

WHEN MACHINES CHANGED THE WORLD: UNDERSTANDING THE INDUSTRIAL REVOLUTION



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The Industrial Revolution began in the late 18th century and continued into the 19th century. It was a period of time that resulted in significant changes in transport, manufacturing and power production that changed the modern world forever.

This revolution began in Britain due to its easy access to coal deposits and a culture of experimentation. However, from there, it quickly spread to other parts of the world, including Europe and North America.

Driven by ambitious businesspeople who sought to earn vast profits by the introduction of new technologies, the Industrial Revolution set the stage for modern machinery and mass production techniques.

What was the Industrial Revolution?

Prior to the 18th century, British manufacturing, or the creation of goods, was conducted on a small scale.

Clothing production primarily took place in individuals' homes or cottages, leading to its designation as a 'cottage industry'.

Throughout much of British history, individuals crafted their own clothing, footwear, and domestic goods in small-scale domestic manufacturing.

In fact, such industries were widespread throughout Europe, not only in Britain.

Typically, women performed this labor within the household, and occasionally, they sold surplus items within their community.

By the dawn of the 18th century, a series of new ideas and technologies began a rapid transformation of the creation of products.

After a revolution in agricultural practices that raised life expectancy and expanded Britain's population, individuals started migrating from rural areas to large cities in search of employment.

At the same time, the emergence of new factories necessitated a substantial workforce. As a result, these factories employed many people at low wages to operate the new factory systems.

Places like Coalbrookdale in Shropshire became early hubs of the Industrial Revolution, especially after Abraham Darby perfected coke smelting.

This led to the construction of the famous Iron Bridge in 1779—now recognized as the world's first iron bridge.



Social Reforms in the Industrial Revolution Lesson



Dramatic changes in transportation during the Industrial Revolution

Steam power

In the Middle Ages, the majority of power sources were derived from natural forces, such as windmills and water wheels.

Consequently, these power sources proved to be unreliable, with their performance fluctuating over the course of the year.

Some people tried to use more consistent sources of power, such as horses, to develop machines to mill flour, but the machines were still slow.

Then, in the early 1700s, several inventors started experimenting with steam, produced from heating water, to create a more reliable power source.

About 1712, Thomas Newcomen created the first steam-powered engine.

It was initially used to pump water out of deep coal mines. However, Newcomen's engine was very large and was hard to move to new locations, so others continued to improve upon his design.

A Scottish engineer, James Watt, and an English manufacturer, Matthew Boulton, made significant improvements to existing steam engines and, at the end of the 18th century, made one of the most efficient systems available.

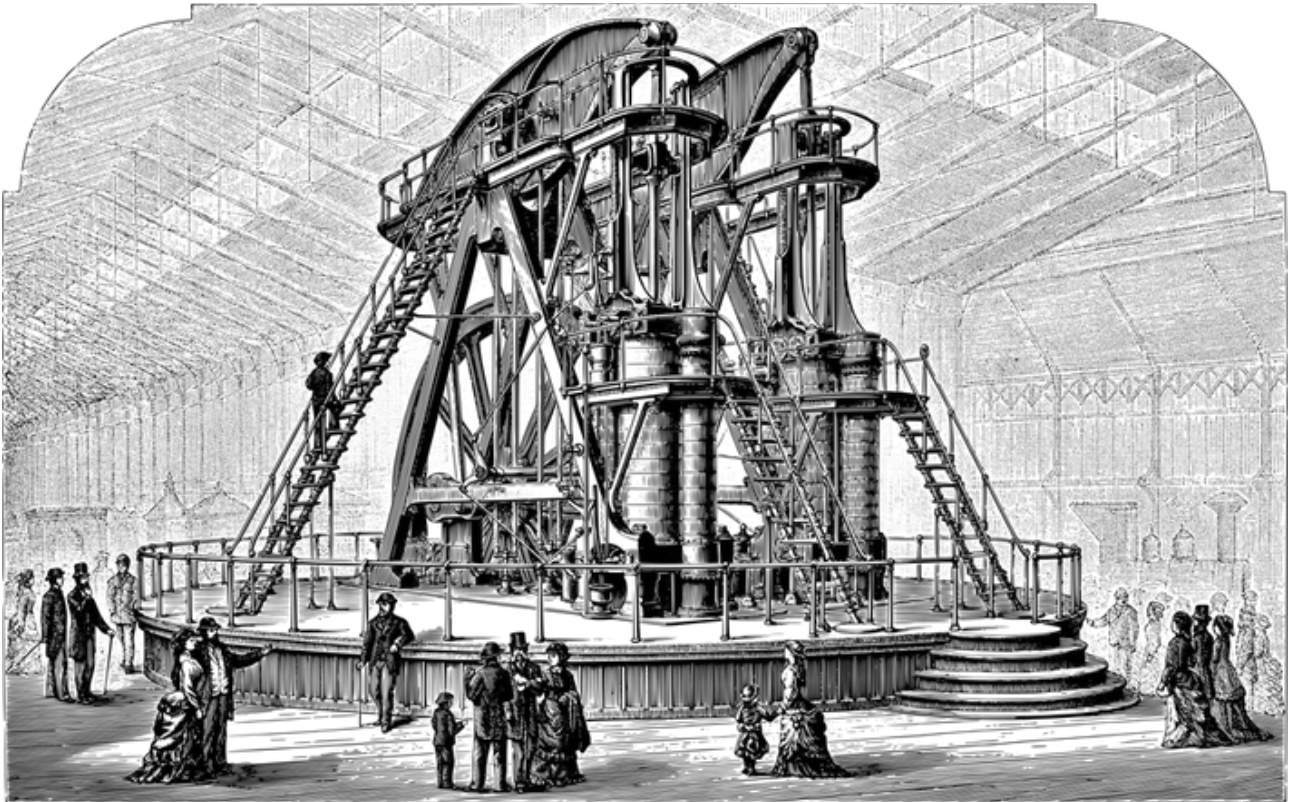
Watt had been attempting to make improvements to steam engines in the 1760s, which led him to forming the partnership with Boulton in 1775.

