

## THE STEAM ENGINE – EXTRACT

The first recorded rudimentary steam engine was the aeolipile mentioned by Vitruvius between 30 and 15 BC and, described by Heron of Alexandria in 1st-century Roman Egypt. Several steam-powered devices were later experimented with or proposed, such as Taqi al-Din's steam jack, a steam turbine in 16th-century Ottoman Egypt, Denis Papin's working model of the steam digester in 1679 and Thomas Savery's steam pump in 17th-century England. In 1712, Thomas Newcomen's atmospheric engine became the first commercially successful engine using the principle of the piston and cylinder, which was the fundamental type of steam engine used until the early 20th century. The steam engine was used to pump water out of coal mines.

### Early steam engines

Thomas Savery was born at the manor house of Shilstone, near Modbury, Devon. He became a military engineer, rising to the rank of captain by 1702, and spent his free time performing experiments in mechanics. In 1696 he took out a patent for a machine for polishing glass or marble and another for "rowing of ships with greater ease and expedition than hitherto been done by any other" which involved paddle-wheels driven by a capstan and which was dismissed by the Admiralty following a negative report by the Surveyor of the Navy, Edmund Dummer.

Savery's engine used condensing steam to create a vacuum that raised water from mines. It was low-cost but had limited pumping height and was prone to boiler explosions.

### Newcomen's engine.

Thomas Newcomen (1664-1729) was an English inventor who created the atmospheric engine, the first practical fuel-burning engine in 1712. He was an ironmonger by trade and a Baptist lay preacher by calling. He was born in Dartmouth, in Devon, England, to a merchant family and baptised at St. Saviour's Church on 28 February 1664. In those days, flooding in coal and tin mines was a major problem. Newcomen was soon engaged in trying to improve ways to pump out the water from such mines. His ironmonger's business specialised in designing, manufacturing and selling tools for the mining industry. In 1712, Thomas Newcomen developed a more efficient engine with a piston that separated the condensing steam from the water.

### Watt's steam engine.

James Watt FRS FRSE (30 January 1736 – 25 August 1819) was a Scottish inventor, mechanical engineer, and chemist who improved on Thomas Newcomen's 1712 Newcomen steam engine with his Watt steam engine in 1776, which was fundamental to the changes brought by the Industrial Revolution in both his native Great Britain and the rest of the world.

James Watt improved the steam engine by:

Using a double-acting engine that contacted both ends of the piston

Replacing chains with rods for smoother motion

Using iron instead of brass to save money

Adding a pump to remove condensed steam and air

Adding components to keep the piston hot and the condensing tank cool.

In 1816, he took a trip on the paddle-steamer Comet, a product of his inventions, to revisit his hometown of Greenock

**The steam engine became a key driver of the Industrial Revolution.** It replaced water wheels and horses as the main power source for British industry.

The first commercially successful engine that could transmit continuous power to a machine was developed in 1712 by Thomas Newcomen. James Watt made a critical improvement in 1764, by removing spent steam to a separate vessel for condensation, greatly improving the amount of work obtained per unit of fuel consumed.

During the Industrial Revolution, steam engines started to replace water and wind power, and eventually became the dominant source of power in the late 19th century and remaining so into the early decades of the 20th century, when the more efficient steam turbine and the internal combustion engine resulted in the rapid replacement of the steam engines. The steam turbine has become the most common method by which electrical power generators are driven. Investigations are being made into the practicalities of reviving the reciprocating steam engine as the basis for the new wave of advanced steam technology.

End.