



Anton Steurer

DEVELOPMENTS IN TIMBER ENGINEERING

The Swiss Contribution

Birkhäuser

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Foreword

No other material has played as large a role in the history of human development as wood. No other material has influenced us as much, and no other material has been as extensively shaped and transformed by us. Wood does not have a rarefied, exclusive air. The ideas with which it is associated have evolved slowly over millennia. It not only boasts great strength, but can be worked, shaped and altered in a multitude of ways – properties from which dedicated master carpenters, engineers and architects have profited since time immemorial.

"Developments in Timber Engineering. The Swiss Contribution" reports on the work of these masters, placing particular emphasis on the contribution made by Swiss wood builders and architects. The book charts out the development of wood as a building material in Switzerland and depicts the influence of Swiss experts.

Wood was indispensable in many areas of life well into the nineteenth century, but its role was gradually usurped by the new technical materials steel and concrete in the early twentieth century. In recent years, the development of new wooden materials with large dimensions and great strength, as well as improvements in connection technology, have given wood a unique new position in the field of engineered applications. Over the last few decades, daring builders have designed and constructed numerous structures in Switzerland that have not only blazed new trails, but set the tone for further developments. These structures are distinguished by originality, high-

quality design and breathtaking dimensions. Vivid architectural examples reveal the extraordinary interplay between inventive talent, research and the trust designers place in material strength. Now and in the past, the studies conducted by Swiss universities and research facilities have been instrumental in establishing and advancing the technical credibility and reliability of engineered timber construction.

Through their support, the Institute of Structural Engineering at the ETH Zurich, the Society for the Art of Civil Engineering, the "Gerold und Niklaus Schnitter-Fonds für Technikgeschichte" at the ETH Zurich, as well as the Swiss Agency for the Environment (with its Holz 2000 program) have contributed to this special documentation of the history and development of timber engineering. I owe them my heartfelt thanks. I would also like to express my gratitude to the many engineers, builders and architects who made photographs and project documentation available to me. Personal thanks goes to Emil Honegger (ETH Zurich) for his dedicated supervision of text processing and graphic design, and to Charles von Büren (Bern) for his sound technical editorial work.

Anton Steurer

Wood

For millennia, wood was a fundamental material, the very substance of existence. It still is today, even if it sometimes remains hidden from view.

Wood is not one of the four elements – air, water, earth and fire – but if we could add a fifth, wood would be the inevitable choice. Many new products seem to suggest that wood has finally become replaceable. Buildings, furniture and utilitarian objects of wood – such as pepper grinders, umbrella handles and violins – are often seen with a touch of nostalgia. But to view them in this way is to overlook wood's great importance and the influence it exerts on our lives.

There is virtually no quotidian object that does not contain wood or elements of wood. Cellulose – the structural material found in wood cell walls – is by far the most common organic compound in nature. It is also considered the most important raw material for industry. Yet cellulose not only provides a basis for paper and cardboard production. It is also used to make fabrics with a shiny finish, or to manufacture articles of clothing like summer dresses and blouses that have a light, airy feel. In these textiles, it is in the form of chemically or physically extracted cellulose threads (artificial silk) or viscose fibers (cell wool). Cleanroom garments, wound dressings, cellophane, velvet box lining – all are ultimately wooden products.

Wood can also be found in food and pharmaceutical products: the cellulose in canned orange juice ensures a homogeneous mixture of water and fruit. It gives toothpaste its consistency and makes ice cream melt on our tongues. Practically all medicinal and body care products contain wood ingredients. A good example is aesculetin, a horse chestnut extract that absorbs ultraviolet rays in sun block.

"Communities that sell their forests and squander the proceeds are like savages who chop down fruit trees to pick the fruit." This judgement, which comes from an 1848 educational pamphlet from Graubünden Canton, reveals the great value people attached to wood during this age. Though it remains an indispensable part of our lives

today, wood generally seems replaceable and is only truly appreciated in the forests we visit for recreation. Yet two factors are certain to enhance the status of wood in the twenty-first century: its highly diverse applications, and its importance as the most plentiful renewable resource.





Everyday Life 100 Years Ago

Well into the nineteenth century, wood remained an important material in practically all areas of life, whether the household, agriculture, the skilled trades, architecture, shipbuilding or mechanical engineering ... the list is endless. Life was inextricably bound up with wood and wooden objects.

With the transition from pre-industrial to industrial society, materials such as coal and iron usurped the role of wood. There were radical changes in many fields of application that had been dominated by wood for centuries, and man's relationship with wood went through a dramatic transition, too. The technological upheaval was impressively reflected in mammoth steel structures, railways, great feats of engineering and new production methods. Even so, wood continued to exert a strong practical and emotional influence on people's lives.

Wooden structures known as *Wasserfuhren*, or water conduits, were once used to guide water down from the mountains. These daredevil constructions ran along steep mountain cliffs and were used to irrigate more than a third of the agricultural land in Wallis Canton around 1900.





Industrialization irrevocably transformed the technological and social landscape. Even so, one hundred years ago, wood continued to play a major role in people's lives. Though brown coal, hard coal and peat had been burnt for years, charcoal and wood continued to be the primary source of energy – not only for cooking and heating, but for all branches of industry, including glass and ink production, salt extraction and brick-firing. About half of the timber felled was burnt. In view of these diverse applications, it is hardly surprising that, when designing the Swiss fifty franc bill, the Swiss painter Ferdinand Hodler (1853–1918) selected the forest as a symbol of “work in Switzerland”, the theme prescribed by the Swiss National Bank. His famous painting is entitled *The Lumberjack*.



The back of this fifty franc bill, in circulation between 1911 and 1958, is imprinted with the picture of a lumberjack. Ferdinand Hodler's original 1910 painting explores the theme of work in Switzerland, illustrating the close bond between man and wood.