

John Smeaton 1724 -1792

John Smeaton, FRS, (June 8, 1724 – October 28, 1792) was a civil engineer – often regarded as the "father of civil engineering" – responsible for the design of bridges, canals, harbours and lighthouses. He was also a more than capable mechanical engineer and an eminent physicist. He was associated with the Lunar Society. He was the first self-proclaimed civil engineer.

He was born in Austhorpe, Leeds, England. After studying at Leeds Grammar School, he joined his father's law firm, but then left to become a mathematical instrument maker (working with Henry Hindley), developing, among other instruments, a pyrometer to study material expansion and a whirling speculum or horizontal top (a maritime navigation aid).

He was elected a Fellow of the Royal Society in 1753, and in 1759 won the Copley Medal for his research into the mechanics of waterwheels and windmills. His 1759 paper "An Experimental Enquiry Concerning the Natural Powers of Water and Wind to Turn Mills and Other Machines Depending on Circular Motion" addressed the relationship between pressure and velocity for objects moving in air, and his concepts were subsequently developed to devise the 'Smeaton Coefficient'.

[Smeaton coefficient - The lift equation used by the Wright brothers was due to John Smeaton. 0.005 (the drag of a 1-square-foot) plate at 1 mph) was the value as determined by Smeaton, later corrected to 0.0033 by the Wright brothers (by experimentation in wind tunnels).

He was responsible for "Smeaton's Harbour" Rye East Sussex. This was designed to keep Rye as a sea going port after the river Rother was silted up.

Recommended by the Royal Society, Smeaton designed the third Eddystone Lighthouse (1755-59). He pioneered the use of 'hydraulic lime' (a form of mortar which will set under water) and developed a technique involving dovetailed blocks of granite in the building of the lighthouse. His lighthouse remained in use until 1877 when - with the rock underlying the structure's foundations beginning to erode - it was dismantled and partially rebuilt at Plymouth Hoe. He is important in the history, rediscovery of, and development of modern cement, because he identified the compositional requirements needed to obtain "hydraulicity" in lime; work which led ultimately to the invention of Portland cement.

Deciding that he wanted to focus on the lucrative field of civil engineering, he commenced an extensive series of commissions, including:

- the Calder and Hebble Navigation (1758-70)
- Coldstream Bridge over the River Tweed (1762-67)
- Improvements to the River Lee Navigation (1765-70)
- Perth Bridge over the River Tay in Perth (1766-71)
- Ripon Canal (1766-1773)
- the Newark Viaduct over the River Trent in Nottinghamshire (1768-70)
- the Forth and Clyde Canal from Grangemouth to Glasgow (1768-77)
- Banff harbour (1770-75)
- Aberdeen bridge (1775-80)
- Peterhead harbour (1775)
- Harbour works at Ramsgate (retention basin 1776-83; jetty 1788-1792)
- Hexham bridge (1777-90)
- the Birmingham and Fazeley Canal (1782-89)
- St Austell's Charlestown harbour in Cornwall (1792)

Because of his expertise in engineering, Smeaton was called to testify in a court for a case related to the silting-up of the harbour at Wells-next-the-Sea in Norfolk in 1782. He is considered to be the first expert witness to appear in an English court.

Employing his skills as a mechanical engineer, he devised a water engine for the Royal Botanic Gardens at Kew in 1761 and a watermill at Alston, Cumbria in 1767 (he is credited by some for inventing the cast iron axle shaft for waterwheels). In 1782 he built the Chimney Mill at Spital Tongues in Newcastle upon Tyne, the first 5-sailed smock mill in Britain. He also improved Thomas Newcomen's atmospheric steam engine, erecting one at Chasewater mine in Cornwall in 1775.

Highly regarded by other engineers, he contributed to the Lunar Society and founded the Society of Civil Engineers in 1771. He coined the term civil engineers to distinguish them from military engineers graduating from the Royal Military Academy at Woolwich. After his death, the Society was renamed the Smeatonian Society, and was a forerunner of the Institution of Civil Engineers, established in 1818.

His pupils included canal engineer William Jessop and architect and engineer Benjamin Latrobe.

