mill building. The isolated location of these mills also led to the development of the factory colony.

These cotton spinning mills were generally 30ft (10m) wide, up to 100ft (33m) long and between three and six storeys high. The ground and first floors housed the preparatory cotton production processes such as carding, drawing and roving whilst the middle floors housed the water frames, and the top floors were used for reeling and storage.

The first use of steam-power in cotton spinning took place in 1786 at Papplewick Mill in Nottinghamshire. In 1789, a Boulton and Watt steam engine was successfully installed in Piccadilly Mill in Manchester. During the 1790s Crompton's mule was adapted for steam-power in the city so that by 1800 there were more than 40 cotton spinning mills in the Manchester area, of which over half were steam-powered.

The dust from the cotton spinning process created conditions likely to lead to fires and so from the end of the eighteenth century 'fireproof' mills using cast iron columns and brick arches were developed. An early experiment was Ditherington Flax Mill in Shrewsbury. Built between 1796-97 to a design by Charles Bage, it was the world's first wholly iron framed building. This mill set the pattern for many of the fireproof mills of the early-nineteenth century. William Strutt's correspondence with Bage led to a similar system being adopted for his North Mill in Belper (1803-4), replacing the mills on his site that had burned down. Mill fireproofing in the first half of the nineteenth century was led by the mill engineer William Fairbairn who worked with the scientist Eaton Hodgkinson to develop a distinctive brick arched system supported by cast iron beams on circular section cast iron columns.

The last traditional cotton spinning mill to have been built in Lancashire is considered to be Elk Mill, Oldham, erected 1925-28, and demolished in 1999. With the decline of the industry the building of traditionally designed flax, silk and wool spinning mills ended in the mid-twentieth century.

Integrated textile mills

The preparatory processes of the textile industry began to be housed in the same mill building from the mid- to late-eighteenth century. The integrated textile mill - where raw materials entered the mill and grey, unbleached cloth left - developed due to the introduction of steam-powered weaving in the 1820's. Many mills achieved integration through the addition of a process to an earlier specialised mill. In the cotton and flax industries this usually meant the addition of a weaving shed to an existing spinning mill. In the production of woollen cloth, powered spinning and later weaving might

be added to existing scribbling and fulling mills.

Purpose-built integrated mills were widespread in the Lancashire cotton industry of the late 1830s to 1850s, but could also be found in other areas such as Yorkshire (wool) and the South West (wool and flax).

Child labour in the textile industry

Many of those working in textile mills in the eighteenth and nineteenth centuries were children who often came from workhouses. Child apprentices began work at the age of nine and were given food, lodgings and an hour of schooling a week.

Samuel Downe, who was born in Shrewsbury in 1804, worked in Ditherington Flax Mill from the age of 10. He described working conditions in the factory during a Parliamentary Enquiry in 1832:

> 'we used to generally begin at five o'clock in the morning till eight at night'. When asked had he received punishment he replied 'yes, I was strapped most severely till I could not bear to sit upon a chair without pillows, and I was forced to lie upon my face at night. I was put upon a man's back and then strapped by the overlooker'. When asked why he was punished he replied… 'I had never been in a mill where there was machinery, and it was winter time, and we worked by gas-light, and I could not catch the revolutions of the machinery to take the tow out of the hackles; it requires some practice and I was timid at it.'

Improvements followed, and in 1834 the 92 children working at Ditherington Flax Mill only worked part-time and had some schooling between 9-11 am and 3-5 pm.

The future of historic textile mills

In the twentieth century thousands of derelict textile mills were demolished in all the industrial areas of Britain as the traditional industries became smaller and the appearance of historic mill towns was dramatically altered. The mill chimneys which were once a distinctive feature of mill towns almost disappeared completely.

By the 1970s it was beginning to be recognised that textile mills and related buildings were historically important. As more people became interested in industrial heritage, the more significant mills were protected by listing or the designation of conservation areas and many are often now preserved alongside other types of historic buildings in a town. Former mills have been converted into a wide variety of new uses including flats, offices, shops or adapted for new types of industry. Other features that were associated with mills, such as warehouses and canals, are also being conserved, so the restoration of historic mills has become an important part of the regeneration of many former industrial towns.

