

The Steam Engine: Power for a New Revolution

Fuel crises in the 20th and 21st centuries have affected the world's economy and the balance of global political power. During the 18th century, the response to a fuel shortage led to profound economic, technological, and political changes. The introduction of a new source of power, the steam engine, was one of the most important factors in the development of power-driven machine and the Industrial Revolution.

England's rapidly increasing population made it necessary to plant more crops for food. By the 18th century, most of England's forests had been cleared to make way for farmlands. The wood needed to heat homes and the charcoal to fuel fires for the manufacture of iron became scarce.

Since the Middle Ages, people had heated their homes with coal as well as wood. At that time, however, they did not use it in the manufacture of iron. Gradually, ironmakers turned to coal as a cheap source of energy.

As the demand for coal increased, miners dug deeper into the coal deposits. In doing so, they tapped sources of underground water, which filled the mines. At first, pumps worked by horses or donkeys removed the water. But this was an expensive and inefficient procedure.

In 1698, an English engineer named Thomas Savery invented a device that used high-pressure steam to create a vacuum in a metal chamber. Water rushed upward from the mine into the vacuum. Before the cycle could start again, more steam had to be used to remove the water from the chamber.

Fourteen years later, in 1712, Thomas Newcomen, an English ironmonger (seller of iron products) invented a pumping machine that was operated by low-pressure steam. As in Savery's earlier invention, the steam produced a vacuum. But in Newcomen's engine, the vacuum set the various parts of the machine in motion. This engine, which could only move downward, was used solely to pump water out of mines.

In the 1760's and 1770's, English inventor James Watt created a more usable engine. Using Newcomen's design as a foundation, he made it possible to power the upstroke as well as the downward stroke of the piston. Capable of a rotary movement, Watt's machine could run machinery, carriage wheels, or riverboat paddles. By the middle of the 19th century, improved versions of the steam engine were running machines in mines and factories and providing power for locomotives and steamships. The steam engine had become the heart of the Industrial Revolution.

Review Questions

1. How was the development of the steam engine a response to a fuel shortage?
2. How did Newcomen and Watt's steam engine help relieve this fuel shortage?
3. How did the steam engine propel the growth of industry and transportation and help bring about the Industrial Revolution?
4. What fuel today is forcing us to look at new forms of energy? Why? Is this similar to what happened during the 18th century? Explain