The structural assessment of the Brussels model schools – Metal roof trusses (1860-1920)

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In 1875 the Ligue de l'Enseignement and the Brussels architect Ernest Hendrickx realized the École Modèle, a new school building concept that embodied a new educational policy and philosophy, sustained by architecture. This school served as a guideline for over 55 schools, built between 1875 and 1920 in Brussels and its surroundings. One of the main characteristics of these model schools is their préau, a spacious and light central covered courtyard, which organizes the entire school life and enables the use of new concepts of hygiene and safety. By means of iron roof trusses spanning the 9 to 15 m wide préau, light and air was brought right into the building’s core.

The present research goes deeper into the construction and calculation of the visible iron roof trusses of these Brussels model schools. As the use of iron and steel was not fully accepted for public buildings at that time, many of the (industrial bar roof) trusses were hidden behind a false ceiling. Yet, this was not the case for the Polonceau and Ardant trusses, which were both openly showed. By the time of the model schools, the Polonceau truss had already established a solid reputation, and calculation methods were known and generally accepted. The calculation methods of the Ardant truss (an arched truss with fixed ends) on the other hand, were much more complex and not fully understood. A study of the records did not reveal any kind of calculation notes for this truss typology within the model schools. As a consequence, the extremely slender examples raise questions on their structural functioning, load-bearing capacities and capability to comply with modern standards without harming the subtle original structure.

This study presents a historical overview of the school typology, the evolution of the Polonceau and Ardant trusses, the clarification of the used nomenclature and qualities for the different iron and steel varieties, and a discussion on the structural functioning of both trusses. These investigations enable future historians, engineers and architects to justify the historical value, to point out the structural qualities, weaknesses and the current safety level while assessing these kind of trusses.