The international importance of the textile industry in Britain has been recognised by inscribing the Derwent Valley Mills which includes Cromford, Saltaire (Yorkshire) and New Lanark (Scotland) as World Heritage Sites.
Further information on Saltaire, a purpose-built textile settlement with model housing for the workforce, can be found in the main Industrial Heritage Teacher's Kit:
(content.historicengland.org.uk/content/docs/education/explorer/teachers-kit-investigating-industrial-sites.pdf)

Industrial Heritage - The Textile Industry

Key sites

The three World Heritage Sites provide an important illustration of the international significance of the textile industry in the UK:

- Derwent Valley Mills, Derbyshire (derwentvalleymills.org/derwent-valley-mills/history).
- Saltaire, Yorkshire (saltairevillage.info/).
- New Lanark, Scotland (newlanark.org/).

Other examples in England include:

- Ancoats Mills, Manchester – retains a number of huge steam-driven cotton mills beside the Rochdale Canal. Ancoats Buildings Preservation Trust (now Heritage Works) is a registered charity whose aim is the regeneration of the historic buildings in Ancoats, its website has information and photographs of many of the buildings in area: (heritageworks.co.uk/abpt-final/about_ancoats_buildings.htm).
- Queen Street Mill, Harle Syke, Burnley – the world's only surviving steam-powered weaving shed. (lancashire.gov.uk/leisure-and-culture/museums/queen-street-mill-textile-museum.aspx). Note: In 2017 this was no longer open to the public, but can be visited by pre-booked school parties.
- Armley Mills, Leeds – houses the industrial museum which includes a number of early fireproof buildings. (leeds.gov.uk/museumsandgalleries/Pages/armleymills.aspx).
- Quarry Bank Mill, Styal, Cheshire – owned by the National Trust this model industrial development includes an apprentice house and workers housing. (nationaltrust.org.uk/quarry-bank).
- Stott Park Bobbin Mill, Finsthwaite, Cumbria – an English Heritage property, this working bobbin mill is the last of many that once existed in the Lake District. (english-heritage.org.uk/visit/places/stott-park-bobbin-mill/).
- Ruddington Framework Knitters Workshops, Nottinghamshire – illustrates the importance of domestic scale production. (frameworkknittersmuseum.org.uk/).
- Whitchurch Silk Mill, Hampshire – early-nineteenth century mill that still produces silk. (whitchurchsilkmill.org.uk/mill/index.php).
- Coldharbour Mill, Uffculme, Devon – restored as a working museum with a steam engine and waterwheel. (coldharbourmill.org.uk/).

Sources

Palmer, M, Nevell, M, Sissons, M. (2012) *Industrial Archaeology: A Handbook*, Council for British Archaeology Practical Handbooks.

Shire publications provide a useful series of booklets on the subject including;

The Woollen Industry (Aspin, C. 1982),

The Cotton Industry (Aspin, C. 1981),

Flax and Linen (Baines, P. 1985),

Silk Industry (Bush, S. 2001),

Textile Machines (Benson, A. 1983),

Looms and Weaving (Benson, A, and Warburton, N. 1995) and

Textile Printing (Clark, H. 1985).

Textiles are also considered in the *Designation Listing Selection Guide: Industrial Structures* (2011). (historicengland.org.uk/images-books/publications/dlsg-industrial/).

Activities – The Textile Industry

Curriculum Links.

History: Chronological understanding – understanding progression and change in the development of the textile industry. Knowledge and understanding of key events, people and changes in the past – a study of the key textile innovators and inventions. Historical interpretation and enquiry – examining primary and secondary source materials, investigating past events, understanding change and continuity.

Geography: Use Ordnance Survey maps to investigate changes in transport links to textile sites. Examining the textile industry in the developing world.

Science: Investigate materials and their properties. Sorting and classifying materials and investigating their origins, uses and how they respond to change.

Design & Technology: Explore how products have been designed and made in the past, identifying how products contribute to lifestyles and consumer choices. Exploring the impact of ideas, design decisions and technological advances.

