

Review

Alan Hayward enjoys this book portraying the historical development of railways through 130 engineering drawings from the National Railway Museum's impressive collection.

Railways: a history in drawings

Author: Christopher Valkoinen
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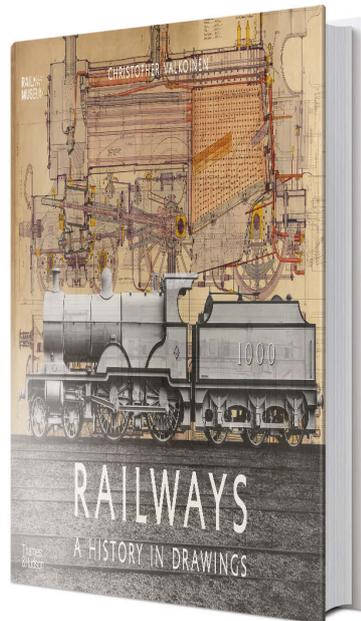
THIS WEIGHTY VOLUME (2.3kg), measuring 245mm × 335mm, would complement any coffee table and provide reference for many aspects of railway history. Drawings are generally presented at full-page size including background descriptions, be it a class of locomotive or part of railway infrastructure.

The drawings show the meticulous skill of the 19th and early 20th century draughtsmen in the portraying of details. Many drawings use colour wash so that different components and material are identifiable. Elevation views often make use of shading and are works of art.

The Introduction observes that before the industrial revolution, engineering was in the hands of craftsmen. Until the 19th century, there was little need for engineering drawings because design and manufacture was a single process. Thereafter, drawings became essential to specify and record the manufacture of factory products or construction at sites. The arrival of the steam engine from 1775, through the partnership of Boulton & Watt, led to them employing a draughtsman.

Robert Stephenson can be credited with establishing the first dedicated railway drawing office at his Newcastle works, where locomotives were being built and Stephenson was designing bridges. Regimented training, including evening classes, was given to apprentices and draughtsmen working alongside each other.

Stephenson complained in 1836 that staff often then left to join other companies with the rapid growth of industry. The contribution of draughtsmen to the development of the railways was immense, though their names have



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THE DRAWINGS SHOW THE METICULOUS SKILL OF THE 19TH AND EARLY 20TH CENTURY DRAUGHTSMEN

normally been obscured by history, compared with the engineers who signed the drawings and took the credit.

The book presents the drawings in a series of chapters:

Two centuries of locomotion

This concentrates on famous steam locomotives, including Trevithick's 'Penydarren' of 1804, the 'Rocket' of 1829, the broad gauge 'North Star' (1837), 'Stirling 8ft Single' (1874), 'City of Truro' (1901), Nigel Gresley's 'Flying Scotsman' (1923), Great Western 'Castle' class (1923), LMS 'Coronation' class (1937), Gresley's 126mph A4 'Mallard' (1938), Bulleid's 'Merchant Navy' (1941) and BR 'Britannia' (1951).

Also included are diesel and electric locomotives, including the English Electric 'Deltic' (1955), the experimental 'APT' tilting train (1972) and the class 43 'HST' (1976).

Most of the drawings are 'general arrangement' sectional elevations beautifully detailed (colouring of drawings generally only persisted up to WWII). There would have been numerous other drawings produced of all the components, such as boiler, main frames, wheels, cylinders and valve gear.

The railway passenger

The drawings include early four- and six-wheeled carriages, through bogie carriages, the first sleeper trains in 1873 and the

diesel multiple unit 'DMU' trains from 1955.

Freight on the railways

A drawing is included of a GWR 90ft long articulated trolley with 12 axles designed to carry exceptional loads up to 120 tons (1930). The railways were only lifted from their obligation as common carriers in 1964. A photograph shows a lengthy LNER set of vehicles totalling 28 axles incorporating cantilever counterweights for carrying loads such as power station generators.

Railway workers

Various drawings include a Director's Saloon (1906), and a GWR permanent way trolley (1874), but I had expected mention of the 'railway navy'.

The railway workshop of the world

A drawing is included of Robert Stephenson's River Nile Bridge (c.1858). This was more than 1650ft in length including a swing span.

Railways at war

A drawing shows one of 300 Great Central Railway class 8K 2-8-0 locomotives built for export to Europe during WWI. Another illustrates landing craft manufactured by various railway works during WWII.

Building the railways

Maps are included of the Stockton and Darlington Railway opened in 1825, engineered by George Stephenson, and of the Liverpool and Manchester Railway. This was opened in 1829 in time for the Rainhill trials where Robert Stephenson's 'Rocket' paved the way forward for steam traction.

An illustration appears of the Sankey Viaduct. Curzon Street Station is shown, of which more than 100 drawings survive. Its opening in 1838 completed the lines from London to Birmingham, Liverpool and Manchester. Other drawings include the west portal of Brunel's Box Tunnel (1841), Robert Stephenson's Newcastle High Level Bridge (1849), Brunel's Royal Albert Bridge (1859), Grimsby Docks (1885) and Cardiff General Station (as expanded by 1934).

Overall comments

The book provides an excellent insight into the history of railways and is of general interest as well as to technical

engineers. It forms a lasting tribute to the draughtsmen and tracers who painstakingly prepared the drawings in advance of the introduction of duplicating facilities or computer-aided design. In appealing to readers who are railway enthusiasts, there is understandably an emphasis towards the unending glamour of steam locomotives. As a result, some structural engineers may feel that this has been at the expense of attention to railway infrastructure.

The Forth Bridge by Baker and Fowler is illustrated in the last chapter by an overall elevation and plan, scant coverage for such an iconic structure. Similarly, although plan drawings are shown for Glasgow Central Station (1905), London's Marylebone Station (1899), and Waterloo Station as rebuilt (1920s), I would like to have seen details of the roof structures.

Other important features on the railway network which could have been considered for inclusion are the noteworthy overall roof stations of St Pancras, York, Carlisle, Newcastle and

Edinburgh Waverley, among others. Other structures could be the Kilsby Tunnel, Severn Tunnel, Glenfinnan Viaduct, Ribbleshead Viaduct, Ouse Valley Viaduct, Conway and Britannia bridges, and Barmouth Bridge.

Included is a glossary, a list of books for further reading and a comprehensive index.

This book should appeal to structural engineers with an involvement or interest in railways. To this reviewer, the drawings show that good draughtsmanship and artistic flair are valuable ingredients in producing the best engineering.

Alan Hayward

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Alan Hayward is co-founder of bridge specialists Cass Hayward Consulting Engineers. He has been a bridge designer/constructor for more than 50 years and a lifelong railway enthusiast.

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