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# Editorial

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This themed issue of the *Engineering History and Heritage* celebrates the 250th anniversary of the birth of John Rennie (1761–1821). There have been biographies of the man, particularly in Samuel Smiles' (1862) *Lives of the Engineers, volume 2* and by CTG Boucher (1963), *John Rennie 1761–1821: The Life and Work of a Great Engineer*. The former relied heavily on material supplied by Rennie's sons, while the latter made use of material that had been deposited by Rennie's descendants in the Institution of Civil Engineers' archives and the National Library of Scotland, as well as minute books of two major canals built by Rennie. Filial devotion and the lapse of time meant that there were a few errors in Smiles, which unfortunately have been repeated by subsequent authors, and Boucher's enthusiasm for his subject, in an otherwise valuable book, led him to introduce a few more.

This issue does not pretend to be a new life of Rennie. Rather, it takes six aspects of his work and looks at them in greater depth than might be appropriate in a biography.

John Rennie was born on 7 June 1761, the ninth and youngest child of a reasonably prosperous tenant farmer in East Lothian. His father died when John was five, but his oldest brother, George, took over responsibility for the family, even though he was then only 17 years old himself. In his spare time from attending the parish school, John frequented the workshop of Andrew Meikle, the celebrated millwright who invented the threshing machine and who lived about a mile away. Andrew's sons were much of an age with John (Dodd and Dodd, 2010). A map surveyed in 1799 shows a 'threshing wind machine', shown in the background of the well-known engraving of Rennie's birthplace (Smiles, 1862).

The first paper in this issue (Hills, 2011) describes Rennie's education and work for Meikle. Already he had attracted notice beyond his immediate neighbourhood. In 1779, aged 18, he set up in business on his own account, when his first job was to design and build a new watermill for Meikle's own use. He managed to save enough to attend Edinburgh University for three years, while continuing to earn by working during the lengthy vacations. He was the first civil engineer to receive a university education.

During this time he visited some newly-erected steam engines in Fife and East Lothian, which determined him to visit Boulton & Watt's factory near Birmingham. On his way there in 1784 he visited and made notes not only of several mills and iron works but also canals, docks and bridges. He was then employed by Boulton & Watt to supervise the installation of machinery in the Albion Mills at Southwark, the first large steam-powered factory in the capital. Its success made his name. He would continue to undertake mechanical engineering throughout his life, the company that he founded being continued by his sons after his death, but, as Hills points out, his major achievement in this field was his use of steam power in so many applications for civil engineering.

Rennie's first commissions in civil engineering were for canal surveys in 1789, though none of these schemes came to fruition. In 1791 he was appointed to survey a canal to cross the Pennines from Manchester to West Yorkshire, one of several competing projects in the area at the time. The second paper (Clarke, 2011) recounts the problems of trying to thread a waterway along a line largely dictated by the local geography, where much of the available water was already spoken for by water-powered factories. Clarke also throws light on the relationship between the consulting engineer, engaged on a number of commissions elsewhere at the same time, and the surveyors on the ground who had to find ways of satisfying the competing interests. Rennie took his scheme for the Rochdale Canal to Parliament twice. The mill owners were too powerful on both occasions and the bills were rejected. On the third attempt, although the detailed work was undertaken by Rennie and his team, the work was reviewed by the more experienced William Jessop, who carried the bill successfully. Clarke suggests that Rennie was on a steep learning curve with the Rochdale Canal, but it is worth noting that while this was going on, Rennie gained the Acts for the Lancaster and Ulverstone Canals and oversaw their construction.

Rennie's canals included some magnificent masonry aqueducts and many more ordinary overbridges, but his first major road bridge was not built until 1798–1802. The third paper (Ruddock, 2011) outlines the progression from that structure, Wolseley Bridge near Stafford, via the fine five-arch bridge over the Tweed at Kelso, to Waterloo Bridge in London, a structure that Smiles thought 'indeed a noble work, and probably has not its equal for magnitude, beauty and solidity'. It took just over six years to build Waterloo Bridge and Ruddock takes us through the many

technical and political challenges that Rennie faced in order to bring the project to a triumphant conclusion. A brief codicil considers the bridge's influence on later works.

Rennie was one of the earliest engineers to design a cast-iron bridge, in 1791, though it was not built; nor was one with a 135 m span for the Menai Straits designed in 1802. The fourth paper (Swailes, 2011) sets these early Rennie designs in context, showing how they developed from an idea put forward in France in 1778 and were progressed in Britain by Thomas Wilson and others. However, as his design for Southwark Bridge developed from an initial proposal in 1811 to start of construction in 1814, Rennie changed to an arrangement much more like the railway bridges of the following era. Although unprofitable to its proprietors and sometimes criticised as being unnecessarily heavy, the bridge performed satisfactorily until it was replaced in 1913.

Rennie's practice included almost the whole range of civil engineering. One type of work that is less obvious to the untrained eye, but just as important as the transport projects described above, is fen drainage. The fifth paper (Barton, 2011) reminds us that the creation of prime agricultural land from unproductive wastes was just as important as coal in fuelling the industrial revolution. Barton describes two contrasting drainage schemes in Lincolnshire, the River Witham through and below Lincoln and the East, West and Wildmore fens that drained into the Witham's tidal estuary. Barton makes the point that land drainage projects in Britain seldom started with a 'blank canvas' and describes how the many earlier attempts to deal with these areas affected Rennie's ability to provide solutions. He also highlights the problems of dealing with large bodies of landowners and other interested parties, and how Rennie was well served by the powerful influence of Sir Joseph Banks, President of the Royal Society and a personal friend. Both schemes were successful at the time, although subsequent changes in the land have required further works.

Many biographies of civil engineers, following Smiles, portray the subject as a lone individual, designing and directing great works almost in isolation. By the end of the eighteenth century that was no longer possible, if indeed it ever had been so. Rennie did not directly employ any engineering staff, but he relied heavily on two groups of associates, the engineering surveyors who did the detailed preliminary work and had sufficient expertise to be able to suggest the best mode of achieving the desired outcome, and the resident engineering staff who supervised the actual construction and often had to deal with problems on the spot. The sixth and final paper (Cross-Rudkin, 2011) describes the latter group, and shows how Rennie built up a corps of people whom he could confidently recommend to project clients for employment. They in turn depended to some extent on Rennie for continuing employment as projects came to completion, but there is sufficient evidence to show that they had an unfeigned regard for his ability and leadership.

The six papers, and a briefing (Tegg, 2011) on a modern problem that Rennie could not have foreseen, provide a varied insight into some of the works that made Rennie one of the leading engineers of the early-nineteenth century and should help to give Rennie more of the recognition that is his due.

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