Art & Design: Use first-hand observation to explore and develop ideas. Trying out tools and techniques and applying these to materials and processes.

English: Through creative writing exercises, role play and examining a range of historical sources pupils will demonstrate the core skills of reading, writing and speaking and listening.

ICT: Gathering, analysing and presenting information about the development of the textile industry using a variety of media.

Activities – The Textile Industry

Activities – use the images in the pack to assist you with the following activities:

- Look for evidence of the textile industry in your local area – look for mill buildings, street names related to the textile industry and workers housing. Use Ordnance Survey maps to investigate the relationship between the textile mills and workers housing together with sources of power and transport links. Census returns can provide information of textile workers and their occupations.

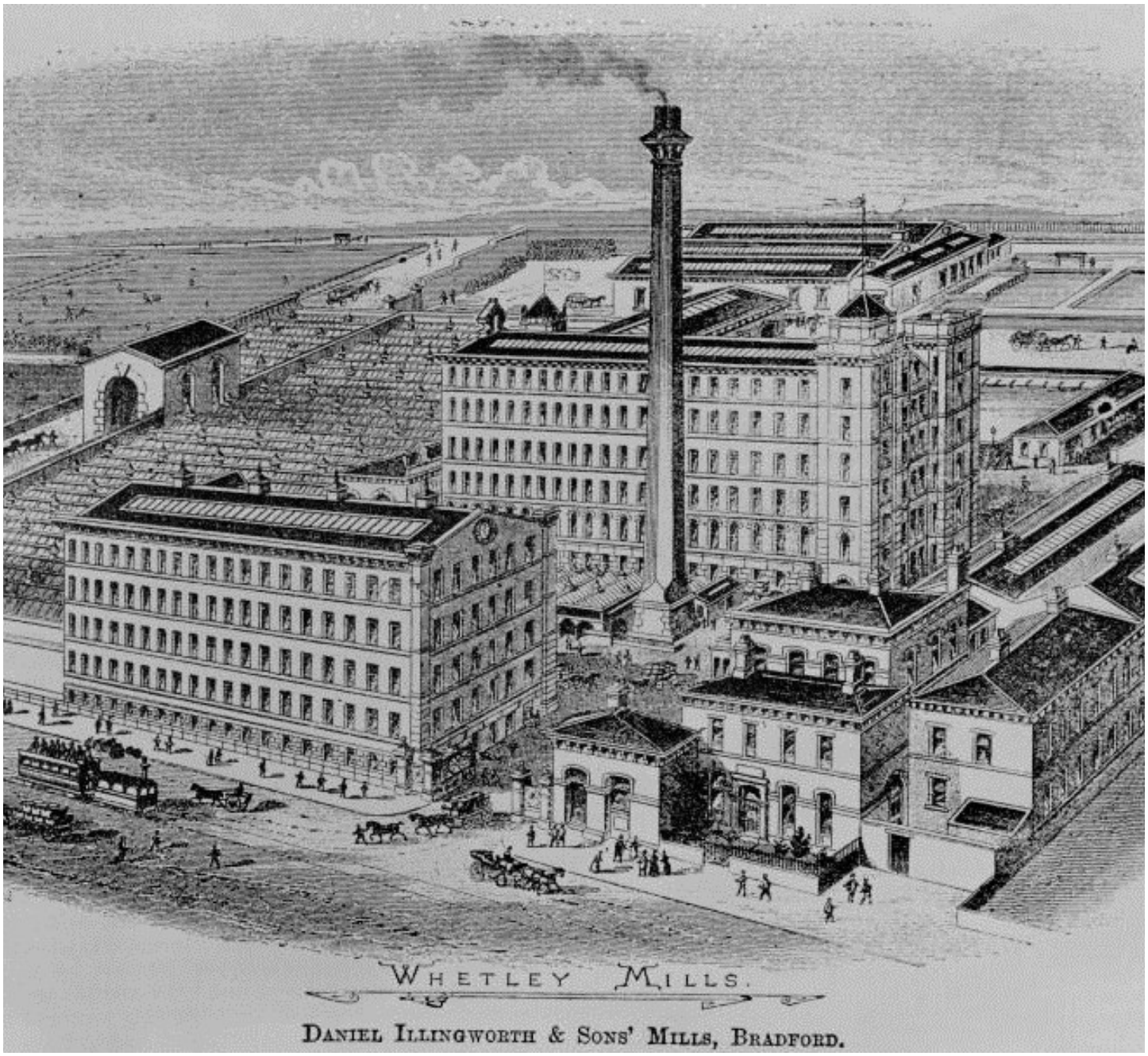
- Ask pupils to investigate conditions in the textile industry in the developing world such as Bangladesh. Pupils could investigate health and safety issues in eighteenth century British textile mills and compare them with the working conditions of overseas garment workers today.

