Werner Blaser

Werner Sobek: Art of Engineering.

Ingenieur-kunst

Basel: Birkhauser, 1999

Reviewed by Holger Falter

“Each type of architecture, when understood as ‘art of building’, incorporates the art of engineering.” With these words author Werner Blaser introduces the work of Werner Sobek. The book describes through examples the intention of Sobek to achieve a complex unity out of the interplay between structural frame and architectural form. For him, the design of a structure is not only limited to the necessity to provide structural safety, stability and durability. The art of engineering is the result of the intertwining of functionality, technology and aesthetics. With this attitude, Sobek follows the tradition of the so-called Stuttgart School, where he studied architecture and engineering and came into contact with Jörg Schlaich, Frei Otto and Klaus Linkwitz, all of whom were involved in the design and erection of the roof for the Olympic Stadium in Munich.

Frei Otto studied the principle of minimal surfaces in architecture through experiments with hanging chain nets and soap films, as was described by Michele Emmer in his contribution to *Nexus: Architecture and Mathematics* (Edizioni dell’Erba, Fucecchio, Florence, 1996), entitled “Architecture and Mathematics: Soap Bubbles and Soap Films”. A “minimal surface” defines the surface of least area with a closed curve and can be obtained by experimenting with a soap film between rigid boundaries. As pneumatic, membrane and cable-net structures transfer loads via tension to the supports, such experimentally-found surfaces are the basis of the form-finding process for tension structures. This method was first used by Frei Otto in the German Pavillion at the Expo in Montreal 1968. Although the shape of the minimal surface is the most economical, it is not always the optimum shape for a built structure since they experience also non-form-defined loads resulting from snow, wind, and the like. Reversing this type of form results in the loads being mainly transferred via compression with minimal bending. Very thin double curved shells, as built by Heinz Isler and Felix Candela, are the result.

Out of those early steps in the history of form-finding, the research project “wide span membrane structures” was founded, where Werner Sobek was given the possibility to study new contributions to mathematical methods of form-finding, as well as an investigation of the material properties of fabrics. After finishing his dissertation, he worked in the office of Jörg

Schlaich and became involved in two large lightweight structures also described in this book, the courverture of the Arena in Nimes and the Arena in Xaragossa. In 1990 Werner Sobek became Professor at the University of Hannover and founded his own engineering consultancy. In 1994 he came back to Stuttgart as the successor of Frei Otto at the Institute for Lightweight Structures. Since then, he has worked on numerous projects and competitions with famous architects such as Helmut Jahn and Finn Geipel.

This book on Werner Sobek's projects portrays not only the aim to construct lightweight structures, but demonstrates the desire to take into consideration other aspects such as light transmission, heating and cooling of the shell, and room and building acoustics. Werner Sobek sees the special quality of "lightweight construction" in the economical use of materials and their careful processing. Therefore his projects show the intention to build structures as light as possible by using the latest sophisticated possibilities taken from disciplines such as automobile engineering, shipbuilding and aerospace.

Johannes Malms contributes a well-written essay about the art of engineering entitled "Going Back." Following that, Werner Blaser writes about Sobek's self-adapting systems, convertible structures and his principles of lightweight construction. The projects described are illustrated by beautiful black and white photographs. The spectrum of projects ranges from a small bus-stop to his designs for a new airport in Bangkok. Instead of detailed technical descriptions, Werner Blaser has written a comprehensible introduction to Sobek's ideas and vision of structures. A critical analysis of lightweight construction is missing. In this book the lightness of a structure is the main criterion, but is not further investigated.

It is an inspiring book for engineers, architects and anyone interested in design.

The reviewer

Holger Falter studied structural engineering at the University of Stuttgart. After getting his first degree in 1991 he continued his studies at the Institute of Structural Design II at the University of Stuttgart and the Politecnico di Milan in Italy. In 1998 he received his Ph.D. in Engineering at the University of Stuttgart. He published several articles on the "Conceptual Design of Structures". At the Nexus conference in 1998 he presented a paper entitled "The influence of Mathematics on the Development of Structural Form". He currently works for Ove Arup Germany in Berlin.