Karl-Eugen Kurrer, The History of the Theory of Structures. From Arch Analysis to Computational Mechanics, Berlin: Ernst & Sohn, 2008. Pp. 848. ISBN 978-3-433-01838-5.

By Marta Macedo[*]

The English edition of The History of the Theory of Structures follows the first edition in German language. However, we are not dealing with a classic translation. In 2002, Geschichte der Baustatik was already a massive book 540 pages long. In 2008 this new revised volume, richer in depth of detail and collected examples, continues to impress the reader. The 848 pages, despite causing an initial perplexity, soon revel no intention to intimidate. In fact, the theory of structures already has a long history, and both subject and writer are no perfect strangers. Following on the footsteps of the famous Stepan Prokofievich Timoshenko, Edoardo Benvenuto or Clifford Ambrose Truesdell, Kurrer specialized in this area for the last 30 years.

According to Kurrer, the construction of this scientific discipline's history, as well as the real understanding of the theories that allow engineers to calculate a structure's strength and stiffness, is made possible only by taking into account its human actors. By following those same actors, Kurrer manages to pursue one of his main objectives. Throughout the book he intends to establish a new pedagogic plan based on a "historico-genetic" method of teaching. As such, he rejects the common practice of teaching abstract formulas, choosing instead a method that considers the deep complexity of construction science and its transdisciplinary structure. Having mainly in mind future engineers and architects, Kurrer also intends to seduce those already working.

Divided in twelve parts, the book does not follow a chronological organization, neither are its chapters similar either in terms of subject, approach or length. In fact there are more general and introductory chapters (1, 2 and 10 for example) and others that deal thoroughly with specific cases (4 and 11). The difficulty of legibility that this strategy could entail ends up not being a problem, because the book is to be chiefly considered as a reference work and not as a textbook or a continuous narrative.

Many characters perform in Kurrer's history, weaving a dense complex plot. Because of that, toward the end of the book, Kurrer thought it would be useful to add 175 biographical portraits of the most central figures. However, the numbers involved are much more

impressive. Coming from different backgrounds these characters move between the scholarly world, the professional arena, the realm of politics, and also between very different geographies. They don't always agree or collaborate, and frequently end up disputing each other's theories in public polemics and controversies. Almost all of them combine the tasks of building with those of research. And this is undoubtably one the most interesting facts for historians of science and historians of technology. This way, Kurrer places his book in the already long tradition of bringing technology into the history of science, allowing us to see both more clearly.

According to Kurrer's chronology on the history of structures, the period of discipline formation takes place between 1825 and 1900. Exactly when industrial development was at its peak, the theory of structures was establishing itself as an autonomous and solid corpus of knowledge. By then, building structures had become physical translations of scientific achievements, offering, at the same time, momentum for deeper investigations. With such beginnings, states the author, it is impossible to detach science of construction from construction itself, therefore, from economy, political discussions, and social problems.

Kurrer provides us with a great number of examples. Many "heroes" of the history of the theory of structures were profoundly involved with building practice, establishing a permanent connection between the calm environments of academic research and muddy, noisy and conflictive construction yards. Claude-Louis-Marie-Henri Navier, one of the founding fathers of the discipline, developed his structural theories after great efforts to build a suspension bridge. Benoît-Pierre-Emile Clapeyron and Gabriel Lamé, both decisive to the development of structural analysis, were also renowned railroad engineers. The same is true for the Germans Karl Culmann and Otto Mohr, the Scottish William John Macquorn Rankine and the Italian Alberto Castigliano, among many others. Gustave Eiffel's great business company, for example, could not pass without the work of creative experts in structural calculations like Maurice Koechlin.

There is no doubt about the pertinence of Kurrer's book for the field of history of science and technology. Historians however should move cautiously into this word of structural engineering. That's why Kurrer urges us to "open the Black Box of the history of theory of structures" with a plea: "do not be afraid of formulas!" (p. 29).

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