- Use ICT to investigate the inventions and innovators who revolutionised the textile industry and create a Facebook-style profile for each inventor.

- Explore the contrasting properties of linen, wool, cotton and silk. Examine each fabric for absorbency, strength, crease resistance, etc. Investigate the different historical use for fabrics and compare with uses today.

- Use the extract about child labour in the textile industry as the stimulus for an ICT based class investigation. Encourage a group discussion and set a creative writing and role play activity. Read the extract in which Samuel Downe describes his experiences in Ditherington Flax Mill and record class responses. Use ICT to make further investigations into working conditions for children in Victorian textile mills. Split the class into two groups, group one will take on the role of a child labourer giving evidence before the Commission, group two will take on the role of the Commissioners listening to the evidence. Ask the whole class for suggestions about how Victorian employers could have improved the conditions of child workers. Research the 1834 Poor Law Amendment Act for information about changes to child labour laws.

Images – The Textile Industry



Whetley Mills, Manningham, Bradford, West Yorkshire

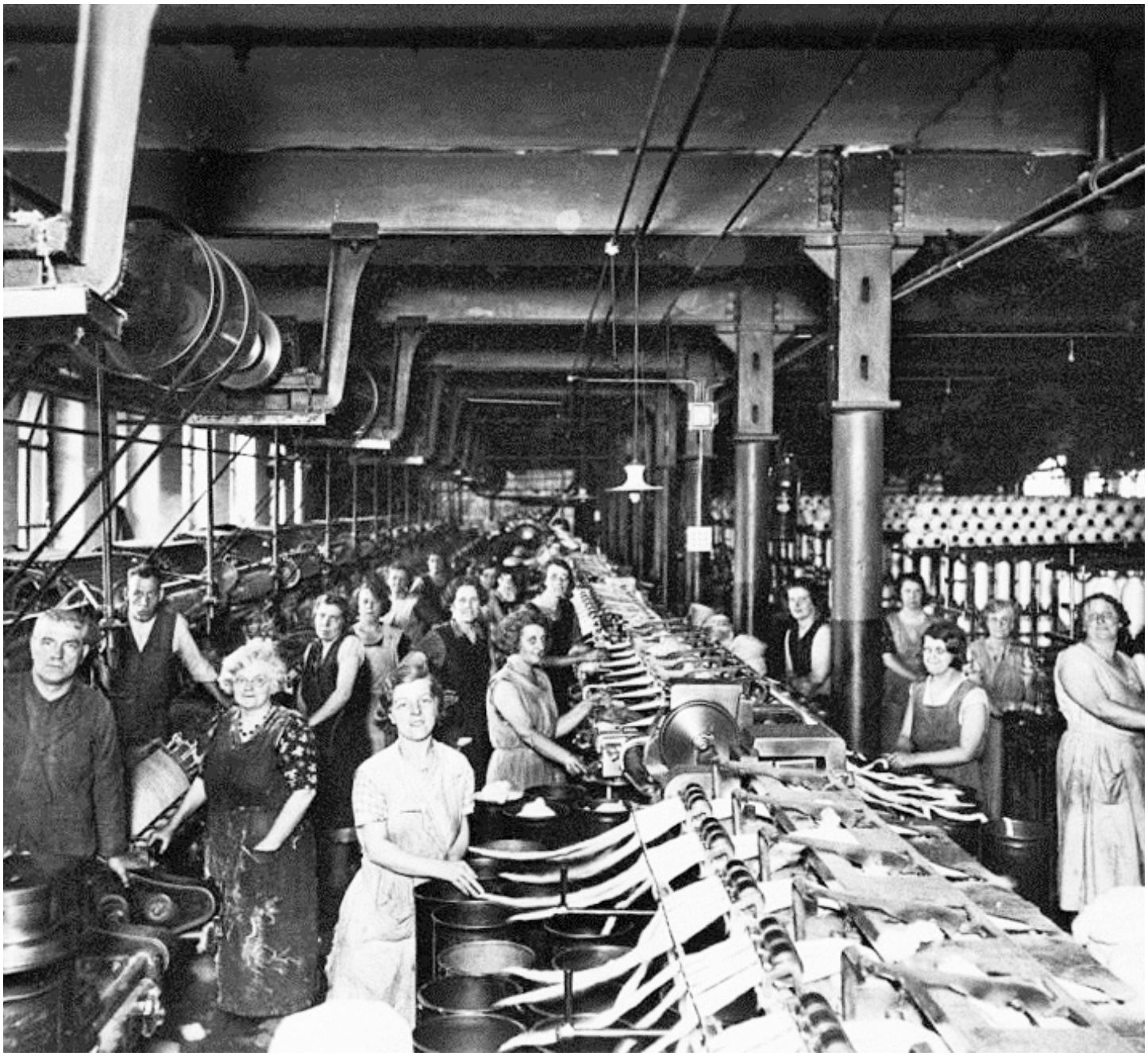
This illustration is taken from "The Century's Progress", published in 1893. It shows a clean and rather sanitised view of the mill, which it describes as a "model of efficiency". This is based on its output, not the conditions of the workers. Note the acres of weaving sheds to the left of the main mill buildings.