Their new engines were a substantial improvement over those which came before because they required less coal to produce more steam power and required less repairs.

These new Boulton and Watt engines became commercially viable by the 1780s and were sold to factories all around the world.

Since, these new steam engines created a far more consistent source of power, machines could now be run around the clock, as long as they had a constant source of coal to burn for their fires

As a result, many steam engines were built near to coal mines. This meant that coal production in Britain soared from 5 million tons in 1750 to over 50 million tons by 1850, driven by the demand for fuel to power steam engines in factories, mines, and railways.



Source: <https://pixabay.com/vectors/steam-engine-machine-line-art-5257203/>

Textile factories

With the creation of consistent power sources, other inventors began improving upon the old cottage industry for cloth creation.

In 1764, James Hargreaves invented a 'spinning jenny', which allowed for the spinning of multiple threads but was mainly limited to home use.

Shortly after this, in 1769, Richard Arkwright invented the 'water frame', a machine powered by water that could spin cotton threads automatically.

Unlike the spinning jenny, the water frame operated on a larger scale, providing consistent results without manual spinning.

As a result, Arkwright's machine soon found a home in mills, which required substantial space for operations and set a strong precedent for centralized manufacturing in the textile industry.

Then, in 1779, Samuel Crompton developed the 'spinning mule'. This device combined elements of the spinning jenny and the water frame, which enabled the production of stronger and finer threads.

When factory owners connected steam engines to these textile machines, the quantity of cloth produced escalated rapidly.

Large factory buildings with rows of textile machines could now produce products around the clock.

By the 1780s, Edmund Cartwright developed the power loom, an invention that enabled cloth to be produced quickly and in large quantities.

This machine operated at a much higher speed than earlier manual methods and introduced efficient mass production to textile manufacturing.

The power loom produced affordable cloth on a scale that was previously unimaginable.

Properly designed factories could operate dozens of machines simultaneously with a single steam engine.

However, the continuous operation of numerous machines necessitated frequent maintenance. Consequently, factories employed teams to oversee textile production and ensure smooth operation.

To minimize expenses, factory owners often paid workers the lowest possible wages.

Children were frequently employed, as they could be paid less and their small size allowed them to fit inside machinery for repairs.



Source: <https://pixabay.com/photos/mill-industrial-england-96810/>

Transportation

With the rise in cloth production, the demand for transporting these goods to stores also grew.

Similarly, as factories required more coal to power their steam engines, the owners sought faster methods to deliver it to their sites.

To address this issue, inventors started to devise ways to upgrade the ancient dirt road system that had been in use across Britain for thousands of years.

One of the earliest solutions was to utilize the river systems traversing Britain. By constructing long, narrow boats, goods could be transported faster than the roads permitted.

However, rivers seldom interconnected directly. Consequently, engineers started to build artificial waterways, known as canals, to link natural river systems with major cities.

One notable instance occurred in 1761 when the Duke of Bridgewater linked his coal mine at Worsley to Manchester via a new canal.

Consequently, Manchester emerged as a pivotal city for industrial production.

In fact, Manchester was famously dubbed 'Cottonopolis', since it became the epicenter of cotton processing and manufacturing.

This led to a boom in canal construction through the 1790s, which was driven by both industrial demand and infrastructure investment.

By 1815, Britain boasted an extensive network of canals, totaling approximately 2,000 miles.

As canal revenues rose, towns sought to enhance their road systems to benefit from the transportation revolution.

Local communities applied for a government initiative known as the 'Turnpike Acts,' a succession of acts enacted over time.

While the first Turnpike Acts dated back to 1663, they became essential during the Industrial Revolution, as they provided funds for major road improvements in the 18th century.

They did this by permitting the establishment of trusts to upkeep and upgrade roads, with tolls imposed on travelers to finance these improvements.

This gave authorities the permission to construct new roads that could be paid for by charging a fee to those who travelled on them.

With more efficient modes of transport, sources of power and manufacturing technologies, Britain was able to become the wealthiest trading power in the world.

The industrial revolution was one of the main causes of the British Empire's global dominance throughout the 19th century of world history.

Adapted from: [When machines changed the world: Understanding the Industrial Revolution - History Skills](#)