Book review

Early Structural Steel in London Buildings – A Discreet Revolution

Jonathan Clarke, English Heritage, London, UK, 2014,
ISBN 978-1-84802-103-7, £75.00, 393 pp.

From the outside of a large nineteenth-century building such as a theatre, hotel or office building in a major city, it can be surprisingly difficult to know whether it has only load-bearing masonry walls or an internal structure of iron or steel. Generally, most large buildings, whether having an iron or steel internal frame or not, were built to look like traditional masonry buildings, as this was perceived to be more robust and solid, which appealed to accepted taste. In fact, by the 1890s, most large buildings had iron or steel frames behind the stone or brick facades. These consisted of a huge variety of iron or steel beams and columns and an even larger variety of floor structures. Perhaps because iron- and steel-frame elements in non-industrial buildings of the second half of the nineteenth century are seldom visible, their construction has seldom been studied in depth. Exposed iron and steel structures such as markets, railway stations and exhibition buildings have received disproportionate attention. Jonathan Clarke's excellent book goes a long way to remedy this lack of attention. While he deals almost exclusively with buildings in London, the same 'discreet revolution' took place in all of Britain's major cities.

In broad terms, cast iron was the material of choice for beams until the 1860s, wrought iron from the 1860s to around 1890, and steel thereafter. Cast iron was used for much longer for columns – until the early twentieth century, in fact – partly because of its superior strength to wrought iron and steel, but largely because of the ease with which it could be shaped to suit the often complex connexions between beams and columns, with the bonus of sometimes being used to create an attractive capital.

In Britain, until the early twentieth century, all of these buildings had iron or steel columns only within the building, away from the external walls. The end beam of the internal frame had to be supported in the load-bearing external masonry wall. Indeed, this was a requirement of the London building regulations until the 1930s.

The first of the book's two parts sets the context for the gradual replacement of all structural elements made from cast or wrought iron with steel, which took place during the period from around 1880 to 1920. Eight chapters look

at the legacy of cast- and wrought-iron structures from the earlier part of the century and the emergence of the fully-framed building in which floor loads were carried entirely by columns. The influence of the continental iron and steel industries is addressed, as well as the later influence from the USA. One chapter covers the development of the London building regulations and another the sometimes acrimonious relations between architect, engineer and contractor as the construction industry was challenged and transformed by the emergence of a new standard form of building. Separate chapters in the second part of the book illustrate how steel was introduced into the various different types of large building – theatres, hotels and clubs, offices and banks, industrial buildings and a miscellany of churches, stores, tube stations, swimming pools and fire stations.

The diagrams, contemporary illustrations and both old and modern photographs, many in colour, are both numerous (344 in total) and of exceptional quality. While this book has been written as a historical record and analysis of a period of great change in the British construction industry, it will be of immense value to anyone engaged in extending the life and in the conservation of Victorian buildings.

For me, one of the greatest insights, and one that is extremely significant with regard to how it might be assessed and repaired if necessary, was the moment that it was realised that it was not necessary to join orthogonal pairs of beams and the columns of two storeys in a single connexion – six members meeting at a point. This had been the tradition with cast-iron beams and columns, and was possible because the connections were not made rigid in order to carry bending moments. Most likely in the 1890s, a construction genius realised that if the splice between columns in one storey and the next was made 5–600 mm above the level of the floors, the orthogonal beams could be riveted to an uncluttered H-column, making the frame much easier to construct and, indeed, to maintain or refurbish.

The book illustrates the great ingenuity of builders, engineers and architects in devising new ways of using both wrought iron and steel at a time when there were no 'standard' solutions. The almost unlimited variety of designs reflects the new types of building, influences from abroad, regulations, the costs of the raw material and, of course, the experience, preferences and sheer creativity of the designers and constructors themselves. The results are absolutely fascinating.

Bill Addis