Images – The Textile Industry

Cromford Mill, Cromford, Derbyshire

This water-powered cotton mill was built in 1771 by the industrialist Sir Richard Arkwright, as was the nearby village where he housed his workforce. This makes the building the world's first site to utilise a system of mass production and the template for many later factory villages.

Images – The Textile Industry



Wellington Mills, Elland, West Yorkshire

This picture from Wellington Mills shows women operating machines while men work as mechanics. The machines to the right of this picture are carding machines. These used spiked drums in which the cotton was rotated. This process aligned the fibres, which were then placed in buckets as lengths or 'slivers'. The women in the foreground are mainly working on doubling frames where the slivers were combined to make threads.

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Images – The Textile Industry

Textile Warehouse, Manchester

The picture shows textiles being packed at the turn of the century. Rows of windows and light coloured walls helped to keep the factory illuminated. The work here is being undertaken exclusively by women. Taken c1900.

Images – The Textile Industry

Stone Bleaching Baths, Hodge Lane, Longdendale, Greater Manchester

These large stone vats or baths were part of the Hodge textile works. They date from the late 1700s and are probably the earliest known textile site in Tameside. Each one of the baths is made from giant stone slabs joined together by iron stays. They are about six feet deep. Grey cloth would have been bleached with lime to make it white, and then laid out in the fields to dry.

