



The Origins of the Industrial Revolution

During the Long Nineteenth Century, Britain had several advantages that allowed it to industrialize first. What were they? Nick Dennis travels to England to mine for answers.

00:01

*Nick Dennis in an industrial factory
A black and white photo of women working in an early industrial factory*

*Drawing of a city market;
Drawing of an industrial city filled with billows of pollution*

01:05

Map of Northern England

01:35

Coal and Environmental Factors

*Video footage of the Caphouse Colliery and the National Coal Mining Museum
A drawing of an early Chinese steam engine*

02:13

A drawing: "Thomas Newcomen's engine for draining a mine, 1712"

03:11

Nick Dennis with Alan and Taz, two men who work in the coal mines, at the

The Industrial Revolution was probably one of the greatest transformations in human history. Arguably, it has changed how humans live more than any event since the Agricultural Revolution. Industrialization—producing goods on a scale beyond what could be made in the home—has helped to shape the kind of work we do today. It led to fewer farmers, fewer artisans, and more people in wage paid jobs in factories, or in jobs that support factories. It changed where we live, moving us from rural villages or small towns into apartments and houses and big cities. And it even influenced how our days are structured. The school bell and the factory whistle and shift work reshaped our understanding of time. It gave us a world of mass-produced stuff, from clothing, to tools, to iPhones, all obtainable only with money we earn from our industrial jobs. And increasingly it affects the very air we breathe and the water we drink.

And since the Industrial Revolution began in the 18th century, these changes have happened more rapidly and spread to more places around the world. How did the Industrial Revolution begin? To answer that question, we are going to focus on the region where it all started: northern England. It was here that the coal-fired steam engine, the textile factory, and the other elements of modern industrialization first all came together in the mid-18th century.

But why was this part of England specifically at the heart of these incredible and turbulent transformations? I'm here at the Caphouse Colliery, at the National Coal Mining Museum, to begin the search for answers to that question. This is a colliery—a mine from which coal is extracted. Coal fueled the Industrial Revolution; it was coal that made new steam engines possible, and it was these new steam engines that powered industrial factories, trains, and steam ships. The first steam engines were rudimentary and were not invented in Britain. They were first invented in China, some hundred years before the Industrial Revolution.

So why did steam-powered industrialization take off in Britain, and not China? Some historians argue Britain had a unique set of environmental factors that made coal-fired steam power cheap and easy here. First, Britain had very large coal deposits. The coal was also quite near the surface—that means they were easy to mine with 18th-century technology. The only problem was that these mines sometimes filled up with water, but steam engines solved that problem.

The first steam engines in England, which were very inefficient, were, in fact, used to pump water out of coal mines. They were so inefficient, that they were only useful in a place where coal was pretty much free, at the head of the mines. In addition, British coal mines were close to cities where factories and cheap labor to work in them were in ready supply. Finally, Britain is quite flat, which made it possible to build canals to connect the cities to the coal.

I'm here with Alan and Taz, 459 feet and two and a half inches underground to find out about the importance of coal, and what life was like for miners.

NICK: So why was coal important for the Industrial Revolution in Britain?

Caphouse Colliery

03:51

Footage of the museum shows sculptures of people working in the mines; a drawing of an 18th century coal mine

TAZ: Well, they discovered it could make steam. There's no steam without coal. Coal was important, and obviously steam, it were used to generate pumps, steam engines to wind men in and out of [the] mine. The first cars were steam, yeah? So it's been a massive part of this country's history, and helped to make it what it is today. Without coal and steam, well, this country wouldn't be as great as what it is today.

NICK: So how was the coal taken out of the mine, and where did it go?

ALAN: Well, in early days, it were taken out [of the] mine by manual labor. Women, children, anybody that needed employment were employed in the mines.

TAZ: In the early days, when they started getting into what you'd call, you might think's a deep mine at 140 meters, there were a bucket, big bucket called the cable, yeah, that would be lowered down to load it up, and then they'd have a horse on a rope, going around a wheel gin, which lifted the coal. Slow process but, still managed to get it out.

