**Industrial Revolution**

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The concept of an “industrial revolution” was not formed until after people considered it had taken place,

even then it is arguable if it was actually over. The whole idea of “revolution” has been questioned, as its

timespan covers at least three generations, unlike the immediacy of political revolutions on which the concept

was based. However the idea of an industrial revolution is seductive and has been expanded. Since the late

nineteenth century two further industrial revolutions are said to have happened, and a fourth is presently

ongoing.

The term was probably first coined by the French economist Jérôme-Adolphe Blanqui in 1837, but it

only became widely used in the country where it was supposed to have happened (i.e., England) in the 1880s.

Although Frederick Engels used the term in his seminal *The Conditions of the Working Class in England*

published in 1844, it was not translated into English until the 1880s, whereupon it was often referred to by

left-leaning commentators, such as Arnold Toynbee, and became rooted in the popular imagination. Ironically,

by this time the “second industrial revolution” was already underway.

The Industrial Revolution is supposed to have begun with advances in textiles technology, notably Kay’s

“flying shuttle” (1733), Hargreaves’s “Spinning Jenny” (1764), and Carter’s power loom (1784). Simultaneously

there were advances in iron processing, in particular associated with Abraham Darby’s ironworks in

Coalbrookdale that was the first to make widescale use of coke for smelting. The final key element of the

Industrial Revolution was James Watt’s invention of the rotary steam engine in 1782, which allowed plant to

be powered regardless of on-site natural resources. The rotary engine, in turn, allowed the development of

steam powered locomotives opening the “railway age.”

These technologies brought with them significant social change, the consequence of the factory system

of manufacture. Increases in production went hand in hand with advances in distribution and communication.

The development of the turnpike road system in the UK (from 1707) provided a reliable and fast means of land

transport by stage-coach for people, and mail, with goods being dispatched by waggon. In addition, many

industrialists invested in the construction of canals, particularly for the transport of fragile and/or heavy loads.

While the railways merely replaced this earlier infrastructure, their quickly increasing speed and power and

their significant economy in relation to their predecessors brought with them significant changes. These are

usually quantified by increasing delivery of raw material and distribution of finished goods, but many of their

effects were more abstract, for instance the creation of standard time. Their visibility and the fact that railway

travel soon became within reach of the working classes played an important part in creating the idea of a

revolution that would create a future very different from the present by the application of technological

advances.

In design, one of the most cited significant figures of the Industrial Revolution is the ceramic

manufacturer Josiah Wedgwood (1730–95). This is because, in addition to adopting new technologies,

Wedgwood was keen to develop the factory system to clearly divide design from manufacture. Moreover, he

invested in canals and developed advanced retailing techniques. Importantly Wedgwood created a “brand” in

which the “ownership” of the product remained in the hands of manufacturer, regardless of the retailer or the

anonymity and distance of the market. This made “Wedgwood” a household name and its products early

examples of what would much later be termed consumer durables.

The Industrial Revolution put in place the infrastructure required for “modernity,” a term first used by

Charles Baudelaire in his essay “The Painter of Modern Life” (1863). His definition of the term was made in the

context of Hausmann’s Paris, the bourgeois capital of Europe. Here its new boulevards were devoted to shops,

restaurants, and the overt expenditure of disposable income; the trappings of the new middle classes, their

existence dependent on the management of industry and capital and the trades and professions associated

with it. By the late nineteenth century “modernity” had been established in the UK, USA, and most of western

Europe, even if at its fringes it was limited to larger cities and towns. A key indication of a country achieving

industrialized status was when the majority of its inhabitants were urban dwellers, which the United Kingdom

achieved at about the time of the 1851 census.

The Second Industrial Revolution is seen to be largely concerned with technologies that moved beyond

the mechanical, most notably the development of electrical power and communication. The first manifestation

of this was in the invention of the telegraph. The fantastic nature of this, and the possibilities it offered, was

popularly demonstrated in 1845 with the arrest of the murderer John Tawell. Tawell boarded a train in Slough,

England, only to find that, in the time of his 18 mile journey, his crime had been discovered and reported to

the authorities in London some time before he arrived there. The development of high voltage supply

happened later, particularly after Edison invented the incandescent bulb in 1879. At first it was mainly used for

lighting but soon began to be applied to domestic and industrial equipment. Other technologies associated

with the second industrial revolution are the telephone, phonograph, radio, and cine-film.

In transport, the internal combustion engine, first applied to a road vehicle by Karl Benz in 1885, is seen

to define the Second Industrial Revolution. It shifted the concept of powered travel from the public to the

personal and industrialized societies began to move into the period of “automobilism,” which is still ongoing.

Moreover the engine was light and powerful enough to be successfully applied to aircraft, ushering in the age

of powered flight.

In design terms, the Second Industrial Revolution put in place the infrastructure required for

modernism (the philosophical and artistic movement, different from the phenomenon of “modernity”). The

new technologies offered the prospect of clean, brightly lit urban environments entirely powered by

electricity, created from system-built steel, glass, and reinforced concrete buildings and their populations the

ability to travel where and when they pleased by motorcar. A “second machine age” systematizing mass

production, as developed by Henry Ford, brought the (somewhat optimistic) prospect of hygienic

accommodation, extended leisure time, and abundant consumer durables being available to all levels of

society.

The Third Industrial Revolution is based entirely on electronics, most notably the computer. This was

first successfully developed and applied to business by the British company Lyon’s Bakery for perishables

distribution to their restaurants and retail outlets in 1951. However, it was not until the development of the

personal computer in the late 1970s that the third revolution is understood to have properly commenced,

flourishing with public access to the Internet during the 1990s. The third revolution is thus very much about

the virtual and, in particular, instant information transfer. As with the previous industrial revolutions, the third

revolution has significant socio-political implications, many of which are associated with social media and

networking. It has also facilitated globalization of design, manufacture, and distribution.

Klaus Schwab, chair of the World Economic Forum, forwarded the concept of a “fourth revolution” in

2016. His high profile has led to it being widely disseminated, particularly (and appropriately) over the web. A

growing number of publications explore the subject and it has gained currency in the “soft” design areas such

as service, human-centered, and codesign. Schwab proposes that the fourth revolution is an extension from

the third and to use Schwab’s words, it is characterized by a fusion of technologies that is blurring the lines

between the physical, digital, and biological spheres. These include nanotechnology (humans integrated with

technology) and autonomous machines (machines that could replicate human agency through artificial

intelligence).

Interestingly, each of the four revolutions has been progressively less retrospective. While the first did

not enter popular currency until about a century after it began, the second was defined in half that time. The

third was defined as it was happening and the fourth is largely prediction rather than fact.

**References and further reading**

Hudson, Pat. 2014. *Industrial Revolution*. London: Bloomsbury Academic.

Marsh, Peter. 2013. *The New Industrial Revolution: Consumers, Globalization and the End of Mass*

*Production*. New Haven, CT: Yale University Press.