Images – The Textile Industry

106-112 Nottingham Road, Stapleford, Nottinghamshire

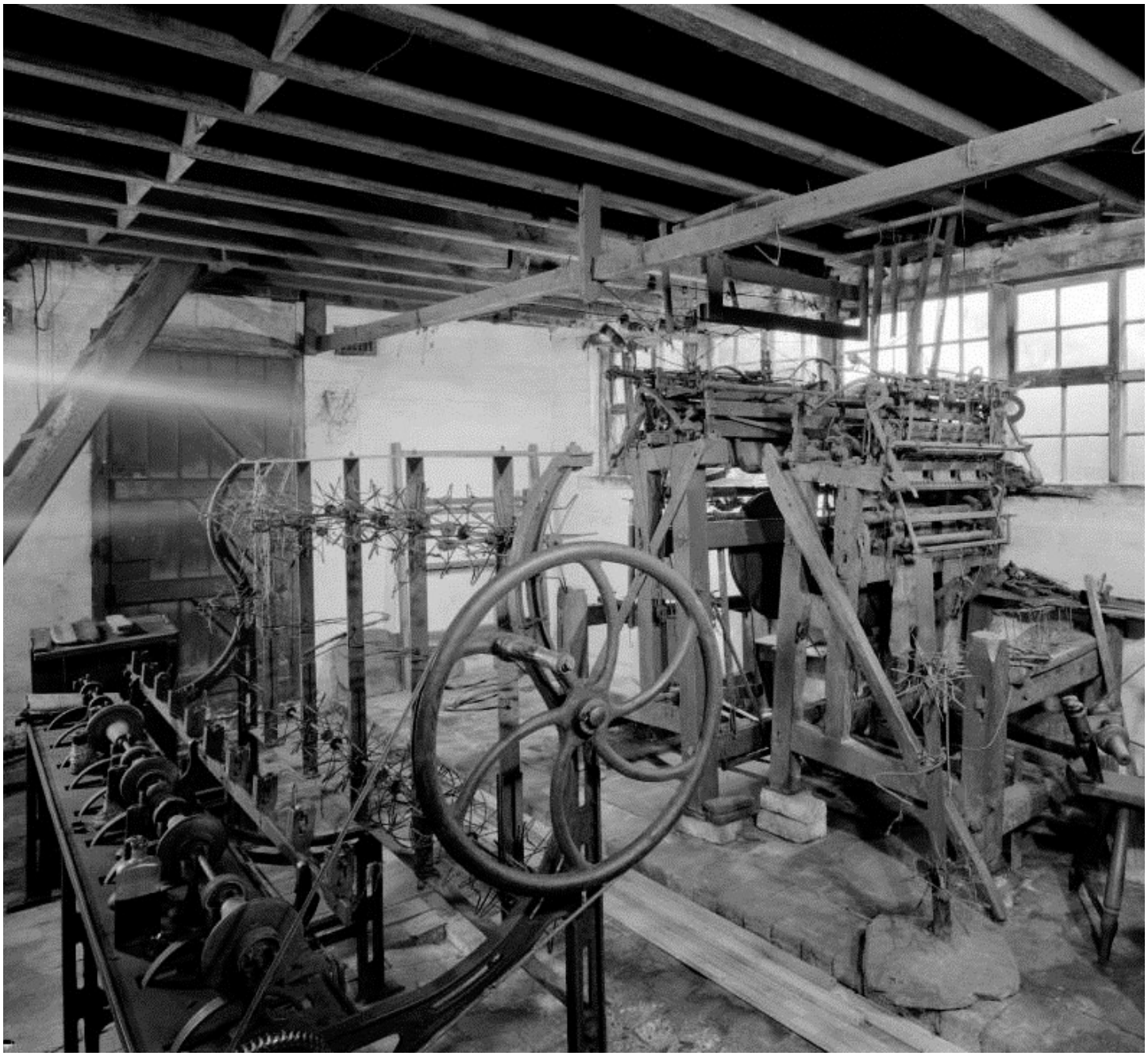
These houses were built in the early 1800s. They were originally 4 lace makers' cottages. The distinctive windows on the top floor are a sign that it was used by lace or other textile workers. Windows were very expensive at this time and large windows like this were only put into houses where a large amount of light was needed because people were working. Lace making was a major industry in Nottinghamshire at this time.

Images – The Textile Industry

Former Hosiery Workshop, London Road, Kegworth, Leicestershire

This workshop was built for framework knitting in the early to mid 1800s. It is the best surviving example in Leicestershire of the intermediate stage of the hosiery industry, between framework knitters working in their own homes to large scale factories with knitting machines. It was by the Branson family from 1880. The hosiery (socks and stockings) was reputed to be of high quality, It took royal orders, including socks for George V in 1911.

Images – The Textile Industry



Frame knitters' workshop, 42-44 Bushloe End, Wigston, Leicestershire

The hosiery industry maintained an almost exclusively domestic system of production until the mid-nineteenth century, of which this frameshop with an attached house is a unique survival. It was built in 1880 and the machines seen here were last used in 1972 (when this photograph was taken).