ALAN: Then obviously they started shallow, and then they went deeper and deeper as technology progressed. The turning point was steam power, really. 'Cuz the coal burnt in steam boilers to produce steam power, which then motivated the production of coal—just, we could pump water out [of] the ground, and we could go deeper and deeper into thicker and more productive seams.

04:51

Textile and Trade

A painting depicts people shearing sheep and working with their wool

NICK: The availability of coal wasn't the only reason that Britain was uniquely suited to industrialization. For better or for worse, Britain was a nation with a long history of trade. In particular, Britain had been in the textile industry for centuries, raising sheep, turning their wool into cloth, and selling that cloth to Europe and the wider world. In 1700, about 70% of British exports were woolen products, so it was a short but significant step from the kinds of small-scale textile production in the pre-industrial era, to the large textile mills of the industrial era.

05:29

Reproduction of a steam engine

I've come to Nottingham, in the Midlands of England, to find out more about the role of textiles in the development of the Industrial Revolution. I'm here at the Lace Hall with Richard Brawn.

NICK: So Richard, what kinds of textiles were produced here in Nottingham?

RICHARD: Lace—mainly lace. After 200 lace factories, [there's] only one actually running still in Nottingham.

NICK: So how was the lace produced before the Industrial Revolution?

RICHARD: Most likely by hand. Then they produced the machine, which, you had to power it yourself, moving pedals and things like this. Then they produced the first lace machine which was powered by a shaft driven by steam engine. And then after that it went from steam engine to an electric motor.

06:14

Finance, Wages, and Property Rights

*A photograph of women sewing lace by hand
Video footage of a lace machine in action*

NICK: Beyond commodities, Britain had finance. Partly because of the long history of textile production, Britain had lots of merchants and other people who financed and made money from trade.

Drawing of the Bank of England, painted depiction of Parliament

A drawing of an 1837 patent for a steam engine

A chart shows laborers' wages around the world; wages in London are significantly higher.

07:29

Empire and Trade

Artwork depicts slave labor on plantations and in homes

Drawing of a British man on a horse looking over workers that are cutting down trees for timber

08:25

These people became increasingly powerful in British government over many centuries. As a result, by the 18th century, British laws were very friendly to those in industry and trade. The country had a number of banks that supported new industrial ventures, and there were lots of laws to protect private property. The availability of finance and legal protections encouraged people in England to take risks, and invest in new enterprises like factories. Some of the most important of the new laws were patent laws, which protected people's rights to profit from their new inventions, such as the machines that run the collieries and mills.

Another reason that factory owners in England adopted machines so rapidly, was because wages were so high here, compared to many other parts of the world. As a result, it was too expensive to hire lots of people, so business owners looked for ways to save money by having machines do the work, instead. You might consider the rise of AI and robots that do the work of humans today, pretty similar thinking.

Some historians think that Britain's industrialization wasn't principally a result of these internal factors at all, but rather, really, a result of its place in global networks of trade, and at the head of a vast empire. The list of global contributions to industrialization proposed by historians is a long one. Some historians argue that profits made from the trade in enslaved Africans, and their labor on Caribbean plantations, helped fund technological innovations like the steam engine. Others point out that food grown or fished in the American colonies by settlers, often taught by indigenous people, flooded into Britain, allowing people there to concentrate on factory work rather than farming. Similarly, natural resources flowed into Britain from their colonies. Timber and cotton were particularly important, but also the colonies were a captive market for British industrial products, once British factories began to produce them.

All of these factors—money, food, resources and markets—may well have spurred industrialization in Britain, first. The Industrial Revolution helped to make Britain a global power and create the largest territorial Empire in history. Slavery, the exploitation of workers at home and abroad, and questionable trade arrangements were fueled by technology, personal ingenuity, geography, and the laws of the land. The term 'Industrial Revolution' can hide these unique elements coming together, that not only changed the lives of everyone involved, but also the lives of everyone who came after.